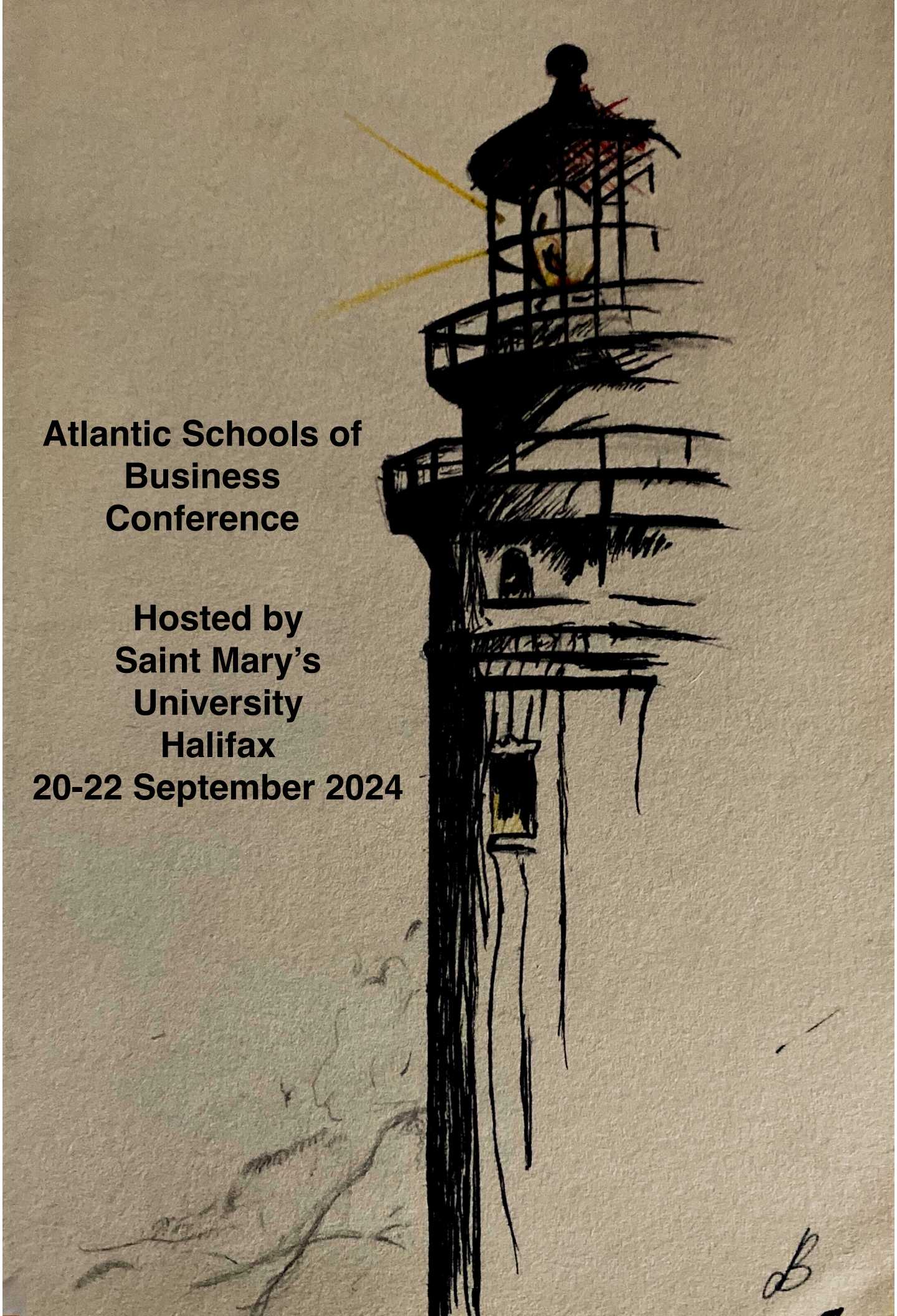
# Atlantic Schools of Business Conference

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# CONFERENCE PROCEEDINGS

# FULL PAPERS

# COMMUNICATION

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# GOVERNMENT HEALTH COMMUNICATION AND THE PANDEMIC OF 2020

## Abstract

The goal of this paper is to assess the efficacy of government and public health communication during the COVID-19 Pandemic, which started in early 2020. A qualitative content analysis using secondary research sources was conducted, along with a qualitative review of a sample of four news releases issued by the Nova Scotia Government from March to September 2020 at the beginning of the pandemic. The aim was to identify recurring themes and readability scores. Drawing on a previously used research framework (Kelly, et al., 2023) for assessment helped identify research gaps and shortcomings in recognizing the public audience literacy level target. Communication played a crucial role in managing the pandemic by conveying information, providing education, and updating the general population to lessen the risks and impact of the coronavirus. Effective communication requires an understanding of the audience's ability to comprehend and apply the information presented.

## Introduction

The Nova Scotia government issued over two hundred news releases between March and September 2020, alerting, informing, and advising Nova Scotians of the COVID-19 virus and pandemic-related safety measures. The news releases followed a standard format, with critical subjects or topics appearing consistently throughout these releases. Those subjects included advice on how to prevent contracting and spreading the COVID-19 virus, what protocols to follow when returning to Nova Scotia from outside the province, the number of confirmed positive cases, and the number of deaths resulting from the virus.

The news releases usually included a pull quote from a senior government leader like then Premier Stephen McNeil or Dr. Robert Strang, chief medical officer of health for Nova Scotia. Most new releases provided updates on public health measures related to travel restrictions and social gatherings. The releases also included links to various websites for additional guidance and sources of information on medical support and the provincial health information call centre, known as 811.

## Background

### Literature Review

Communication plays an integral role in managing a pandemic by conveying information, education, and updates to the general population to mitigate the dangers and impact of the health threat. As stated in the Canadian Government's 2018 pandemic communications strategy:

> During a pandemic, timely and transparent communication is critical in building public trust in the capacity of officials to manage the pandemic and to protect Canadians. At each stage of the pandemic, providing accurate, credible and timely information—through the right message, delivered at the right time by the right person to the right audience—can help protect the public's health, save lives and minimize social and economic disruption. (Henry, 2018, p. 106)

Communication in government and healthcare is foundational to relationship building and collaboration among governments, healthcare organizations, health practitioners, patients, families, governments, agencies, and partners. It builds trust, and credibility and is the means for informing, educating, and providing direction on health matters. Without functioning, effective communication the newest vaccine or the most innovative health technology will be compromised in serving the general public.

***Crisis Communication.*** Crisis communication is meant to be strategic in order to improve a situation (Coombs, 2015). The Situational Crisis Communication Theory (SCCT) provides a framework for analysis to examine and understand how to manage crisis communications, and how to predict the responses of people in such a situation (Coombs, 2007. In applying the 'best practices' in crisis communication and SCCT, organizations can satisfy the requirement to provide essential information for the protection of stakeholders while managing the reputational risk to the organization. The SCCT draws on Attribution Theory, which states that people look for something or someone to attribute the cause of an event or situation to (Coombs, 2007, p. 165). Crisis communication also reflects the ethical duty of public communication and as such, the priority is to inform before moving on to reputation management (Coombs, 2007, p. 165). During the pandemic, federal and provincial governments were responsible for producing regular updates which often included emotionally evocative and negative news. Balancing the need to inform and manage their reputation as a credible and trusted source of information may have influenced governments' choices in developing messages to share with the public.

In their research, Dubé et al. (2022) selected the Crisis and Emergency Risk Communication (CERC) model as the theoretical framework in their analysis of the data collected (Dubé, Labbé, Malo, & Pelletier, 2022). This study looked at how government and health providers communicated information to the public on COVID-19 during the pandemic, and how that information was received and understood (Dubé et al., 2022, p. 24). This article provides a Canadian lens on health communication and includes the interviews of healthcare providers, and professional communication practitioners working with either government or health authorities.

***Themes.*** Throughout this literature review, several foci were identified across the articles selected for thematic analysis. Literacy and health literacy, target audience, message format and consistency, and the media's role were consistently raised in each study as contributing factors to the success or failure of a communication strategy and its execution. Health literacy is described as the degree to which people can find, understand and use health information as it applies to themselves and others (Armstrong et al., 2024). Most articles and texts selected for this literature review were limited to Canadian-authored research sources. The researchers drew from publicly available information resources for their studies and evaluated their communication data and samples using a variety of communication and literacy assessment tools and measurements.

The recurrent findings of the studies highlighted the need for communicators to understand the audience for the intended communication. That audience profile must include the reading proficiency level and reader health literacy capacity as this informs not only the development of information but also the format for delivery. Trust and credibility were also raised in the studies reviewed. As noted in the book *SARS Unmasked: Risk Communication of Pandemics and Influenza in Canada*, "Individuals (non-experts) need accurate information to assess risk levels, and this must be available in a timely manner from a credible source (usually an expert)." (Tyshenko & Paterson, 2010, p. 244). It should be assumed that the message

audience targeted by governments and health organizations will not have a professional-level background or understanding of legislation, policy, and healthcare.

***Health Literacy and Audience*.** Literacy is linked to good or poor health (Gillis & Sears, 2012, p. 263) and is an evolving communication barrier to Nova Scotians in rural areas. There are several reasons for this, one being that curriculums are not standardized and can vary from region to region. Depending on the stream of study or training students are pursuing upon high school graduation, they may find that literacy demands vary. For example, a pipefitter might find their literacy needs are more closely tied to work and trade specifications in their profession whereas an accounting graduate working as a bank teller might find they require strong written communication skills in addition to accounting expertise given their interactions with clients who are members of the general public (Gillis & Sears, 2012, p. 259). Williamson and Martin (2010) stated that for communication to be effective in health, it must be "…noticed, read, understood, believed and remembered." (Williamson & Martin, 2010, p. 1824). Understandability and actionability of communication cannot take place without literacy skills. For those developing communication products, the readers' literacy level must be ascertained and catered to in message development. Health outcomes are negatively affected when communication is not accessible, and this is especially true for ethnic minority groups (Kelly et al., 2023, p. 2).

The peer-reviewed article *Evaluation of the Readability, Understandability, and Actionability of COVID-19 Public Health Messaging in Atlantic Canada* (Kelly, Campbell, Salijevic, Doak, & Montelpare, 2023) focused on the provinces that make up our Atlantic Canada region. Nova Scotia, New Brunswick, Newfoundland and Labrador, and Prince Edward Island became known as the "Atlantic Bubble," with reciprocal travel agreements in place to manage movement restrictions for their respective populations during the pandemic. Their geographical proximity to one another and shared culture and history meant that messaging by government officials would often reference the protocols in place by their provincial neighbour, or mirror the information shared throughout the Atlantic bubble. Kelly et al. (2023) evaluated communications materials using the Flesch-Kincaid Grade Level assessment, the CDC Clear Communications Index, and the Patient and Education Materials Assessment Tool to measure and rate user readability, understandability and actionability (Kelly, et al. 2023, p. 1). They found that on average, the materials evaluated required a Grade 11 reading (Kelly, et al. 2023, p. 6). and by comparison, videos and infographics were the most understandable and actionable by users (Kelly, et al., 2023, p. 8).

In their study on health communication in hospitals Williamson and Martin (2010) took a similar methodological approach to the study by Kelly et al. (2023) and looked at health literacy from the patient and staff perspective (Williamson & Martin, 2010). They noted that healthcare pamphlets created for use by patients and those receiving healthcare services vary in the Flesch-Kincaid readability scores. This translates to a range of understandability when examining the written health information provided to patients and health care service recipients with departmental variations and inconsistencies in written materials that are produced by the hospital for the patient (general public) information and education (Williamson & Martin, 2010, p. 1825). As noted by the researchers, to reach the broadest audience, communication using written materials for patients and the general public should target the lowest grade level of the Flesch Kincaid rating scale, hitting not only goals for readability but understandability (Williamson & Martin, 2010, p. 1824).

The efficacy of the messages communicated to the public could be measured by how well people understood and used their COVID-19 prevention and management knowledge. Researchers examined the process by which the flow of information from research and policy development to public dissemination was managed and looked at critical elements such as understandability (what is understood) and actionability (what can be taken and put into practice) (Kelly, et al., 2023, p. 2). The study results by Kelly et al. (2023) revealed that Newfoundland and Labrador scored first in terms of message actionability, followed by New Brunswick. The authors hypothesise that this could be due to the balance of text and video messages

delivered by those two provinces compared to Nova Scotia and Prince Edward Island where there was a greater reliance on print and web-based information and messaging (Kelly et al., 2023, p. 8). The use of short messages, videos and infographics produced at a grade six to eight reading level in Newfoundland and New Brunswick also led to higher readability and understandability scores (Kelly et al., 2023, p. 8). Those provinces (Nova Scotia and New Brunswick) relying on print and web-based information scored the lowest on readability, understandability, and actionability (Kelly, et al., 2023, p. 8).

***Communication Format and Delivery*.** Human interaction as a form of communication is found to have positive benefits in information delivery and risk communication (Dickmann, Keeping, Mischler, & Heudorf, 2016). Dickmann, et al. studied the management of risk communication and public health professionals messaging around Methicillin-resistant Staphylococcus Aureus (MRSA). A call centre for public health in Germany was established under their Ministry of Health (Dickmann, et al., 2016, p. 57). This was a departure from the traditional written form of communication for the delivery of information to end users (public and health care professionals) with a rotating staff set up to respond to phone calls. This format for communication alleviated the question of literacy levels and while callers were able to obtain the needed information about health and infection control measures, there was also a social function and human interaction that comes from speaking with another person (Dickmann, et al. 2016, p.61).

Hospitals and healthcare providers often rely on pamphlets or Patient Information Leaflets (PILs) as a means of communicating health information to patients and families. Patients rely on PILs as a source of information about their health services and treatment (Williamson & Martin, 2010, p. 1824). PILs, like government news releases, have the same formatting and layout in terms of relying on consistent visual presentation, fonts and colours (Williamson & Martin, 2010, p. 1824). Unlike verbal instructions which are naturally adapted to the patient's understanding level, written materials are written for a fixed age or reading group (Williamson & Martin, 2010, p. 1824). The issues and challenges facing communicators using PILs in a healthcare setting are not dissimilar from the challenges facing government departments in communicating health information to the public. Can we then assume that a hospital audience and a general public audience are at the same reading level? Both audiences are generally composed of laypeople in terms of medical knowledge and training. The patients for whom PILs are written and the general public for whom government news releases were written would be in the same category of target reading level.

A qualitative review of news releases and press briefings from Nova Scotia, Ontario and Alberta from January 2020 to October 2021 in addition to interviews with 34 key public health team members from across Canada was conducted resulting in a thematic analysis of the information collected (Lowe, Harmon, Kholina, Parker, & Graham, 2022). From their research, four themes emerged as key to effective communication: "transparency, promptness, clarity and engagement of diverse communities" (Lowe, et al., 2022, p. 34) and in the absence of these ingredients, the study found that communication efficacy, including the following of health advice (message actionability), was diminished (Lowe, et al., 2022, p. 34). The sharing of opposing information contributed to vaccine hesitancy and mistrust among the public (Lowe, et al., 2022, p. 41).

Consistency of message language was found to be lacking with press briefings and public health messages referring to lockdowns, circuit-breakers, and stay-at-home orders among the terms used to inform of the same thing (Lowe, et al., 2022, p. 39). Consistency of messaging was also noted by Fafard et al. (2020) as an area of consideration for communicators in health and government messaging (Fafard, Wilson, Cassola, & Hoffman, 2020). Through their qualitative study, they examined the message consistency of Chief Medical Officers (CMOs) across Canada using news releases published through provincial government websites between January 21, and March 31, 2020. Fafard, et al. (2020) explained that news releases were chosen as a data source for their study because they are a form of communication used across all provinces so lend themselves to comparison given that they tend to follow a consistent format (Fafard, et al., 2020, p. 61). The content analysis which employed a data framework to identify themes of messages revealed that

while messages were developed to reassure the public, the messaging changed over time as new information became available and issues evolved (Fafard, et al., 2020, p. 64).

In terms of overall communication quality, Lowe et al. (2022) concluded that by applying their assessment framework, the communications they reviewed would not be considered "good communication" (Lowe, et al., 2022, p. 41). They pointed to a need for increased diversity in those representing government and healthcare messaging (Lowe, et al., 2022, p. 42). Diversity was also featured in the study by Dubé, et al (2022) and their examination of the impact of pandemic communication in Quebec. Their qualitative study involved collecting data through interviews with communication specialists and healthcare providers and focus groups. The focus groups consisted of members of the public ranging in age from young adult to adult, including those born in Quebec, and those of Asian ethnicity for a range of experiences and backgrounds. The researchers stated that they were seeking the insights of "…those who suffered harshly from economic consequences of the pandemic measures." (Dubé, et al., 2022, p. 24).

In their concluding recommendations, Lowe et al. (2022) suggest that federal guidelines on best practices for communication be developed for improved, coordinated messaging (Lowe, et al., 2022, p. 42). This was an interesting recommendation as there is a pandemic communication strategy on the Government of Canada website dated May 2018 (Henry, 2018) created by the Canadian Pandemic Influenza Preparedness (CPIP) Task Group which was chaired by Dr. Bonnie Henry who served as the Provincial Health Officer for British Columbia during the pandemic of 2020. This document was not referenced in the Lowe et al. (2022) research article, yet it would likely have been worthy of consideration as an existing strategy tool for the development of a national communication framework, as they had suggested.

***Media.*** Messages delivered through public health spokespeople across Canada were picked up and repeated by the media. As noted by Lowe et al. (2022) the news media play a role in sharing information with the public (Lowe, et al., 2022, p.35). One study that took place in Quebec found that in all their focus groups, traditional media was noted as a primary source of information regarding COVID-19 (Dubé, et al., 2022, p. 28). The presence of the media as a communication partner is also reflected in the recommendation by Kelly et al. (2023) who state that research in the future should be expanded to include an impact assessment of the media in their work to promote and share information as it contributes to the readability, understandability and actionability of public health communications (Kelly, et al., 2023, p. 10). Without proactively communicating the messages that government and health leadership want to share and promote, the media (and others) will fill that void with their own message.

During the SARS outbreak in 2003, the public often found their information was consistently provided by the media which shaped their view of the risks and issues associated with this health crisis (Tyshenko & Paterson, 2010, p. 246). Again, it was suggested through the study by Dickmann, et al. (2015), that additional research is needed to validate the hypothesis that "population groups with relatively little knowledge react more easily and people with more expert knowledge are more resilient to media coverage." (Dickmann, et al., 2016, p. 60). Without the benefit of this recommended future research, it remains clear that the media had a significant partner role to the government and health leaders in echoing and amplifying messages regarding health safety and public health protective measures.

***Readability and Behaviour.*** The four sample news releases used for this project were over the recommended reading grade level for the general public audience, supporting the need for further research, discussion and planning for health communication in Nova Scotia. Studies have shown that the type and size of font influence readability, and patients unable to read a prescription label have lower compliance and, therefore, worse health (Weih et al., 2008). When written information is not easily understood due to readability barriers, it hinders effective information processing. As a result, information aimed at promoting healthy behaviours becomes ineffective (Bould & Forshaw, 2022). In a focus group with community members discussing COVID-19 information, participants cited mainstream media as a primary source of

information, with half of the participants noting they relied on social media as their information source. However, most reported relying on government-issued messages as a trusted source of information regarding COVID-19 (Dubé, et al., 2022, p. 28). Those focus group participants also attributed the favourable COVID-19 vaccine rates and public health measures to limit the spread of the virus. At the same time, professional healthcare communicators wondered if the paternalistic tone of the government's messaging hindered behavioural change (Dubé, et al., 2022, p. 29). Governments should strive to promote public health-oriented behaviour by ensuring people can easily understand and act upon the information provided through readable, applicable, tone-appropriate messaging.

***Gaps*.** Given the issues noted around health literacy in public communication and the theme that communicators in government and healthcare are producing materials at reading grades higher than the general population's reading ability, communicators need to not only consider who they are writing for but also routinely assess their communication materials to assess compatibility with the changing population and demographics.

In their study on the assessment of patient information, Williamson and Martin (2022) collected available PILs with 171 samples from one study-participating hospital. The documents were then adapted to MS Word format to allow for coding, analysis, and scoring and rating using the Flesch-Kincaid readability index. The reading materials were then evaluated by the researchers for their readability score against the grade reading level of the intended audience: hospital patients and families. It was interesting that the researchers were able to glean so much information using a tool that is so readily available through Microsoft Word. It could then be hypothesised that healthcare communicators could easily replicate these steps and employ them on a routine basis when checking their written communication for public use.

The researchers note that while their method of applying the Flesch, and the Flesch-Kincaid assessment to materials does not address the understanding of written text, it does address the readability score based on a grade level of prescribed readership (Williamson & Martin, 2010, p. 1829). The researchers noted that layout and style can affect the Flesch-Kincaid rating which considers these elements in scoring (Williamson & Martin, 2010, p. 1827).

The visual appeal of information in marketing is well known as a contributor to the success of a communication campaign. It would be interesting to know why the benefits of visual presentation were not considered (at least in any detail) throughout the other articles reviewed for this literature review. Perhaps it is felt that such focus on the layout and style of a message is secondary to the content and, therefore not important. As seen in this study, visual presentation does indeed matter when factoring into the readability score of a text.

## Analysis

### Qualitative Evaluation

A qualitative content analysis of four news releases selected from what Nova Scotia Public Health defined as Wave 1 of the pandemic (March 1 – September 30, 2020) (Jamieson et al., 2024) was conducted. The releases were selected for the first release day of each alternating month, starting with March 9, 2020, and continuing with May 1, 2020, July 5, 2020, and concluding with September 3, 2020. Each theme was assigned a specific colour to facilitate identifying and counting themes in a news release.

The results of that scoring were noted in the first section of Table 1 under the heading *Communication Goals*. All the news releases had a uniform layout. They consistently included the main communication goals identified for the analysis, such as virus testing numbers, virus symptoms, directions for treatment

and recovery, instructions for returning travelers, positive and confirmed case numbers, and the number of deaths. Although the first news release, dated March 9, 2020, did not include the number of tests or testing instructions since they were unavailable at that point of the pandemic, all the other news releases covered all the main points consistently throughout the spring and summer of 2020.

**Readability Evaluation**

Two tests commonly used to measure readability are the Flesch Reading Ease score and the Flesch Kincaid Grade Level (Flesch Reading Ease and the Flesch Kincaid Grade Level; Readable, 2024). They use the same units to calculate scores but with different weightings. The Flesch Reading Ease score ranges from 1 to 100, while the Flesch Kincaid Grade Level reflects the US education grade level system. A high score on the Flesch Reading Ease Scale indicates that the text is relatively easy to read, and a low score denotes more difficulty in reading.

To assess the readability and grade level of the releases, the four samples were saved from the Nova Scotia government website in PDF format and then converted to Microsoft Word. A reading statistics application was run on each document to yield a statistical readability summary, which included the Flesch Reading Ease score and the Flesch-Kincaid Grade. The Flesch Kincaid Grade is a formula that determines the reading grade level of a text based on sentence length and word complexity. Along with the Flesch Reading Ease score, they have been used for over 70 years by writers, communicators, and other professionals who rely on it to help them understand how readers will process and understand a text.

For the purpose of this project, to determine the target readership grade level for a general public Nova Scotia reading audience, the chief of communications for the Nova Scotia Health Authority was consulted. She stated that health communicators are advised to set a target readership level of grade 6 (K. Grant, personal communication, April 4, 2024). The sample news releases issued by the Government of Nova Scotia that were analyzed for this project scored between 10.1 and 12.9, or what the Flesch-Kincaid scale would rank as high school to university/college level reading ability, far beyond the recommended grade 6 level.

The Flesh Reading Ease score is based on a scale of 1 to 100 for a range of easy to complex in terms of reading ease. A score of 70-80 would be roughly the equivalent of a grade 8 level reading ability.

**Table 1**

| | News Release Date: | March 9, 2020 | May 1, 2020 | July 5, 2020 | September 3, 2020 |
|---|---|---|---|---|---|
| **COMMUNICATION GOALS (Occurrence of each theme = 1)** | | | | | |
| | COVID-19 Testing: Number of tests provided or instructions for testing | 0 | 1 | 1 | 1 |
| | Symptoms List | 1 | 1 | 1 | 1 |
| | Directions for COVID-19 hygiene and spread | 1 | 1 | 1 | 1 |
| | Travel/Return from travel instructions | 1 | 1 | 1 | 1 |
| | Number of COVID-positive cases in NS | 1 | 1 | 1 | 1 |

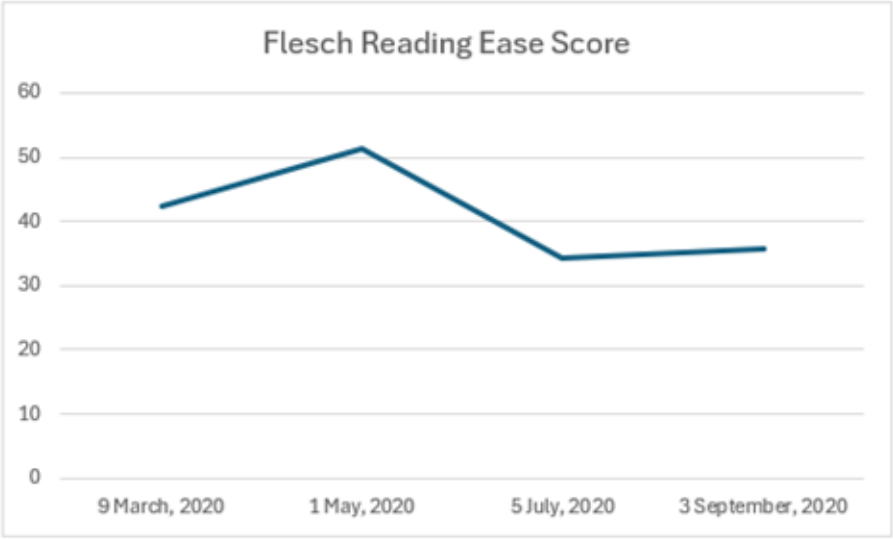
| News Release Date: | March 9, 2020 | May 1, 2020 | July 5, 2020 | September 3, 2020 |
|---|---|---|---|---|
| Number of deaths since March 1, 2020 | 0 | 1 | 1 | 1 |
| **TOTAL Goals Occurrence Count** | 4 | 6 | 6 | 6 |
| **READABILITY & UNDERSTANDABILITY** | | | | |
| Sentences Count | 11 | 21 | 21 | 21 |
| Words | 414 | 697 | 577 | 537 |
| Words Per Sentence | 20.4 | 16.0 | 17.9 | 16.0 |
| Flesch-Kincaid Grade Level: Number | 12.4 | 10.1 | 12.9 | 12.2 |
| Meet or Exceed Nova Scotia Health's Target Reading Literacy (Reading) Level: Y*es/No/Above/ Below* | No | No | No | No |

According to the Flesch-Kincaid Grade level, grades between three to six are for readers in the age eight to eleven-year-old range which would be considered an elementary school reading level (Flesch Reading Ease and the Flesch Kincaid Grade Level; Readable, 2024). For a general public target audience, the recommended grade level for reading is the elementary school grade 8, or ages 13 to 14 (Flesch Reading Ease and the Flesch Kincaid Grade Level; Readable, 2024).

As these project sample news releases contained factual information (such as the number of deaths in a reporting period) and instructional information (such as hand washing and self-isolation), we conducted a content analysis, assigning one value to each occurrence of the subject theme information. The overall score based on the occurrence count is noted in the second half of Table 1 under the heading *Readability & Understandability.*

Figure 1 illustrates the Flesch Reading Ease score range of the evaluated news releases. The scores ranched from 42.4 in March 2020 to 35.6 in September 2020 and peaked at 51.2 in May 2020. In terms of readability ease, written material scoring between 30 to 60 is considered difficult to read with anything between 30 and 50 at a US college graduate level. The news release of May 1, 2020, was 697 words with only 4.7 percent passive sentences. By comparison, the news release of March 9, 2020, had 414 words but contained 18.1 percent of passive sentences. One might assume that the shorter March text (by half of the word length) would be easier to read but we see that the percentage of passive sentences plays a significant role in reading ease.

**Figure 1**
*Illustration of Flesch Reading Ease Score of Selected Nova Scotia Government News Releases*




## Future Research

Given the significance and duration of the effects of the pandemic, a continuation of the research conducted by Fafard et al. (2020) beyond the period of March 31, 2020, would be worthwhile as the Canadian government did not announce travel restrictions until mid to late March 16, 2020, (Prime Minister of Canada, 2020) and message around restrictions for containment of the spread of the virus was just ramping up. The research on health communication delivered through governments during the pandemic has highlighted the need for a consistent assessment of health-related communication readability, understandability, and actionability; establishing a baseline of those measures and reassessing them should be standard practice for government and health communicators. For health communicators, the goal to follow the principles outlined in CERC to be first, be right and be credible (Dubé et al., 2022 p. 531) requires an additional principle of 'be understood'.

In their study on the readability of printed materials about dementia for patients and caregivers, Weih et al. (2008) concluded that most written materials for patients are created by people in the health system who do not reflect the patient population regarding age and education. Therefore, these materials do not match the reading skills of the target group. This raises an interesting challenge for health communicators who are called upon to deliver easily understandable information for use by the general public, often conveying complex medical ideas and instructions. Personal bias and assumptions about the target reading audience can easily contribute to public health messaging missing the intended goal of government and communication health providers like hospitals and partner organizations. Artificial intelligence (AI) 's role in creating health information has begun to show the benefits of this technology in reaching the reader.

Research on the use of AI in developing readable and understandable materials for patients at the recommended target grade-six level revealed that while the technology could assist with reaching the readability level, using the natural language processing tool known as ChatGPT, the AI-generated materials

still sometimes exceeded the recommended reading level (Armstrong et al., 2024). Pharmacists represented the clinical participants in the study, and although they were somewhat confident in the technology, none were completely confident with using the AI tool (Armstrong et al., 2024). The researchers posit that this could be due to a lack of confidence in AI-generated content and a personal bias against AI in general (Armstrong et al., 2024, p. 807). They add that while the technology is widely available, it is largely unregulated (Armstrong et al. 2024, p. 807).

## Conclusion and Recommendations

During the pandemic of 2020, governments and health agencies worldwide worked to provide information to the public that would not only inform but educate and provide direction to keep people safe and prevent the spread of the coronavirus. News releases must effectively convey complex information to people of all reading abilities since this format of communication does not allow the opportunity for interaction or feedback. One should not assume the general public's literacy or health literacy levels when writing and approving news releases. It is crucial for government and health communicators to regularly evaluate the readability, understandability, and actionability of health-related communications.

In order to accurately represent the changing and growing population of Nova Scotia, it is important for all government and provincially funded communication branches to follow the Flesch-Kincaid Grade Level and Flesch Reading Ease score guidelines. These assessments should be routinely applied using the available Microsoft Word tools to evaluate written materials intended for the general public. The application for running the test to score text is readily available to all users with Nova Scotia Health and the Government of Nova Scotia (including the Nova Scotia Department of Health and Wellness) network accounts, including licensing for Microsoft Office and Microsoft Word programs. In addition, the increased use of posters and infographics over web-based and print text should be considered to address literacy and language differences of the general public (Kelly et al., 2023).

As populations change and diversify in Canada, so too should the presentation and delivery options of critical public health information. Utilizing a call-centre model for information sharing and feedback adds the much-needed human element to crisis communication and public health information dissemination. In the event of future pandemics and widespread health events, the Nova Scotia Government should also strongly consider the addition of a call centre separate and apart from the 811-phone information service to address specific concerns and questions of the public for whom reading is a barrier to information. The option to speak to a person allows those who cannot read due to visual impairment, reading disorders (e.g. Dyslexia) or lack of access to a computer or laptop to speak with someone directly to obtain the information they need, and ask questions or provide feedback for greater understanding of the information presented.

Provincial governments' increasing reliance on and promotion of a 'self-service' approach to healthcare requires individuals to navigate various technology-based health services to access care and health information (Doucette, 2023). Such publicly funded investments warrant regularly assessing the population's literacy to ensure communicators are enabling the public to comprehend and utilize healthcare information effectively and can fully access the services and supports provided. Beyond health literacy research, Bould & Forshaw (2022) suggest that e-Health literacy be an area for deliberation, given people's propensity and reliance on seeking and using the information found online, especially during the pandemic. Accessible health and public safety information and instructions that are easily understood can mitigate the reliance on hearsay and misinformation during a global health crisis.

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**Appendix A**
**March 9, 2020 News Release and Flesch-Kincaid Reading Score**

NOVA SCOTIA

News release

# New National Screening Protocols for COVID-19

9 March 2020 | 1:50 PM

Health and Wellness
COVID - 19

---

New national screening protocols have been established as the novel coronavirus (COVID-19) continues to expand globally.

Anyone who has travelled outside Canada may have come in contact with the novel coronavirus and should closely monitor their health for 14 days after returning to the country. Travellers who start to feel unwell, should stay at home/self-isolate away from the public. Individuals who develop a fever, with a temperature 38°C or higher, and/or cough should call 811 for assessment.

To date, there have been no confirmed cases of COVID-19 in Nova Scotia.

To help protect older Nova Scotians and those most at risk for severe illness, the province is restricting visitors who have travelled outside the country in the last 14 days from entering long-term care homes. As always, anyone who is feeling unwell should not enter a facility.

"We are expanding our screening to include travel outside of the country as the virus continues to spread," said Dr. Robert Strang, chief medical officer of health. "With more cases expected in Canada and spread into the community likely, we are adapting our processes to respond to this rapidly evolving situation."

To prevent the spread of respiratory viruses, including COVID-19, it is important that all Nova Scotians:

- practise good handwashing hygiene
- use cough and sneeze etiquette
- avoid touching your face
- minimize close face-to-face contact with people who appear ill
- stay away from others if you feel unwell
- regularly clean and disinfect high touch surfaces

Nova Scotians can find accurate, up-to-date information at: https://novascotia.ca/coronavirus .

## Quick Facts:

- in December 2019, cases of pneumonia were reported in Wuhan, China, caused by a new virus that had not been seen in humans. The illness was caused by the novel coronavirus (SARS-CoV-2) and is called COVID-19
- as of March 8, 2020, 62 cases of COVID-19 have been confirmed in Canada and the virus continues to expand globally
- Nova Scotia launched a website dedicated to the latest information about the coronavirus in January
- the Government of Canada has set up a novel coronavirus information line at 1-833-784-4397

## Additional Resources:

The Public Health Agency of Canada maintains a list of affected areas: https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/health-professionals/covid-19-affected-areas-list.html

Government of Canada: https://canada.ca/coronavirus

Nova Scotia Public Health offices: http://www.nshealth.ca/public-health-offices

Readability Statistics

| | |
|---|---|
| **Counts** | |
| Words | 414 |
| Characters | 2,822 |
| Paragraphs | 28 |
| Sentences | 11 |
| **Averages** | |
| Sentences per Paragraph | 1.5 |
| Words per Sentence | 20.4 |
| Characters per Word | 5.0 |
| **Readability** | |
| Flesch Reading Ease | 42.4 |
| Flesch-Kincaid Grade Level | 12.4 |
| Passive Sentences | 18.1% |

**Appendix B**
**May 1, 2020 News Release and Flesch-Kincaid Reading Score**

NOVA SCOTIA

News release

# Easing of Some Public Health Measures

1 May 2020 | 3:51 PM

COVID-19
Health and Wellness

---

Premier Stephen McNeil and Dr. Robert Strang, chief medical officer of health, announced today, May 1, the easing of some public health restrictions around COVID-19.

"We know that getting outdoors for recreation is important for people's physical and mental health," said Premier McNeil. "That's why we are easing some restrictions, while still keeping the majority of our public health directives in place to continue fighting the virus. But I need to be clear: if we see an increase in positive cases or people not continuing to adhere to all the public health measures, the restrictions will return."

Existing public health directives around social distancing and social gatherings remain in place. People must keep two metres apart and not gather in groups of more than five.

The initial steps are:

- provincial and municipal parks can reopen, but playground equipment will continue to be off limits
- trails are allowed to open
- people are allowed to use and visit community gardens
- garden centres, nurseries and similar businesses can open
- sportfishing is permitted from shore or boat, but fishing derbies are not allowed
- people can attend boating, yacht or sailing clubs for the purpose of preparing boats for use
- golf driving ranges can open, including those at golf clubs, but the course must remain closed; golf clubs can perform necessary maintenance and preparations for opening
- people can use their cottages. Use is restricted to one household unit at a time, travel must be directly to the cottage and back, and travelling back and forth frequently from cottage and primary residence is discouraged
- provincial and private campgrounds remain closed, but they can perform necessary maintenance and preparations for opening. An exception is recreational vehicles parked year-round at private campgrounds, which can be used but must follow the same rules as cottages
- drive-in religious services will be allowed, as long as people stay in their cars, they are parked two metres apart and there are no interactions between people in cars or between people in cars and others

These measures take effect immediately.

Details on these adjustments can be found at, https://novascotia.ca/coronavirus/

"Our ability to open things up further – for example, beaches, golf courses and campgrounds – depends on how each of us does with these adjustments, how well Nova Scotians comply and how the pandemic continues to impact people's health," Dr. Strang said. "We can't let our guards down. We need to continue to flatten the curve."

A phased plan to further lift public health restrictions is under development. It is based on science and the timing of each phase will be determined by the result of the easing of restrictions.

To date, Nova Scotia has 28,883 negative test results, 969 positive COVID-19 test results and 59 deaths. Confirmed cases range in age from under 10 to over 90. Ten individuals are currently in hospital, three of those in ICU. Five-hundred and ninety-two individuals have now recovered and their cases of COVID-19 are considered resolved. Cases have been identified in all parts of the province. A map and graphic presentation of the case data is available at https://novascotia.ca/coronavirus/data .

If you have two or more of the following symptoms, visit https://811.novascotia.ca to determine if you should call 811 for further assessment:

- fever
- new or worsening cough
- sore throat
- runny nose
- headache

Nova Scotians can find accurate, up-to-date information, handwashing posters and fact sheets at https://novascotia.ca/coronavirus .

## Quick Facts:

- testing numbers are updated daily at https://novascotia.ca/coronavirus
- a state of emergency was declared under the Emergency Management Act on March 22 and extended to May 17, 2020

## Additional Resources:

Government of Canada: https://canada.ca/coronavirus

Government of Canada toll-free information line 1-833-784-4397

The Mental Health Provincial Crisis Line is available 24/7 to anyone experiencing a mental health or addictions crisis, or someone concerned about them, by calling 1-888-429-8167 (toll free)

Kids Help Phone is available 24/7, by calling 1-800-668-6868 (toll-free)

For help or information about domestic violence 24/7, call 1-855-225-0220 (toll-free)

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Readability Statistics

| | |
|---|---|
| **Counts** | |
| Words | 697 |
| Characters | 4,062 |
| Paragraphs | 42 |
| Sentences | 21 |
| **Averages** | |
| Sentences per Paragraph | 2.1 |
| Words per Sentence | 16.0 |
| Characters per Word | 5.0 |
| **Readability** | |
| Flesch Reading Ease | 51.2 |
| Flesch-Kincaid Grade Level | 10.1 |
| Passive Sentences | 4.7% |

**Appendix C**
**July 5, 2020 News Release and Flesch-Kincaid Reading Score**

News release

# No New Cases of COVID-19

5 July 2020 | 10:50 AM

COVID - 19
Health and Wellness

---

As of today, July 5, Nova Scotia has three active cases of COVID-19. No new cases were identified on Saturday, July 4.

The QEII Health Sciences Centre's microbiology lab completed 441 Nova Scotia tests on July 4 and is operating 24-hours.

There are no licensed long-term care homes in Nova Scotia with active cases of COVID-19.

To date, Nova Scotia has 54,910 negative test results, 1,064 positive COVID-19 cases, 61 deaths and three active COVID-19 cases. Cases range in age from under 10 to over 90. Nine-hundred and ninety-eight cases are now resolved. Two people are currently in hospital. Both patients' COVID-19 infections are considered resolved but they are being treated in hospital. Cases have been identified in all parts of the province. Cumulative cases by zone may change as data is updated in Panorama.

If you have any one of the following symptoms, visit https://811.novascotia.ca to determine if you should call 811 for further assessment:

- fever (i.e. chills, sweats)
- cough or worsening of a previous cough
- sore throat
- headache
- shortness of breath
- muscle aches
- sneezing
- nasal congestion/runny nose
- hoarse voice
- diarrhea
- unusual fatigue
- loss of sense of smell or taste
- red, purple or blueish lesions on the feet, toes or fingers without clear cause

When a new case of COVID-19 is confirmed, public health works to identify and test people who may have come in close contact with that person. Those individuals who have been confirmed are being directed to self-isolate at home, away from the public, for 14 days.

Anyone who has travelled outside of Atlantic Canada must self-isolate for 14 days. As always, any Nova Scotian who develops symptoms of acute respiratory illness should limit their contact with others until they feel better.

It remains important for Nova Scotians to strictly adhere to the public health order and directives - practise good hand washing and other hygiene steps, maintain a physical distance when and where required, and wear a non-medical mas when physical distancing is difficult.

As of July 3, interprovincial travel within Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland and Labrador, without the requirement to self-isolate for permanent Atlantic Canadian residents, is permitted. All public health directives of each province must be followed. Under Nova Scotia's Health Protection Act order, visitors from other Canadian provinces and territories must self-isolate for 14 days. Other visitors from outside the Atlantic provinces who have self-isolated for 14 days in another Atlantic province may travel to Nova Scotia without self-isolating again.

Nova Scotians can find accurate, up-to-date information, handwashing posters and fact sheets at https://novascotia.ca/coronavirus .

Businesses and other organizations can find information to help them safely reopen at https://novascotia.ca/reopening nova-scotia .

## Quick Facts:

- testing numbers are updated daily at https://novascotia.ca/coronavirus
- a state of emergency was declared under the Emergency Management Act on March 22 and extended to July 12

## Additional Resources:

Government of Canada: https://canada.ca/coronavirus

Government of Canada information line 1-833-784-4397 (toll-free)

The Mental Health Provincial Crisis Line is available 24/7 to anyone experiencing a mental health or addictions crisis, or someone concerned about them, by calling 1-888-429-8167 (toll-free)

Kids Help Phone is available 24/7 by calling 1-800-668-6868 (toll-free)

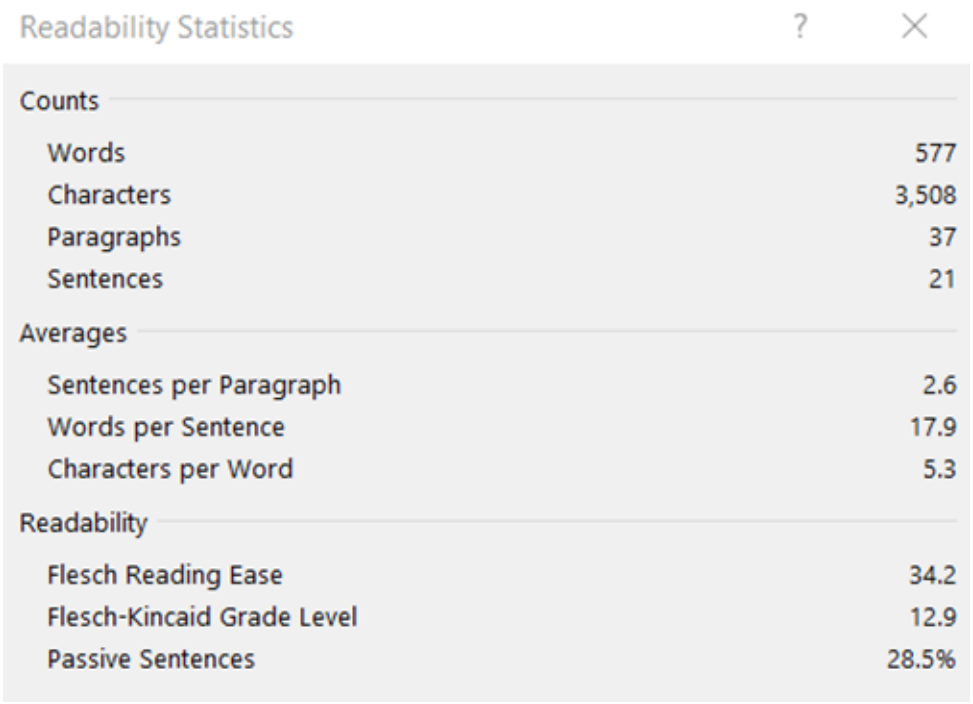
For help or information about domestic violence 24/7, call 1-855-225-0220 (toll-free)

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Readability Statistics
?
Counts
Words 577
Characters 3,508
Paragraphs 37
Sentences 21
Averages
Sentences per Paragraph 2.6
Words per Sentence 17.9
Characters per Word 5.3
Readability
Flesch Reading Ease 34.2
Flesch-Kincaid Grade Level 12.9
Passive Sentences 28.5%

**Appendix D**
**September 2, 2020, News Release and Flesch-Kincaid Reading Score**

NOVA SCOTIA

News release

# No New Cases of COVID-19

3 September 2020 | 11:37 AM

COVID - 19
**Health and Wellness**

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As of today, Sept. 3, Nova Scotia has six active cases of COVID-19. No new cases were identified Wednesday, Sept. 2.

Nova Scotia Health Authority's labs completed 1,335 Nova Scotia tests on Sept. 2.

To date, Nova Scotia has 77,685 negative test results, 1,085 positive COVID-19 cases and 65 deaths. No one is currently in hospital. Cases range in age from under 10 to over 90. One thousand and fourteen cases are now resolved. Cases have been identified in all parts of the province. Cumulative cases by zone may change as data is updated in Panorama.

If you have any one of the following symptoms, visit https://811.novascotia.ca to determine if you should call 811 for further assessment:

- fever (i.e. chills, sweats)
- cough or worsening of a previous cough
- sore throat
- headache
- shortness of breath
- muscle aches
- sneezing
- nasal congestion/runny nose
- hoarse voice
- diarrhea
- unusual fatigue
- loss of sense of smell or taste
- red, purple or bluish lesions on the feet, toes or fingers without clear cause

When a new case of COVID-19 is confirmed, public health works to identify and test people who may have come in close contact with that person. Those individuals who have been confirmed are being directed to self-isolate at home, away from the public, for 14 days.

Anyone who has travelled outside of Atlantic Canada must self-isolate for 14 days. As always, any Nova Scotian who develops symptoms of acute respiratory illness should limit their contact with others until they feel better.

It remains important for Nova Scotians to strictly adhere to the public health order and directives - practise good hand washing and other hygiene steps, maintain a physical distance when and where required. Wearing a non-medical mask is mandatory in most indoor public places.

As of July 3, interprovincial travel within Nova Scotia, New Brunswick, Prince Edward Island and Newfoundland and Labrador, without the requirement to self-isolate for permanent Atlantic Canadian residents, is permitted. All public health directives of each province must be followed. Under Nova Scotia's Health Protection Act order, visitors from other Canadian provinces and territories must self-isolate for 14 days. Other visitors from outside the Atlantic provinces who have self-isolated for 14 days in another Atlantic province may travel to Nova Scotia without self-isolating again.

Nova Scotians can find accurate, up-to-date information, handwashing posters and fact sheets at https://novascotia.ca/coronavirus .

Businesses and other organizations can find information to help them safely reopen at https://novascotia.ca/reopening nova-scotia .

## Quick Facts:

- testing numbers are updated daily at https://novascotia.ca/coronavirus
- a state of emergency was declared under the Emergency Management Act on March 22 and extended to Sept. 6

## Additional Resources:

Government of Canada: https://canada.ca/coronavirus

Government of Canada information line 1-833-784-4397 (toll-free)

The Mental Health Provincial Crisis Line is available 24/7 to anyone experiencing a mental health or addictions crisis, or someone concerned about them, by calling 1-888-429-8167 (toll-free)

Kids Help Phone is available 24/7 by calling 1-800-668-6868 (toll-free)

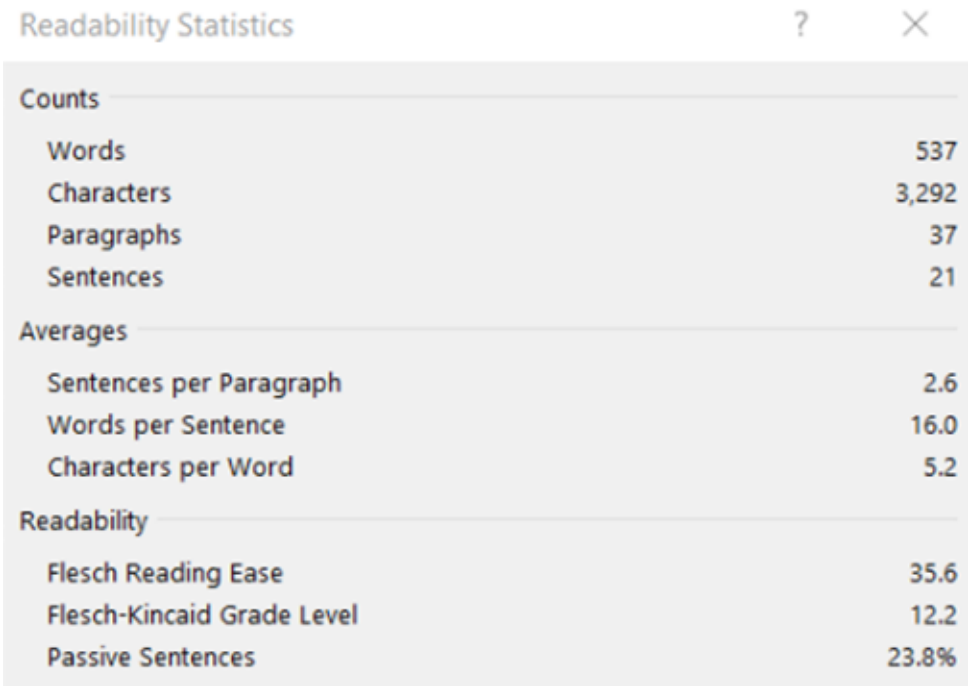
For help or information about domestic violence 24/7, call 1-855-225-0220 (toll-free)

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Readability Statistics
Counts
Words 537
Characters 3,292
Paragraphs 37
Sentences 21
Averages
Sentences per Paragraph 2.6
Words per Sentence 16.0
Characters per Word 5.2
Readability
Flesch Reading Ease 35.6
Flesch-Kincaid Grade Level 12.2
Passive Sentences 23.8%

**Janice Osei-Essah**
**Mount Saint Vincent University**

# EXPLORING TRUST BETWEEN PARENT INFLUENCERS AND PARENT AUDIENCES ON SOCIAL MEDIA

Based on Sztompka's (1999) framework of trustworthiness, this study explores how parenting influencers establish, maintain and convey trustworthiness on social media platforms with their audiences. Using a novel digital ethnography (netnography) approach as method and Instagram as platform, the findings of this qualitative study was grouped according to themes related to three dimensions of the framework of trustworthiness. That is, performance (education and credentials; commitment and consistency), reputation (peer -to-peer cross promotion; testimonials) and appearance (relatability and authenticity). Future research is needed to explore trust building strategies from influencer perspective and audience perspective.

## Introduction

Over the past several decades, the world has gradually moved online. The relevance of the internet and its impact on the digital world and our lives is undeniable and has become the norm in our current society; almost every activity has become digitized to some degree (Ampong et al., 2018). From consumer purchases, working remotely to even the volume of information and educational resources available on the Internet which has made learning more accessible than ever before, empowering people and communities with the opportunities to upskill and broaden their horizons from the comfort of their homes. As digital platforms transform almost every facet of life and industry, there have been increasing calls for research on this digital shift (De Reuver et al., 2018).

One of the ways that digitization and digital platforms have impacted our lives significantly is through social media. Social media has forever changed communication and has become an indispensable tool for connection and the transmission of information. Today's social media platforms now offer users the ability to communicate with others in a rapid and sometimes real-time dynamic, giving people more freedom to share and interact with others (Cheng et al., 2017).

A current trend on social media is the trend of influencers. Influencers are often regular people who have amassed a large following on social media, simply because of the content they post. Influencers often operate within specific niches, advising or educating on topics or phenomena on which they are experts (McCorquodale, 2020). Influencers, irrespective of the niche they operate in have become successful as the online space has gradually become a place where individuals actively seek out content they are most interested in.

The current social media influencer landscape is diverse and there are countless influencers in specific and combined niches. For example, travel bloggers, brand influencers, food, fashion and lifestyle influencers, parent influencers, and sports influencers are just a few of the long list of possibilities. These influencers continually create targeted and strategic content to meet specific audiences' needs while cultivating an authentic personal brand that commands the attention of their audiences (Campbell & Farrell, 2020; Hu et al., 2019). Hence, despite audiences being saturated with so much information to choose from online, there is still an emphasis on online distinctiveness for visibility purposes.

One of the influencer niches online is Parenting influencers, a recent phenomenon, as parents are increasingly relying on online platforms for social support to aid or guide them in parenting (Haslam et al., 2017). Social media therefore provides ready-to-use and easily accessible content for parents with children ranging from newborns to late teenagers. Parenting influencers have therefore become the go to people/ support providing parenting tips, programs and information to parents are intended to aid parents in understanding children's behaviours and in becoming attuned to their children's emotional needs, which in turn enables children to develop emotional and behavioural self-regulation skills for life.

However, in building their brand, social media influencers must capitalize on trust to amass the followership needed to succeed in the online space. This is especially as human interactions become increasingly mediated through digital platforms. Therefore, it is necessary to consider the concept of trust and assess how this relational trust is established and communicated by Influencers to amass the right any followership, must be able to create an intimate profile and project a space where audiences have the confidence to trust and engage with content created by such parenting influencers.

This study therefore seeks to examine and understand the ways trustworthiness is communicated by social media influencers who focus on providing information about parenting support across North America. I use the novel approach of netnography to study parenting support influencers and their audiences, and analyze the content, communication and engagement between influencers and audiences using Sztompka's (1999) theoretical framework of relationship-based trust. This framework focuses on three dimensions of relationship-based trust, or trustworthiness: performance, reputation, and appearance.

In context to the above background, this paper addresses the following research question; How do social media parenting influencers draw on the dimensions of Sztompka's theory (performance, reputation and appearance) in their communication with parent audiences to influence trust? The rest of the paper is organized as follows, review of pertinent literature, the underlying theoretical framework, methodology, findings and analysis and conclusion.

## Literature Review

### Understanding digitalization

Digitalization is a "societal transformation process that uses ubiquitous digital technologies to connect ever larger social spaces" (Trittin-Ulbrich et al., 2021, p. 9). In many parts of the world,

societal engagement heavily depends on digital information and communication technologies (ICT) (Andrade & Doolin, 2016) which is as a result of the proliferation of digital devices like telephones, laptops, tablets etc. enabled by the internet has greatly influenced and changed how we live and connect (Reed, 2018). Digitalization has caused a gradual transition from physical processes to virtual processes. This heavy reliance on digitalization has encouraged the adoption of digital media platforms; an example is social media platforms, which have greatly impacted humans' way of life (Trittin-Ulbrich et al., 2021). These social media platforms have become means of organizing and shaping human activities, including economic, social and political interactions and communication (Asadullah et al., 2018).

**Understanding Social Media**

The term social media refers to virtual platforms that enable societal interactions and bonding opportunities without geographic constraints. It provides users with an opportunity to connect, communicate, and share ideas through electronic means enabled by the Internet (Abell & Biswas, 2023). Social media includes messaging apps like WhatsApp, social networking sites like Facebook and media-sharing sites like Instagram and TikTok (Han et al., 2021). Users tend to use social media for diverse reasons. It is commonly used as a source of connection, to share information, and learn (Duggan et al., 2015; Jorge et al., 2021) but also to fulfil emotional needs like seeking help, advice and connection (Blum-Ross & Livingstone, 2017). Others use it to engage in politics and civic activities, exchange important health information, interact with the government, learn in both formal and informal settings and provide social and emotional support (Duggan et al., 2015). As people continually harness the power of social media, it is evident that social media creates a shared network for groups and enables social integration, network support, emotional support, shared identities, and the facilitation of interpersonal relationships (Cataldo et al., 2022; Duggan et `al., 2015) specific to individual needs..

**Emergence of Social Media Influences (SMI's)**

"In today's digital world, we are witnessing the explosive growth of this generation's new idols who owe their fame to social media and are better known as social media influencers" (Ruiz Gómez, 2019, p. 10). The current era of digital connectivity has enabled this new set of opinion leaders to connect with their followers to disseminate information, content, and values and influence their audience, followers, and subscribers by building a relationship with them over some time through social interactions (Zou et al., 2021). Social media influencers are content creators who are active on diverse social media platforms and who command followership and viewership based on their brand as being charismatic, likeable, engaging and knowledgeable in their field (Hudders et al., 2021; Leite & Baptista, 2022). Influencers usually build their content across different platforms and provide valuable content that attracts followers over time (Yuan & Lou, 2020). Some of the dominant platforms that enable influencers include Instagram, Twitter, Facebook, YouTube and TikTok (Yuan & Lou, 2020).

Influencers have come to "represent a new type of independent third-party endorser who shapes audience attitudes through blogs, tweets, and the use of other social media" (Freberg et al., 2011, p. 90). SMIs focus on different or specific niches and or subject matters like travel, lifestyle, food, parenting, and health, to name a few. Due to the ability of SMI's to impact consumer decisions (Han & Balabanis, 2024), a vast amount of research has been done on SMIs in diverse fields like travel travel (Wellman et al., 2020), fashion, mom bloggers (Archer, 2019; Jorge et al., 2021),

audience authenticity (Cho et al., 2022), high-network influencers and influencer capital acquisition (Brooks et al., 2021), health outcomes (Powell & Pring, 2024; Zou, et al., 2021) etc.

**Parenting and Social Media Use (SMU)**

Parents increasingly resort to social media platforms as accessible and diverse outlets for information about child development, health, lifestyle and other facets of their parenting journey (Olpin et al., 2023). Recognizing the motivations and consequences of information-seeking behaviour in this context is vital for understanding the broader landscape of parenting in the digital age. Accessibility and convenience are some of the key factors that drive parents to use social media for information-seeking purposes (Jorge et al., 2021). Social media platforms provide a wide array of groups, forums, and pages dedicated to parenting topics, covering areas such as infancy, child nutrition, behavioural challenges, and educational strategies. Additionally, parents benefit from real-time information and updates on parenting trends, emerging research, and child-related news, fostering a sense of immediacy and relevance. Moreover, parents turn to social media to gain diverse perspectives and experiences in parenting.

**Online Trust**

The subject of trust cannot be overlooked as social media has become a main source of sharing and accessing information by diverse groups online. Obadă & Dabija (2022) posits that digital platforms like social media, which promote interactivity and content co-creation, provide a platform to develop and maintain long-lasting online relationships with different stakeholders and foster two-way communication between groups of people, organizations, individuals and their external publics. In the influencer domain, influencers through these interactions have the power to shape audiences' attitudes through the content they produce and their followership (Abell & Biswas, 2023), which contributes to the unique relationships in building online trust (Liu et al., 2015). Although most of the online information-sharing exists within people with close relations or ties, social media through the accessibility to online platforms has brought about close conversations among groups of people that are not so close, but only interact via online platforms mostly because they share similar interests. Considering this, trust is built through continuous interaction and “the confidence in an exchange partner’s reliability and integrity” (Morgan & Hunt, 1994, p. 23 as cited in Kim & Kim, 2021, p. 225).

Managing and maintaining trust is essential in the influencer world as trust fuels the maintenance of all forms of exchange in relationship building (Lee et al., 2022a). Social media influencers, because of their position of being seen as trustworthy by other social media users, are usually able to forge a relationship with their audiences due to the authentic experience they provide to their followers.

It is worth noting that influencers are deemed trustworthy only when internet users perceive them as authentically producing content and valuable content they require (Hudders et al., 2021). Social media influencers have come to embody that epitome of trust as they build the bridge between regular everyday social media users and influencers who have amassed a large following and are seen as experts in specific fields (Liu et al., 2015).

## Theoretical framework

Sztompka's (1999) framework of trustworthiness focuses on trust building from a relational approach (Kacperska et al., 2022). Sztompka posits that various cues, and situations enable people to confer their trust on another person, process, or institution. He argues that the three cues in estimating or determining trustworthiness are reputation, performance and appearance. These determinants of trust were initially explained from a business and political perspective. However, I propose to apply this framework of trustworthiness to social media studies, from a communication perspective and assess trustworthiness as relating to parenting influencers and how they build trust and influence on social media.

Reputation like a good name, is hard to earn but also extremely easy to lose. Reputation according to Sztompka (1999) "is an investment, a resource which allows us to elicit from others some valuable assets, among them, their trust and all that goes with it" (p.75). Sztompka defines reputation as "simply the record of past deeds" (p. 71). In terms of reputational trust there is the tendency of trust to be contagious because of trust extended by the public and "significant other" (p.73). Sztompka (1999) asserts that reputational information that people rely on to build trust can be falsified to mislead others to form trust. For example, falsification of credentials in the business realm, buying of votes in the political realm and buying followers and likes in the social media landscape.

Performance accesses the current conduct to confer trust. "Performance means actual deeds, present conduct, currently obtained results" (Sztompka, 1999, p.75). A major flaw with the performance cue as a benchmark to confer trust pointed out by Sztompka (1999) is people's ability to put on the best behaviour while under observation. Although there are a variety of metrics used to measure performance, evaluation of performance can also be subjected to the evaluator's bias and sometimes manipulations. In adopting this tenet to the social media landscape, performance metrics include things like quality of content, follower size and growth over time, number of likes, comments, and/or views, and even things like the number of collaborations or paid content are used to judge performance. We decide how trustworthy someone is based on our assessment of their performance against these types of metrics in the social media context.

Appearance and demeanor are the third factors involved in deciding trustworthiness. The relationship of appearance to trustworthiness is most significant across three dimensions: dress, bodily discipline, and civility (Giddens, 1991 as cited in Sztompka's 1999). It can be said that it is the external cue that enhances trust as we consider individuals to be trustworthy if they are well-dressed, exhibit neatness, healthfulness, and order; and, if they are civil – good-mannered and appropriately restrained in their everyday behaviour. These external cues, although, much more deceptive than reputation and performance are still relevant to trust according to Sztompka's (1999) framework of trustworthiness. Also, people continually trust individuals who are similar to them in terms of appearance and stature. For example in the context of this study, parents will trust parenting advice from a parent influencer who has lived the experience and suggestions being brought forward to the online public domain.

## Methodology

I employ the use of netnography (Kozinets 2019) in this study. Netnography is defined as a reflexive and non-intrusive approach to analyzing communication and behaviour on digital platforms and it is well-suited for studying cybercultures (Tavakoli & Wijesinghe, 2019). Netnography is a qualitative, interpretive methodology that allows the researcher to embed themselves into online communities and conversations through digital observation. I use a non-participatory, or passive observer style of netnography for this study, so I simply observed without engaging.

For my study, I focused on Instagram as it has become a prominent media-sharing platform. It is also well-suited for studying parenting influencers for several reasons. First, Instagram's primary focus on visual content allows influencers to create compelling and relatable narratives through images and videos, which are more engaging and emotionally resonant compared to text-based content (Atiq et al., 2022; Leaver et al., 2020). Second, Instagram's extensive use of features like stories and reels provides influencers with multiple avenues to interact with their audience in real-time and over extended periods. These features enable dynamic and continuous engagement, fostering a sense of community and sustained interaction, which are critical for developing trust. Additionally, Instagram's algorithm prioritizes content based on engagement metrics, meaning that posts by influencers who effectively engage their audience are more likely to be seen by a wider audience.

### Population

In this study, the population under investigation is parent influencers, specifically parent influencers on Instagram. I used the framework from Campbell and Farrell (2020) which categorizes influencers according to follower size to focus my study on mega-influencers (more than one million followers) and macro-influencers (between 100,000 and one million followers). I made this choice in order to ensure that I was observing an active community which I expected to have high levels of engagement from users, as well as regular, consistent posting from the influencers. I purposively selected six influencers to “follow” as part of my netnography. Criteria for selection included that they had to be parent influencers, posting content related to parenting, like parenting advice/support. The second criteria for selection was account size, as discussed above. I prioritized selecting parent influencers with content focused on the social and emotional health of children. I generated this list of influencers, using my knowledge of popular parenting influencers from my professional background, as well as my personal knowledge of parenting influencers who I have followed or seen on my own social media.

### Netnography in Action

After selecting my influencers, I created a brand -new Instagram account and followed just the six selected influencers so that I could immerse myself in their digital content. I also prepared a spreadsheet to record my fieldnotes. Each day, I would record whether or not each influencer had posted on their Instagram feed, stories the type of post, and the general content of the post. Additionally, I created space to record my thoughts and reflections regarding their content. I also noted whether or not the influencers were engaging with comments on their posts, and for each

post, whether the comments were generally positive or negative. I also created space to record my reflections on how influencers engaged with their audiences generally, as well as a general space to record my overall observations. For this section, I used the prompts of performance, reputation and appearance from Sztompka's model to help ensure my thinking returned to these concepts regularly.

I then began my netnographic journey in earnest. For one month, I spent at least one hour each day immersing myself in the digital world of my six parenting influencers. Each day, I would log on to my Instagram account and review the content posted. I would read posts, scroll through comments, and watch Instagram stories. I recorded every single post during the one month period. I also joined several Instagram Live sessions throughout the month and observed the real-time conversations occurring between the influencers and their followers in this format. While I didn't physically gather each post throughout the month, any posts or stories that seemed significant to me with Sztompka's framework of trustworthiness in mind were screen-captured and stored. As I reviewed the content, I worked on my fieldnotes, taking note of key details and crafting deeper reflections several times a week.

## Findings

I present the findings of my research, focusing on identifying themes within three main categories: performance, reputation, and appearance. Under the performance category, two sub-themes emerged: the first was Education & Credentials. The second sub-theme was Commitment & Consistency. Within the reputation category, I surface the sub-themes of Cross-Promotion and Testimonials. Finally, the appearance category explores the sub-themes of Relatability of Shared and Real-life Experiences (I'm just like you Factor) and the theme of Communication where I examine the deliberate use of language and voice moderation to signal trustworthiness.

### Themes Related to Performance

I identify and discuss two sub-themes related to performance and how each of these sub-themes contribute to trustworthiness on the influencer platforms.

#### *Education and Credentials*

From the netnography it was evident that influencers use various tactics to show their expertise and authority in parenting to foster their trustworthiness. One of the primary tactics employed by influencers is the strategic creation of content that highlights their knowledge and experience in parenting. This serves to emphasize their credentials and authority in the field of parenting. Influencers achieve this by emphasizing their credentials on their social media profiles, in terms of their education, qualifications, and achievements related to the parenting sphere. Some also mention their credentials when introducing themselves in their posts to highlight their expertise in the field of parenting. An example is doctorshefali who introduces herself as a "Clinical psychologist, 3 times New York Times best-selling author, host of a band-new podcast, parenting & you" (Doctorshefali, May 14, 2024). By this self-introduction, she inherently depicts and portrays herself as an authority figure in the field of parenting. This in a way may influence trust-

building on the platform because some parents may trust such an influencer not because of the content posted but because of the profile behind the content shared.

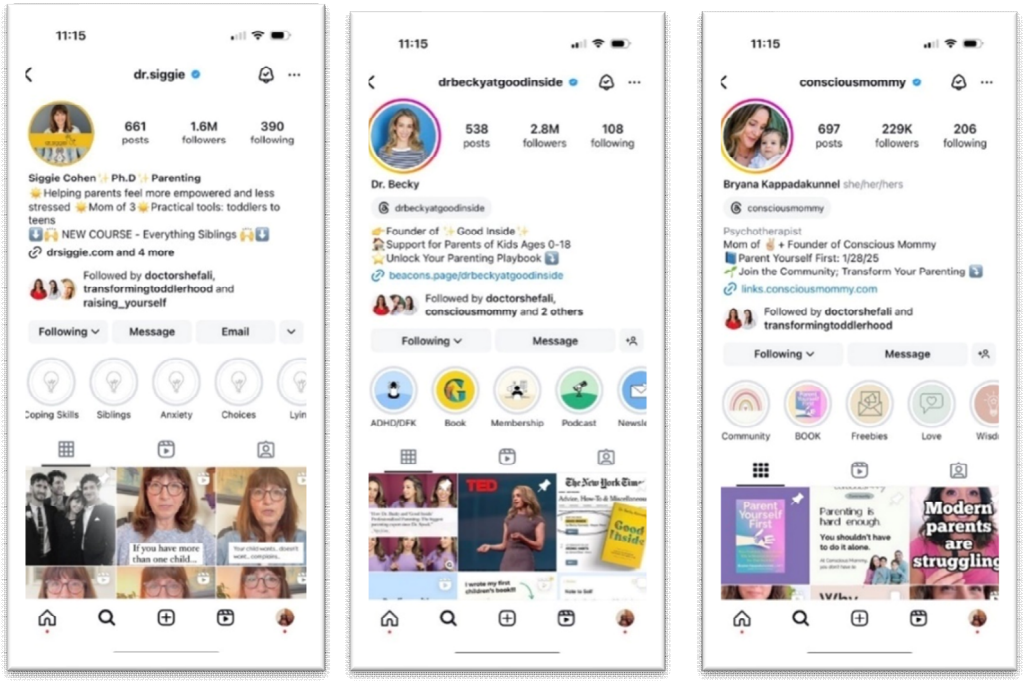



**Figure 1 - Sample influencer profiles stating their expertise**

I also noticed that when providing parenting advice, almost all the influencers continually draw on their credentials to justify their credibility for sharing parenting content online and even for critiquing and busting myths they do not necessarily agree with. For instance, while debunking certain parenting myths she came across online, consciousmommy stated the following to merit her being a certified therapist and parenting coach.

> "…Some of us are licenced and have worked the 3,000 hours of supervised training, licenced clinician, many many years of graduate school and usually do some kind of upskill training, continued education" (May 29, 2024).

Through the netnographic process this emphasis on credentials became a dominant powerful theme in communicating trustworthiness. The profile is always a sort of "starter pack" to quickly know about an individual, and the influencers used that to their advantage. Focusing on their education and credentials this way is useful to highlight performance, as Sztompka (1999) defines it. By drawing on these aspects, influencers add legitimacy for their audiences, regardless of what they actually say. This focus on credentials is consistent with literature (Jetter, 2024) that highlights formal training and expertise as a way of enhancing perceived authority, in her study on spiritual influencers as a source of authority in the current digitalized era. I suggest that by seeing the focus on education and credentials as part of the performance dimension of trustworthiness, it is plausible to consider influencers as adding to their audiences' perceptions of their own trustworthiness, as well as authority.

***Commitment and Consistency.***

While engaged in my netnography, I noticed that all the influencers seemed to be on a fixed schedule of posting content. This commitment and consistency to their pages depicts their level of dedication to creating content as well as actively engaging with their audiences and responding to their messages and comments, thereby fostering audience's trust in them as parent influencers. The consistency of content creation is a prominent theme observed in their adherence to regular posting schedules across various social media platforms. This finding is coherent with the literature reviewed as Kim and Johnson, (2016) postulate that Influencers typically maintain a consistent presence by posting daily updates on their feeds or stories. This regularity ensures that their audience receives a steady stream of content related to parenting, reinforcing the influencer's dedication to their niche and maintaining audience engagement over time. Being consistently visible on stories, for example, like most of my influencers were, may help convey that they are an ally to parents in need, and there when needed. As I actively engaged in the parenting platforms of the influencers under study, I became familiar with the parenting post schedule of the various influencers and how religious they were about it. For instance, doctorshefali posted her podcast intro every Tuesday, and excerpts on every Wednesday and Thursday while consciousmommy and dr.siggie posted their introductory topics on Mondays. However, an interesting post from conciousmommy was always her pole dancing sessions which she shared in her stories every Wednesday. Influencers posting frequently contributed to being perceived as trustworthy. Influencers' regular posting and engagement not only help to retain existing followers but also attract new ones who appreciate the dependable presence of these parenting influencers.

**Themes Related to Reputation**

I identified two sub-themes the fit well under the dimension of reputation: cross-promotion and testimonials.

***Cross-promotion (Peer to Peer Influencer Support)***

Throughout the netnographic process, one major theme that stood out was Cross-promotion, or peer-to-peer support among parenting influencers. It was interesting to me that the parenting influencer community continually supported each other by actively endorsing and promoting each other's content to enhance visibility and engagement within their shared communities. Even within the relatively small group of parenting influencers I selected for this study, I later realized they all followed each other and engaged with one another's content by liking and reposting each other's pages and content. The theme of cross-promotion extended beyond the group of accounts selected for this study to the wider and tight-knit parenting influencer group. A prime example of cross-promotion with influencers wholly supporting, validating and endorsing each other's content was evident during the launch of Dr. Shefali's new podcast titled "Parenting & You". This was demonstrated in various ways. For example, Terri Cole, a psychotherapist, author and relationship and boundary expert, featured Dr. Shefali in a live interview on her page @terricole, to talk about "love, growth, relationships, parenting, all the things…AND her new pod Parenting & YOU with Dr. Shefali where in every episode she coaches REAL parents in REAL time" (May 16, 2024). On May 27th, Dr. Shefali also posted a reel on her feed about @kristinaKuzmic called "I can fix this and other lies I told myself while parenting my struggling child" I suggest that cross-promotion is an important element of trustworthiness as a dimension of reputation. Although this adds to the overall community building, it also offers parent audiences an endorsement of other parent

influencers who are considered trustworthy within the parent influencer community. It means that influencers are able to have others highlight the value of their content, building their reputations to external audiences.

### *Testimonials*

Under the concept of testimonials, the two classification found was celebrity testimonials and the second is audience testimonials.

### *Celebrity Testimonials*

Among the small group of influencers selected for this study, I noticed that once a new project was developed the influencers focused on promoting content within their circles, this recognition extended beyond the influencer landscape to the outside world into the world of celebrities. This recognition and validation by celebrities in various industries outside the parenting influencer world like music (@Pink), acting (@evalogoria), lifestyle/wellbeing (@melrobbins) contribute to the reputation of the influencers, especially in increasing their visibility and reach. These endorsements and collaborations greatly influence the reputation of influencers, increasing their trustworthiness by being projected by these well-known public figures as experts in their niche. One example of this is related to when Dr. Shefali launched her podcast. A tactic that she used was sharing what other celebrities are saying about her on her page and on the celebrity's page. For instance, @melrobbins shares that doctorshefalli is an expert in "giving world-class parenting advice that has absolutely changed my life"(May 15, 2024).

Throughout the process of collecting data, I noticed that often the posts with high levels In addition, the celebrity endorsements of influencers add a prestige factor, contributing to their reputation as experts. By receiving endorsements from celebrities, influencers are able to trade on the reputation of that celebrity, increasing their own cache to their audience.

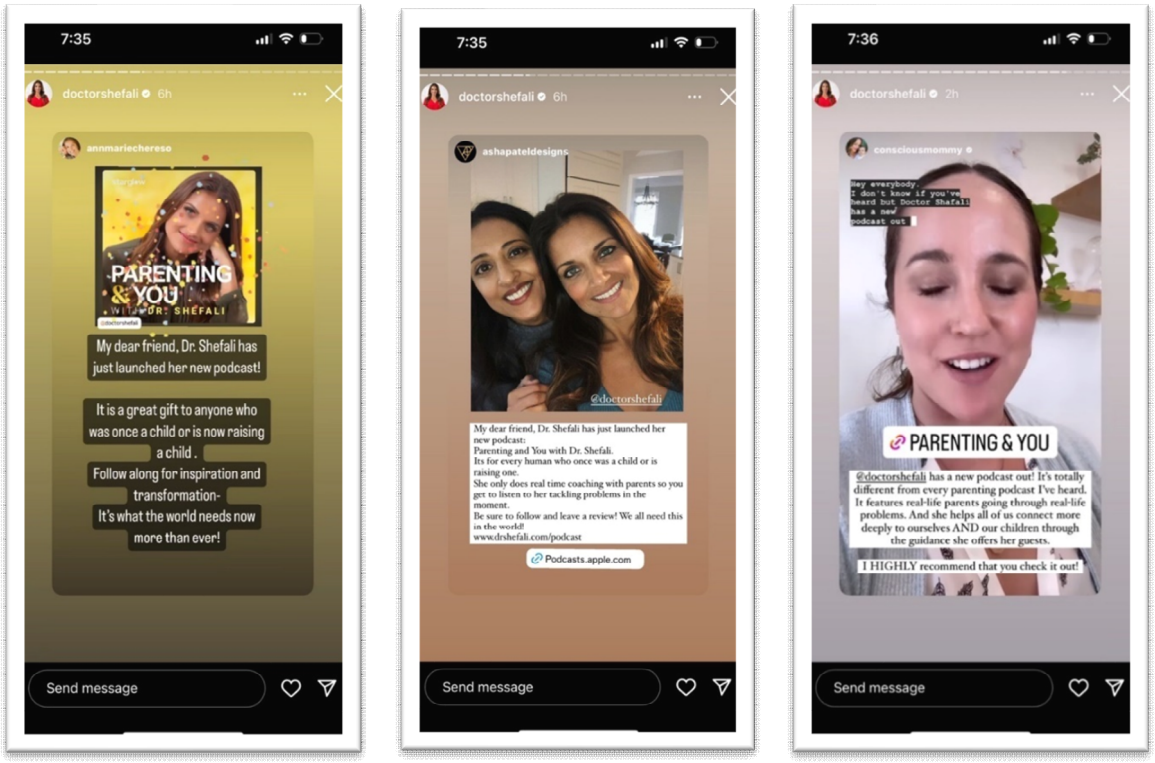



**Figure 2 Story Post of influencer promotion (May 14, 2024)**

***Audience Testimonials***

It became clear throughout my netnography that parent influencers also rely significantly on testimonials from their followers, or audiences, to bolster their credibility and trustworthiness. Influencers regularly reshared the testimonials of regular parents. These would be official or unofficial testimonials. For example, influencers would share a screenshot of a direct message that they had received from a parent on Instagram, stating how much that influencer had helped them. For example, dr.siggie shared a message from on her story from one of her followers which read "I tried potty methods and yours is the 1 that helped and worked!!" (May 13, 2024). Although this is not a long and detailed testimonial, sharing it allows dr. siggie to show that parents are making use of her content and finding success. Additionally, the testimonial is clearly informal, and likely not solicited, which allows dr. siggie to show her expertise and usefulness without seeming too contrived. Most of the influencers I followed shared these types of messages very frequently, and almost daily would feature this type of content.

I found that these audience testimonials serve as social proof, affirming the authenticity and reliability of parent influencers' advice, recommendations, and narratives. This then builds their reputation by demonstrating that their content resonates with ordinary individuals and parents facing similar challenges and experiences. This validation not only enhances the influencer's reputation but also encourages new audience members to engage with their content, thereby expanding not just their reach and influence but also their trustworthiness.

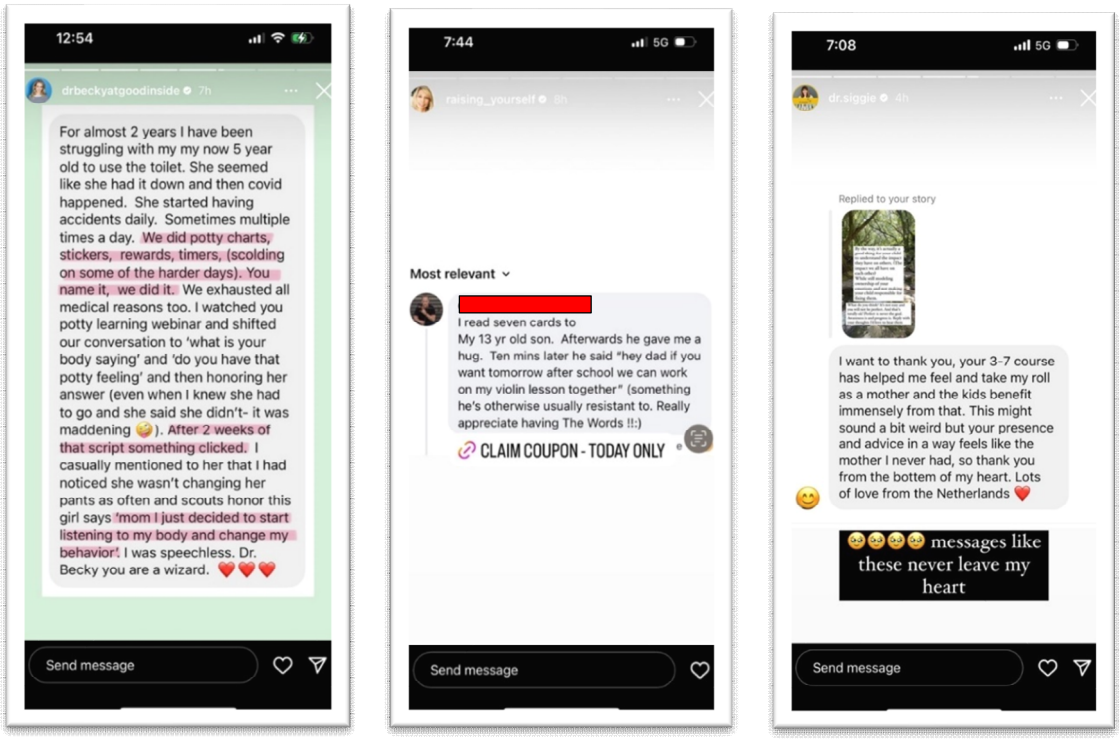



**Figure 3 – Audience Testimonials.**

## Themes Related to Appearance

Related to appearance, Relatability of Shared and Real-Life Experiences and Originality and Authenticity were discussed. Under these broad themes, I discuss specifics related to physical appearance, use of language, and story-telling as communication tactics that appear to be employed by the influencers to contribute to trustworthiness.

### *Relatability of Shared and Real-life Experiences ("I'm just like you Factor")*

One common theme that emerged through my analysis was the sharing of genuine personal experiences related to parenting. I describe this as the "I'm just like you factor." The influencers constantly communicated their relatability by striving to appear like an everyday parent. They shared their own, apparently genuine, experiences with parenting, tying it in with their expert content to reinforce the practicality of their parenting advice, strategies and tactics. Although it is evident that some have assistants online to aid in their content creation, the parenting influencers I followed clearly strive to connect their online personas with their everyday experiences as they address common challenges they encounter in their role as regular parents and not as experts. This separation of the person from the expert seemed intentional as a way to reassure the audience of the challenges of parenting, regardless of knowledge and expertise. For example, Transforming Toddlerhood, recounts her day in her May 29 posts, sharing her frustrations with the day, that she was bickering with her husband, and that she had even snapped at her two-year-old. In sharing this type of information with her audience, she goes through the process of revaluating her emotions

in what is presented as real-time self-reflection, ultimately sharing a key takeaway for her audience after processing the frustrations of her day:

> "The key takeaway here is to remember that we are HUMAN we make mistakes and assumptions whether it's with our parenting partner or our children. When we change the way we respond to our big feelings, we are breaking generational cycles and this means having conversations about the things that trigger us instead of reacting in the moment. View yourself as your child's Loving Leader & Guide instead of an enforcer. And seeing your children for who they are instead of who you want them to be" (May 29, 2024).

By intentionally sharing her emotional struggle and the process of its repair, Transforming Toddlerhood is able to show how normal it is to make mistakes, even as an expert, while also demonstrating how the skills she shares in her content helps her and can help her audience.

This echoes Peterson's (2017) findings in a study on mommy bloggers which suggested that these types of bloggers often recount their own challenges, successes, and learning moments. It is interesting, though not unexpected, that the parenting influencers I followed on Instagram employ a similar strategy. I suggest this makes them appear more authentic. From my study, parenting influencers, projecting themselves as vulnerable parents, but also experts, share their lessons learned throughout their journey. This helps them appear as normal parents, just like their audiences. However, I suggest that presenting themselves this way is likely intentional; it is a strategy for relating to others. I found myself wondering throughout the netnographic process whether the challenging moments that some of the influencers described really occurred, or really did happen. Although they appear authentic, it does seem likely that this appearance of authenticity, of being 'just like you,' is not genuine, but rather part of their planned content creation, with the recognition that presenting themselves in this way makes them more relatable, and thus more trustworthy.

Despite the skepticism described above, the relatability, the connection that the parenting influencers made as one parent to another parent, did seem a significant piece of what allows parenting influencers to build their trustworthiness. Duffey et al. (2024) suggest that personal vulnerability is crucial to building community and accruing followers, and I suggest that in the parent influencer domain, this certainly remains important. Through relatable anecdotes and emotions related specifically to parenting, parent influencers activate a sense of empathy and connection among their parent audiences. I suggest that this "I'm just like you" factor fosters a sense of bond, friendship, and solidarity within the parenting community, positioning influencers as trusted peers rather than distant unrelatable experts. This underscores the importance of this theme, and its connection with the construct of appearance helps emphasize how appearing relatable can potentially impact trustworthiness.

### *Physical Appearance*

In connection with this theme of relatability is the sub-theme of physical appearance. Throughout the netnographic process, I noticed the varied ways that the parent influencers seemed to actively curate their actual appearance, in order to resonate with their audience and align with their content. For example, when talking about the difficulties of parenting, or the challenges of a particular day,

it was common for the influencers to post on their stories wearing loungewear, such as sweatpants, with their hair undone and no makeup. For example, drbeckyatgoodinside shared a story on May 16, 2024 about a challenge with her child. In this story, she appears to be wearing no make-up, her hair is pulled up in a messy style, and she is wearing a relaxed sleeveless t-shirt (See Figure 4.4). She looks just like a normal person would look around their own house after a long day. In contrast, when drbeckyatgoodinside was invited to participate in a conference on digital parenting, she posted a picture of herself to her Instagram stories, showing her in a highly professional outfit. Her hair is smooth and styled, she is wearing make-up, and appears to be wearing professional-style clothing. The contrast in physical appearance from drbeckyatgoodinside – the parenting expert, and drbecktyatgoodinside – the mom just like you, is carefully communicated, I suggest through the clothing choice.

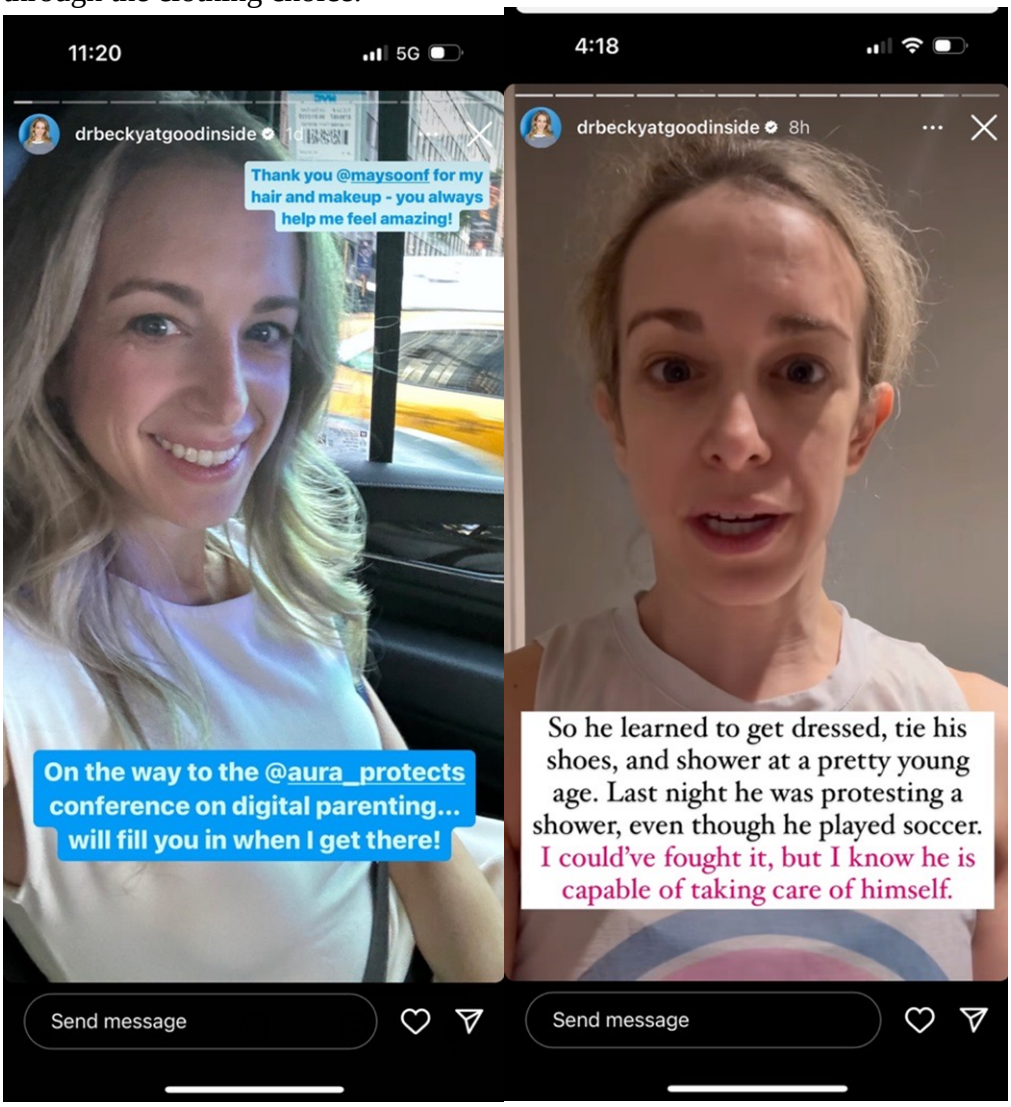



**Figure 4 Stories captured from drbeckyatgoodinside, showing her fully made up on her way to a conference (June 5, 2024) and an early morning story in which she describes a challenge with her son (May 16, 2024).**

The choice to appear as a tired, struggling parent, versus a knowledgeable and credible expert in the field is context-specific, of course, but also seems to be an intentional strategy, based on what I noticed in my netnography. Drbeckyatgoodinside was not the only influencer who appeared to intentionally post both physical selves. For example, consciousmommy and doctorshefali were two other influencers who I noticed frequently showed themselves in this contrasted way. While doctorshefali would show herself dressed in a very formal outfit, with full make-up when presenting at a summit or promoting her podcast. However, she also cultivated more relaxed moments with her audiences, hosting live videos and posting on stories in her loungewear and without any make-up.

I noted this regularly throughout the netnographic process, regularly enough that it appeared significant enough to emerge as a theme connected to the idea of relatability. Part of how parent influencers appear to show their relatability is not just through sharing their difficult and challenging parenting experiences, as I discussed in the previous section, but also through aligning that those difficult moments with an appearance that conveys that struggle. By appearing tired, unmade-up, in lounge-style clothing, the influencers appeared to be reflecting who they see as their audience. I posit that they make content with this type of appearance not because they necessarily are being authentic, but rather because that's what they feel their audience looks like. For example, I myself would often be reviewing their daily content in my pajamas, feeling exhausted after a long day struggling to parent my boys effectively and patiently. Although I was interrogating their reasons for appearing on their social platform with no makeup or in pajamas, I did also feel seen, understood, and related to! Again, I felt myself very much drawn in by their apparent relatability, as in the prior section. However, it wasn't just about what they were sharing verbally, but also about what they were communicating physically. I suggest that this combination of polished presentation and apparently authentic sharing contributes to building trust and connection with the audience. By adapting their attire and presentation style to match the context of their messaging while also sharing glimpses of their everyday lives, the parenting influencers ultimately appear more trustworthy.

### *Authenticity*

During my netnographic process, I noticed that the notion of authenticity seems to have a pivotal role in shaping the dynamics of online interactions. Authenticity, or the influencer's authentic self, is communicated through language and storytelling, and underscores the influencers' efforts to cultivate genuine connections by sharing personal, unfiltered experiences in real time. Although this is similar to relatability, I suggest that it is distinct in that the examples I share to explain this theme focus on the influencers being more 'themselves.' The authentic self that I suggest influencers communicate serves to make them distinct from other influencers, as well as to allow them to foster connections with their audiences outside of the identity of parent.

One example of this is the display of emotion. Throughout my netnography, I noticed that influencers candidly express their emotions. I noticed this as part of their intention to connect in a relatable way with other parents, but beyond this relatability, there were also expressions of stress, happiness, frustration and surprise that were related more to the experience of being an influencer, living life online, struggling to keep up with adult demands, and more. For example, one day consciousmommy openly discussed her frustration over technical glitches in her recordings. In her

expression of frustration, she is not a parent, she is not relating with other parents; rather, I suggest that she is an influencer, authentically communicating her emotional self within that identity.




**Figure 5 Story post documenting raw emotions (June 1st, 2024)**

Aside from sharing their feelings, the influencers also documented intimate moments of their lives outside of their parenting niche. I was struck by how much the influencers I followed seemed to bare their souls to their audiences in their posts, speaking directly to their audiences as if they were sharing with close friends. I suggest that this perception of intimacy shared between influencers and their audiences contributes to the idea that the influencer is sharing an authentic self, and therefore is genuinely connected with their audiences. Although I do not discuss parasocial relationships in detail in this paper, I did notice how this type of content fostered those parasocial connections, making influencers seem like genuine and loyal friends to their audiences. The idea that this authenticity, which I suggest is distinct from relatability, is a feature of this realm as well is an interesting outcome of my netnography.

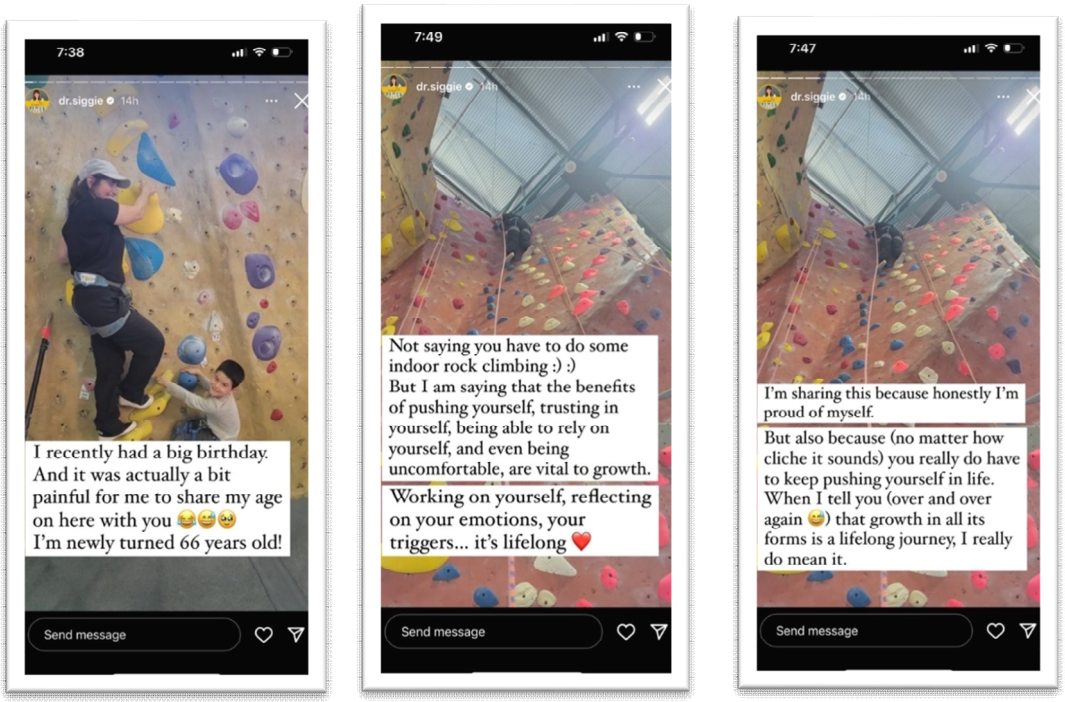



**Figure 6- Story post share intimate moments of their lives (May 25th, 2024)**

From my observations, I realized that the practice of being authentic through emotional transparency and personal sharing serves multiple functions within the influencer ecosystem. Firstly, it establishes a sense of authenticity by presenting a raw, unvarnished portrayal of the influencer's life, thereby fostering a deeper connection with the audience. By openly acknowledging setbacks and challenges and sharing snippets of their lives, not just as a parent, but as individuals, influencers appear more realistic and authentic. These qualities likely resonate strongly with followers seeking genuine connections in a digital landscape often perceived as curated and polished. Moreover, I suggest that the deliberate showcasing of authentic emotions contributes to the influencers' trustworthiness. This is in line with existing literature that suggests audiences are more likely to trust and engage with content that feels authentic and sincere, compared to content perceived as contrived or overly scripted (Smith & Sanderson, 2020). Thus, the strategic deployment of authenticity as an individual not only enhances the influencers' personal brand but also strengthens the bond of trust between them and their audience, perhaps contributing to long-term engagement from audiences.

## Conclusion and future research

By structuring my findings around Sztompka's framework, I have shown how this framework can be effectively applied to explore trustworthiness in a social media environment. This approach allowed me to bring structure to my analysis, drawing out key insights on the strategies parenting influencers use to establish and maintain trust based on the three dimensions of trustworthiness; performance, reputation, and appearance. Ultimately, I suggest that this adds important nuance to our understanding of the complex concept of trustworthiness, within the complicated domain of social media, in the relatively unstudied context of parent influencers.

My focus was specifically on parenting influencers, and the scope of my research was limited to a relatively small group of influencers. Importantly, I observed these influencers' interactions and content without directly questioning them about their trust-building strategies. Future research should consider examining trust-building strategies from the perspective of the influencers themselves. Additionally, it would be useful to further explore the value of Sztompka's framework of trustworthiness in the social media setting through additional studies, including studies that evaluate trustworthiness from the audience side, and ask audiences to identify aspects related to performance, reputation and appearance that influence their assessment of trustworthiness. However, as an exploratory first step at bringing an alternative framework of trustworthiness into an understudied niche of influencers, this study serves a useful purpose and contributes to our understanding of the strategies employed by parent influencers to communicate and build trustworthiness with their audiences on Instagram.

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# ENTREPRENEURSHIP

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# HIGH TIDES MAKE GOOD WINES. COLLABORATION IN THE CRAFT WINE INDUSTRY FOR RURAL REVITALIZATION

**Abstract**

This paper contributes to the understanding of how through the creation and accumulation of skills, artisanal production has sometimes played a key role in reversing demographic decline rural areas, and engendering vibrant communities in otherwise peripheral and marginal local economies. Focusing on artisan vineyards, we show how craft-based production often depends on more tacit knowledge and highly contextual skills. We argue that these characteristics play a key role in both technical innovation and place-making, and that they also foster cross-sector collaboration whilst promoting community and economic development. The main aim of this paper is to analyze how place-making in rural regions has been a function of the concerted cooperation of rural actors in attracting resources, accumulating knowledge and developing the capacity and skills to innovate. Our goal has been to increase our understanding of how the craft wine industry has the potential to reverse the ebb tide of young people and attract new resources, transforming the capacity of local communities. To this end, we elaborate how the local factors (e.g. local culture and identity) play an important role as a source of social cohesion. We provide a framework anchored in the Systems of Innovation and Place-Making literatures, that elaborate on the specific combinations of actors, their interactions, and visions to experiment and create something new in a remote rural region of Canada.

Keywords: craft-based industries, rural revitalization, place-making, place-based innovation, communities of actors, rural settings.
JEL codes: O13, R11, Z31

## 1. Introduction

Increasing inequality between rural and urban regions (Breau, 2015) is to some extent an inevitable consequence of what Doreen Massey (1995) once called 'spatial divisions of labour' and the propensity for capitalist modernization to be associated with successive 'rounds of accumulation' interspersed with episodes of 'creative destruction (Harvey 2010; Schumpeter 2006). Often dependent on extractive industries, rural economies are often less able than (even 'rust belt') cities to repurpose infrastructure and specialist skills (Drabebstott 2010). Indeed, the increase of the rural-urban divide has intensified with the concept of city-region and city-region based policies (Accordino 2019). The growing inequalities between rural and urban settings are also associated to the lack of infrastructure, and investment in infrastructure projects, outmigration and depopulation, and a 'brain drain' and associated loss of knowledge and skills (Vazzana et al 2019; Sano et al 2020). With a declining tax base and demographic imbalance, rural areas are often subject to threshold and 'critical mass' effects with

regard to schooling, health and other services – positive feedback loops which can quickly degrade the quality of life, further undermining the 'stickiness' of rural communities and their capacity to retain people and capital. Understanding the role of specific craft sectors rural revitalization can inform policy innovation in relation to the rural-urban divide. For instance, there are good examples of craft-based industries, relying on tacit knowledge (Gonzalez et al 2005) but contributing to wider processes of knowledge creation and innovation. In many ways this reflects a generalised potential in rural agrarian experience – a pattern of 'rural dexterity' that for Morales (2019) constitutes an untapped potential in the education and engagement of children in rural schools.

Principles of place-making in relation to regional economy (Doloreux & Lord-Tarte, 2014; Quilley 2000) and sense of place (Tan &Tan 2023; Reynolds 2021; Stead et al 2023) centre on the importance of creating sustainable environments that enable people to maintain a sense of belonging, autonomy, independence, safety and security (Fang, Woolrych, Sixsmith, Canham, Battersby, Sixsmith)

The paper is structured as follows, Section 2 provides the literature discussion anchored on the Systems of Innovation and Place-Making literatures. Section 3 presents the methodology we employed to conduct our analysis. In section 4, we delineate the role that craft industry is playing in rural revitalization. In section 5 we provide concluding remarks and reflect on the policy implications of the study.

## 2. Literature review

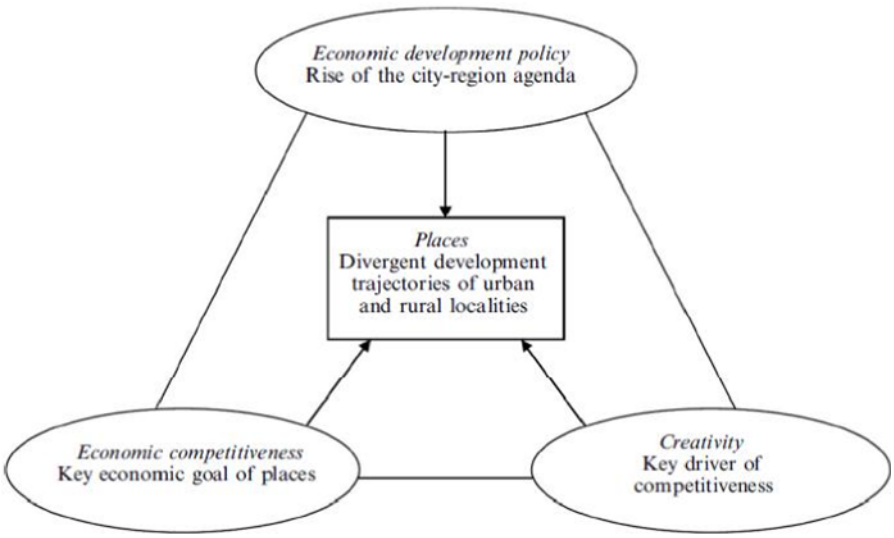
In recent years, craft-based industries have received special attention due to their capacity to generate the knowledge, know-how and reservoir of practical experience required to innovate in remote areas. In this section, we elaborate further on the contributions from three main bodies of literature that can help to better understand the role of rural craft industries in the process of social and economic innovation and the embeddedness of these dynamics. In addition, we link this discussion with place-making/marketing literature in order to unpack the role of actors and the broader context for rural place-making and revitalization. This discussion provides the point of departure for a subsequent examination of the role of craft-based industries in enhancing the 'stickiness' of rural communities in their capacity to retain and attract both, people (Raco 2007) and inward investment.

### 2.1. Place-making from a systemic view

For Dax and Fischer (2018), approaches to regional development must go beyond strategies for targeting economic growth, and have to include elements of social innovation and social cohesion. This is because generalised social trust preconditions all other dimensions of wellbeing (Huppert et al 2004; Tuominen and Haanpää 2022; Putnam 2000). The traditional framing of rural regions in terms of agriculture, natural resources, extractive industry, and long-established identities of peripheral recipients of state aid (Dax and Fischer 2018:298), must give way to embrace the new rural economy. This would include many of the craft-based industries that have evolved and flourished in rural areas.

Horlings (2015) and Ventura et al. (2008) suggest that a rural web is composed by the interrelations and interactions that exist between actors, resources, activities, sectors, and places within rural areas, that goes well beyond farming. Huggins (2011) suggest that the web of interactions emerges at the intersection of three dimensions, economic development policy, creativity and competitiveness to contribute to place-based development. The three dimensions describe the regionally available social and natural resources and the specific ways in which these are combined and developed (see Figure 1).

Figure 1. Huggins framework of placed-based development



Source: Huggins (2011).

Huggins' rural web (2011) resembles the more widely known 'Systems of Innovation' framework which emphasizes the set of actors and institutions relevant for the production of knowledge and generation of innovations (Lundvall 1994, Freeman 1995). However, a framework is always just a tool. As Freeman (1995) observes "it is important to elaborate on what the framework can do for us". For application to the problem of craft-industry and rural revitalization, the more spatially-focused emphasis on 'regional innovation systems/networks' (Askheim & Gertler, 2009) is appropriate. These models focus on "multi-stakeholder, regional development organizations established to support regional partnerships" (Bramwell 2019:279). As we will elaborate below, concepts on regional systems of innovation are better suited to provide an understanding of the key actors embedded in a regional context and that are relevant to the production and accumulation of knowledge required to innovate.

From economic geography and economic sociology, the concept of 'place-making' draws attention to geographic location, the embeddedness of actors in specific local contexts, and embodied in social constructs, and thereby infused with meaning (Gieryn, 2000;Panelli et al 2007; Aquilino et al 202; Hill, Manning and Frost 2021; Perkins et al 2023).

With this in mind, the concept of regional systems of innovation can fruitfully be extended to embrace a more fine grained consideration of place-making through mutual identification, imaginative projection and narrative. This involves attending to distinct forms of local knowledge, beliefs, and the deeper emotional, symbolic and pre-cognitive relationships between people and place (Gieryn, 2000; Williams, 2014; Kalantaridis, 2019). These elements play a central role for the creation and dissemination of knowledge, in particular for those craft-based industries with a high degree of tacit knowledge. As described by Dunn et al. (1995) and Csurgó (2016), place-making is the symbolic as well as the material construction of the place where the notion of place identity is central. Elements of place-making play a key role since local stakeholders collect and reconstruct elements of the locality (Csurgó 2016). Beyond the structural and economic characteristics of the locality, place-making emphasizes on the importance of local knowledge and cultural characteristics, community capacity and social capital (Halseth et al., 2010; Cross, 2015; Csurgó & Megyesi 2016).

The concept of regional competitiveness has played a central role for place-making. Within this literature, there is consensus that regional competitiveness can be measured in terms of the 'assets' of the local business environment (Malecki, 2004; 2007). These include the level of human capital, the degree of innovative capacity, and the quality of the local infrastructure – but also the generalized 'rural dexterity' referred to above. The influence that these 'assets' can have on firm competitiveness – e.g. the ability of regions to attract creative and innovative talent; the provision of high-quality facilities required to advance a specific endeavour; the diversity and flexibility of local supply chains – are key features of regional competitive advantage (Kitson et al, 2004).

### 2.2. Rural revitalization

Craft-based industries as well as supporting actors and infrastructure, can play an important role in enhancing the 'stickiness' of peripheral economies in attracting and retaining skilled labour, entrepreneurial talent and capital. For example, elaborating on the wine industry in the Talca region of Chile, Giuliani (2011: 1334-1335) argues that "in 2002, a considerable number of the firms in the cluster were technological laggards. By 2006 the cluster had changed quite strikingly". In just 4 years, changes in infrastructure, a dedicated training institute, a laboratory at the University of Talca, concerted marketing initiatives in relation to the 'wine route', and the establishment of new local craft ventures combined in a highly effective re-branding or the whole region and a successful process of rural revitalization.

Rural regions show different economic dynamics that contrast with the traditional urban dynamics of generation of knowledge. Many rural regions need to use economic-ecological sustainability as a guiding principle for new development (Chaminade, 2020). Understanding how geographically and economically peripheral rural areas, often with few resources, sluggish economic development and low levels of social well-being can find tipping points, levers for systemic transformation and generate cascading reversals across multiple domains is central to the problem of rural revitalization. For example, Akgun, Baycan, and Nijkamp (2015) investigated 77 rural areas in Belgium, France, Italy and Turkey. They sought to understand how these regions can be attractive, innovative and developed "hot spots" while maintaining their sustainability. A hot spot, they argue (2015:681) " is composed of regional clusters of firms that compete in the same industry." Such hot spots are differentiated according to the arrangement of critical factors that drive rural development. On the basis that rural habitants have a strong local identity and have developed trusting and co-operative relations with others play a key role to transform rural areas into "hot spots" (Akgün et al. 2015; Giuliani, 2011). Akgun et al. (2015, pp 680) elaborate on the critical factors required for sustainable rural development.

In elaborating these elements, this literature emphasizes the importance of culture and relational proximity as an anchor for trust formation, community connection and sense of belonging. Although the skillsets and knowledge base of the actors involved engenders an embedded capacity for problem solving, this depends to some extent on the strength of local institutions (for instance sector-based craft associations) and the ability of community members to influence local decision-making

In the following sections we elaborate on the methodology for this analysis and develop an analytical framework to elaborate on the specific combinations of actors, their interactions, and visions to experiment and create something new in a remote rural region of Canada.

## 3. Methodology

### 3.1. Nova Scotia wine industry

The wine industry in Nova Scotia is relatively new, with the first vineyards planted in the Bear River valley in 1611 by French settlers, and the oldest commercial wineries starting operations in the 1980s. After the initial set up of the first winery, many more followed, and currently the industry in Nova Scotia has over 28 wineries of different sizes across the four different micro regions in the province --the Malagash Peninsula, Gaspereau Valley, Annapolis Valley and the South Shore. The Annapolis Valley hosts most of the wineries, and in that region we can observe some of the benefits that come with initial agglomeration dynamics. This explonential growth over two decades can be attributed to the region of origin (Jantzi & McSweeney, 2019). Due to the harsh conditions of the region, traditionally only hybrid varieties of grapes like L'Acadie Blanc, NY Muscat, Léon Millot, and Riesling were planted and used for wine production. However, in recent years and due to climate change conditions, many of the wine growers have experimented with plant varieties from the old-world wine countries, including Chardonay, Carb Franc and Viognier.

### 3.2. Data collection

To collect pertinent data we elaborated two interview guides for two targeted group of respondents – the actors related to the wine industry and the system-level actors from support organisations (i.e. government, associations, extension offices). The interview guide for wineries included open-ended questions which allowed for semi-structured interviews and included four sections on path creation, collaboration, local impact and place-making, and the opportunities and barriers for the industry's growth. The interview guide for support organisations covered path creation, the role of the organisation in supporting the evolution of the industry, local impact, place-making, and a self-assessment of the main initiatives and programs that they could implement in the future to support the industry's growth.

We identified the wine industry respondents through different repertoires, including the Wine Growers Nova Scotia (WGNS), Perennia, Internet searches, and through word-of-mouth in the field. We adopted a snowball strategy, wherein initial conversations with wine industry respondents generated contacts for subsequent interviews. The respondents from the six support organisations were identified by industry or academic references and contacted through email.

The interviews took place between February and October 2022 and sixteen wineries, out of a total population of twenty-eight, were interviewed. There were one and up to three respondents per winery, usually the founder, owner and/or master winemaker. From the six support organisations, we conducted two interviews with respondents from two divisions of a research organisation. One interview in a wine industry association. Two interviews with respondents from two divisions of a government agency, and one interview with a Crown corporation. Each of the twenty-two interviews lasted between 45 and 90 minutes. The interviews with wineries were conducted in situ, with the exception of one, while all the interviews with support organizations were conducted online. Table 1. Presents the interviews conducted across Nova Scotia. The qualitative data collected was enriched through documents from publicly available sources, (news articles, expert and government reports, professional publications) to ensure construct validity.

Table 1. Interviews conducted across Nova Scotia

| **Region** | **Wineries** |
|---|---|
| **Annapolis valley**<br>13 wineries | 8 Interviewed |
| | 5 Not interviewed |
| **Gaspereau Valley**: 8 wineries | 5 Interviewed |
| | 3 Not interviewed |
| **South Shore**<br>**5 wineries** | 2 Interviewed |
| | 3 Not interviewed |
| **Northumberland Shore**<br>**(Malagash Peninsula)**<br>**5 wineries** | 1 Interviewed |
| | 4 Not interviewed |
| **Cape Breton**<br>**1 winery** | 1 Not interviewed |

### 3.3. Data analysis

We coded all interviews following a preliminary framework that follows three stages, namely:

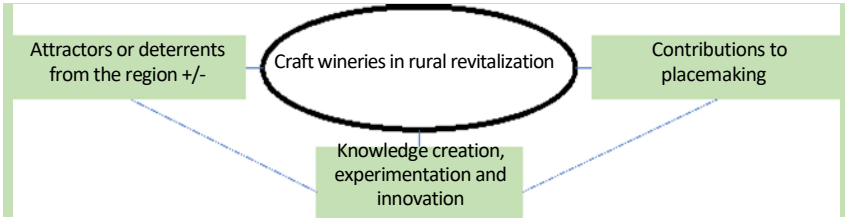
i. *Attractors and deterrents*: including the role of the government, culture and social systems, the socio-economic traction of the local, the geo-ecological 'terroir', the economy of households and communities, the regulatory context, the education system, supporting organizations, patterns of employment and human capital, and market conditions.

ii. *Rural revitalization*: including the role of entrepreneurship and innovation, knowledge building and experimentation, employment creation, and industry spillovers

iii. *Contributions to placemaking*: including branding of the region, social capital accumulation, festivals and culture, community, and strengthened systems.

We coded the interviews following this preliminary framework on three stages. In the first stage we transcribed the interviews into text and started coding them according to the three dimensions. In the second stage, we grouped the codes per dimension, and synthesized the responses in case it was necessary. In the third stage we aimed to identify the connections the dimensions and elaborate a clearer understanding of those elements contributing to regional 'stickiness' and attracting winery owners and winemakers to the region, and identifying the significant deterrents or barriers. We also built into the identification that the craft wine industry plays for rural revitalization towards the attraction and retention of talent, and creativity, experimentation and innovation; and also identified what were the main contributors to placemaking from the actions that the craft wine industry has followed (See Figure 2).

Fig 2. Process of analysis



After coding the interviews and identifying each dimension along the three steps for place-making, we also found secondary sources of information associated to specific elements that were mentioned by the interviewees. For example, after a retaliation from the WTO to end a tax exemption towards new-new world wine countries that have specific characteristics for wine production, some of the interviewees referred to the hardship that wineries would face if a new tax would be implemented,.[1] Another example related to the government support for grape growers and wineries for instance in relation to the replanting new varieties of vines, the acquisition of equipment, industry promotion and trade missions in other markets.
We then complemented the stories we heard from the interviews to provide a clearer discussion on the specific elements that are relevant as attractors from the region and contribute to the process of rural revitalization to finally contribute to place-making. In the next section, we elaborate in more detail the stories we heard regarding these three stages of the role of the craft wine industry in Nova Scotia for rural revitalization.

## 4. Results

### 4.1. Attractors and deterrents

#### *4.1.1 Human capital*

The craft-wine industry in Nova Scotia represents a new-new wine region. Even though some of the first vines were planted in 1611, the first commercial wineries initiated operations only in 1980s. It is then relevant to elaborate on those elements that drew the attention of and investment from entrepreneurs who saw an opportunity. For example, the two first wineries in the region provide an excellent example of this. The oldest continuous operation in Nova Scotia is Jost Vineyards. The original owners of Jost immigrated to Nova Scotia from Germany, and started operations as a farm, not a winery. The family planted vineyards for wine production for their own consumption, but according to the original owners, they mention "We planted too many grapes and we couldn't drink that much wine. So we needed to go to the next level, a commercial winery." Although Domaine de Grand-Pre was the first commercial winery in Nova Scotia, it has not experienced continuous operation. The winery was purchased by an entrepreneur from Switzerland, who saw an opportunity albeit in a risky context.

Human capital had to be developed by relying in different forms external sources of knowledge, first the attraction of talent from outside the province, second hiring consultants that had expertise in other wine regions in Canada and the world, and by locals studying abroad and returning to the province. This combination of acquisition of knowledge from different locations gave place to unique forms of recombination of knowledge for wine growing.

#### *4.1.2. Education system*

The presence of universities and research centres has been highlighted as an important component for the creation of knowledge, and for the formation of talent. However, the education programs relevant to wine production and farming are relatively new in the province, and as we will elaborate further in the next subsection, the education system evolved contributing to further rural revitalization.

[1] Ewirp

#### *4.1.3. Region and 'terroir'*

Terroir refers to micro environmental, geophysical, ecological factors and habitual patterns of cultivation that affect a vine variety's phenotype generating a place-specific taste and bouquet that is semi-independent of the genetics of the plant (Robinson 2006). Nova Scotia constitutes a very unique setting for wine production. As many of the interviewees repeatedly affirmed: "We are at the edge of wine production." Highlighting the dangers arising from late frosts and summer storms, producers proudly insisted that it is precisely the harsh conditions of the region that make it possible to produce a unique product. And it is true that the specific conditions – the highest tides in the world, the the micro-climate of the valleys – that provide the best growing conditions are located very close to the coast, providing a very unique set of tones to Nova Scotian wine. The cold or cool weather, and the proximity to the ocean, gives the wine from unique levels of acidity and minerality imparting a distinctive terroir. It is for this reason that the region is starting to receive world level recognition for sparkling white wines and roses. During our interviews he heard this recurring theme "We have a great propensity to grow aromatic grapes. We have warm days and generally long ripening periods, but we have cool nights. We are able to retain the acidity and the aromatics that are developing those grapes, and then transfer for those or translate them over into the wine and winemaking. That sets us apart and it is not easy here."

#### *4.1.4. Culture and collaboration*

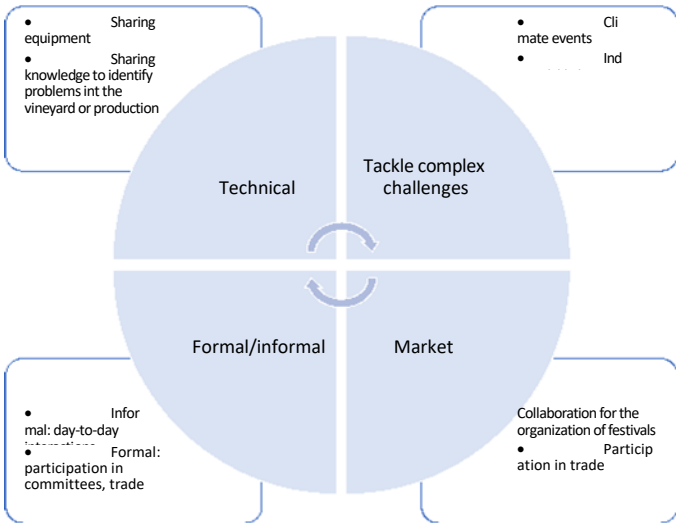
Echoing the findings of other studies such as Giuliani (2005), on 'co-opetition' among wine growers in Chile, we observed an active culture of collaboration between ostensible competitors. In Nova Scotia, we identified several elements that indicate different forms of collaboration relating variously to technical innovation, market structure, informal cooperation and mutual aid and collaboration to tackle complex challenges.

*Technical collaboration*: Sharing an interest in the identification and solution of technical problems, wine makers and grape growers share actively information, and tacit knowledge on how to tackle a specific problems. In addition, we identified collaboration specific to production when the wine makers and vineyard managers share or borrow equipment to alleviate shortages due to malfunctioning and/or to achieve informal economies of scale in relation to capital investment. The recurrent theme on sharing equipment indicated that "that's just one example of sort of the collaborative spirit among the winemakers and their willingness to share and so forth from a specific angle, we often share equipment and lend equipment. Wineries are expensive and some of the stuff that we need are not things that we need a lot of. I've got pieces of equipment in our cellar that belong to other wineries that they've lent me, and other wineries have pieces of my equipment"

*Market collaboration*: Wineries habitually cooperate to participate in festivals and conferences to promote the region – both in relation to tourism and economic development. As a product wine is a powerful symbol because it carries with it an aura of sophistication whilst appealing to the tastes and aesthetic sensibilities of the kind of high-status service workers that the region and investing companies seeks to attract (Ho 2021; Booth 2010; Bourdieu 1984).

Furthermore, a common quote we heard "high tides lift all boats", in their meaning, this quote implies that if all in the industry work together, that will have positive implications for the industry and the region in general. This was prevalent special when the need to tackle complex problems arises, for instance he heard from many of the interviewees, that when some extreme weather conditions arise that wiped out more than 50% of vines in the province, the industry came together to try to address this challenge. "They help each other in real hard times. When we had that freeze event and they did step up and they helped each other."
These forms of collaboration show an interesting form of co-opetition that is deliberate and self-conscious, in the sense that wineries see each other as colleagues to share ideas, knowledge, equipment, and receive feedback on products and marketing ideas. "These people aren't my competitors. These people are my colleagues. And the growth for one is growth for everyone. Detriments for one is detriment for the rest. If we all push together, we all got better at it. It means that everything improves as a whole, it give more people to come and celebrate our region. Because in the world of wine, regionality is important, it becomes a culture based around it."

Fig 3. Forms of collaboration in the industry



#### *4.1.5 Supporting organizations and role of the government*

Government and supporting organizations have played a key role in the development of the wine industry. We also observe a dynamic evolution in terms of the programming that these organizations have offered to support the industry. For instance, financial support from the NS Department of Agriculture has increased substantially with focus on grape growing and wine production. In the last five years, approximately 50% of funding was provided to the top 5 programs, namely: Fiona Agriculture Disaster Assistance, Homegrown Success, Wild Blueberry Harvest Efficiency, Vineyard Development and Expansion Program, and Advancing Innovative Technologies programs. The Vineyard Development Expansion Program was initiated in 2018 and had a significant impact in expanding the footprint of vineyards for the wineries, allowing them to increase production, and also to experiment with new grape varieties.

Perennia, one of the government extension organizations had also played a key role to support the growth of the industry, offering laboratory services, implementing a terroir project, and offering consultancy services. All these initiatives emerged over a period of just five years.

Educational programs and research centres linked to universities had also evolved to support the industry, for instance, Acadia University is the closest university located in the wine region in the Annapolis Valley, they implemented a new laboratory to conduct test for quality of wine and soils. They had also incorporated curricula in their programming. These additions had also attracted students, and experts and academics that come to collaborate with researchers and practitioners in the region.

#### *4.1.6. Regulatory context*

The regulatory context plays a central role and can mitigate in favour or against of the success of the industry. One important regulation that contributed greatly to the industry is the Farm Winery Act proposed by the NS Department of Agriculture requiring farm wineries to be adjacent to the farmland that producing their own grapes for wine production. This Act has had significant implications for the revitalization of rural Nova Scotia, and particularly with respect to the connection of communities to the land. On the one hand, having a winery required access to adjacent farmland, and gave room to further experimentation with different grape varieties that were not commonly found in the region. On the other hand, winemakers and winery owners are firm believers that they are not making wine, rather they are growing wine, and the process starts in the farm, having the right soil and the right farming techniques. This firm belief has emphasized the importance of local wine production, starting from farming with local grapes grown locally.

The industry as a whole is certainly interested in improving the standards of quality across the sector. Committees have been working to develop quality standards comparable to in British Columbia, Ontario (VQA), and Quebec. The industry perceives that this initiative will be beneficial and provide more recognition to the wines in Nova Scotia. However, the development of such quality standards, requires the development of a regulatory body with some kind of ascriptive monopoly.

### 4.2. Rural revitalization

Within rural revitalization, we considered the role of entrepreneurship and innovation, knowledge building and experimentation, employment creation, and industry spillovers.

#### *4.2.1. Entrepreneurship and innovation*

Doloreux et al. (forthcoming) elaborate on the role of individual agency as a key component for the creation of the industry in a remote region. They emphasize on the role of Schumpeterian entrepreneurs as key actors taking the leap of faith and creating something if not from nothing, from resources and capacities not readily apparent. Such Schumpeterian pioneers make it possible for subsequent rounds of investment. This case study seems very much to fit this pattern. Entrepreneurs such as Jost and Domaine de Grand-Pre broke ground for a cascade of subsequent investment in late decades. Initially their businesses broke the imaginary constraint showing that wine *could* be produced in the region. With considerable personal charisma and the enthusiasm of converts, they

also provided support and encouragement for new entrants. Each entrepreneur that followed and contributed to the industry added more to the industry and enhanced the attractiveness of the region.
The first wineries took an important risk starting an industry that was not there before. Many of these wineries focused on wine growing and did not have a point of sale in the winery preferring a 'visit only by appointment' system. Later entrepreneurs brought with them a more sophisticated vision of customer service and the capital to bring it to market. They recognized the importance of creating a consumer *experience*. Led by the founders of Lucket Vineyards and Benjamin Bridge, this wave of investment consolidated the importance of the industry in the self-image of the region and significantly policy- makers in Halifax concerned with the more general branding and marketing of Nova Scotia as a tourist destination and an attractive site for entrepreneurs and investors in other sectors.

All these entrepreneurs fostered the industry in the region, and by doing so they also contributed with the attraction of talent and creation of knowledge for innovation. The innovations we identified in the industry include technological and non-technological innovations, including process innovations, product innovations, and market and organizational innovations. It is important to emphasize that process innovations start from the growing techniques, and experimentation with new grape varieties, combination and recombination of fermenting practices, and bottling processes. Wine makers and winery owners in the region embrace the risk and recognize that there might be differences between vintages.

#### *4.2.2. Knowledge building and experimentation*

Path creation (Doloreux, year) in regions that have not traditionally been active in a specific industry requires the acquisition of knowledge for production, and the curiosity for experimentation and innovation. The craft wine industry is associated with a high amount of tacit knowledge. This can be better mobilised to the advantage of new entrants to the degree that it can be be anchored in scientific knowledge. Wine makers and vineyard managers build their knowledge and skills throughout the years. We observed multiple forms of knowledge building required for the industry in the region. This process included relying on different sources of external knowledge such as consultants, hiring talent from abroad, and acquisition of formal and practical knowledge and skills from other regions with longer history in wine making. The external acquisition of knowledge and skills allowed the start of wine making with commercial purposes. The process of accumulation of knowledge, combined with interaction, curiosity and ingenuity permitted new recombination of knowledge (Nonaka and Takeuchi, 1982) that gave room to a very unique style of wine making and wine from the region. From our interviews, the process of knowledge accumulation and the role that external sources of knowledge had in the region was a recurrent theme:

#### *4.2.3 Employment creation*

The craft wine industry in Nova Scotia is small. Producers and policy makers recognize that their contribution to direct employment is small. However, the attraction and retention of the talent that generates innovation in a nascent industry is highly significant for a rural setting. As was highlighted by the *Now or Never Report* in 2014 (Ivany, 2014), Nova Scotia has always had a problem of outmigration, specially of younger population in rural areas, given the lack of meaningful opportunities. We argue that the wine industry has given younger generations in rural Nova Scotia a hope to contribute in a meaningful way to the region,
More generally, by contributing to the rebranding of the region as a potentially cosmopolitan context for educated service sector workers and investors, the industry is having an outsize impact on local economic development (Sanvido 2019).

#### *4.2.4 Industry spillovers*

One of the key contributions from the industry are the spillovers it generates in particular to other craft-based industries, and to the tourism industry. These contributions had been used well for branding the region as a wine destination. Arguably these spillovers represent over $200 million CAD of economic impact to the region. "Because we started it, it prompted others to do the same or to see the potential and doing it. Now Tourism NS can go out there and say, hey, we have a wine region, come see the area. It impacts local accommodation. It

impacts all the stores in the region. People come here, they're staying for a few days, not just for an afternoon. They sleep. They eat. They shop. They tour. Local tour companies have started. They can take small groups and bring them to all the wineries. Bus tours are coming up now. Cruise ships have been coming early on."

### 4.3. Contributions to place-making

Within contributions to placemaking we included branding of the region, social capital accumulation, festivals and culture, community, and strengthened systems

#### *4.3.1 Branding the region*

We identified two key industry initiatives that contributed to branding the region, the conceptualization of Tidal Bay, that has origin appellation, and festivals that bring more awareness about the wine industry.

*a) Tidal Bay.*

The appellation d'origine contrôlée (AOC – appellation of origin) is a designation in the French wine industry protecting the commercial identity of a food product defined by processes of production and processing are carried out in a legally demarcated geographical area, synonymous with a terroir, and associated with traditional know-how and methods. Tidal Bay is the only 'appellation of origin' wine in North America. The AOC emerged from a local industry initiative that sought to develop a product that could represent the region in a unique way: "Nova Scotia in a Bottle". The concept originated from conversations between the wineries in the region and an external consultant. These conversations centered on the specific characteristics of the wine. Initially focused on a red wine the consensus eventually focussed on white wine. The industry association set up a technical committee establish up the specific guidelines and parameters in terms of content of specific grapes, alcohol, acidity. The different wineries were to be able to adjust these characteristics within the specified parameters. During the first trial, many wineries brought samples of the wine, and kept adjusting the parameters, in order to establish a recognizable and unique wine. The final parameters set include a content of at least 70% of l'Acadie blanc grapes. As part of this process a campaign was launched in the wine community to find a suitable name. Of three of the finalists, 'Tidal Bay' emerged as a compelling winner, leveraging the wider tourist recognition of the Bay of Fundy.

*(b) Festivals and culture and building community*

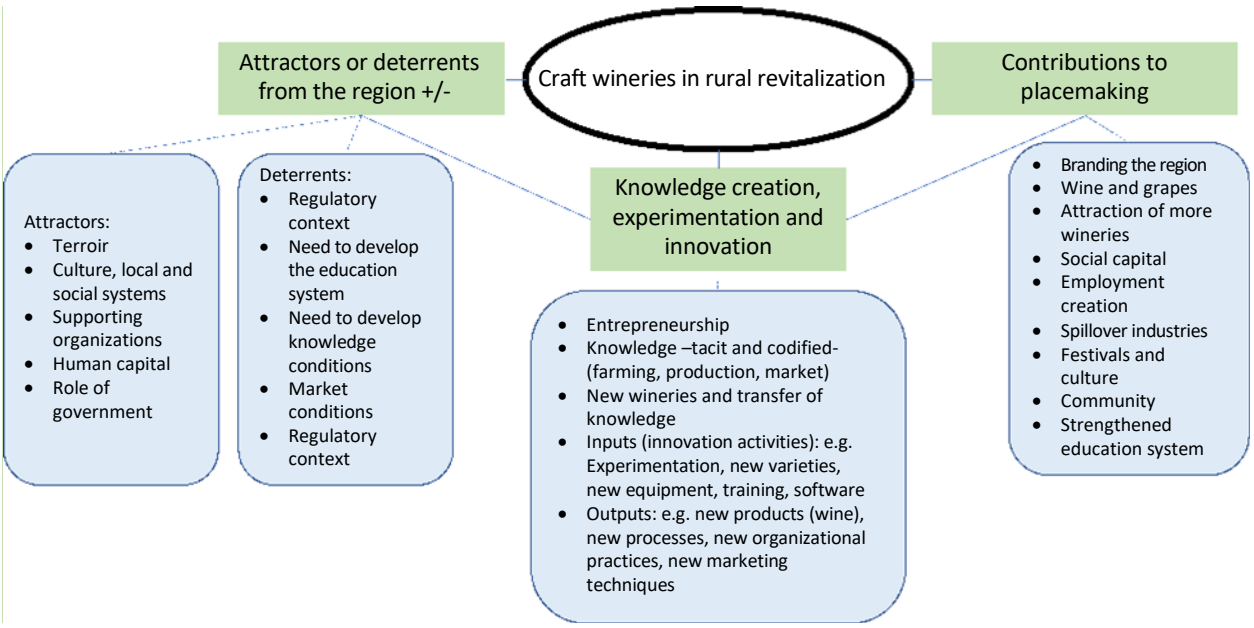
Festivals had always been important in rural regions (Novelli 2022; Qu and Zollet 2023). They bring industries together, and give recognition to their products and initiatives, but most importantly, they bring the community together to celebrate. The wine industry has been at the centre of the organization of many of these festivals including the Harvest festival and the Ice Wine Festival. These festivals represent the connection with community. For instance, the Harvest Festival organized at one of the wineries is a celebration of harvest and also represents an opportunity to support the community by donating all registration income to local charities. The Ice Wine Festival started as an initiative organized by the Industry Association, and few years later it was going to be discontinued, but by the initiative of two of the wineries, the festival is ongoing. The importance of this festival is that it provides the opportunity for organizing common activities during the harsh winter in Nova Scotia, and it gives an excuse for people to visit the wine region.

#### *4.3.2 Social capital accumulation*

The wine industry in the region, has given the opportunity for social capital accumulation, first by attracting and retaining human capital, and then by strengthening the networks between them, that are necessary to share knowledge and practices to elevate the industry. A key element that has contributed to social capital accumulation is the relational proximity of many of the wine makers. Wine makers share many specific characteristics that include not only generational proximity, but also personality proximity. They see the world in a very unique way, collaborate by sharing knowledge, equipment, and time to contribute to place-making. This seems that fits their personality, as also found in other craft industries.

#### *4.3.3 Strengthened systems*

The evolution of the wine industry in Nova Scotia has promoted a positive evolution in the offerings from many of the relevant organizations in the region. It also has fostered interactions with different organizations from within the region and from outside the region that had supported the evolution of the wine industry. This has had positive impacts in terms of the infrastructure in support organizations, the education system, government support, and support from the industry association. The wineries had attracted and retained talent that had contributed to the accumulation of knowledge required for innovation and that had made Nova Scotia their home. The education system has developed new programing to provide skills required for vineyard management and wine making, and many of these offerings are either developed or staffed by some winemakers in the region. In addition, the education system has invested in laboratories to support testing and research related to the industry. Support organizations like Perennia had contributed to attracting specialist to conduct projects that advance knowledge in Terroir and knowledge dissemination. These initiatives have had a profound impact to the industry, as many of the winery owners recognize. The government organizations including the NS Department of Agriculture had implemented and maintained programming to support the expansion of the wine industry and alleviate the negative impact of weather events that had devastated a significant percentage of vines in the region. The provincial Nova Scotia Liquor Corporation (NSLC) has also worked closely with the industry to showcase the products from the wineries in the region. The connection with external consultants had been a necessary strategy from the beginning, in an effort to bring the knowledge for wine growing in the region. These efforts continue, and had also emphasized the need to visit other wine regions in the world. This evolution has not been automatic, and rather, it had required the collective action from industry representatives, and conversations between the different system actors. More important, it had required alienation of strategies from within the wine industry to bring a stronger voice.




## 5. Conclusions

The main aim of this paper is to provide a framework anchored in the Systems of Innovation and Place-Making literatures that elaborates on the specific combinations of actors, their interactions, and visions to experiment and create something new in a remote rural region of Canada. These framework helps us understand how craft industries, like the craft wine industry, through the creation and accumulation of skills, have played a key role in reversing the decline of population in rural areas, transforming them into vibrant communities.

We identified elements of attraction to the region as important foundational elements for the origins of the industry. These elements are associated with individual factors, such as the entrepreneurial spirit of key individuals, and also with systemic factors linked to the role of support organizations, and specific regional characteristics.

The role of the industry for rural revitalization has been quite important in terms of the role it had played for the attraction and retention of talent, and for the knowledge that is being created and shared by the industry wine makers. These process are not unique to the region, and had been identified by other wine regions For example Giulianni (2011) identifies similar process for knowledge sharing and transformation, and certification of quality standards that contributed to the rural revitalization of the wine industry in Colchagua, Chile.

The different initiatives by the wine industry in the region had contributed to placemaking in the sense of supporting the emergence of a “learning hot spot” (Akgün 2015:683). The rural wine region in Nova Scotia has promoted the learning process and attracted inputs for research and development (R&D) and innovative activities in the wine industry. As Akgün (2015) suggests, “learning hot spots” can be places where researchers, governments, private firms and students can be trained or experience local knowledge.

We identified in the study that different forms of knowledge occur at different levels. In terms of knowledge required for farming and production, it requires an active and dynamic forms of knowledge sharing between vineyard managers and winemakers via informal channels, and via the participation of committees for specific initiatives, including for example the conceptualization of Tiday Bay, specification of quality certifications. In terms of market knowledge, the conversations and different forms of knowledge are more diverse and include support organizations and government organizations.

We also identified that relational proximity is essential for knowledge sharing, and advancing initiatives that will promote place-making in the region, similar to the findings of Giuliani (2011) and Kraus (2019) in terms of technological gatekeepers in that case. For vineyard managers and wine makers, knowledge sharing is a day-to-day practice and occurs in an informal setting. They strongly believe that if each winery is stronger, then the whole industry is stronger.

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# FINANCE

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# FINTECH AND ECONOMIC PERFORMANCE: A META-ANALYTICAL PERSPECTIVE

## Abstract

This study is the first meta-analysis to examine the relationship between FinTech and economic performance, exploring variations across developed and developing countries, as well as regions including Asia, the Middle East & Africa, Europe, and North America. The analysis indicates a generally positive impact of FinTech on economic performance, with an overall partial correlation coefficient (PCC) of 0.11. The effect is significant in most regions except the Middle East & Africa. Strong evidence of publication selection bias (PSB) was found, but after adjusting for PSB, the effect remains non-zero, with PCCs ranging from 0.118 to 0.659.

## 1. Introduction

The advent of financial technology (FinTech) has brought profound changes to the global economic landscape, reshaping the ways in which financial services are delivered, accessed, and consumed. Over the past decade, FinTech has evolved from a niche sector into a critical component of the financial systems of both developed and developing countries. FinTech, broadly defined as the application of digital technologies to financial services, encompasses a wide range of innovations, including digital payment systems, peer-to-peer lending platforms, and blockchain technologies. These innovations have the potential to enhance economic performance by improving financial inclusion, reducing transaction costs, increasing the efficiency of financial markets, and fostering entrepreneurship and innovation. Its impact is evident in various aspects of economic performance, including financial inclusion, efficiency, productivity, and overall economic growth (Hosen et al., 2023). FinTech facilitates in increased savings, investment, and consumption, which in turn stimulates economic growth. Additionally, FinTech enhances the efficiency of financial services by reducing transaction costs, improving the speed of transactions, and increasing transparency. These improvements lead to more efficient capital allocation, lower costs for consumers and businesses, and a more competitive financial sector. FinTech fosters innovation by promoting the development of new financial products and services. This innovation can lead to the creation of new markets and the expansion of existing ones, further contributing to economic performance (Chen et al., 2022).

However, the extent and nature of FinTech's influence on economic performance are far from uniform across different regions and levels of economic development. While FinTech offers numerous benefits, it can also adversely impact economic performance in several ways. The rapid expansion of FinTech can lead to increased financial instability, particularly when regulatory frameworks lag behind technological innovations. For example, the proliferation of decentralized finance (DeFi) and cryptocurrencies has introduced new risks related to fraud, cyberattacks, and market volatility, potentially destabilizing financial systems (Zohar, 2015). Additionally, the rise of FinTech could exacerbate inequality. While digital

platforms have the potential to enhance financial inclusion, they may also widen the digital divide, leaving behind those without access to technology or digital literacy (Gabor & Brooks, 2020). This could lead to unequal economic opportunities and outcomes, further entrenching disparities. Moreover, FinTech's reliance on data-driven models can result in biased lending practices, negatively affecting certain groups and stifling economic participation (Hurley & Adebayo, 2016).

Given that the impact of FinTech on economic performance is likely to differ depending on the economic development level of a country. In developed countries, where financial systems are already well-established and efficient, FinTech may primarily contribute to incremental improvements in efficiency and productivity. The high penetration of digital infrastructure and the availability of capital in these economies facilitate the rapid adoption and scaling of FinTech innovations. As a result, the impact of FinTech on economic performance in developed countries might be more pronounced in areas such as financial sector efficiency, innovation, and competitiveness. In contrast, in developing countries, where financial systems are often less developed, FinTech can play a transformative role by addressing key challenges such as financial exclusion, high transaction costs, and limited access to credit. FinTech innovations in these contexts have the potential to leapfrog traditional banking systems, enabling broader access to financial services for underserved populations and small and medium-sized enterprises (SMEs). This can lead to significant improvements in economic performance by fostering greater economic participation, reducing poverty, and supporting the growth of the informal economy.

Several studies have investigated the nexus between FinTech and economic performance but have not reached conclusive evidence. For instance, FinTech enhances efficiency and reduces operating costs, banks with higher FinTech scores are generally more operationally efficient and resilient during crises (Allen et al., 2024). Likewise, Toumi et al. (2022) found that during the COVID-19 pandemic, FinTech firms demonstrated better environmental performance compared to non-FinTech firms. Additionally, the market performance of FinTech firms, particularly in terms of sustainability and efficiency, was superior to that of non-FinTech firms during this period. Conversely, Almulla et al. (2021) examined the impact of financial technology (FinTech) services provided by banks on their performance in the Gulf Cooperation Countries, considering the competitive growth of FinTech firms from 2014 to 2019. The study found that FinTech services had a negative impact on the financial performance of both conventional and Islamic banks. Figure 1 displays a boxplot summarizing the literature, highlighting that empirical estimates vary significantly across studies and by the economic development level of the country.

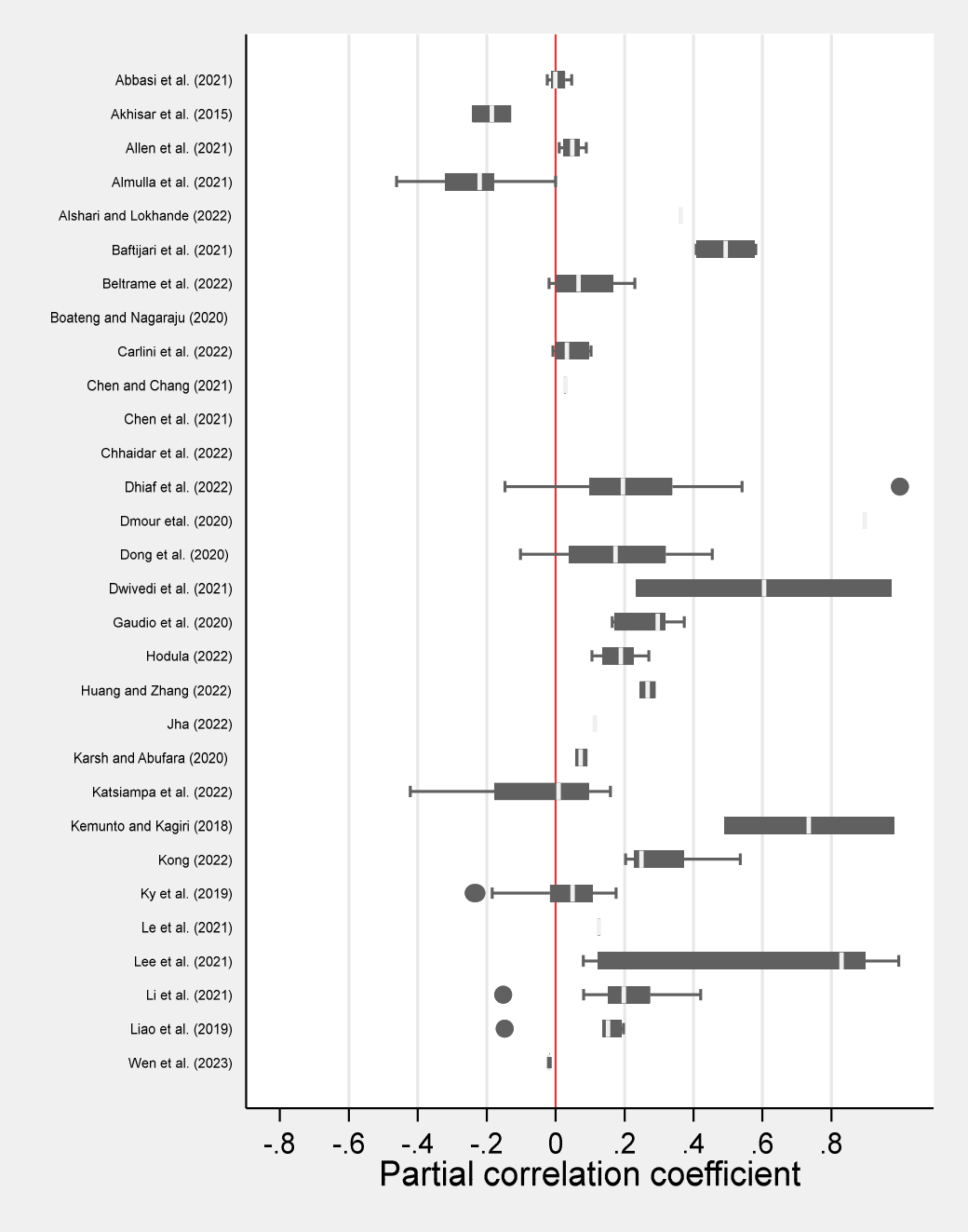



**Figure 1**. Box plot of *PCC* by study

*Notes*: The box plot demonstrates the impact of FinTech on economic performance based on 408 estimates from 30 studies. The vertical red line indicates no association. The length of each box represents the interquartile range (P25-P75), with the central line showing the median. Whiskers extend to the smallest and largest estimates within 1.5 times the interquartile range. The lines on the far left and right denote the lower and upper adjacent values, respectively.

Source: Authors' illustration

Understanding this complex nexus requires a comprehensive and nuanced approach, which is the focus of this article. This paper aims to explore the relationship between FinTech and economic performance through a meta-study that systematically analyzes and synthesizes existing empirical research. By examining how this nexus varies across different economic contexts—such as developed and developing countries—and across various regions—such as Asia, the Middle East & Africa, Europe, and North America—this study

seeks to provide a clearer understanding of the global dynamics at play. The motivation for such analysis stems from the growing body of literature that offers mixed and sometimes conflicting findings on the FinTech-economic performance relationship. A meta-study approach allows for the aggregation of these findings to identify broader patterns, commonalities, and divergences, thus offering valuable insights for policymakers, researchers, and practitioners.

The diverse and context-specific nature of FinTech's impact on economic performance necessitates a meta-study approach. The existing literature on the subject is extensive but fragmented, with studies often focusing on specific countries, regions, or aspects of FinTech. These studies employ a variety of methodologies, data sources, and theoretical frameworks, leading to a wide range of findings that are not always comparable or easily generalizable. A meta-study provides a systematic and rigorous method for synthesizing the results of multiple studies, allowing for the identification of overarching trends and the assessment of the overall strength of the evidence. By aggregating data from a large number of studies, a meta-study can also help to mitigate the limitations of individual studies, such as small sample sizes or methodological biases, and provide more robust conclusions. Moreover, a meta-study can reveal how the FinTech-economic performance nexus differs across different contexts. For example, it can shed light on whether the impact of FinTech on economic performance is more significant in developed or developing countries, or whether certain types of FinTech innovations have a greater impact in specific regions. This context-specific analysis is crucial for understanding the global dynamics of FinTech and for informing the development of policies that can maximize its positive impact on economic performance.

This paper contributes to the existing literature in several ways. First, this is the first study that highlights the differentiation of the FinTech-economic performance nexus by economic development level. In developed countries, FinTech primarily enhances efficiency and innovation within mature financial systems, leading to incremental gains in productivity. In contrast, in developing countries, FinTech can drive transformative changes by addressing structural weaknesses, such as limited banking infrastructure and access to credit, thereby promoting financial inclusion and poverty reduction. The paper emphasizes that the impact of FinTech varies significantly between these contexts, with different mediating factors influencing its effectiveness in enhancing economic performance. Understanding these distinctions is key to optimizing FinTech's potential.

Second, this paper explores how the FinTech-economic performance nexus varies not only by economic development level but also across different regions. Regional differences are influenced by factors like financial system structure, cultural attitudes, and regulatory environments. In Asia, rapid FinTech growth, especially in China and India, drives significant improvements in financial inclusion due to high mobile phone penetration and supportive policies. In contrast, the Middle East and Africa show diverse outcomes, with some countries like Kenya benefiting from FinTech, while others face challenges due to inadequate infrastructure. Europe’s FinTech sector thrives on regulatory initiatives, while North America, particularly the U.S., experiences significant innovation despite a fragmented regulatory landscape. The paper also considers a global perspective, analyzing how international frameworks and cross-border dynamics influence FinTech’s impact on economic performance. The study offers valuable insights for policymakers and practitioners on leveraging FinTech across various contexts.

Third, we performed publication selection bias (PSB) in the literature on the impact of FinTech on economic performance. PSB occurs when studies with significant or favorable results are more likely to be published, potentially skewing the overall understanding of FinTech's effects. Examining PSB is crucial in a meta-study to ensure that findings reflect a true and comprehensive picture of FinTech’s impact. By addressing PSB, we can improve the reliability and validity of meta-analyses, leading to more accurate and actionable insights for researchers and policymakers.

The rest of the study is organized as follows: Section 2 outlines the process for selecting studies included in the meta-analysis. Section 3 offers a synthesis of the gathered estimates. Section 4 evaluates publication selection bias. Finally, Section 5 delivers the concluding remarks.

## 2. Literature selection process and methodology

This section details our methods for selecting and classifying relevant studies, as well as our approach to performing the meta-analysis using the gathered empirical data. We have assembled literature that investigates the impact of FinTech on economic performance. The relationship underlying this analysis is demonstrated in Equation (1):

$$Economic\ Performance_{it} = \propto + \beta\ FinTech_{it} + \gamma X_{it} + + \varepsilon_{it} \quad (1)$$

In this context, i and t represent the country and time indices, respectively, while, $Economic\ Performance_{it}$ includes factors like economic growth, productivity, employment, and returns on assets or equity. $FinTech_{it}$ covers various forms such as digital payments, blockchain and cryptocurrencies, internet finance index, mobile money, and peer-to-peer (P2P) lending and crowdfunding. $X_{it}$ is a vector of control variables (such as GDP per capita, financial market development, regulatory quality, human capital, technological infrastructure, and institutional quality, among others) that account for other influences on economic performance, while $\varepsilon_{it}$ denotes the error term. Although Equation (1) is designed for panel data settings, previous studies have often used cross-sectional data. The choice of dependent, independent, and control variables differs across the studies included in this meta-analysis.

We conducted an extensive literature review to explore the FinTech-economic performance nexus, utilizing databases such as Google Scholar, EconLit, and Web of Science. Our search involved keywords like "FinTech" paired with "economic performance" or "FinTech impact on economy." To maintain the relevance and reliability of the literature, we applied specific selection criteria. First, we focused on studies published in English to allow independent coding by three authors. Second, we included both published and unpublished studies, acknowledging that excluding unpublished research in a meta-analysis could lead to bias and lower the quality of estimates (Stanley & Doucouliagos, 2012). To ensure quality, we assigned weights to each study based on its SCImago Journal Rank, giving higher-ranked studies greater importance. Third, we only considered empirical studies that provided sufficient data, such as t-statistics and degrees of freedom, allowing us to calculate partial correlation coefficients. We excluded studies that only presented descriptive statistics or correlation analyses.

The estimates from primary studies, aimed at explaining the FinTech-economic performance relationship, were derived from various regression models, including log-lin, lin-log, or log-log models, and utilized different measurement scales and units. As a result, the coefficients reflecting the impact of environmental factors on economic performance across these studies are not directly comparable. Following the approach by , we used partial correlation coefficients (PCCs) to standardize effect sizes across multiple studies examining the relationship between specific variables. This method enables the comparison and synthesis of findings from diverse studies and helps assess the strength and direction of the relationship between two variables while controlling for additional factors. The estimates collected were converted into PCCs using Equation (2).

$$PCC_k = \frac{t_k}{\sqrt{t_k^2 + df_k}} \quad (2)$$

where the standard error of the PCC is given by $\sqrt{(1 - PCC_k^2)/df_k}$, and where $t_k$ and $df_k$ denote the t-statistic and the degrees of freedom of the $k^{th}$estimate, respectively, for $k = 1, 2, \ldots, K$ collected estimates. The partial correlation coefficient (PCC) is a dimensionless metric used in this study to evaluate

the strength of the relationship between FinTech information and economic performance. When holding other variables constant, a PCC of 0.10 suggests that FinTech-related information accounts for about 10% of the variation in economic performance observed in this study.

## 3. Synthesis of estimates

In the initial stage of our analysis, we conduct a meta-synthesis of estimates, which is crucial for aggregating and analyzing diverse data from various studies. This method provides a more comprehensive and reliable understanding of a subject by integrating findings from multiple sources, thereby strengthening the conclusions and supporting evidence-based decision-making (Borenstein et al., 2007). Synthesizing quantitative data from the collected estimates typically involves using either meta-fixed-effects or meta-random-effects models. The meta-fixed-effects model assumes a consistent treatment effect across all studies, while the meta-random-effects model allows for variations in the treatment effect between studies. The choice of model is determined through an empirical test using Cochrane's Q test of homogeneity. If this test rejects the null hypothesis, indicating significant heterogeneity among studies, the random-effects model is preferred; otherwise, the fixed-effects model is used (Borenstein et al., 2007). In our analysis, Cochrane's Q test of homogeneity rejects the null hypothesis, supporting the use of the random-effects model.

Panel (a) of Table 2 presents the synthesized impact of FinTech on economic performance across all studies, while Panels (b) and (c) display the relationship by the economic development of the country and across various regions, respectively. The first row of the table shows the overall effect of FinTech on economic performance from all studies, with subsequent rows detailing the results by economic development and region. As shown in Table 2, except for the studies focusing on the Middle East & Africa, where the association is found to be insignificant, the relationship between FinTech and economic performance is significantly positive across different levels of economic development and regions. Overall, the impact of FinTech on economic performance is 0.11, as indicated by the partial correlation coefficients (PCCs).

**Table 2**. Synthesis of Collected Estimates

| | | (a) Traditional synthesis | | (b) Heterogeneity test and measures | | |
|---|---|---|---|---|---|---|
| Study type | Number of estimates ($K$) | Fixed-effect model ($z$ value)[a] | Random-effects model ($z$ value)[a] | Cochran $Q$ test of homogeneity ($p$ value)[b] | $I^2$ statistic[c] | $H$ statistic[d] |
| (a) All studies | 393 | 0.068 *** | 0.11 *** | 66985.76 *** | 99.5 | 14.204 |
| | | 114.791 | 11.624 | 0.000 | | |
| (b) By Economic development | | | | | | |
| Developed countries sample | 63 | 0.045 *** | 0.127 *** | 2833.255 *** | 98 | 7.113 |
| | | 16.322 | 6.02 | 0.000 | | |
| Developing countries sample | 312 | 0.316 *** | 0.098 *** | 45631.15 *** | 99.5 | 13.565 |
| | | 155.213 | 3.396 | 0.000 | | |
| Global sample | 18 | 0.032 *** | 0.145 *** | 61.169 *** | 72.2 | 1.897 |
| | | 11.222 | 5.423 | 0.000 | | |
| (c) By Regions | | | | | | |
| Studies of Asia-Pacific | 238 | 0.331 *** | 0.119 *** | 41164.71 *** | 99.6 | 15.337 |
| | | 153.017 | 3.419 | 0.000 | | |
| Studies of Middle East & Africa | 69 | 0.15 *** | 0.01 | 3145.37 *** | 97.9 | 6.852 |
| | | 23.867 | 0.235 | 0.000 | | |
| Studies of Europe | 22 | 0.243 *** | 0.243 *** | 44.9 *** | 66.6 | 1.73 |
| | | 11.578 | 6.355 | 0.000 | | |
| Studies of North America | 20 | 0.304 *** | 0.241 *** | 1478.027 *** | 98.7 | 8.82 |
| | | 37.774 | 3.295 | 0.000 | | |
| Studies of Global | 25 | 0.049 *** | 0.03 *** | 17591.93 *** | 93.6 | 3.96 |
| | | 37.131 | 5.412 | 0.000 | | |

*Notes*: See Table A1 for further details about the description of above regions.

[a] Null hypothesis: The synthesized effect size is zero.

[b] Null hypothesis: Studies are homogeneous.

[c] Range is between 0% and 100%; larger scores indicating heterogeneity.

[d] Takes zero in the case of homogeneity

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels respectively.

By economic development, the greatest impact is observed in global sample studies (0.145 PCC), followed by developed countries (0.127 PCC) and developing countries (0.098 PCC). Regionally, FinTech has the strongest influence on economic performance in Europe, followed by North America, Asia-Pacific, and global studies, with respective PCC values of 0.243, 0.241, 0.119, and 0.03. The association remains insignificant for studies in the Middle East & Africa.

## 4. Assessment of publication selection bias

Publication selection bias (PSB) occurs when researchers and journals tend to favor studies with statistically significant results or those that align with theoretical expectations, leading to an overrepresentation of positive findings in the literature. This bias may stem from various factors, including the pursuit of academic recognition, pressure to publish, and editorial preferences for novel or striking results. For example, there is often a preference for publishing studies that demonstrate a positive impact of FinTech on a country's economic performance, while studies that highlight the drawbacks or limitations of FinTech may receive less attention and are published less frequently. Additionally, a geographic bias exists in FinTech literature, with studies from regions with well-established FinTech infrastructures, such as Western Europe, the US, and Canada, being more commonly published than those from areas with less developed FinTech ecosystems. This bias can distort the perceived impact of FinTech on economic performance, potentially misrepresenting the reality in regions where FinTech is less prevalent. These biases have three major implications. First, publication bias can lead to an incomplete and distorted understanding of the research landscape, as studies with non-significant or negative results are less likely to be published, resulting in an overestimation of treatment effects and skewing the overall evidence towards positive findings. Second, the

neglect of potentially important interventions with non-significant or negative outcomes may cause researchers and policymakers to prioritize interventions or research directions based solely on the published literature, potentially leading to the misallocation of resources or the adoption of ineffective strategies (Ioannidis, 2022; Ioannidis et al., 2017).

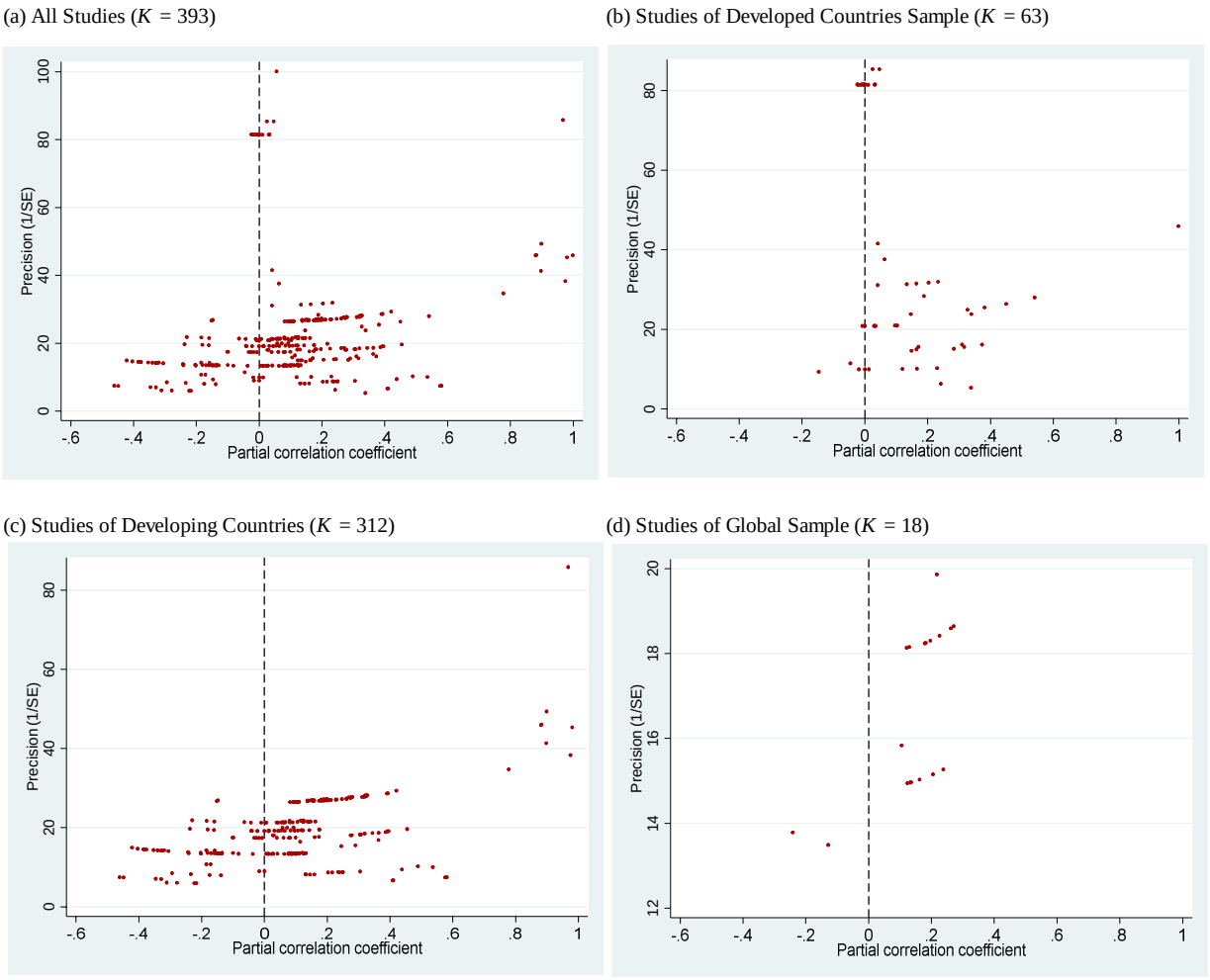



**Figure 2**. Funnel plots by regions

*Note*: Precision is the inverse of the standard error of the partial correlation coefficient (PCC)

Source: Authors' illustration

Researchers often use methods like the funnel plot to evaluate publication selection bias (PSB). A funnel plot displays partial correlation coefficients against the inverse of their standard errors. In the absence of PSB, the plot would form a symmetrical inverted funnel, with the most precise observations clustering near the true underlying effect (Sterne & Egger, 2001). Figure 2 (above) shows funnel plots for all studies and three specific regions, revealing asymmetry in each case, which suggests the presence of publication bias. However, Stanley and Doucouliagos (2012) argued that detecting PSB using funnel plots can be subjective and recommended alternative empirical methods for its identification. They proposed three techniques: the funnel-asymmetry test (FAT), the precision-effect test (PET), and the precision-effect estimate with

standard error (PEESE). These methods allow for the empirical analysis of PSB by regressing the t-value of the kth estimate on precision, as outlined in Equation (3).

$$t_k = \beta_0 + \beta_1(1/SE_k) + v_k \quad (3)$$

The presence of publication selection bias (PSB) in the literature can be identified using the funnel-asymmetry test (FAT) if the intercept term β0 is statistically significant and different from zero. On the other hand, a significant value for β1 in the precision-effect test (PET) indicates a genuine underlying effect in the collected estimates. However, PET results can be biased if PSB is present. To mitigate this issue, Stanley and Doucouliagos (2012) suggest using the precision-effect estimate with standard error (PEESE) test, which adjusts for publication bias and provides a more accurate measure of the effect size, as calculated in Equation (4).

$$t_k = \beta_0 SE_k + \beta_1(1/SE_k) + v_k \quad (4)$$

Equation 4 suggests that there is a non-zero effect in the literature when β1 is statistically significant, with the strength of the relationship determined by the coefficient value of β1. To carry out the FAT-PET-PEESE tests, we follow the approach outlined by Anwar and Iwasaki (2022) and Cazachevici et al. (2020), using five different estimators: (1) Weighted Least Squares (WLS) with robust standard errors, where weights are based on inverse variance; (2) Cluster-Robust Ordinary Least Squares (OLS), which clusters the collected estimates by study and calculates robust standard errors; (3) Cluster-Robust Fixed-Effects Panel LSDV; (4) Mixed-Effects REML; and (5) Instrumental Variables Regression (IV) with fixed effects, using the inverse of the square root of the number of observations as an instrument.

Table 3 (below) presents the results of the publication bias analysis. In Panel (a), the FAT test provides strong evidence of publication bias in the literature, as four of the five models rejects the null hypothesis (β0=0). The PET test results, however, show that the null hypothesis is rejected in two out of five models, suggesting the lack of a genuine effect in the collected estimates. Panel (b) shows the results of the PEESE test, which indicate a non-zero effect adjusted for publication bias, with the null hypothesis (β1=0) being rejected in three out of the five models. The actual effects of FinTech on economic performance range from 0.118 to 0.659 in terms of PCC.

In conclusion, while there is evidence of publication bias in the literature on FinTech's impact on economic performance, the PEESE test results suggest that a meaningful effect does exist, though it may be overstated in some cases. These findings underscore the need for caution in interpreting the empirical evidence and highlight the importance of employing robust statistical methods to account for potential biases in meta-analyses.

## 5. Conclusion

This paper provides a comprehensive meta-study on the relationship between FinTech and economic performance, systematically analyzing existing empirical research to reveal how this relationship varies across different economic contexts and regions. Our analysis highlights a generally positive impact of FinTech on economic performance, with an overall partial correlation coefficient (PCC) of 0.11. This positive association is consistent across most regions and economic development levels, except for the Middle East & Africa, where the impact is found to be insignificant. The study also addresses publication bias in the literature. The funnel asymmetry test (FAT) indicates significant publication bias, with four of the five models rejecting the null hypothesis of no bias. Despite this, the precision-effect test (PET) reveals that the null hypothesis is only rejected in two models, suggesting potential issues with the robustness of the reported effects. However, the precision-effect estimate with standard error (PEESE) test confirms a non-zero effect of FinTech on economic performance after adjusting for publication bias, with PCCs ranging from 0.118 to 0.659. These findings underscore the complexity of the FinTech-economic

performance nexus. While FinTech generally has a positive impact on economic performance, the magnitude of this impact varies across regions and economic contexts. The evidence of publication bias highlights the need for a more nuanced understanding of FinTech's effects and suggests that some positive impacts reported in the literature might be overstated due to selective reporting.

**Table 3**. Meta-regression analysis of publication selection bias

**(a) FAT-PET test (Equation: $t = \beta_0 + \beta_1(1/SE) + v$)**

| Estimator | WLS, robust | WLS, cluster | Cluster-robust fixed-effects panel LSDV | Mixed-effects REML | IV |
|---|---|---|---|---|---|
| Model | [1] | [2] | [3][a] | [4] | [5] |
| Publication bias: (FAT: $H_0: \beta_0 = 0$) | 0.900*** | 0.900*** | 0.150 | 0.113*** | 0.113*** |
| | (0.118) | (0.126) | (0.133) | (0.016) | (0.016) |
| True effect: $1/SE$ (PET: $H_0: \beta_1 = 0$) | -10.057*** | -10.057*** | -1.391 | 1.499 | 1.499 |
| | (1.444) | (1.808) | (4.931) | (2.769) | (2.769) |
| Observations | 333 | 333 | 333 | 333 | 333 |

**(b) PEESE approach (Equation: $t = \beta_0 SE + \beta_1(1/SE) + v$)**

| Estimator | WLS, robust | WLS, cluster | Population-averaged panel GEE | Mixed-effects REML | IV |
|---|---|---|---|---|---|
| Model | [6] | [7] | [8] | [9] | [10] |
| *SE* | -56.576*** | -56.576*** | -52.911* | -52.911 | -52.911 |
| | (13.237) | (14.776) | (30.678) | (39.613) | (39.613) |
| Non-zero effect: $1/SE$ ($H_0: \beta_1 = 0$) | 0.659*** | 0.659*** | 0.118*** | 0.118 | 0.118 |
| | (0.121) | (0.135) | (0.017) | (0.093) | (0.093) |
| Observations | 333 | 333 | 333 | 333 | 333 |

*Notes* : Specifications [1] to [3], [6], [7], and [10] are weighted by inverse variance. Specifications [1], [2], [6] and [7] are estimated using WLS. Following Cazachevici et al. (2021), we used panel data instrumental variables regression with fixed effects in specifications [5] and [10], and where the inverse of the square root of the number of degrees of freedom is used as an instrument.

[a] Hausman test: $\chi^2 = 0.27$, $p = 0.602$

Figures in parentheses beneath the regression coefficients are robust standard errors except for Models [5] and [9] where standard errors are estimated, respectively. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' estimation

Policymakers should design and implement balanced FinTech policies that encourage innovation while addressing potential risks. Given the positive impact of FinTech on economic performance, governments in developing regions, particularly the Middle East & Africa, should create supportive regulatory environments to stimulate FinTech growth and bridge the gap in economic benefits. Furthermore, to combat publication bias and improve the reliability of research on FinTech, policymakers and research institutions should promote transparent reporting practices. Encouraging the publication of all research findings, including those with non-significant results, will lead to a more accurate and comprehensive understanding of FinTech's impact on economic performance.

Future research could focus on exploring the specific factors that contribute to regional variations in the impact of FinTech on economic performance. This includes investigating the role of local regulatory environments, infrastructure development, and market maturity in shaping FinTech's effectiveness. Additionally, future researchers should conduct longitudinal studies to assess how the impact of FinTech on economic performance evolves over time. This research could provide insights into how technological advancements and changing economic conditions affect the relationship between FinTech and economic growth. In summary, while this study confirms a generally positive effect of FinTech on economic performance, it also highlights the need for more rigorous and unbiased research to fully understand the

dynamics at play. Addressing publication bias and focusing on regional and temporal variations will be crucial for developing effective policies and advancing the field of FinTech research.

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# INSURANCE PERSPECTIVES ON CLIMATE CHANGE-INDUCED PUBLIC HEALTH EMERGENCIES: A RAPID SCOPING REVIEW

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## ABSTRACT

Climate-induced extreme weather and infectious diseases result in enormous negative economic impacts. Associated insurance is an important adaptation strategy, and a lack of coverage for vulnerable populations is an emerging social determinant of health. We explore current perspectives on insurance for natural disasters and infectious diseases amid climate crises.129 articles were included following a comprehensive search. Index-based insurance and public-private sector partnerships were discussed as possible adaptive measures to manage climate risk. In addition to risk perception and social capital influence insurance purchasing. Corporate strategies insurance companies use to remain sustainable may affect public interests. Multisector dialogue and extensive research are needed to find innovative and effective solutions to safeguard vulnerable populations and ensure the sustainability of insurance systems.

## Introduction

In September 2022, two Category 4 hurricanes, Fiona and Ian, wreaked havoc across Atlantic Canada and southwest Florida and South Carolina in the U.S., respectively. These hurricanes destroyed property and infrastructure, incurring billions of dollars in damage due to the storm surge and flooding.[1,2] Meanwhile, increased heat, extended drought, and dry atmosphere have amplified the aridity of forests, augmented the risk and extent of wildfires in the western U.S. and Canada and burned millions of acres of forest and thousands of homes, with numerous communities recently being completely wiped out.[3,4] This catastrophic destruction cannot be viewed in isolation, and these events must instead be seen as key examples of how climate change is rapidly emerging as a formidable public health emergency.[5] In addition to natural disasters, climate change has also caused an increase in the incidence and spread of Lyme disease and West Nile Virus infection throughout North America via the expansion of ticks and mosquitos and their habitats and has enhanced microbe multiplication due to the warming climate.[6-11]

Climate disruption and extreme weather conditions are already worse than anticipated, and emerging infectious diseases are spreading faster than predicted, resulting in enormous negative impacts on the household economy and public finances.[5] Adaptation was the key to the climate change action framework of the 26th United Nations climate change Conference of the Parties (COP26), and insurance was one of the most important components of the proposed adaptation strategies. A lack of insurance coverage for vulnerable communities is an emerging social determinant of health that has already affected a significant number of people.[12,13] Since most of the financial toll due to extreme weather conditions is not fully recovered by usual insurance policy, people are required to buy separate coverage for flooding caused by storm surges, and most people who need this coverage do not have it because it is often not offered or is prohibitively expensive.[9,13-15] Despite the very high (three times the national average) annual premium on Florida property insurance, it is not enough to cover any risks associated with storms or sea level rise.[16] This study aims to provide a comprehensive overview of insurance for natural disasters and infectious diseases and how the insurance sectors, government, and public can potentially adapt to current climate crises.

## Methods

### Study Design

This study was conducted as a rapid scoping review to produce evidence in a resource-efficient manner. Scoping reviews provide a base assessment of the current research scope and are useful when establishing a research foundation in an emerging area.[17] Rapid reviews reduce the resource burden while maintaining rigor and can help establish directions for future research.[17]

### Eligibility Criteria

Studies eligible for inclusion met the following criteria (see Table 1 for search terms).

***Inclusion Criteria***

- Quantitative and qualitative studies
- Peer-reviewed articles, industry and government reports, and academic theses
- Discussion on climate change and insurance or financial system impacts
- Focuses on vector-borne infectious diseases or extreme weather events
- Global focus

***Exclusion Criteria***

- Non-focal climate topics
    - food insecurity
    - pollution
    - chronic disease shifts
    - mental health not linked to the focal topic
    - water quality
    - water and foodborne diseases not linked to extreme weather
- Non-focal financial focus
    - general financial impacts not linked to the focal climate topic
- Not available in English
- Full text not available
- Ethnographic studies due to their broad focus
- News articles

Table 1. Boolean Terms for Database Search

| Framework | Concept | Variations |
|---|---|---|
| Climate | Climate change | Climate change, climate crisis, global warming, climate, climate risk |
| | Weather | Extreme weather, climate event, wildfire, flood, hurricane, cyclone heatwave, storm, seismological event, earthquake, volcano, tornado, winter storm, dust storm, monsoon, drought, winter storm |
| | Infectious Disease | Infectious disease, vector borne disease, Lyme disease, West Nile virus, mosquito borne disease, |
| Connection (AND) | Impact | Impact, influence, cause, effect, affect, consequence, |
| | Adaptation | Adaptation, mitigation, adjustment, remodeling, reconstruct, alleviation |
| Economic (AND) | Finance | Financial, economic. Insurance, payment, claims, subsidies, risk recovery |
| Industry | Organization | Insurance, sector, industry, government, policy |

**Search Strategy**

***Information Sources***

Due to the rapid review, databases searched were limited to the following major databases: Web of Science, Medline, Scopus, SocINDEX, Business Source Complete, EconLIT, and ProQuest Environmental Science Collection. Searches were conducted on 6 June 2022.

***Grey Literature***

A thorough grey literature search of business reports, conference presentations, and dissertations was conducted to include industry perspectives. Mixed methods studies were targeted to ensure a comprehensive view of the available data types. Search sites included Google, Google Scholar, and ProQuest: Thesis. The first 400 results of each search were screened.

**Study Screening and Selection**

Following search development, 3,767 articles were identified in the search and imported into EndNote, and duplicates were removed. Articles were then reviewed by the primary investigator by abstract and then by

full text. Seven hundred thirty-eight full-text documents were screened for inclusion, from which 208 met the inclusion criteria. Research from the OECD countries was separated from non-OECD countries due to the potential influence of international aid groups, and the complexity of insurance systems in non-OECD countries clouded the results. Results from OECD countries included 129 articles (Figure 1) (see supplementary file 1 for the included citation list, referenced with prefix [S]). Results from non-OECD countries will be analyzed and reported separately to compare results to OECD countries.

***Data Extraction***

Data was extracted from full texts into an Excel spreadsheet for analysis. Information extracted included Basic article information (i.e. Title, authors, publication date, study location, full abstract), study objectives and design, relevant results (i.e. insurance based context and results, policy discussions and context, extreme weather type)

Fig 1. Flow diagram of article selection

Fig 1. Flow diagram of article selection

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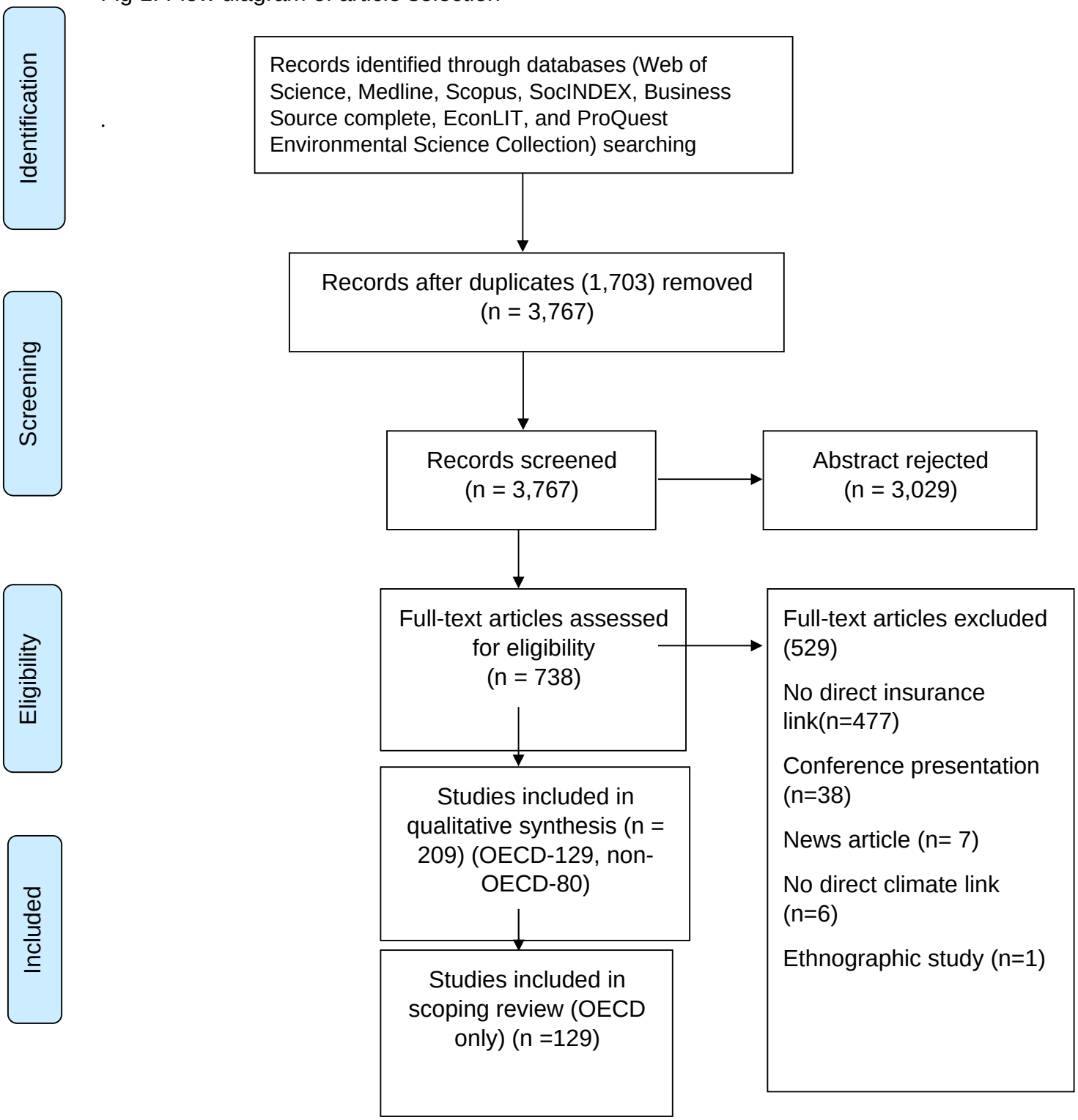




Figure 2: Publication time line (from 1988 to 2021)

Table 2. Geographic Distribution of the Included Studies

| Country/Region | Number of Studies |
|---|---|
| Canada | 4 |
| US | 42 |
| Australia | 11 |
| EU* | 34 |
| Austria | 2 |
| Germany | 5 |
| Netherlands | 9 |
| Italy | 4 |
| Sweden | 1 |
| UK | 6 |
| Mexico | 1 |
| Norway | 1 |
| Global | 14 |
| Other** | 14 |

* Individual country numbers will not add to EU total as some studies focused on EU countries collectively.
**Includes discussions, methods papers, and reviews that are not location specific

**Included Studies**

Studies included were published between 1988 and 2022 (Figure 2). Preceding 2004, only four studies[S54-57] were published in 16 years, and the other 125 studies were published in the following 19 years, with a considerable jump in publications starting in 2019[S1-53] (Fig. 2). The majority of studies were based in the U.S.[S15-35,57-71] (n=37) or EU[S1-10,56,72-96] (n=34) context. Most of Europe's studies came from the Netherlands[S76-81,86-88] (n=9) (Table 2).

## Results

In terms of disaster type covered, flood damages (from rainfall, storms, or sea-level rise) were the focus of the majority of articles (n=45)[S1-5,22-29,41-47,69-72,74-85,97-106], followed by damages to crops (from rainfall changes, temperature extremes, storm damages)[S7-9,11,13,30-34,39,49,53,56,58,61,62,89,95,107-111] (n= 24), and then storm-based damages (hailstorms, windstorms, tornados, etc.)[S14-20,40,50,55,57,64-68,86,88,92,112-115] (n=22).

Damages from wildfires were underrepresented in the literature, with only three articles specifically discussing wildfires.[S43,59,115] However, many articles (n=33)[S10,12,21,35-38,48,52,54,60,63,73,87,90,91,93,94,96,116-129] discussed general disaster recovery without a focus on disaster type. It is also worth noting that even though infectious diseases were included in the search criteria, studies addressing them were not represented (n=0) in the literature from OECD countries.

### Themes

#### *Index-based Insurance*

Index-based insurance is frequently discussed in the (n=13) as a possible mitigation strategy for climate-based risks in the insurance sector.[S5,8,11,13,30,32,49,51,53,60,108-110] Index-based insurance is unique in that insurance providers pay out benefits based on a pre-determined index (i.e., rainfall level, storm severity, etc.) for associated losses.[18] In an index-based system, the underlying index is based on objective measures, such as rainfall, that show a correlation with outcomes, such as crop yield.[S109] Index-based insurance is most commonly used for crop-insurance (n=10) where rainfall or temperature levels determine the insurance payout rather than measured damages. However, there are discussions across countries about adapting these models to disaster coverage. Temporally, this option was not discussed in a climate context until 2008, and it followed a similar publication trend as the overall studies reviewed. The literature argues that index-based insurance may help reduce or manage the risks of extreme events and is able to reduce premiums.[S32,49,60,108-10] Premium reductions are typically attributed to lower administrative costs as on-the-ground assessments are unnecessary, transaction costs are lower, and market volatility is reduced.[S49,60,109] One study found that heat-index insurance reduced premiums by 27–29% for corn farmers in Illinois in the U.S.[S32] However, the efficiency of index-based insurance compared to traditional models is highly dependent on geography and local economic factors and can even change seasonally within a region.[S11,30,108-10] In terms of geography, an Australian study found that rainfall-based index insurance in the eastern part of the country was consistently inefficient, but western wheat region farmers saw benefits up to AU$97 per household.[S11] Economically, weather-based index insurance reduces the cost of risk when the correlation between yields or outcomes and the index used is increased.[S109] Additionally, a limitation of index-based insurance is the risk that insured individuals could suffer losses and receive inadequate payment to cover actual damages.[S109] Considering this, insurance payments should be developed in consideration with local recovery costs.

#### *Public-private partnerships*

Discussions of government involvement in insurance adaptation and management are extensive in the literature (n=40).[S1,4,7,8,15,18,19,21-23,29,33,36,40,42,50,65,66,69,71,75,78,79,81-83,87,90, 91,94,96,97,104,107,115,116, 118,120,123,128] Most of these policy discussions are centered around the U.S. (n=14), with five focusing specifically on the National Flood Insurance Program and the E.U. (n=13). Different levels of government involvement and strategies are discussed, such as national insurance programs (as seen in the U.S.)[S7,8,26,30,78],subsidized reinsurance programs[S3,94], and tax and emergency aid-based policy incentivization.[S19,65] Subsidized insurance is generally the option implemented in high-income countries.[S7] Currently, subsidized crop insurance is the primary way farmers manage losses in the U.S. and is mostly used by industrial-sized farms.[S30] Utilization of this program has only increased with time, with participation increasing from 30% to 60% between 1994 and 2000.[S7] There is also pressure on governments to buy back high-risk properties to reduce long-term

risk.[S24,18] Subsidized reinsurance is also presented as a solution for rising premiums and subsequent decreasing demand.[S3] Suggestions from a study of the U.K's reinsurance program indicate that public-private partnerships should incentivize risk reduction and be based on transparency and equal treatment.[S94] Naturally, the applicability of government-led programs will be unique to each country's political landscape; however, the extensive literature on government involvement suggests a shared responsibility between the public and private sectors. A downside to subsidized insurance presented is that subsidized flood insurance can lead to unsustainable farming practices.[S26] Flood zone land typically has poor soil quality, making farm sustainability challenging.[S26] Without available flood insurance, flood zone land could instead be used for flood retention purposes.[S26] In terms of disaster type, floods are discussed most frequently in terms of government involvement (n=16). While the U.S.'s National Flood Insurance program does contribute to this, the uninsurability of most flood plains is also likely a factor, as government involvement is potentially more acceptable in areas where the private sector fails.[19]

### *Moral Hazard*

Longstanding discussions surrounding moral hazard were also present (n=7).[S19,26,32,82,91,97,126] A moral hazard is the possibility that insurance, particularly subsidized insurance, will disincentivize adaptive measures.[20] For example, the continuous rebuilding of homes in high-risk coastal zones or the use of flood plains for agriculture.[S18,26] Temporally, these articles started in 2004 and have rapidly increased since 2021, suggesting a recent resurgence in interest. Most of these discussions center on flood insurance, likely because it is subsidized more often. The literature focuses on strategies to minimize this hazard through more policy regulation and incentivizing or mandating adaptive measures to access funding. These measures can focus on relevant adaptive measures or incentivize relocation in particularly risky regions. Some specific suggestions included a "twice and out" buyout program[S18], reduced premiums for adaptation measures, and education on risk and the programs available. The buyback program proposed would allow property destroyed once to either be rebuilt or sold to the government. Upon the property's second destruction or if it has accrued enough damage beyond a set threshold, the property will be sold to the government at twice its market value.[S18] Education on risk and the programs available is necessary as a U.S. survey showed that coastal homeowners are not updating their homes for hurricane risk because they are unaware of insurance incentives and policies, not because they expect insurance to cover losses.[S19]

### *Public Perspectives*

Research into community members' perspectives is essential to identify barriers to adaptation and motivations for purchasing insurance.[S2,15,16,17,20,29,35,36,42,58,59,82,101] A household survey in Germany found that the propensity to mitigate flood damage will increase in the future as a ‘climate adaptation signal’.[S82] However, another study showed that risk perception and belief alone were not enough to account for adaptation decisions, as social capital (*bonding*, *bridging*, and *linking*) also matters.[S36] *Bonding* refers to closely knit groups joined typically by family, friendship, or a shared social identity.[S36] *Bridging* is the bonding of groups between people who have differences in some socio-demographic or social identity.[S36] These two relationship types are characteristically horizontal, whereas *linking* is a vertical relationship between individuals or communities and larger political, economic, or institutional structures that hold different levels of authority.[S36] Having social capital in the form of these connections contributed to adaptive capacity and was shown to be particularly powerful in rural communities due to the absence of more formal supports.[S26] In addition to adaptive behaviors, purchasing insurance was influenced by perceived damages, risk tolerance, social norms, and flood zones.[S17,29,59,101] Social norms refer to how individuals situate themselves within their social circles and the pressure they feel within those relationships. The more individuals felt their peers were taking adaptive measures, the more likely they were to report purchasing insurance.[S101] In terms of relocation vs. rebuilding, one study addressed this topic following Hurricane Sandy (2012) and found that relocation might lessen the negative consequences of disaster-related housing damage compared to rebuilding.[S90] Additionally, one Canadian study found that individuals are not willing to pay much for insurance and expect the government to cover the majority of the financial recovery costs.[S42]

## Discussion

In COP26, the OECD countries failed to make any commitments to keep planetary warming under 1.5°C; instead, it is expected to rise above 1.8°C, even if the existing key pledges are followed up with meaningful policies and legislation.[S21] Thus, we are going to experience more frequent and high-intensity natural disasters and rising incidences of infectious diseases, which will eventually impact existing insurance policies. For the sustainability of the insurance sector, the industry is anticipated to change their strategies, which may potentially go against the interest and capacity of vulnerable households.

Index-based insurance and government partnerships are areas of high interest in terms of adaptive capabilities. However, the cost-effectiveness of index-based insurance is widely variable, and policy is highly localized. Considering these factors, instead of forming a universal policy, more localized research should be conducted on these models to identify contexts in which there are viable alternatives. The pitfalls of index-based insurance are that some high-risk communities, such as coastal communities, may not be coverable. Alternatively, an individual may experience damage but receive no insurance payments if the event falls below the determined index.

Government-based programs can be helpful in shifting risk and burden away from the private sector and are more stable as they do not experience the same market volatility. However, their drawbacks include the creation of a moral hazard, particularly with individuals continuing to live in high-risk coastal zones or using poor-quality land for agriculture. Considering this moral hazard, little evidence has indicated that insurance coverage alone impacts individuals' adaptive behaviors; however, protecting against this through incentives and regulations is well supported in the literature. The specific mechanisms of incentivization or regulations implemented will be specific to the location and disaster type. However, moral hazards for subsidized insurance is better documented and requires more aggressive mitigating programs, such as the twice and out buyback program previously discussed.

Studying public perceptions of climate change risk is particularly important as it has been shown that belief or risk is possibly not the leading indicator of adaptive behavior. More research should be conducted that considers community perspectives in relation to adaptive interventions suggested in the literature.

Another important note is that while food insecurity was excluded from this review, crop insurance was well represented. This is likely because the presence of crop insurance functions independently of food insecurity. When farmers lose crops and receive insurance payments, it allows them to recover for the next season. However, this insurance cannot provide additional food to the community, so associated food insecurity will need to be managed through different systems and is beyond the scope of this review.

Despite a significant rise in the number of recent climate change and insurance-related studies, there are still gaps in research on wildfires, infectious diseases and insurance, despite the increasing frequency and intensity of devastating wildfires and expansion of vector habitats. The application of experience with insurance for floods, storms, and wildfires can be contested since the risk perceptions and mitigations, health impacts, and compensation for wildfires are unique and will require different approaches. Rising incidences of infectious diseases resulting in unprecedented inpatient care costs and long-term disability will further stress existing overstretched health costs. We suggest extensive research to find innovative and effective solutions to safeguard the additional burden of infectious diseases and to ensure the sustainability of insurance systems.

Lastly, the authors recommend that national and subnational public health agencies, law makers and the insurance industry must have effective dialogue and develop pragmatic policies by putting public interest and the sustainability of the industry at the forefront. These institutions can play pivotal roles by addressing knowledge gaps and working in tandem with these stakeholders.

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**Supplementary file 1**
**Finally selected articles (n=129)**


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# BALANCING RISK, FAIRNESS, AND COSTS: A FRAMEWORK FOR HYDROGEN REFUELING STATION LOCATION IN URBAN AREAS

This research presents a framework to optimize the location-allocation of hydrogen refueling stations (HRS) by addressing demographics of different zones within a city. Additionally, it contributes to the literature by considering multiple objectives and attributes such as fairness, costs, and drivers' preferences in determining the location and capacity of HRSs. The proposed method is validated using data from the Halifax Regional Municipality (HRM). A risk assessment evaluates potential fire hazards at proposed locations using the Technique for Order of Preference by Similarity to the Ideal Solution (TOPSIS) ranking method. The Pareto front obtained from the tri-objective model is used to help policy-makers decide the optimal location of HRSs by balancing economic, fairness in access, and drivers' preference objectives.

## Introduction

The transportation sector has a prominent role in the global air pollution as it heavily relies on burning fossil fuels comprising more than 60% of the world's total oil consumption (Bartolozzi et al., 2013). In particular, in Canada, the transportation sector accounts for 22% of aggregate emissions across all transportation categories (Government of Canada, 2017). Hydrogen, as a versatile and high-energy-density carrier, holds economic and environmental benefits and could play a crucial role in decarbonization of the transportation sector (Government of Canada, 2020).

Despite the potential benefits of using Hydrogen in the transportation sector, a number of formidable challenges hinder its widespread early adoption. Specifically, substantial capital investment is required to establish adequate refueling infrastructure necessary to provide smooth Hydrogen Vehicle (HV) operations and to boost the adoption of HVs among drivers (Kang & Recker, 2015). In designing the network of refueling stations, besides the cost, two main factors should be taken into account: fairness and equity in getting access to the network, and drivers' preferences. In resource allocation context, the main focus of equity and fairness considerations is on treating different customers fairly and providing them with an equal distribution of benefits (Mostajabdaveh et al., 2019). The literature lacks in incorporating these factors, all together, when deciding the location and capacity of HRSs.

Also, it should be noted that taking customers' preferences into account has a rich history in the operations research literature. Notably, within the context of facility location problems, it is assumed that decisions on the location of facilities should be in line with customers' preferences (ReVelle, 1986), (Drezner, 1994).

The ultimate goal of this study is developing a comprehensive framework to help decision-makers in selecting optimal location and capacity of HRSs from multiple-stakeholders' perspective. To achieve this goal, the following research objectives are targeted: incorporating and evaluating the role of demographic data on the HV refueling demand prediction, involving the public concern regarding the risk associated with hydrogen refueling into the optimal location decisions process, integrating HV drivers' preferences in the location decisions, evaluating the flexibility of the proposed framework to the potential changes in the future, and investigating the role pre-screening potential locations for HRSs based on a set of criteria on the tri-objective function values.

## Literature Review

The location-allocation problem entails strategically placing facilities in the decision area to optimize objectives in production and supply chains (e.g., factories, warehouses, stations). Such decisions can affect costs and profits for the decision-maker (Owen & Daskin, 1998). In the HRS location-allocation problems, there exists considerable investment and operational costs which create a profitability challenge that necessitates government policy support. Therefore, a majority of studies focused on minimizing the cost when deciding the optimal location of HRSs. However, designing HRSs requires involving multiple factors (Ibrahim & Al-Mohannadi, 2023). Geçici et al. highlighted the importance of considering variations in hydrogen demand in different periods in designing HRS networks (Geçici et al., 2022). Since the hydrogen demand is uncertain for the future, there are different prediction methods to predict it to use in the location-allocation model (Kang & Recker, 2015), (Krafft et al., 2021), (Fuse et al., 2021), (Kim et al., 2020), (Kuby et al., 2009), (Zheng et al., 2021), (Lin et al., 2020). Regarding safety concerns, Yoo et al. assessed the risk of liquid and gaseous hydrogen for site selection decisions (Yoo et al., 2021). In addition, Azadnia et al. underscored the significance of risk analysis for designing hydrogen supply chains and proposed some risk mitigation strategies (Azadnia et al., 2023).

In terms of fairness, social justice, and equity in access to HRSs, there is a lack of studies to address these important factors. Therefore, we reviewed studies that suggested some innovative ideas to involve fairness in the location-allocation problems. Espejo et al. introduced envy as a fairness method to address equity in uncapacitated facility location problems, defining it as the sum of absolute deviations from preferences at each demand point. Envy has since been applied in various fields (Espejo et al., 2009). Chanta et al. used it in emergency medical response to integrate fairness into survival functions (Chanta et al., 2014). Rey et al. applied it to redistribute surplus perishable food in humanitarian logistics (Rey et al., 2018).

Although the literature lacks in addressing drivers' preferences in HRS location-allocation problems, there are some lessons learned from other studies to be used for the defined problem in this research. In recent years, several studies have considered driver preferences in the placement of EV charging facilities. He et al. (He et al., 2018) assessed the supply and demand for EV charging infrastructure in Beijing. They considered spatial and contextual factors for public charging stations and used a Delphi approach to estimate charging demand based on interviews with key stakeholders. The study suggested that the deployment of public charging stations in Beijing is primarily a government-led process, leaving little room for individual preferences. Lee et al. (Lee et al., 2020) analyzed the charging behaviors of EV drivers in California, revealing variations based on socio-demographic factors, vehicle features, and workplace charging availability.

## Methodology

This section describes the targeted problem in details. After defining the characteristics of the problem, the proposed framework is discussed.

***Problem Definition.*** The problem addressed in this research is the optimization of HRS locations by considering socio-economic aspects. Besides the cost as a crucial objective for establishing HRSs, there are other criteria to be involved in the optimal design of such stations. It underscores the importance of extending stakeholders from only investors to the others such as drivers and public citizens. Therefore, the focus is on involving objectives that serve HV drivers in the optimal HRS decisions. For example, there are multiple reasons for an urban trip such as shopping, commute to work/office, driving a kid to school, or even visiting a medical clinic. These reasons could impact the sensitivity and preference for selecting a refueling station (e.g., closer to the home, closer to a destination). As a result, a function is required to quantify the HV drivers' preferences to be involved for location-allocation decisions.

A set of assumptions is considered to propose a framework for the optimal location of HRSs as follows:

- Due to the complexities of zonal HRS locations, the center of a zone is used to estimate the location of a potential HRS.
- The demand for refueling services is considered deterministic. The problem considers a single period of time.
- The driving range of all HVs is considered the same.

Based on the above assumption, a framework is proposed to achieve research objectives. The next sub-section elaborated on the proposed framework.

***Proposed Framework.*** The framework for the research on HRS location planning is structured into four main steps. Figure 1 summarizes the steps and outputs of the proposed framework.

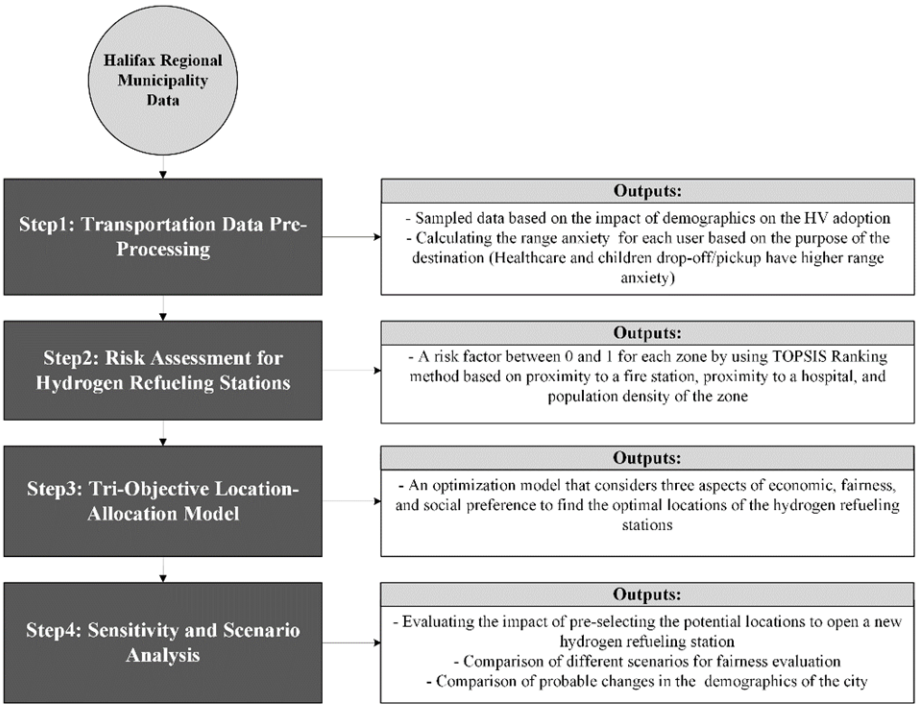



*Figure 1 Proposed Framework.*

To formulate the HRS location-allocation problem, the following notations are used:

**Sets/Indices**

- L: Set of potential locations, indexed by *l*.
- I: Set of drivers with pre-defined origin and destination, indexed by *i*.
- K: Set of range anxiety types based on the driver's destination, indexed by *k*.

**Parameters**

- $c_1$: Fixed cost of opening a new station.
- $c_2$: Variable cost based on the capacity of the station.
- N: Number of stations to be opened.
- $risk_l$: Risk factor related to opening a station at location *l*.
- R: Total risk of the system.
- MaxCap: Maximum capacity of refueling stations (kg).
- $f_p$: The amount of hydrogen per each refueling (fixed for all drivers).
- $range_i$: Driving range of driver *i*'s vehicle when the fuel tank is full.
- $RF_i$: Remaining fuel at the beginning of the day for driver *i*. (It is a random number between zero and $range_i$ for each driver.)
- α: The percentage of zones to reduce demand to minimize the gap.
- β: The percentage of change in demand of selected zones (*α%* of all zones).
- $\zeta_{ik}$: Range anxiety of driver *i* with destination type *k*.

- dis(i,l): Total distance, from origin to destination, for driver *i* if refueling at location *l*.
- $Ratio_{il}$: The preference ratio of station *l* by driver *i*.
- $p_{il}$: The normalized preference of station *l* for driver *i*.
- $P_l$: Summation of all normalized preferences at station *l*.
- $\mu_(demo_)$: The average number of HV adopters for all zones.
- $dev_l$: Deviation of zone *l*'s adoption rate from the average ($\mu_(demo_)$).

**Variables**

- $\mathbf{y}_l$: Binary variable that equals 1 if a station is opened at location *l*; 0, otherwise.
- $\boldsymbol{\gamma}_l$: Capacity of station *l* (kg).

***Data Preprocessing.*** The initial phase of the framework is data pre-processing, including data cleaning and demand prediction. For demand prediction, factors such as household income exceeding 100,000 Canadian Dollars (CAD) and education levels higher than high school are considered. These are key factors to alternative-fuel vehicle adoption factors (Iogansen et al., 2023). Since a zone-based solution approach is employed, the number of potential adopters for each zone was calculated using the latest demographics and census data available for each zone. These estimates were then normalized to ensure comparability across different zones.

The preference of drivers for different refueling stations can be shown by $Ratio_{il}$:

$$Ratio_{il} = \frac{(range(i) - RC(i))}{dis(i,l) * (1 + \zeta_k)} \quad (1)$$

$Ratio_{il}$ shows the difference of preference between different refueling station locations for each driver. $range(i) - RC(i)$ shows the distance that driver i can drive according to the vehicle range and remaining fuel. In this equation, $dis(i,l) * (1 + \zeta_k)$ shows the believed distance for driver i to travel from origin to destination while refueling at station l. The distance to the refueling station is multiplied by the range anxiety of the driver, which is a value between zero and one, according to the purpose of the destination. The higher-priority destinations make the ratio smaller, which means that the driver is more pessimist and the preference to refuel is higher for them.

To normalize the ratio for all drivers at all stations, the parameter $p_{il}$ is defined as below:

$$s_i = \sum_l^L Ratio(i,l) \ \forall i \in I \quad (2)$$

$$p_{il} = \frac{Ratio_{il}}{s_i} \quad (3)$$

Equations (2)-(3) lead to a normalized value of $p_{il}$ expressing the preference of driver i to refuel at station l. This parameter is used in the model to maximize the preference of the opened stations.

***Risk Assessment of HRSs.*** Following data pre-processing, a risk assessment is conducted to evaluate the potential fire hazards associated with each nominated HRS location. A TOPSIS ranking method is applied to calculate the risk of each zone. The evaluation focuses on three critical factors for each zone: proximity to a fire station, proximity to a hospital, and population density. Equal weight is considered for each of these three factors. By assessing these factors, a risk score between zero and one is assigned to each potential location. This step considers safety concerns, particularly those related to fire hazards, thoroughly integrated into the decision-making process. For each zone of Halifax Regional Municipality (HRM), a risk factor due to fire hazards is defined.

***Tri-objective Model.*** This section introduces the proposed tri-objective mathematical model to optimize the location and capacity of HRSs. The HRS location-allocation problem is modeled as a tri-objective mathematical model, balancing economic, fairness, and driver preference objectives as shown below:

$$Obj1: \min\left(\sum_l^L c_{1l} y_l + \sum_l^L c_{2l} \gamma_l\right) \quad (4)$$

$$\text{Obj2 :} \max\left(\sum_l^L dev_l\, y_l\right) \quad (5)$$

$$\text{Obj3 :} \max\left(\sum_l^L P_l y_l\right) \quad (6)$$

s.t.

$$\sum_l^L y_l = N \quad (7)$$

$$f_p \sum_i^I (p_{il})\, y_l \le \gamma_l \qquad \forall l \in L \quad (8)$$

$$capacity_l \le \max_cap \quad \forall l \in L \quad (9)$$

$$\sum_l^L risk_l y_l \le R \quad (10)$$

$$y_l \in \{0,1\} \quad (11)$$

$$\gamma_l \ge 0 \quad (12)$$

The first objective function, Eq. (4), minimizes the total annual cost of all opened stations including the capital cost of establishment for each station, the cost for establishing a new HRS based on zonal land prices, and operational costs based on the capacity of stations by minimizing the deviation of opened HRS from the average. The second objective function, Eq(5), maximizes the fairness of the opened stations by minimizing the deviation of opened stations from the average HV adoptors number. The third objective function, Eq.(6), maximizes the total preference of the drivers on the opened stations. Constraint (7) ensures that the number of total opened refueling stations meets the demand. Constraints (8) and (9) define the capacity of each station. In other words, only the opened stations can have a capacity greater than zero, and it also depends on the total preference of the drivers at the station. Constraint (10) ensures that the total risk of the opened HRSs meets the pre-defined risk tolerance of the stations. Finally, constraint (11)-(12) assumes the positivity of capacity variables and the integrality of the opening station decision variables.

The fairness objective function maximizes the fairness in access to HRSs by minimizing the maximum gap of the zones' adoption rates. The normalized demographic factor of each zone, which is the normalized number of sampled HV adopters based on the demographic factor of the zone, is used to model the fairness function. The minimization is based on the deviation of zonal normalized HV adoptors' number from the average of all zones, promoting justice in the location of HRSs. Initially, the α% of the zones that are farthest from the average are selected. Such percentage of zones are further adjusted by β% to minimize the gap between the maximum demand and minimum demand of zones with the average. This adjustment reduces extreme disparities, ensuring a more balanced distribution of attributes and fairness in access. The primary goal of the objective function is to minimize the deviation of the opened refueling stations from the average attribute value, effectively allocating resources to zones with the highest potential for HV adoption. This approach not only reduces societal gaps but also enhances mobility justice for drivers, ensuring that all zones have more similar attributes and better access to refueling stations.

Let demo = [$\text{demo}_1$, $\text{demo}_2$, …, $\text{demo}_l$] represent the number of HV adopters based on demographic values for L different zones. Define $\mu(\text{demo})$ as the mean value of the demographic data:

$$\mu(\text{demo}) = \frac{1}{L}\sum_{l=1}^{L} \text{demo}_l$$

To determine the top α% threshold for elements greater than μ(demo), we calculate the (1−α)-quantile, denoted as $Q(1-\alpha)(\text{demo} \mid \text{demo} > \mu(\text{demo}))$:

$$Q(1-\alpha)(\text{demo} \mid \text{demo} > \mu(\text{demo}))$$

Similarly, the bottom α% threshold for elements smaller than $\mu(\text{demo})$ is given by the α-quantile, denoted as $Q(\alpha)(\text{demo} \mid \text{demo} < \mu(\text{demo}))$:

$$Q(\alpha)(\text{demo} \mid \text{demo} < \mu(\text{demo}))$$

The adjustment of the demographic values is intended to reduce societal gaps by modifying the values farthest from the mean. For the top β% values of the demographic data, the adjusted values are:

$$\text{demo}_l = \begin{cases} (1-\beta) \times demo_l & if \quad demo_l > Q(1-\alpha)(demo \mid demo > \mu(demo)) \\ demo_l & Otherwise \end{cases}$$

Similarly, for the bottom β% values, the adjusted values are:

$$\text{demo}_l = \begin{cases} (1+\beta) \times demo_l & if \quad demo_l < Q(\alpha)(demo \mid demo < \mu(demo)) \\ demo_l & Otherwise \end{cases}$$

The fairness objective function minimizes the total deviation of each zone's adoption value from the mean. The deviation percentage for each zone, denoted as $\text{dev}_l$, is defined as:

$$dev_l = \frac{(|\text{demo}_l - \mu_{(}\text{demo}_{)}|}{\mu_{(}\text{demo}_{)}} \times 100$$

The final phase involves performing a sensitivity analysis to evaluate the quality of the location-allocation model. This analysis assesses the impact of pre-selecting potential refueling station sites and compares various scenarios for cost, fairness, and preference evaluation.

## Results and Discussion

This section introduces the data used and presents the results of the tri-objective optimization model. The implications of the findings for the strategic location of HRSs are further described in this section.

### Data

This study utilizes multiple datasets to predict HV adoption rates and identify strategic locations for HRSs in Halifax, Canada. It is assumed that gaseous tube trailers are used to deliver hydrogen to HRSs. On average, an HV has a driving range of 600 km (California Air Resources Board, 2024). The total capital cost for establishing a new refueling station is 1,930,000 (CAD) and the daily fueling capacity of each station is 770 kg (Satyapal, 2022). These values are considered fixed for all drivers and HRSs. The hydrogen price market in 2030 will be 3.4 CAD on average (Company, 2022) The land price for a new HRS at each zone is based on the HRM land prices available (ViewPoint Realty, 2024).

The demographic data for 63 dissemination areas within HRM is obtained from the 2021 Canadian census dataset. This dataset includes detailed attributes such as age, sex, education level, household income, and other socio-economic indicators, crucial for understanding the adoption patterns of HVs. The dataset forms the basis of the tri-objective optimization model and enables finding the trade-offs between cost minimization, fairness in accessibility, and driver preference satisfaction.

The 2023 Traffic Analysis Zones (TAZ) data set obtained from Halifax Travel Activity (HaliTRAC) survey is used to provide detailed zonal information on the origin and destination of drivers, along with the purpose of their trips (Habib, 2023). This dataset is instrumental in modeling transportation patterns and understanding the spatial distribution of travel demand across HRM. The purpose of the destination for each driver enables us to estimate their range anxiety.

### Single-objective Results

To understand the individual impacts of each objective within the tri-objective optimization model, three single-objective models were solved separately. This approach allows us to isolate and analyze the influence of each objective independently. As illustrated in Figure 2, the location of the selected HRSs varied significantly depending on the prioritized objective.

By focusing solely on minimizing costs, HRSs are selected based on the lowest land prices, neglecting drivers' satisfaction and fairness in accessibility. Minimizing fairness deviation prioritized equitable access but ignored total costs and drivers' preferences. When optimizing for drivers' preferences alone, stations were concentrated in areas with higher traffic. It also focused on drivers with higher range anxiety, aiming to minimize driving distances. This approach enhances convenience but may not ensure equitable distribution across all zones of HRM.

The parameter $\alpha$ is set to 50% as the baseline, meaning that the top and bottom 50% of the values are adjusted to be closer to the average, thereby reducing the overall disparity. Additionally, $\beta$ is set to 50%, signifying that the highest and lowest values of deviations are modified by increasing and decreasing them

by 50%, respectively. These adjustments are intended to mitigate the societal gaps and enhance the equity of resource allocation among different zones.
The optimal values of the single objective models for the total cost, fairness deviation, and the total drivers' preferences are 2,938,290 CAD, 240%, and 106, respectively. Evidently, a single-objective model does not provide an optimal solution for the rest of objectives; therefore, the worst value of each objective function is determined as 3,672,176 CAD for the cost, 65% for the fairness deviation, and 250 for the preference value. These bounds are the limit of steps in the Pareto front analysis, as discussed in the multi-objective results.

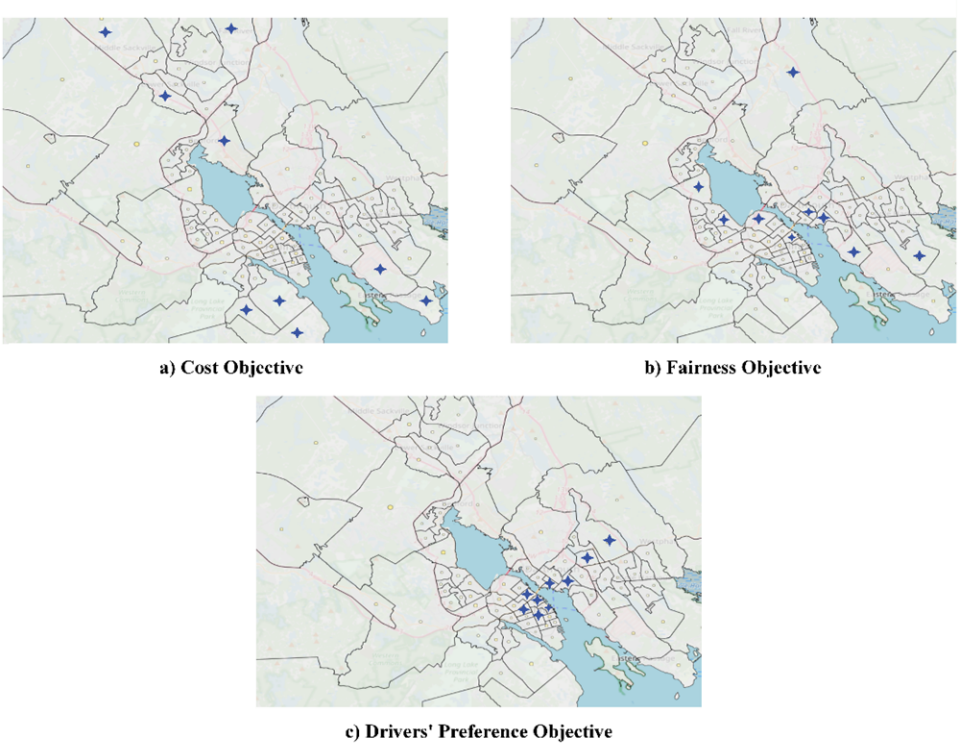



*Figure 2 Single Objective Results.*

## Multi-objective Results

The Pareto front is a crucial concept in multi-objective optimization, representing a set of non-dominated solutions where no objective can be improved without sacrificing at least one other objective. In this research, each optimal point was added using the augmented epsilon constraint method. This approach systematically explores the trade-offs between objectives functions by iterative adjusting constraints and optimizing one objective at a time, ensuring a comprehensive representation of the Pareto front. In this method, a range is calculated for each objective function. Then the range is divided into n equal steps to find the optimal solution at each step (Mavrotas & Florios, 2013). Figure 3 depicts the Pareto front for the tri-objective model, showcasing the distribution of optimal solutions across the objective space. Each point on the graph corresponds to a potential solution, demonstrating the inherent compromises among the three objectives. The decision-makers have the flexibility to choose from any of the optimal solutions presented on the Pareto front according to their specific allocation limitations and strategic priorities.

By identifying the solution with the shortest aggregated distance, a balanced compromise that respects the priorities of cost efficiency, fairness, and driver preference is ensured. The resulting optimal solution, highlighted in Figure 3, offers a flexible and well-rounded strategy for the location of HRSs. The point shown as a red star entails the total annual cost of 3,069,142 CAD, the fairness deviation of 69% from the average, and the preference value of 191.

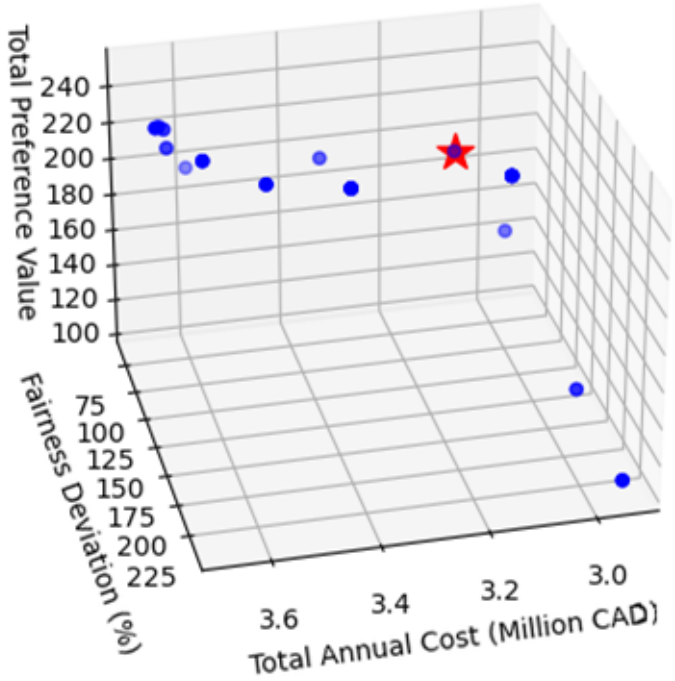



*Figure 3 Pareto front plot for tri-Objective problem.*

**Scenario Analysis for the Flexibility of the Proposed Framework**

This section investigates a set of scenarios on the flexibility of the proposed framework, such as developing various criteria for pre-screening potential locations for HRSs.

In the original model, all 63 dissemination areas in HRM were considered for potential HRS locations. However, a pragmatic approach would screen those zones based on four primary criteria to nominate only 20 zones. The first criterion nominates zones based on closeness to important facilities such as shopping malls, superstores, universities, airports, and other significant amenities that would benefit from proximity to a refueling station. The second criterion selects zones based on closeness to major and important roads, ensuring accessibility and convenience for a larger number of potential drivers. The third one nominates 20 potential locations in top-20 populated zones of HRM (Brinkhoff, 2024). The last criterion uniformly distributes nominated locations throughout HRM. In other words, 20 zones with the same distance (with a small gap) are selected to solve the model. Figure 4 shows the potential zones of these four different criteria before applying the model.

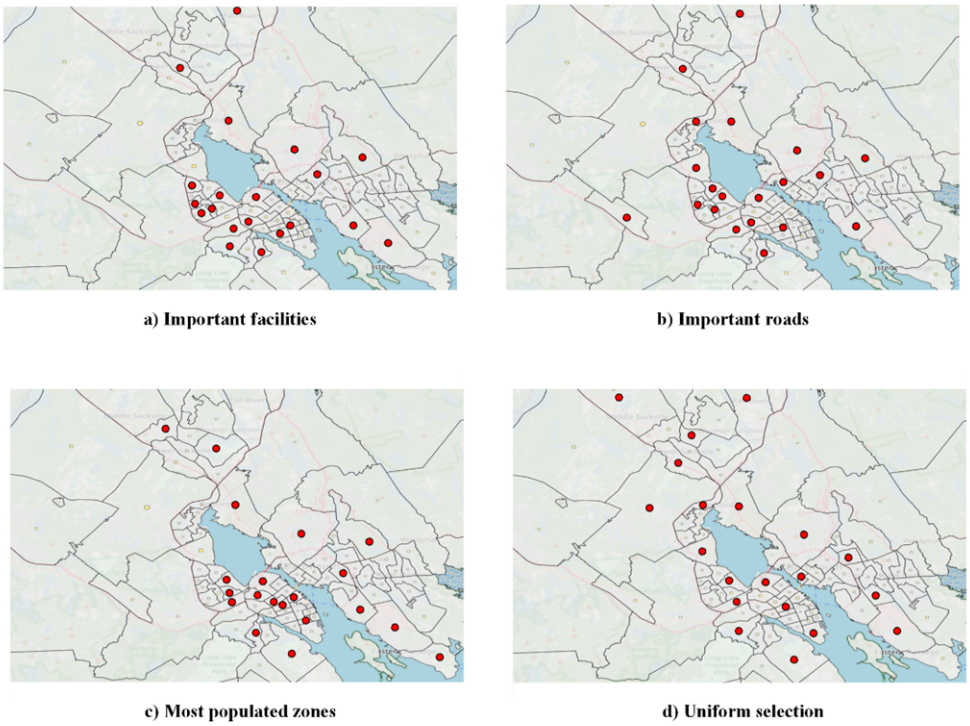



*Figure 4 Targeted potential locations criteria.*

Table 1 summarizes all attributes of new potential location scenarios in comparison with the original results. In all of the scenarios, the total annual cost of opening the HRSs is divided by 10 years, which is the average lifetime of an HRS (Viktorsson et al., 2017).

*Table 1 Summary of results for different potential locations.*

| | **Case 1** | **Case 2** | **Case 3** | **Case 4** | **Case 5** |
|---|---|---|---|---|---|
| **No. of Potential Locations** | 63 | 20 | 20 | 20 | 20 |
| **Method of Potential Location Selection** | All Zones | Important Facilities | Important Road | Most Populated Zones | Uniform Distance |
| **Total Annual Cost (min)** | 2,938, 290 | 3,105,730 | 3,096,180 | 3,346,281 | 2,984,321 |
| **Total Annual Cost (max)** | 3,672, 176 | 3,744,235 | 3,802,256 | 3,954,065 | 3,704,569 |
| **Fairness Deviation (%) (min)** | 65 | 79 | 74 | 85 | 53 |
| **Fairness Deviation (%) (max)** | 240 | 256 | 262 | 372 | 212 |
| **Preference (min)** | 106 | 137 | 127 | 187 | 103 |
| **Preference (max)** | 250 | 235 | 249 | 250 | 224 |

| | | | | | |
|---|---|---|---|---|---|
| **Pareto-Front Optimal Point (Cost)** | 3,069,142 | 3,345,221 | 3,425,888 | 3,647,663 | 3,098,125 |
| **Pareto-Front Optimal Point (Fairness Deviation (%))** | 69 | 82 | 78 | 97 | 57 |
| Pareto-Front Optimal Point (Preference) | 191 | 181 | 185 | 204 | 152 |
| Total Capacity of the Stations (kg) | 4135 | 4325 | 4370 | 4315 | 4065 |
| Avg. Distance between opened Stations (km) | 6.5 | 4.3 | 4.7 | 5.2 | 2.9 |

In Case 5, where the potential locations are selected uniformly distributed across HRM, the total annual cost is close to the original solution, and the fairness deviation is decreased from 69% to 57%, meaning that the city has more mobility justice and access equity. However, the preference of the drivers has decreased remarkably from 191 to 152, meaning that the selected stations are not in the locations where drivers have higher range anxiety.

The analysis indicates that closeness to populated zones, Case 4, could significantly improve the drivers' preference metrics, reaching the highest possible levels. This suggests that drivers are highly satisfied with the convenience and accessibility of the stations when they are located near major thoroughfares. However, this enhanced satisfaction comes at a considerable financial cost. The total annual cost in this scenario is substantially higher than in the original case where potential locations were selected across all zones. This cost increase is a critical factor that decision-makers need to consider. The fairness metric, which measures the equitable distribution of resources and benefits across different driver groups, shows a marked decline in this scenario. This suggests that while drivers who frequently use major roads benefit, other drivers may face reduced access or longer distances to the nearest station.

In cases 2 and 3, where the drivers' access to important facilities and major roads of HRM has been considered, there will be an increase in the total annual cost for both cases, as well as a decrease in the drivers' preference and an increase in the fairness deviation. Ultimately, the decision-maker should carefully evaluate these trade-offs to determine the most strategic plan for the future.

## Conclusion

This study provides a comprehensive framework to optimize the location and capacity of hydrogen refueling stations within Halifax Regional Municipality, Canada. The study addresses the critical challenges of planning and establishing an efficient and equitable HRS network through a combination of demographic analysis, risk assessment, and multi-objective optimization.

The study contributes to literature and offers several important managerial implications for the decision-makers. First, the multi-objective optimization model provides a balanced approach to decision-making, ensuring that budget limitation, fairness in access, and drivers' preferences are simultaneously considered. The framework helps policymakers establish hydrogen refueling infrastructure, ensuring that investments are not only economically efficient but also socially equitable and user-satisfactory.

Second, the demographic-based demand prediction and the inclusion of range anxiety in driver preferences highlight the importance of understanding social aspects and drivers' behavior in the infrastructure planning. Decision-makers can use these insights to plan the location and capacity of HRSs for specific community needs, thereby increasing the likelihood of successful adoption of hydrogen vehicles.

Lastly, the risk assessment component, which incorporates safety considerations such as proximity to fire stations and hospitals, and population density of the zones, ensures that safety is not ignored in the process of optimizing the HRS locations.

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# GENDER & DIVERSITY

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# UNDERREPRESENTATION OF WOMEN IN BUSINESS-TO-BUSINESS SALES: A SCOPING REVIEW AND FUTURE RESEARCH DIRECTIONS

Despite evidence supporting gender diversity in business-to-business (B2B) sales, a gender imbalance persists. This review synthesises the literature on gender differences, motivational factors, and organizational support in B2B sales. Key findings highlight disparities in sales motivation, the role of social media in customer relationships, and challenges faced by women, including wage discrepancies and workplace harassment. The review emphasises the need for inclusive talent management strategies and supportive leadership to enhance sales performance and address gender disparities.

## Introduction

The persistent underrepresentation of women in business-to-business (B2B) sales roles has far-reaching implications for gender equality and organizational performance. The ramifications of this disparity extend beyond individual experiences, impacting the overall effectiveness and diversity of sales teams (Hoogendoorn et al., 2013). Women in B2B sales frequently face unique challenges, such as pay discrimination (Shea et al., 2020; Peesker & Lister, 2020; Nsiah et al., 2013), sexual harassment (Larson & Mullen, 2020), prevalent bias (Catalyst, 1995), and a lack of mentorship (Virick & Greer, 2012), all of which can hinder their professional advancement. These obstacles affect the individuals involved and limit the potential diversity and efficacy of sales teams, potentially undermining business outcomes (McKinsey, 2015; Hoogendoorn et al., 2013).

Reports from various surveys over the past decade indicate that women represent about a third of salesforce positions (Shea et al., 2020). A LinkedIn Research survey in 2014 highlighted this gap, showing that while women constitute 39% of the overall workforce in sales, they hold only 31% of sales roles in technology and 27% of sales leadership roles (LinkedIn, 2014). The Canadian Professional Sales Association states that women represent only 30% of commercial sales professionals in Canada (CPSA, 2019) with women making up only 12% of senior sales leadership roles (Johnstone, 2017). This underrepresentation at higher levels of leadership is significant, considering that many executives have advanced through sales roles (Groysberg et al., 2011), and the low percentage of women in these roles contributes to their minimal representation among CEOs in Fortune 500 companies, which stands at just 7.4% (Shea et al., 2020).

A career in sales is an attractive option for a career path though, offering opportunities for substantial earnings, career advancement, personal growth, and the development of valuable skills. The appeal of the sales role is that it acts as an entry point for college graduates seeking business experience, training in an industry, and higher earnings through performance-based compensation (Deeter-Schmelz, et al., 2018). The flexibility and independence offered by sales roles are also appealing, as there is potential for high remuneration, career advancement, and personal growth opportunities in sales. The COVID-19 pandemic has further enhanced the attractiveness of sales careers by accelerating the adoption of hybrid working models. McKinsey (2022) found that 90% of enterprises surveyed plan to maintain changes made to their

sales force, allowing for more flexibility and less travel for B2B sales professionals, which contributes to a more attractive work-life balance.

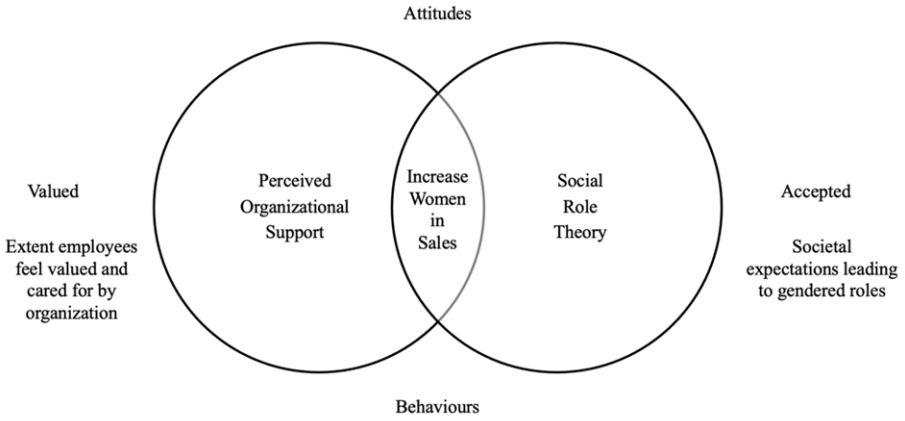
The importance of gender diversity in sales is increasingly recognized by companies, with industry research reporting a correlation between gender diversity and financial performance (McKinsey, 2015), suggesting that companies with greater gender diversity are 15% more likely to outperform their industry medians financially. This relationship has strengthened over time, as further industry research suggests that the likelihood of financial outperformance increased from 15% in 2014 to 25% in 2019 (McKinsey, 2020). It is not just the industry paying attention to this potential performance gain. Researchers have also reported in peer-reviewed studies that gender-balanced sales teams often outperform male-dominated teams in sales and profits (Hoogendoorn et al., 2013) and that women in sales are reporting attainment of quota at higher rates than men (Peesker & Lister, 2020). Being a woman in a male-dominated field like sales can also offer advantages, such as more access to women executives and overcoming sales stereotypes (Larson & Mullen, 2020).

Although researchers have been interested in questions about the B2B Sales Gender Gap since the 1980s, no attempts have been made to date to analyse the existing literature using systematic research synthesis methods. Nevertheless, broader preliminary searches highlight the significance of conducting a scoping review to enhance our understanding of the current state of the existing research evidence, thus, this scoping review addresses the question, "Why aren't there more women in business-to-business sales?" by examining the peer-reviewed literature. By exploring potential interventions and exposures, this research seeks to provide actionable insights for organizations to create a more inclusive and equitable sales environment and to provide insights to researchers looking to investigate interventions that may benefit gender diversity and business performance.

## Closing the B2B Sales Gender Gap

When considering the trends in attracting and retaining women in B2B sales environments, two theoretical frameworks are helpful to guide the analysis of the literature (*Figure* 1). Perceived Organizational Support Theory (Eisenberger et al., 1986) and Social Role Theory (Eagly & Wood, 2012) provide a lens to examine women's representation, experiences, and views about being valued in an organization and their experiences of performing outside of expected role stereotypes.

*Figure* 1. Theoretical Analysis Framework



### *Perceived Organizational Support*

Perceived Organizational Support (POS) theory is a psychological framework that focuses on how employees believe their organization values their contributions and cares about their well-being (Eisenberger et al., 1986). The theory posits that employees form a general perception about the degree to which the organization supports them, and this perception influences various work-related attitudes and behaviours. Findings from one study indicated that "employees develop global beliefs concerning the degree to which the organization values their contributions and cares about their well-being" and that "perceived organizational support increases an employee's efforts to meet the organization's goals" (Eisenberger et al., 1986, p. 503). In other words, employees who feel valued and cared for perform better.

In the context of sales, understanding POS can be crucial for sales recruitment, performance, and retention of employees. Sales roles often involve high levels of stress and performance pressure, and a perception of strong organizational support can mitigate these challenges. Salespeople who feel supported by their organization may be more motivated, committed, and likely to work harder to meet sales targets. The POS theory suggests that when employees perceive their organization as supportive, acknowledging their contributions and caring for their well-being, they will be more motivated and committed. This heightened motivation can increase effort and improve performance, especially in high-stress roles like sales. A team that feels supported by its organization will be more cohesive and effective. When an organization actively supports its employees, it fosters a positive work environment, increasing team motivation and collaboration. Organizations that implement POS principles will improve employee retention, satisfaction, and productivity. These factors contribute to enhanced overall organizational performance. By promoting gender diversity and challenging traditional gender roles, organizations can tap into a broader range of talents and perspectives, crucial for innovation and adapting to market changes. Also, gender-diverse organizations are often viewed favourably, improving their reputation and attractiveness to potential employees and customers. Thus, by integrating the principles of perceived organizational support theory, organizations can develop strategies to enhance employee perceptions of support, thereby improving individual and organizational outcomes.

### *Social Role Theory*

Social Role Theory suggests that the division of labour between men and women leads to the development of gender roles, shaping the behaviours, attitudes, and expectations associated with each gender (Eagly & Wood, 2012). Eagly & Wood write that "stereotypes can act as self-fulfilling prophecies" (p. 462), which may help to explain why we see an underrepresentation of women in business-to-business sales (Shea et. al., 2020). These stereotypes are reinforced by the very language the industry often uses to describe sales professionals as either "hunters" or "farmers" (DeCarlo & Lam, 2015), with each of these descriptors having a historic gender stereotype as primarily masculine or primarily feminine. Accordingly, individuals might be influenced by gender stereotypes, which could affect their career choices and professional behaviour. Overcoming these stereotypes can lead to more diverse career paths and personal growth.

In the sales context, social role theory can help explain why certain gender roles may influence sales tactics, customer interactions, and career choices. B2B sales roles often serve as a pipeline to leadership positions and the lack of women in these roles can be both a cause and a consequence of the lack of women leadership in organizations, perpetuating a cycle of underrepresentation. While traditional gender roles have persisted, they are not static and can change over time. Acknowledging and challenging traditional gender roles, as social role theory suggests, can lead to more inclusive and diverse teams, enhancing team creativity, problem-solving, and overall performance. Increasingly, organizations are recognizing the value of diverse sales teams and are taking steps to recruit more women into B2B sales roles (Zoltners et al., 2020).

### *Theoretical Analysis Framework*

Using perceived organizational support and social role theory can magnify the sites of opportunity to shift norms and practices to close the B2B sales gender gap. As more organizations adopt these approaches, industry standards evolve to prioritise employee support and gender diversity. This shift can lead to a more inclusive and equitable industry culture, potentially influencing societal perceptions and expectations regarding gender roles in business, particularly in sales. Over time, these changes can contribute to greater gender equality in B2B sales roles, driving sustainable growth and innovation across the industry.

## Methodology

Due to the broad nature of published papers on the topic, this study used a scoping review research synthesis approach as a guide (JBI, 2023). To develop a comprehensive understanding of the peer-reviewed research about women in business-to-business sales, a systematic literature search and article selection process was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Protocols 2015 (Moher et al., 2015). This review began with developing a search strategy and protocol, including defining the keywords and performing searches to refine the results before selecting the final keywords (*Table* 1). A combination of Boolean searches and within-category terms was used. The terms Gender, Job Satisfaction, Career Attributes, and Sales were combined with the AND / OR terms to provide the search results.

*Table* 1. Search Protocol

| **Search Terms** | **Databases** |
|---|---|
| (Ab) Gender AND Job Satisfaction OR (Ab) Career Attributes AND Sales (See Notes) | ABI/Inform, Academic Search Premier, Business Source Premier, NovaNet, PsycInfo, |
| **Inclusion** | **Exclusion** |
| Women in B2B sales at all levels of the sales hierarchy including entry to executives who perform sales<br>Interventions and exposures aimed at increasing the representation of women in B2B sales such as training, mentorship, onboarding, recruitment strategies, and bias reduction programs<br>All levels of evidence | Men in B2B sales; retail sales; non-sales roles<br>Interventions and exposures not related to B2B sales or aimed at increasing women's representation broadly |

*Notes: Boolean search approach (ALL= (Gender AND Job Satisfaction OR Career Attributes AND Sales))*

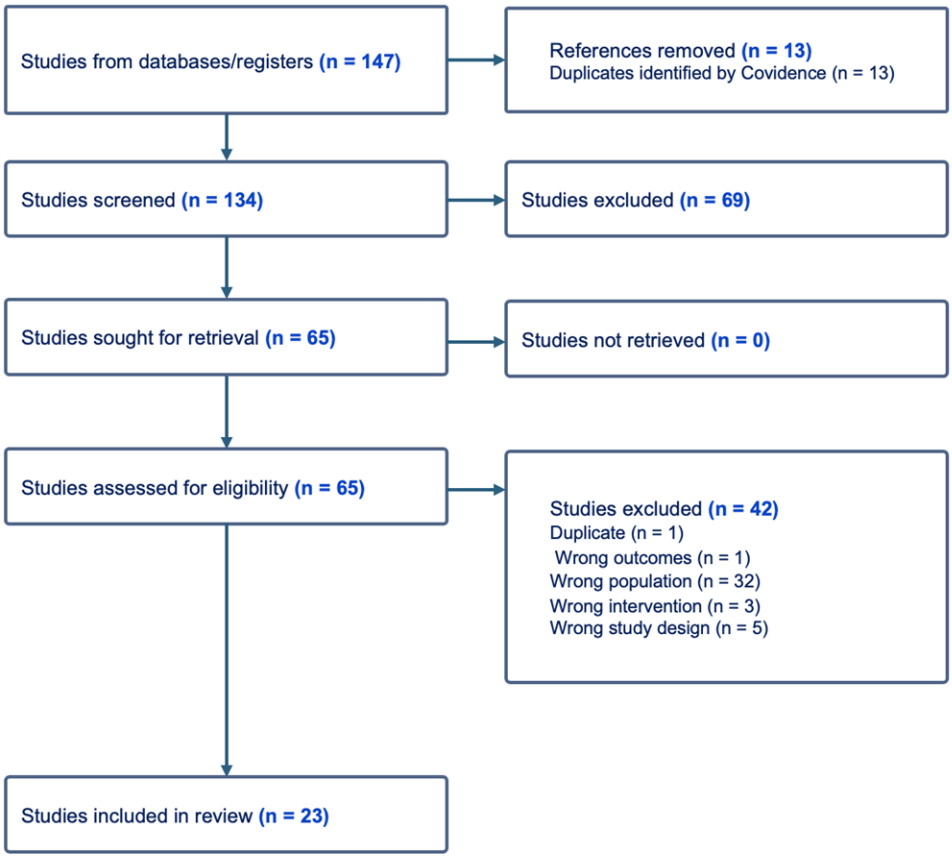
Data extraction and coding were guided by the protocol and theoretical framework. Each paper meeting the inclusion criteria had the following data extracted: year of publication, authors, type of intervention/exposure, and evidence type. In addition, the number of citations for each paper was sourced through Google Scholar. Using qualitative thematic analysis, each paper was read thoroughly to identify recurring ideas, concepts, and theories related to the research topic. The papers were then coded into one of two categories, Perceived Organizational Support or Social Role Theory, based on the theoretical underpinning of the themes explored. For example, if a research paper was focused on the perception of

sales as a career and career path, it was coded as Social Role Theory. If a research paper was focused on mentorship, pay equity, or compensation plan design, it was coded to Perceived Organizational Support.

## Results

The PRISM results from the search strategy are provided in *Figure* 2. The literature search was performed using the selected terms in September 2023 via ABI/Inform, Academic Search Premier, Business Source Premier, NovaNet, and PsycInfo. The search attributes included peer-reviewed and English language only. The initial search resulted in 147 peer-reviewed studies. The authors imported the RIS files from the search into Covidence, a leading systematic review tool. Thirteen studies were removed due to duplicates, and 134 studies were screened for inclusion and exclusion criteria (PICOS) by two reviewers, of which 69 studies were excluded due to non-relevance. Full-text review was performed on 65 studies, of which 42 were excluded (32 wrong populations, 5 wrong study designs, 3 wrong interventions, 1 duplicate, and 1 wrong outcome). Twenty-three studies were included in the data extraction.

*Figure* 2. PRISM results



Of the 23 papers, only one study was performed outside of the United States, and only one study had any kind of follow-up, with the rest being cross-sectional studies that viewed a single point in time and employed surveys only. All 23 research papers were appraised as being of lower levels of evidence. While all 23 studies investigated provided an interesting perspective on gender in B2B sales, they only provided a snapshot of the population at a single point, offering limited ability to establish a cause-and-effect relationship or assess changes over time.

**Research Themes**

Synthesis of the findings of this scoping review illustrate five key themes: (1) gender disparities in B2B sales, (2) obstacles and stereotypes encountered by women in B2B sales, (3) advantages of women sales professionals, (4) the importance of mentoring and job motivation, and (5) impact of ethical workplace climate (*Table* 2). The associated papers for each theme are provided in Appendix 1.

*Table* 2. Themes and description

| Theme | Description | Papers Number (Appendix 1) |
|---|---|---|
| **Gender disparities** | Women in B2B sales encounter unique challenges compared to men, affecting their career growth, job satisfaction, and stress levels. | 1, 3, 6, 7, 9, 10, 13, 19, 20, 21 |
| **Obstacles & stereotypes** | Women in B2B sales face obstacles like exclusion from networks, limited power, and gender stereotypes, impeding their career growth. | 1, 3, 6, 7, 13, 20 |
| **Representation advantages** | Women in B2B sales bring unique strengths such as strong relationship-building skills and customer-focused selling approaches. | 7, 14, 19, 20, 23 |
| **Mentoring** | Mentoring is essential in shaping the careers of sales professionals, especially women, by offering guidance and support. | 8, 12, 14, 16 |
| **Ethical workplace climate** | An ethical workplace climate fosters job engagement, satisfaction, and well-being among sales representatives. | 17, 19, 21, 23 |

***Theme 1: Gender disparities***

This research theme highlights that women in B2B sales face specific challenges and disparities compared to their male counterparts. Gender disparities in B2B sales refer to the unequal treatment, experiences, and opportunities faced by women in the profession, often leading to challenges and obstacles that hinder their

career advancement and job satisfaction. These disparities are evident in various aspects of the sales field, including role perceptions, obstacles to career progression, job satisfaction, and perceived opportunities.

Research in this area highlighted key obstacles for women in professional selling: exclusion from informal networking and learning experiences (Busch & Bush, 1978; Siguaw & Honeycutt, 1995; Russ & McNeilly, 1995), restricted organizational power (Kennedy & Lawton, 1992), and gender stereotyping (Gable & Reed, 1987).

Notable gender disparities were found in the anticipatory stage, or interviewing and onboarding phase of their career, and in job outcomes. Women face challenges like lower job satisfaction and fewer perceived opportunities (Kennedy, 1992). One study found that women in B2B sales exhibit higher customer orientation than men, yet highlighted the stereotypes that undervalue women's effectiveness in sales roles (Siguaw, 1995). The potential impact of gender bias was observed in the workplace where women had a greater sense of pessimism regarding career advancement opportunities (Moncrief, 2000), experienced higher levels of stress, were less positively inclined toward career advancement, and exhibited lower commitment compared to men (McNeilly, 2000). This illustrates clear gender disparities in experiences and commitment levels.

Role clarity within the B2B sales environment emerges as a critical factor. The research suggests that with greater role clarity, women were less likely to utilise emotion-focused coping strategies in response to stress on the job (Boyd et al., 2009), which may lead to greater job satisfaction. When we consider early research on role clarity, where women reported lower role clarity scores (Busch & Bush, 1978; Siguaw & Honeycutt, 1995; Boles et al., 2003), one possibility presented was that men excluded women from fraternising sessions where topics critical to role clarity were discussed and that women were less likely to ask for help for fear that inquiries may be perceived as incompetence (Busch & Bush, 1978). There is still a need for cultural change in organizations to become more supportive to attract and retain more women in sales, identifying the 3% growth rate in women in sales over the last decade (Itani et al., 2021). Studies underscored the importance of Perceived Organizational Support, revealing that higher levels of support are linked to greater satisfaction (Rutherford et al., 2014).

The literature illustrates that while men and women in sales report similar job satisfaction and organizational commitment levels, the underlying factors contributing to these outcomes differ significantly between genders (Siguaw & Honeycut, 1995). For example, women in sales are prone to experiencing higher work-family conflict, which negatively influences their satisfaction with work, a stressor less pronounced by their male counterparts (Boles et al., 2013). This disparity is compounded by significant differences in the relationships between role conflict, role ambiguity, and job satisfaction factors for men and women, indicating distinct experiences and challenges faced by each gender in the sales domain (Boles et al., 2003). Compensation structure within sales organizations reveals a gender gap, with women receiving lower sales commissions than men, reflecting a broader trend of gender-based pay disparities and highlighting the need for strategies to address these imbalances (Srivastava & Tang, 2022). A more nuanced and supportive approach ought to be adopted by organizations as they advocate to remove gender stereotypes and disparities to cultivate a gender-diverse sales force (Itani et al., 2021; Busch & Bush, 1978). Acknowledging and addressing these gender disparities is important to create an equitable and productive sales environment where the strengths and challenges of each gender are recognized and harnessed to drive organizational success and employee satisfaction.

***Theme 2: Obstacles and stereotypes***

Women in B2B sales are confronted with various obstacles and stereotypes that can impact their professional experiences and their career progression. Women's challenges are multifaceted, stemming from deep-rooted cultural norms and organizational structures that have historically favoured their male

counterparts. This imbalance is manifested in various aspects of their professional lives, from the scarcity of role models and mentorship opportunities to the pervasive stereotypes that undermine their contributions (Siguaw & Honeycutt, 1995).

One of the pressing issues women face in B2B sales is the lack of fraternisation opportunities and role models. One author described this gender stereotyping and discrimination as being prevalent among the "good old boys" who continue to hold sales and sales leadership roles in many firms (Russ & McNeilly, 1995). This absence is not merely about numbers but also the quality of interaction and support that fosters professional growth and development. Women in sales often find themselves in environments that offer limited opportunities to connect with peers or leaders who can relate to their experiences, guide their career paths, and advocate for their success (Siguaw & Honeycutt, 1995; Kennedy & Lawton, 1992)

The sales environment has long been characterised by gender stereotyping, where women are perceived as less effective or desirable employees. These stereotypes are not benign; they shape the attitudes and behaviours of sales managers and colleagues, leading to discriminatory practices and policies that hinder women's career advancement (Siguaw & Honeycutt, 1995). Addressing these stereotypes is not just a matter of fairness but also a business imperative. Diverse sales teams are better equipped to understand and meet the needs of a diverse customer base as a balanced and heterogeneous sales force, with mixed-gender teams complementing each other. (Itani et al., 2021).

In addition to these external challenges, women in B2B sales also grapple with internal conflicts and stresses that are magnified by the gendered nature of their work environment. The studies reviewed show that women are more relationship-oriented and emphasise social relationships in the workplace (Boles et al., 2007). While this relational focus can be a strength, enabling women to foster deeper connections with clients and colleagues, it also renders them vulnerable to the negative effects of emotional exhaustion (Boles et al., 2007; Rutherford et al, 2014). This emotional toll is made worse by work-family conflicts, which have been found to have a stronger impact on women than men, affecting their satisfaction with work and career progression (Rutherford et al., 2014).

Women's journey in B2B sales is marked by a complex interplay of barriers and stereotypes that require concerted efforts to overcome. When provided with the right support and opportunities, women have shown their ability to thrive in B2B sales roles, bringing unique strengths and perspectives that enhance team performance and business outcomes. To harness this potential, organizations must take proactive steps to foster an inclusive and supportive work environment. This involves not only countering stereotypes and providing equal opportunities but also creating policies and practices that acknowledge and address the unique challenges women face in B2B sales (Russ & McNeilly, 1995).

***Theme 3: Advantages of women as sales professionals***

While the challenges and obstacles women face in B2B sales are significant, there are unique advantages that are highlighted in the literature reviewed. Women sales professionals have been consistently identified as more relationship-focused compared to their male counterparts, a trait that aligns well with the increasing emphasis on customer-oriented selling and relationship management in the modern sales environment (Rutherford et al., 2014). One study from four decades ago delved into the nuances of communication styles, negotiation tactics, and relationship approaches, highlighting the distinctive competencies of Women sales professionals in these areas (Busch & Bush, 1978).

One paper advocated for diversity-focused recruiting in sales, underscoring the critical need to include more women candidates to bridge the gender gap and cultivate a gender-diverse sales force (Itani et al., 2021). The research posits that not only are women underrepresented in sales, but when present, they often outperform their male counterparts, primarily due to their superior relational skills, empathy, and focus on

nurturing relationships. This suggests that a balanced and heterogeneous sales force with mixed-gender teams can significantly benefit organizations by harnessing complementary strengths (ibid).

The research underscores the proficiency of women sales representatives in adaptive selling and customer orientation, noting that while there were no significant gender differences in adaptive selling, women tended to engage more in customer-oriented selling (Siguaw & Honeycutt, 1995). The role of social media also plays a role, with researchers pointing out that the interaction effect of social media use on improving salesperson performance is markedly stronger for women salespeople, suggesting their adeptness in utilising digital tools to enhance relationships and sales outcomes (Itani et al., 2021).

The relational orientation of women was reaffirmed, emphasising that women are socialised into communal values and behaviours, which influences how they perceive and react to job situations (Boles et al., 2007). This inherent orientation towards fostering social relationships is a substantial asset in B2B sales, where relationship management and customer trust are paramount. Moreover, the research discussed women's affinity for servant leadership, a style characterised by relationship-oriented, other-centred, and supportive behaviours (Westbrook & Peterson, 2022). This leadership style aligns well with the traits of women described in the research review and contributes to higher job satisfaction, fostering a supportive and productive environment.

The advantages of women in B2B sales are numerous, encompassing superior relationships-building capabilities, customer-oriented selling, proficiency in adaptive selling, and effective use of digital tools for sales enhancement. Organizations that recognize, embrace, and foster these strengths are likely to benefit from a more inclusive, dynamic, and high-performing sales force aligned with the broader objectives of gender equity and diversity in the workplace.

***Theme 4: The importance of mentoring and job motivation***

Mentoring in B2B sales is a vital component that significantly influences job satisfaction, retention, and career advancement, particularly for women in the field. The importance of job satisfaction as a determinant of an employee's propensity to leave (Ladik et al., 2002), which is a critical factor for both men and women, with a pronounced impact on low-performing salespeople. This study revealed that high-performing saleswomen exhibit greater confidence in their tenure with the firm, suggesting a link between job satisfaction, performance, and the likelihood of staying with the firm (ibid).

The role of mentoring in shaping career trajectories cannot be overstated, with one researcher emphasising that mentoring can profoundly influence employees, with the absence of mentoring perceived as a significant barrier to career advancement (Briggs et al., 2012). This relationship is intricately tied to an employee's psychological contract with their organization and is influenced by external social and cultural expectations about gender, as posited by social role theory (ibid). Age is also highlighted as a crucial factor in shaping job perceptions, indicating the multifaceted nature of mentoring and its impact on career progression.

The dynamics of mentoring relationships in sales organizations reveal interesting gender-based distinctions in the reviewed literature. One study observed that while mentoring relationships are prevalent and beneficial in sales organizations, men and women experience these relationships differently (Fine & Pullins, 1998). While men perceive greater benefits from mentoring, women whom other women mentor tend to experience enhanced job motivation, attributed to the tailored support, counselling, and coaching they receive from their women mentors (ibid). Women tend to be more communal and relationship-oriented, suggesting that women are more inclined to value and invest in social relationships in the workplace (Boles et al., 2007). This orientation influences how women perceive and react to their job situations, potentially impacting their receptiveness to mentoring and its outcomes (ibid).

Barriers to effective mentoring are present and include excursion from informal networks, lack of cultural fit, and the absence of mentoring opportunities. These barriers impede professional growth and negatively impact the organizational commitment among sales employees, underscoring the necessity for inclusive and supportive workplace practices (Briggs et al., 2012).

Mentoring is integral to fostering a conducive environment for the retention, performance, and advancement of B2B sales professionals. Organizations that recognize and facilitate effective mentoring relationships while addressing the barriers to mentoring are likely to benefit from the performance gains that mentoring provides.

***Theme 5: Impact of ethical workplace climate***

The significance of an ethical climate within B2B sales organizations cannot be overstated, especially in its impact on job engagement, satisfaction, and overall well-being of sales representatives. The literature emphasises the crucial role of an ethical climate in directly fostering physical engagement among women B2B sales professionals, highlighting the imperative for organizations to create and maintain such environments to enhance active role engagement (Matthews et al., 2021). This research sheds light on the detrimental effects of perceiving an organizational climate as unethical, noting that it can lead to decreased energy, effort, and commitment to job responsibilities among women in B2B sales (Matthews et al., 2012).

Other authors contribute to this discourse by highlighting the relationship between perceived organizational support and job satisfaction (Rutherford et al., 2014). Their findings indicate that higher levels of perceived support are associated with increased satisfaction with coworkers and supervisors, especially for women. However, they also point out the pronounced impact of work-family conflict (WFC) and emotional exhaustion on women, suggesting that these factors, along with organizational support, are integral in understanding the job satisfaction and engagement levels of women in B2B sales (Rutherford et al., 2014).

The influence of individual and work-related characteristics on negative job-related reactions, such as work dissatisfaction, lack of organizational commitment and work-life stress, was examined (Caswell et al., 2012). Interestingly, while individual characteristics, including gender, had minimal impact on work reactions, work-role experiences, especially supervisory support and role overload, were significant determinants of job-related reactions. This finding underscores the importance of supportive supervisory relationships and manageable workloads in shaping the job experiences of women in B2B sales (ibid).

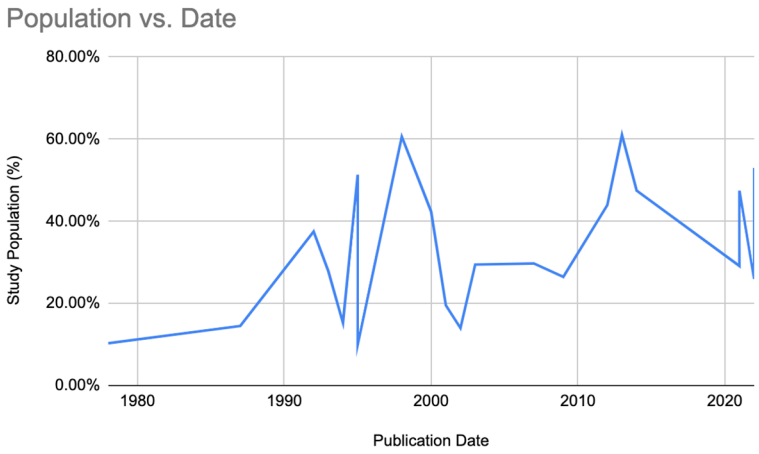
One researcher further delineated the components of an ethical workplace climate, emphasising the necessity of clear expectations for ethical behaviour, the role of leadership in modelling such behaviours, and the provision of tools and training for ethical conduct (Matthews et al., 2021). The study notes the positive impact of perceived supervisor support on male and female sales representatives, reinforcing the significance of a supportive and ethical work environment in fostering job satisfaction and engagement (ibid).

Fostering an ethical climate within B2B sales organizations is paramount for enhancing the engagement, satisfaction, and well-being of sales representatives, particularly for women in B2B sales. Organizations that create and maintain an ethical, supportive, and family-conscious work environment will see a more committed, engaged, and high-performing sales force. Such an environment benefits the employees and contributes to the organization's overall integrity, reputation, and success.

## Discussion

Industry and peer-reviewed research indicate that sales are a male-dominated profession. Studies have found that sales teams with a diverse gender composition tend to perform better (McKinsey, 2015; Hoogendoorn et al., 2013). However, most research on gender diversity in B2B sales was conducted before 2010, dating back to 1978 (*Figure* 3). Given this finding, a new research agenda is needed to close the B2B sales gender gap.

*Figure* 3. Study population over time




A notable observation in the research is the scarcity of intervention studies. Among the 23 studies in the review, 22 employed a cross-sectional design. While this research approach is valuable for providing a snapshot in time, it does not provide insights into the interventions that may be successful in the industry. Only a small fraction, four out of the 23 studies, conducted any form of follow-up with participants over time. Follow-up can help capture the dynamics and potential long-term effects of interventions. The prevalence of cross-sectional studies and the limited number of longitudinal follow-ups highlight a significant area for future research, where more robust, time-extended study designs could offer deeper insights into the effectiveness of interventions and the progression of gender diversity in B2B sales.

After a preliminary analysis of the composition of the participants in the 23 studies, a notable variation in the representation of women is observed. The percentage of women participants in these studies spans a wide spectrum, ranging from as low as 10% to as high as 60%. Calculating an average across all studies reveals that women constitute approximately 33% of the study population. *Figure* 3 illustrates the sporadic representation of women in the studies reviewed over time. While there do appear to be sharper peaks over time, the valleys are notable and suggest that the gender diversity of sales teams is highly sporadic. These figures underscore the underrepresentation of women in the sample groups and potentially reflect broader trends within B2B sales. It also highlights the need for more inclusive research practices to ensure that findings are representative and that women's unique experiences and perspectives in this field are adequately captured and understood.

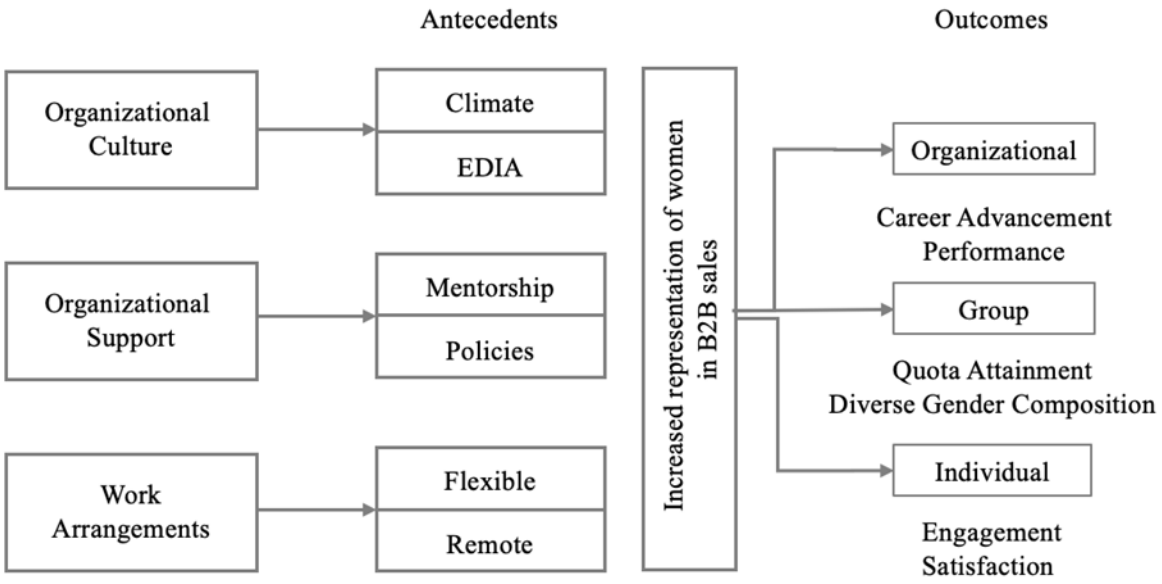
### Future Research Direction

The aim of this scoping review article is to provide a resource for scholars to understand the current state and extent of the literature focused on women in B2B sales while providing future research directions. While exploring women’s experiences in B2B sales has yielded a rich tapestry of insights, the literature

reveals notable gaps that warrant further exploration. By doing a detailed review of the literature, this review provides the field with assurance regarding the areas of study that have been established and where we have knowledge gaps. To our knowledge, no such scoping review has been performed on this important topic, and we encourage future researchers to investigate this topic thoroughly. In service of that call to action, we seek to establish a thorough research agenda that sales scholars can use to guide their scholarly pursuits.

There are several research themes that emerged from this scoping review that we feel are deserving of attention from scholars in the field. This section will present three research themes designed to probe deeper into the impact of Organizational Support, Organizational Culture, and Work arrangements. By addressing these themes, future research can illuminate the experiences of women in B2B sales, offering actionable insights for organizations striving to harness the full potential of their salesforce and create a workplace where every sales professional, irrespective of gender, can thrive.

*Figure* 4. Concept model




***Organizational Support***

Future studies should examine the role of mentorship programs, policies, and practices in supporting women's career advancement in B2B sales. Researchers should investigate how different forms of organizational support, including formal and informal networks, impact job satisfaction, career progression, and retention rates among women sales professionals. Additionally, the influence of organizational policies on creating equitable opportunities for women in sales should be explored, focusing on identifying best practices for fostering an inclusive and supportive work environment.

***Organizational Culture***

The impact of organizational culture on women's experience in B2B sales warrants exploration. Future research should delve into the dimensions of ethical workplace climates and equity, diversity, inclusion, and accessibility (EDIA) initiatives, examining their effects on women's job satisfaction, engagement, and performance outcomes. Studies should also investigate the interplay between organizational culture and intersectionality, exploring how different facets of identity, such as age, race, and cultural background, influence women's experiences in sales roles.

### *Work Arrangements*

The shift toward remote and hybrid work models presents new opportunities and challenges for women in B2B sales. Future research should assess the impact of these work arrangements on women's career progression, work-life balance, and job satisfaction. Studies should explore how remote and hybrid models affect team dynamics, mentorship opportunities, and professional networking in sales. Additionally, the implications of these work arrangements for maintaining client relationships and achieving sales targets should be examined.

The scoping review sets the stage for a robust research program focused on understanding and addressing women's unique challenges and opportunities in B2B sales. Future research can contribute to developing more inclusive, supportive, and effective sales organizations by exploring the themes of Organizational Support, Organizational Culture, and Work Arrangements.

## Practical applications

The scoping review delves into the published literature focused on women in B2B sales, identifying critical themes surrounding women's experiences in B2B sales. The authors seek to offer insightful revelations from the literature about gender disparities, the obstacles and stereotypes women encounter, the distinct advantages women sales professionals bring to the table, the pivotal role of mentoring and job motivation, and the profound impact of an ethical workplace climate. These themes enrich the academic understanding of women's roles in sales and provide actionable insights for practitioners and policymakers committed to fostering equitable, inclusive, and high-performing sales environments.

For practitioners, particularly sales managers and team leaders, the research underscores the importance of acknowledging and addressing gender disparities in sales teams. Managers should proactively recognize and close gender gaps, ensuring equal opportunities for career advancement and fair compensation for women. This involves policy adjustments and a cultural shift towards valuing and leveraging the unique strengths and perspectives that women bring to sales roles. Practitioners can also benefit from understanding the obstacles and stereotypes women face in B2B sales. By creating awareness programs and promoting open discussions about these challenges, organizations can cultivate an environment where biases are challenged, and inclusive behaviours are encouraged. Furthermore, the research highlights the advantages of women sales professionals, such as superior relational skills and a customer-oriented approach. Sales teams should leverage these strengths by positioning women in roles where these skills are most impactful and by creating mixed-gender teams that harness diverse approaches to selling, negotiation, and client relationship management.

Additionally, the importance of mentoring and job motivation cannot be overstated. Practitioners should establish structured mentoring programs that offer guidance, support, and career development opportunities specifically tailored to the needs of women in sales. These programs can be complemented by initiatives that enhance job motivation, such as recognition schemes, career advancement pathways, and continuous learning opportunities. The research also points to the critical impact of an ethical workplace climate on the satisfaction and performance of sales professionals, especially women. Sales managers should ensure that ethical practices are not just documented policies but are integrated into the day-to-day operations, decision-making processes, and organizational culture.

The research offers policymakers a roadmap for developing and implementing policies that foster gender equity in sales. Policies should ensure equal opportunities for women in terms of hiring, promotions, and pay. Moreover, considering the unique challenges and stereotypes women face in sales, policies should also aim to create a supportive environment that actively combats biases and fosters diversity and inclusion. Policymakers should also advocate for and support establishing mentoring programs and initiatives that

promote an ethical workplace climate, recognizing the positive ripple effects these can have on organizational culture, employee satisfaction, and overall business performance.

The research provides a comprehensive overview of the multifaceted nature of women's experiences in B2B sales and offers actionable insights for practitioners and policymakers alike. By acknowledging gender disparities, addressing obstacles and stereotypes, leveraging the advantages of women sales professionals, fostering mentoring and job motivation, and cultivating an ethical workplace climate, organizations can enhance the professional journeys of women in sales and drive greater business success. This comprehensive approach to understanding and supporting women in sales is not just a moral imperative but a strategic business decision that can yield substantial benefits for individuals, organizations, and the industry.

The research sheds light on the challenges faced by women in B2B sales but also highlights their resilience and contributions to the field. It emphasises the importance of acknowledging and addressing gender disparities, such as unequal treatment and limited opportunities, that hinder women's advancement. Additionally, the review underscores the significance of overcoming obstacles and stereotypes, such as exclusion from informal networks and gender biases, to create a more inclusive sales environment. By leveraging women's unique strengths and advantages, such as their relationship-building skills and customer-oriented approaches, organizations can enhance their sales teams' performance and effectiveness.

Moreover, fostering mentoring relationships and providing job motivation can further empower women in sales to achieve their full potential. Through these efforts, coupled with a commitment to cultivating an ethical workplace climate, organizations can support women in sales and drive business success.

## Conclusion

This scoping review critically examines the underrepresentation of women in B2B sales, addressing the intricate interplay of gender dynamics, digital evolution, and organizational support. Despite the benefits of gender diversity in enhancing team performance and financial outcomes, women continue to face significant barriers such as pay discrimination, sexual harassment, and lack of mentorship, impeding their full participation and advancement in sales roles. This review underscores the necessity of leveraging insights from perceived organizational support theory and social role theory to develop comprehensive, actionable research to develop interventions to foster an inclusive and supportive sales environment. For practitioners, this entails creating a workplace culture that not only recognizes and addresses gender disparities but also capitalises on the unique strengths of women sales professionals. For policymakers, the findings advocate for formulating and enforcing robust diversity and inclusion policies, ensuring equitable opportunities and treatment for women in sales.

This review highlights the pressing need to bridge the gender gap in B2B sales, advocating for a change in basic assumptions towards more inclusive, equitable, and high-performing sales environments that harness the diverse talents and perspectives of all members, driving innovation and success in the evolving landscape of business. This review is not without limitations, namely the findings emerging from lower levels of evidence, which introduces concern on the generalizability across regions, industries, and organizations. Accordingly, we offer an agenda for future research which will build upon the work uncovered in the literature through this scoping review.

## Disclosure Statement

No potential conflict of interest was reported by the author(s).

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***Appendix* 1. Included paper data extraction results**

| | Authors | Year | Citation | Level of evidence | Sample | Intervention or Exposure |
|---|---|---|---|---|---|---|
| 1 | Busch, P., & Bush, R. F. | 1978 | Busch & Bush, 1978 | Low | 10% | Compare women and men on six job satisfaction components, value importance of job components, performance, role clarity, and propensity to leave the organization. |
| 2 | Gable, M., & Reed, B. J. | 1987 | Gable & Reed, 1987 | Low | 15% | Investigate areas where women have not made rapid movement into the selling profession, discussion of women's movement into the selling profession, and implications for sales managers. |
| 3 | Kennedy, E. J., & Lawton, L. | 1992 | Kennedy & Lawton, 1992 | Low | 38% | Examine how new recruits, both men and women, in industrial sales positions at a Fortune 100 company, learn their job roles and adapt to the organizational culture shortly after being hired and how this process evolves. |
| 4 | Dubinsky, A. J., Jolson, M. A., Michaels, R. E., Kotabe, M., & Lim, C. U. | 1993 | Dubinksy et al., 1993 | Low | 28% | To examine three key components of motivation - expectancies, instrumentalities, |

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| | | | | | | and valence for rewards - of male and female sales personnel. |
| 5 | Roberts, J. A., & Chonko, L. B. | 1994 | Roberts & Chonko, 1994 | Low | 15% | Test potential moderating effect of gender on the satisfaction with pay/intent to turnover relationship. |
| 6 | Russ, F. A., & McNeilly, K. M. | 1995 | Russ & McNeilly, 1995 | Low | 51% | Measure the moderating impact of experience, gender, and performance on the relationships among job satisfaction dimension, organizational commitment, and turnover intentions. |
| 7 | Siguaw, J. A., & Honeycutt, E. D. | 1995 | Siguaw & Honeycutt, 1995 | Low | 10% | Examine gender-related differences regarding job satisfaction, organizational commitment, role conflict, role ambiguity, and performance for male and female industrial sales persons. |
| 8 | Fine, L. M., & Pullins, E. B. | 1998 | Fine & Pullins, 1998 | Low | 60% | Conduct a systematic investigation of the nature of the peer mentoring relationships in the sales domain. |
| 9 | McNeilly, K. M., & Russ, F. A. | 2000 | McNeilly & Russ, 2000 | Low | Not reported | Explore the impact of demographic |

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| | | | | | | differences between sales reps and their managers using data gathered from 340 manager-rep dyads. |
| 10 | Moncrief, W. C., Babakus, E., Cravens, D. W., & Johnston, M. W. | 2000 | Moncrief et al., 2000 | Low | 42% | Examine gender-based differences in several key sales constructs, including organizational commitment, intention to leave, role stress, and job satisfaction. |
| 11 | Venkatesh, R., Challagalla, G., & Kohli, A. K. | 2001 | Vankatesh et al., 2001 | Low | 20% | Examine the influence of heterogeneity within a sales unit on the unit's levels of job satisfaction and performance. |
| 12 | Ladik, D. M., Marshall, G. W., Lassk, F. G., & Moncrief, W. C. | 2002 | Ladik et al., 2002 | Medium | 14% | To measure the moderating effects of salesperson gender and salesperson performance on the relationship between job satisfaction and propensity to leave the firm. |
| 13 | Boles, J. S., Wood, J. A., & Johnson, J. | 2003 | Boles et al., 2003 | Low | 29% | The study aims to understand how different types of work-related stress impact employees' satisfaction in various aspects of their jobs. |
| 14 | Boles, J., Madupalli, R., | 2007 | Boles et al., 2007 | Low | 30% | To examine the relationship |

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| | Rutherford, B., & Andy Wood, J. | | | | | between job satisfaction and organizational commitment. Is gender a moderator in the relationship between these two facets? |
| 15 | Boyd, N. G., Lewin, J. E., & Sager, J. K. | 2009 | Boyd et al., 2009 | Low | 26% | Investigate how certain workplace factors influence the coping strategies of salespeople and how these strategies affect their job satisfaction and likelihood of wanting to leave their job. |
| 16 | Briggs, E., Jaramillo, F., & Weeks, W. A. | 2012 | Briggs et al., 2012 | Low | Not reported | Explore how sales employees' perceptions of career advancement barriers impact their commitment to their organization. |
| 17 | Caswell, R. A., Jonson, C. L., Dubeck, P. J., Cullen, F. T., & Maume, D. J. | 2012 | Caswell et al., 2012 | Low | 44% | Assess the relative explanatory power of three models of work experiences on four salient measures of work reactions within an information economy. |
| 18 | Ruzic, E. | 2013 | Ruzic, 2013 | Low | 61% | Measure the level of perceived burnout among salespeople in the Republic of Croatia and |

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| | | | | | | investigate the influence of personal characteristics on the level of perceived burnout. |
| 19 | Rutherford, B. N., Marshall, G. W., & Park, J. | 2014 | Rutherford et al, 2014 | Low | 47% | Examine the moderating effects of gender and the distinction between inside and outside sales roles on multifaceted job satisfaction in B2B sales organizations. |
| 20 | Itani, O. S., Kalra, A., Chaker, N. N., & Singh, R. | 2021 | Itani et al, 2021 | Low | 29% | Investigate the influence of salespersons' social media use on their psychological connection with customers in a B2B context. |
| 21 | Matthews, L. M., Edmondson, D. R., & Ward, C. B. | 2021 | Matthews et al, 2021 | Low | 47% | Investigate potential antecedents – grit, ethical climate, and perceived supervisory support – and their impact on physical and emotional engagement in B2B sales-people. |
| 22 | Srivastava, R. V., & Tang, T. | 2022 | Srivastava & Tang, 2022 | Low | 26% | Develop a formative structural equation model (SEM) of the Matthew effect in talent management. |

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|---|---|---|---|---|---|---|
| 23 | Westbrook, K. W., & Peterson, R. M. | 2022 | Westbrook & Peterson, 2022 | Low | 53% | Assess servant leadership's direct and indirect effects on salesperson self-efficacy, job satisfaction, performance, and turnover intentions in a B2B context. |

# HUMAN RESOURCES, INDUSTRIAL RELATIONS, ORGANIZATIONAL BEHAVIOUR & ORGANIZATIONAL THEORY

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# PERCEPTIONS OF LEADERSHIP EMOJI USE IN VIRTUAL TEAMS: A CROSS-CULTURAL STUDY

This research explores cross-cultural differences in perceptions of leadership emoji use and its implication for managing virtual teams. Two randomized controlled experiments tested for the effects of using emojis in computer-mediated workplace communications. Participants from four countries (N = 1488) were randomly assigned to a control or treatment group and asked to read workplace scenarios with or without emoji presence. Leadership perceptions as well as organizational measures, including civility and PO-fit were extended to all participants post-study. We found leadership emoji use to have a significant effect on several leadership perceptions across our sample. Leadership emoji use significantly increased perceptions of warmth for all countries except South Africa but led to negative perceptions of competence when 'strong' emojis (i.e., heart-shaped eyes) were used. German participants were the only country group to be positively impacted by leadership emoji use on organisational outcomes. We deduce that cultural values and a lack of exposure to such forms of expressive communication led to greater impacts. Our findings have implications for diversity management and global leadership communication across virtual teams.

**Keywords:** cross-cultural communication, emoji, leadership perceptions, workplace scenarios

## Introduction

Both globalization and technological advancements have contributed significantly to changes in workplace communication dynamics (Okoro & Washington, 2012; Ter Hoeven et al., 2016). Traditional face-to-face communication is frequently being replaced with computer-mediated communication (Romiszowski &

Mason, 2013). The introduction of new workplace communication technologies increases digital connectivity among co-workers but can also have unintended consequences related to language appropriateness, miscommunications, and impersonalized identities (Cameron & Webster, 2005; Ter Hoeven et al., 2016). These challenges are compounded by cultural differences in the workplace. In face-to-face environments, cultural values can predict communication styles (Hall, 1976; House et al., 2004), including differences of speech related to directness, succinctness, personalization, and affection (Gudykunst & Ting-Toomey, 1988). However, less is known about how cultural differences impact communication styles in digital settings (Mutheu, 2023). One emerging area of research in digital communication, explores differences in emoji use and its subsequent perceptions (Guntuku et al., 2019; Riordan & Glikson, 2020; Togans et al., 2021; Choi et al., 2023; Liegl & Furtner, 2024). Early studies suggest that the appropriateness of using emojis in intra-organizational communication varies depending on context (Luor et al., 2010; Cavalheiro et al., 2022), and that emojis are most frequently used to express positive emotions (Lin, 2019). But subjective perceptions of what constitutes professionalism and emoji use exist (Shandilya et al., 2022), and culture plays a key role in predicting perceptions such as affect (Guntuku et al., 2019), a commonly desired outcome with emoji use.

Today's leaders require a global mindset (Javidan & Bowen, 2013) to effectively manage multi-cultural groups in contemporary professional settings. Leadership communication styles can lead to subjective perceptions as to what constitutes effective workplace communication (Den Hartog et al., 1999; Jennifer & Raman, 2015). Through leadership communication, employees identify with their organizational culture (Jo Hatch & Schultz, 1997), leading to various organizational outcomes (Men, 2014; Men & Jiang, 2016). Therefore, it is important for leaders responsible in setting the 'tone' of organizational culture(s) to be aware of how employees perceive their workplace communications. Despite the acknowledged significance of culture in communication (Hall, 1976; Gudykunst & Ting-Toomey, 1988), and leadership emoji use in communication (Aretz & Mierke, 2019), the interaction between leadership emoji use and culture remains underexplored (Hébert & Tabler, 2019). By addressing this knowledge gap, we aim to make a significant contribution to the fields of leadership communication, cross-cultural perceptions of emoji use, and diversity management. Understanding how to manage cross-cultural communication differences is a dauting task for leaders (Marschan-Piekkari et al., 1999; Shachaf, 2008), further amplified in virtual settings where emotional signalling is digitized.

The primary focus of this study is to explore how perceptions of leadership emoji use differ cross-culturally, and their consequences on organizational outcomes. Simply stated, our research question is *How do cultural differences impact perceptions of leadership emoji use?* Over two studies, we randomly assign participants from four culturally distinct regions into a treatment (scenario with emojis) or control group (scenario without emojis) and measure their perceptions of leadership attributes (i.e., warmth, competence) and organizational outcomes. Research suggests that the way emojis are used (i.e., context, valence of information conveyed, type of emoji) can impact effectiveness (Glikson et al., 2017; Guntuku et al., 2019; Cavalheiro et al., 2024). Therefore, we employ two different types of virtual leadership scenarios, with

varying levels of emoji strength, to account for contextual factors. We select measures of leadership perceptions (i.e., warmth, competence) that are aligned with the prior emoji literature to facilitate cross-study comparisons. This study uses multiple organizational outcomes measures we believe to be sensitive to leadership emoji use. Although there are suggestions that emojis are universal across cultures (Danesi, 2022), more empirical research is needed to determine whether emoji use and preferences for leadership styles are indeed culturally bound (House et al., 2004; Guntuku et al., 2019).

## Theoretical Approach

This research draws upon multiple theoretical frameworks to develop testable hypotheses and explain perceptions of leadership emoji use in cross-cultural virtual teams. First, we draw upon language theorists, who define language as a fundamental aspect of human communication, serving a dual purpose (Brown & Yule, 1983). We distinguish transactional language (i.e., focused on conveying specific details) from interactional language (i.e., phatic), which aims to enrich social relationships and build interpersonal connections (Laver, 1975; Coupland, 2014). By emphasizing the importance of cultivating online relationships over time through text-based communication, it provides a framework for analyzing how virtual teams build bonds and trust using emojis.

The GLOBE research team define leadership as the ability of an individual to influence, motivate, and enable others to contribute toward the effectiveness and success of the organizations of which they are members (House et al, 2004). In the present study, GLOBE's leadership styles and implicit leadership theory (ILT) are used to develop testable hypotheses and explain country-level differences in perceptions of leadership emoji use. We also draw upon cross-cultural communication theorists (Hall, 1976; Gudykunst & Ting-Toomey, 1988) to explain how employees from various cultural backgrounds are likely to perceive leadership emoji use. Hall's (1976) as well as Gudykunst and Ting-Toomey's (1988) cross-cultural communication frameworks suggest that cultural values predict preferences for communication styles (i.e., high-low context, directness, affection, succinctness). Aligning our theoretical approach with recent work, our study can be categorized as analyzing differences in emoji perceptions based on rendering (see Guntuku et al., 2019).

## Literature Review

### Emojis within phatic language.

Phatic language refers to a type of language that focuses on creating an atmosphere of sociability, rather than conveying substantive information, encompassing small talk, greetings, and other sociolinguistic mechanisms (Koo, 2022; Malinowski, 1923). This form of language is integral to building and sustaining social relationships as it plays a crucial role in creating and maintaining social cohesion, amicability, reducing social distance, easing tension, and fostering feelings of agreement, collegiality, and solidarity between communicators (Coupland et al., 1992; Eggins & Slade, 2005). Burnard (2003) specifically noted

phatic language use effectiveness in enhancing the quality of nurse-patient relationships. In organizational digital communication, phatic language extends to visual/textual interactions (Kulkarni, 2014), and presents itself through several modalities, including emails, informal check-ins, and other digital tools capable of transmitting socio-emotional cues (Radovanovic & Ragnedda, 2012; Vetere et al., 2009). Emojis have emerged as an important component of digital phatic language, adding a complex layer to textual interactions to transmit social and emotional cues effectively (Luangrath et al., 2017). However, their effectiveness is often dependent upon context. For example, Cavalheiro and colleagues (2022) highlight the importance of considering relationship proximity and message valence in workplace emoji use. Using a scenario approach, they asked participants to imagine receiving either a negative or a positive message with emojis and to evaluate its appropriateness. They found that participants considered emoji use more inadequate in distant scenarios and within negative messages (Cavalheiro et al., 2022). In addition to relationship proximity, another important contextual factor with respect to emoji effectiveness is leadership use.

**Leader communication and organizational outcomes.**

Leadership communication is a critical component of organizational culture impacting both employee attitudinal and behavioral outcomes (Men, 2014; Men & Jiang, 2016). Leadership communication styles are the first indicator of an organization's professionalism (Saputra, 2021), and have been shown to predict perceived leader performance, satisfaction with leader and team commitment (De Vries & Bakker-Pieper, 2010). However, the modern workplace has transitioned to digital environments, where communication dynamics are evolving. Research exploring the nuances of online leadership communication and its impacts on organizational outcomes is thus gaining importance (i.e., Gore, 2013; Zhang & Venkatesh, 2013; Smith et al., 2018), particularly in the area of leadership emoji use (Aretz & Mierke, 2019; Riordan & Glikson, 2020; Choi et al., 2023; Liegl & Furtner, 2024). Emojis that focus on building social bonds may carry relevance for nurturing positive interpersonal relationships within virtual teams. However, asymmetrical power dynamics (i.e., supervisor-subordinate relationships) may lead to unintended consequences in emoji use for leadership signalling (Ernst et al., 2022). The limited sample of empirical studies investigating leadership emoji use and its impacts on organizational outcomes suggests that leadership emoji use (positive emojis) enhances leadership perceptions (i.e., warmth, likeability) and well as some organizational outcomes (i.e., creativity) but is context dependent.

For example, Aretz and Mierke (2019) asked participants to read an e-mail written by a male supervisor demanding the timely completion of an important task. Supervisors were perceived as lower in assertiveness but higher in warmth when messages were embedded with emojis. Riordan and Glikson (2020) later investigated gender differences of emoji use and manager perceptions (i.e., likability, effectiveness) finding that males were more receptive to leadership emoji use than females. The authors suggest that leaders should consider both the audience and the workplace communication climate before using emojis in emails. Another study within a South Korean context found a positive relationship between a leader's use of positive emojis and its influence on leadership perceptions as well as members' creative performance (Choi et al., 2023). Most recently, Liegl and Furtner (2024) investigated the benefits and risks of emoji use in

leader communication, finding that positive emojis led to positive leader impressions. Thus, leadership emoji use (i.e., positive emojis) in virtual environments should enhance leadership perceptions (i.e., warmth, effectiveness, likability) and certain work outcomes. Although the literature seems to have reached a consensus on leadership perceptions of emoji use, understanding how leadership emoji use impacts organizational outcomes is limited and would benefit from more studies. Additionally, the reviewed literature surveyed homogeneous samples, neglecting employees from diverse cultural backgrounds who are likely to perceive leadership emoji use differently (Guntuku et al., 2019; Togans et al., 2021).

**Culture and Communication.**

Cultural differences in communication styles and perceptions of those different styles have been well documented. For example, Hall's (1976) research demonstrates that communication styles can vary in terms of high-low context. High context communication styles refer to indirect styles of communication, where often the actual message is embedded in the context. Low context communication styles, in comparison, are direct and literal. Asian cultures typically communicate in high-context styles whereas Germanic cultures tend to be lower context (Hall, 1976). Gudykunst and Ting-Toomey (1988) later developed a cross-cultural communication framework classifying communication styles into four categories: direct - indirect, instrumental – affective, personal – contextual, and succinct – elaborate. Their framework builds upon Hall's (1976) two-dimensional theory of communication by adding dimensions related to emotion (i.e., instrumental-affective) and context (i.e., personal-contextual). These additional dimensions can be adapted to virtual workplace environments, where emotional messages are conveyed through emojis.

**GLOBE Leadership theory.**

GLOBE extended the concept of ILT (Lord & Maher, 1991) to the level of national culture and hypothesized that members of different societies may have differing expectations from their leaders, influenced by their cultural values. Research demonstrates how societal cultures can shape the ILT of their members (Javidan et al., 2010). For example, low power distance cultures (i.e., Germany) prefer practicality and value performance, whereas collectivist cultures (i.e., Japan, Korea, and Spain) value group harmony and cooperation (House et al., 2004). Collectivist cultures also exhibit more emotional dependence on the team (House et al., 2004), which could be advantageous for leadership emoji use. After examining the leadership attributes of the six global leadership dimensions, we believe that the following four are most relevant to predicting perceptions of leadership emoji use.

*Charismatic/Value-Based Leadership* reflects the ability to inspire, motivate, and expect high performance outcomes from others based on firmly held core values. Charismatic leadership attributes include honesty (integrity), enthusiasm, and other relevant qualities that are likely to be positively associated with leadership emoji use. *Participative Leadership* reflects the degree to which managers involve others in making and implementing decisions. This inclusive dimension represents humble, liberal, and democratic leadership styles that are also likely to be positively associated with leadership emoji use. *Humane-Oriented Leadership* reflects supportive, considerate and generous attributes that are likely to be

positively associated with leadership emoji use. *Self-Protective Leadership* focuses on ensuring the safety and security of the individual and group through status enhancement and face saving (i.e., hiding emotions), which we predict to be the only leadership style that is negatively associated with leadership emoji use. Finally, we believe that *autonomous* and *team-oriented leadership* styles will not be significantly associated with leadership emoji use.

To construct our hypotheses, we draw upon recent empirical research exploring cross-cultural differences (i.e., East vs West) in perceptions of emoji use. For example, Guntuku and colleagues (2019) compared emoji usage based on frequency, context, and topic associations across countries in the East (China and Japan) and the West (United States, United Kingdom, and Canada), finding recognizable normative and culture specific patterns. East Asians tended to use emojis more frequently, and in relationship enhancing situations (Guntuku et al., 2019). This higher frequency usage could increase perceptions of normality. Later, Togans and colleagues (2021) examined cross-cultural differences in the use of emojis when sending text messages and found that East Asians used significantly more computer mediated communication cues overall, and found positive correlations between emoji use and scores on collectivism and interdependent self-construal. Again, it appears that Asian use emojis more frequently than their western counterparts. Other research found that Spanish (more collectivist, higher power distance) emoji users are more likely than Germans (more individualist, lower power distance) to use strong emojis (i.e., kisses) at the end of conversations (Sampietro et al., 2022). Latin European cultures are thus likely to react positively to emoji use. Based on this discussion we predict the following:

***H1****: The use of emojis by leaders will positively influence perceptions of leadership* ***warmth****, particularly for leaders with higher scores in charisma (H1a), participative leadership (H1b), and human orientation (H1c), but lower scores in self-protection (H1d).*

***H2****: The use of emojis by leaders will positively influence perceptions of leadership* ***competence****, particularly for leaders with higher scores in charisma (H2a), participative leadership (H2b), and human orientation (H2c), but lower scores in self-protection (H2d).*

In terms of how leadership emoji use will impact organizational outcomes across our four-country sample, we draw upon a limited body of literature to gain insights and develop our prediction. Sampietro (2019) discusses how the Spanish-speaking world, show closeness and friendliness as key factors in interaction, and suggest that some strategies related to the use of emojis are strictly related to the specific characteristics of that culture. Within their Spanish sample, the use of emojis contributed to establishing contact and developing positive relational goals (Sampietro, 2019). Thus, those leaders that signal positive emotions are likely to have a positive impact on perceptions of organisational climate. Within east Asia, a South Korean study found that a leader's use of positive emojis enhances members' creativity (Choi et al., 2023). It may be that leadership emoji use signals a participative leadership style and thus freedom of expression, even within higher power distance cultures (i.e., South Korea). Based on this finding, we would expect that

those societies higher on collectivism and power distance to respond more favourably to leadership emoji use with respect to organisational outcomes. Most recently, Liegl and Furtner (2024) conducted two experiments to gain insights into the benefits and risks of emoji use in leader communication. Their sample consisted of an Austrian (i.e., low power distance, high individualism) culture. Unlike the previous studies that drew upon higher power distance, collectivist samples (i.e., Korean, Spanish), they found that the positive effect of leader emoji use on followers' to be less consistent, and more context dependent (Liegl & Furtner, 2024). More specifically, the authors found that emojis act as a salient marker of leader affect in a control-oriented culture, versus a flexibility-oriented culture (Liegl & Furtner, 2024). More individualistic and lower power distance societies may use and respond less favourably to leader emoji use, which subsequently impacts performance. In sum, we predict that:

***H3****: The use of emojis by leaders will positively influence* ***organizational outcomes****, particularly for leaders with higher scores in charisma (H3a), participative leadership (H3b), human orientation (H3c), but lower scores in self-protection (H3d).*

## Study 1: Method

The objective of study 1 was to explore the impact of leadership emoji use on perceived warmth, competence, and organizational outcomes across four culturally distinct country groups. We conducted a controlled experiment, using a workplace scenario consisting of an online conversation between a supervisor and her employee during a performance review discussion (see Appendix 1). Study 1 was designed as a conversational scenario, between a supervisor and their employee. Participants were randomly divided into a treatment group (i.e., scenario with emojis) and a non-treatment group (i.e., scenario without emojis).

***Participants***. We originally recruited a total of 781 participants from Germany, Spain, South Africa, and East Asia (Korea & Japan). Although we acknowledge that Korea and Japan are separate countries, they fall under the same Confucian regional cluster (House et al., 2004). Overall, 34 cases were removed due to data response issues (i.e., incomplete submissions, extreme acquiescence response patterns) leaving us with a final sample of 747. Demographic questions included age, gender, and country of origin. Table 1 summarizes study 1 participant demographics. All participants were recruited via the Prolific online recruitment platform and offered compensation (3.5 USD) for their participation. Prolific is a well-established survey platform used to recruit participants across the world and actively used for consumer, economics, management, and psychology research (Marreiros et al., 2017; Mosleh et al., 2021). Screening filters included country of origin and employment status.

***Measures***. We used a warmth ($\alpha = .92$) and competence ($\alpha = .90$) measure adapted from Fiske et al. (2007) to assess how participants perceived their supervisor. This measure includes three items for both warmth and competence and included the following prompt: "Based on the interaction you had, how _____

is Jennifer?". Participants were asked to rate six adjectives (warm, friendly, good-natured, competent, capable, skillful) on a 7-point Likert scale (*not at all-very much*).

We also extended single-item measures developed from Matthews et al. (2022) to assess participants' organizational perceptions. Specifically, we asked participants "Based on the scenario, please indicate the extent to which you agree or disagree with the following statements". Using a 5-point Likert scale (*strongly agree-disagree*) we asked participants their perceptions of organizational **civility** "*My organization expects employees to treat one another with respect.*", and **person-organization fit** "*I feel like I "fit" with this organization.*".

## Study 1: Results

Tables 1 provides a summary of demographics. The mean age of participants was 34.4 (*SD* = 8.75). Participants were 48.3% female, and 53% were exposed to leadership emoji use. Table 2 summarizes the descriptive statistics and correlations among the variables. As expected, all organizational measures significantly correlated with each other (see Mathews et al., 2022). The leadership emoji use was positively correlated with Warmth ($r = 0.18$, $p < 0.01$) and competence ($r = 0.07$, $p < 0.10$).

**Table 1.** Demographics (Study 1)

| Country | Participants | Age | Treatment | Control | Female |
|---|---|---|---|---|---|
| Germany | 185 | 34.3 (8.00) | 106 | 79 | 64 |
| East Asia* | 168 | 34.3 (7.90) | 91 | 77 | 95 |
| Spain | 198 | 37.1 (9.96) | 98 | 100 | 71 |
| South Africa | 196 | 32.0 (8.14) | 101 | 95 | 131 |
| **Total** | **747** | **34.4 (8.75)** | **396** | **351** | **361** |

*Korea & Japan

[Insert Table 2 about Here]

Given that participants were nested within different countries, we employed hierarchical linear modeling (HLM) to test our hypotheses. HLM accounts for the multilevel structure of predictors and partitions the variance in dependent variables accordingly (Bu et al., 2022; Hofmann et al., 2000). Table 3 presents the HLM analysis results predicting warmth and competence. In this analysis, we regressed the outcome variables on the control variables, the independent variable (emoji use), and the moderating variables to predict warmth and competence. An initial null model, which included no explanatory variables, was estimated and produced ICC(1) values of 0.06 and 0.08, respectively.

***Warmth***. Hypothesis 1 posited that leadership emoji use would positively influence perceptions of leadership warmth, except in the case of self-protective leadership. The coefficient estimates for emoji use ($\beta = 0.40$, $p < 0.001$) across Models 1-4 confirm a positive effect on leadership warmth. For the moderating effects, the positive and statistically significant coefficient of the interaction term in Model 1 ($\beta = 0.19$, $p < 0.05$) supports H1a. However, the insignificant coefficients for the interaction terms in Models 2 and 4, along with the negative coefficient in Model 3 for H1c ($\beta = -0.16$, $p < 0.10$), indicate partial support for H1b, H1c, and H1d

***Competence***. Hypothesis 2 suggested that leadership emoji use would positively affect perceptions of leadership competence for all leadership styles except self-protective leadership. The results show a positive impact on leadership competence ($\beta = 0.14$, $p < 0.05$). However, the insignificant interaction term coefficients indicate that H2a to H2d are only partially supported, confirming that emoji use generally enhances perceptions of leadership competence.

[Insert Table 3 about Here]

**Table 4.** Results of multilevel regressions: predicting organizational outcomes (Study 1)

| | **Civility** | | | | **PO-Fit** | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
| Emoji | 0.06 | 0.07 | 0.06 | 0.06 | 0.08 | 0.08 | 0.08 | 0.08 |
| Age | -0.00 | -0.00 | -0.00 | -0.00 | 0.01$^{+}$ | 0.01$^{+}$ | 0.01$^{+}$ | 0.01$^{+}$ |
| Gender | -0.13** | -0.13** | -0.13** | -0.13** | 0.05 | 0.06 | 0.06 | 0.06 |
| Charismatic | -0.08 | | | | -0.17 | | | |
| Participate | | -0.03 | | | | -0.07 | | |
| Human-oriented | | | 0.04 | | | | 0.11 | |
| Self-protective | | | | 0.06 | | | | 0.06 |
| Emoji × Charismatic | 0.04 | | | | 0.08 | | | |
| Emoji × Participative | | 0.11* | | | | 0.19* | | |
| Emoji × Human-Oriented | | | -0.07 | | | | -0.13$^{+}$ | |
| Emoji × Self-Protective | | | | -0.05 | | | | -0.11 |
| Intercept | 4.58*** | 4.58*** | 4.58*** | 4.58*** | 3.68*** | 3.68*** | 3.68*** | 3.68*** |
| $\chi^2$ | 36.00*** | 45.68*** | 43.93*** | 46.61*** | 40.78*** | 61.06*** | 55.26*** | 61.54*** |
| ICC | 0.09 | 0.11 | 0.10 | 0.11 | 0.10 | 0.14 | 0.13 | 0.14 |

Notes: N = 747. $^{+}$ p < .10, * p < .05, ** p < .01, ***p < .001

***Organizational outcomes*.** Hypothesis 3 predicted that leadership emoji use would positively influence organizational outcomes across all leadership styles except self-protective leadership. To evaluate this hypothesis, organizational outcomes were measured using Civility, Leader, and PO-Fit. An initial null model without explanatory variables produced ICC(1) values of 0.07, 0.04, and 0.10, respectively. When organizational outcomes were measured using Leader, the coefficient estimates indicated that none of the sub-hypotheses H3a to H3d were supported. However, when using Civility and PO-Fit to measure organizational outcomes, the interaction term coefficients partially supported H3b ($\beta = 0.11$, $p < 0.05$; $\beta = 0.19$, $p < 0.05$). The remaining sub-hypotheses received only partial support. Table 5 summarizes these findings.

**Table 5.** Support for the phatic language hypotheses (Study 1)

| **DV: Warmth** | | **DV: Competence** | |
|---|---|---|---|
| H1a | Fully supported | H2a | Partially supported |
| H1b | Partially supported | H2b | Partially supported |
| H1c | Partially supported | H2c | Partially supported |
| H1d | Partially supported | H2d | Partially supported |
| **DV: Organizational outcomes (Civility)** | | **DV: Organizational outcomes (PO-Fit)** | |
| H3a | Not supported | H3a | Not supported |
| H3b | Not supported | H3b | Not supported |
| H3c | Partially supported | H3c | Partially supported |
| H3d | Not supported | H3d | Not supported |
| **DV: Organizational outcomes (Leader)** | | | |
| H3a | Not supported | | |
| H3b | Not supported | | |
| H3c | Not supported | | |
| H3d | Not supported | | |

We also performed additional analysis by treating Germany, East Asia, Spain, and South Africa as moderating variables (yes=1, no=0). We found that the positive effect of emojis on leadership warmth is significantly weaker for the experiment in South Africa compared to other countries, whereas the positive effects of emojis on leadership competence showed no significant differences across the four countries. When using welfare, leader, and social equality to measure organizational outcomes, the effects of emojis showed no significant differences across the four countries. When using civility and PO-Fit to measure organizational outcomes, we found that the effects of emojis were significantly stronger for the experiment in Germany compared to other countries.

## Study 1: Discussion

In study 1 we explored how leadership emoji use between a supervisor and their subordinate impacts employee perceptions of leader warmth, competence, and organizational outcomes. We found significant differences in leadership perceptions for warmth and competence when emojis are used. Specifically, the use of emojis by leaders during performance evaluations was found to significantly enhance perceptions of *warmth* in three out of four countries studied (i.e., all except South Africa), suggesting that emojis serve as effective tools for humanizing digital communications across diverse cultural backgrounds. Consistent with prior research, we found that participative leadership styles positively, and humane orientation leadership styles negatively moderated this interaction. This universality underscores the potential for emojis to transcend cultural barriers and foster positive interpersonal connections in a professional context. However, the impact of emojis on perceptions of organizational outcomes were insignificant for all countries except Germany.

German participants perceived leadership emoji use as positive for increasing organizational Civility and PO-fit. Participative leadership was the only style to significantly and positively moderate the emoji – organizational outcome interaction. This finding was unexpected, and we offer the following explanation. Prior research (Guntuku et al., 2019; Togans et al., 2021) suggests that Germans use emojis the least frequently across our four-country sample. The unfamiliarity of emoji use may have increased its impact on participants in our study; whereas those participants from cultures that use emojis more frequently were less influenced by their use. Future research exploring leadership emoji use simultaneously across low and high-power distance cultures is recommended to confirm our findings.

The findings of study 1 shed light on the nuanced role of emojis in leadership communication, revealing significant cultural dimensions to their interpretation. These variations highlight the complexity of cross-cultural communication and the need for leaders to navigate these differences thoughtfully. Embracing emojis in supervisor communications can offer a strategic advantage by enhancing emotional expressiveness, but it also requires sensitivity to cultural norms and expectations to avoid misinterpretations. While there is no evidence of serious negative consequences in our data from study 1, we use a stronger emoji context for study 2 to investigate the generalizability of our findings.

## Study 2: Method

The objective of study 2 was to continue exploring the impact of leadership emoji use on perceived warmth, competence, and organizational outcomes across our four-country sample, but using stronger emoji signals (i.e., heart-loving eyes). Once again, we conducted a controlled experimental approach using a workplace scenario consisting of a new Director orientation and online communication with his subordinates (see Appendix 2). Thus, in comparison to study 1 (i.e., conversational design between supervisor-subordinate), study 2 used a leadership presentational design. Participants were randomly divided into a treatment group (i.e., scenario with emojis) and a non-treatment group (i.e., scenario without emojis). Additionally, we

included a short scenario depicting a Monday morning virtual 'huddle' and asked participants about their perceptions on the *appropriateness* of discussing various topics (i.e., politics, religion, drinking) in the meeting (see Appendix 2). We explored emoji effects and cross-cultural differences in response patterns.

*Participants.* We originally recruited a total of 753 participants from Germany, Spain, South Africa, and East Asia (approximately 200 per country). 25 cases were removed due to data response issues (i.e., incomplete submissions, extreme acquiescence response patterns) leaving us with a final sample of 728. Demographic questions included age, gender, and country of origin. Table 6 summarizes study 2 participant demographics. All participants were recruited via the Prolific online recruitment platform and offered the same compensation as study 1. Screening filters included country of origin and employment status. The mean age of participants was 34.4 (*SD* = 8.74). Participants were 48% female.

**Table 6**. Demographics (Study 2)

| **Country** | **Participants** | **Age** | **Treatment** | **Control** | **Female** |
|---|---|---|---|---|---|
| Germany | 181 | 32.4 (6.99) | 94 | 87 | 48 |
| East Asia* | 173 | 34.72 (8.73) | 86 | 87 | 109 |
| Spain | 191 | 36.96 (9.66) | 94 | 97 | 78 |
| South Africa | 183 | 32.14 (7.86) | 91 | 92 | 120 |
| **Total** | **728** | **34.4 (8.74)** | **365** | **363** | **353** |

*Korea & Japan

*Measures.* We used the same warmth (α = .89), competence (α = .93), and single-item measures employed in study 1 to assess participants' organizational perceptions. Please see Appendix 2 for a full description of the scenario.

## Study 2: Results

Table 7 summarizes correlations among study variables for our study. Similar to those patterns observed in study 1, all organizational measures significantly correlated with each other. Thus, correlational patterns were mostly replicated from those observed in study 1. Table 8 presents the results of the hierarchical linear modeling (HLM) analysis predicting warmth and competence. The null model, estimated without any explanatory variables, yielded ICC(1) values of 0.10 and 0.12, respectively.

[Insert Table 7 about Here]
[Insert Table 8 about Here]

***Warmth***. Hypothesis 1 predicted that leadership emoji use would positively impact perceptions of leadership warmth for higher scores in all leadership styles except self-protective leadership. The coefficient estimates for leadership emoji use ($\beta = 0.46$, $p < 0.001$) across Models 1-4 indicate a positive

impact on leadership warmth. For the moderating effects, the positive and statistically significant coefficient estimates of the interaction terms ($\beta$ = 0.18, $p < 0.05$; $\beta$ = 0.21, $p < 0.05$) in Models 1 and 2 supported H1a and H1b, respectively. Conversely, the significant and negative coefficient estimates for the interaction terms ($\beta$ = -0.22, $p < 0.01$; $\beta$ = -0.21, $p < 0.05$) in Models 3 and 4 indicate that H1d is supported but H1c is only partially supported.

***Competence***. Hypothesis 2 predicted that leadership emoji use would positively impact perceptions of leadership competence for higher scores in all leadership styles except self-protective leadership. However, the coefficient estimates for leadership emoji use ($\beta$ = -0.32, $p < 0.001$) across Models 5-8 indicate a negative impact on leadership competence, thus none of the sub-hypotheses H2a to H2d are supported.

***Organizational outcomes***. Hypothesis 3 posited that leadership emoji use would positively influence organizational outcomes across all leadership styles except self-protective leadership. Using Civility, Leader, and Person-Organization Fit (PO-Fit) to measure organizational outcomes, the null model without explanatory variables yielded ICC(1) values of 0.11, 0.06, and 0.09, respectively. Table 9 summarizes the results of the HLM analysis predicting organizational outcomes. When using Civility and Leader to measure organizational outcomes, the coefficient estimates indicate that none of the sub-hypotheses H3a to H3d are supported. However, when using PO-Fit, the coefficient estimates for leadership emoji use ($\beta$ = 0.16, $p < 0.05$) indicate a significant positive impact. The interaction term coefficients support H3a ($\beta$ = 0.16, $p < 0.05$), H3b ($\beta$ = 0.22, $p < 0.01$), and H3d ($\beta$ = -0.17, $p < 0.05$), while H3c is only partially supported. Table 10 summarizes these findings.

We also performed additional analyses by treating Germany, East Asia, Spain, and South Africa as moderating variables. We found that the positive effect of emojis on leadership warmth is significantly stronger in Germany than in other countries, while the negative effect of emojis on leadership competence is significantly weaker in South Africa compared to other countries. When using civility to measure organizational outcomes, the effects of emojis showed no significant differences across the four countries. However, when using PO-Fit to measure organizational outcomes, we found that the positive effects of emojis are significantly stronger in Germany and significantly weaker in South Africa compared to other countries.

**Table 9.** Results of multilevel regressions: predicting Organizational outcomes (Study 2)

| | **Civility** | | | | **PO-Fit** | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
| Emoji | 0.01 | 0.01 | 0.01 | 0.01 | 0.16* | 0.16* | 0.16* | 0.16* |
| Age | 0.00 | 0.00 | 0.00 | 0.00 | 0.01* | 0.01* | 0.01* | 0.01* |
| Gender | 0.03 | 0.03 | 0.03 | 0.03 | 0.07 | 0.07 | 0.07 | 0.07 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Charismatic | -0.08 | | | | -0.20 | | | |
| Participate | | -0.02 | | | | -0.12 | | |
| Human-oriented | | | 0.02 | | | | 0.15 | |
| Self-protective | | | | -0.03 | | | | 0.11 |
| Emoji × Charismatic | 0.05 | | | | 0.16* | | | |
| Emoji × Participative | | 0.05 | | | | 0.22** | | |
| Emoji × Human-Oriented | | | -0.06 | | | | -0.20** | |
| Emoji × Self-Protective | | | | -0.06 | | | | -0.17* |
| Intercept | 4.22** | 4.22** | 4.22** | 4.22** | 3.69** | 3.68** | 3.68** | 3.68** |
| $\chi^2$ | 59.22*** | 65.46*** | 65.33*** | 65.40*** | 29.61*** | 49.25*** | 42.26*** | 50.42*** |
| ICC | 0.14 | 0.15 | 0.15 | 0.15 | 0.07 | 0.12 | 0.11 | 0.12 |

Notes: N = 728. $^{+}$ p < .10, * p < .05, ** p < .01, ***p < .001

**Table 10.** Support for the phatic language hypotheses (Study 2)

| **DV: Warmth** | | **DV: Competence** | |
|---|---|---|---|
| H1a | Fully supported | H2a | Not supported |
| H1b | Fully supported | H2b | Not supported |
| H1c | Partially supported | H2c | Not supported |
| H1d | Fully supported | H2d | Not supported |
| **DV: Organizational outcomes (Civility)** | | **DV: Organizational outcomes (Leader)** | |
| H3a | Not supported | H3a | Not supported |
| H3b | Not supported | H3b | Not supported |
| H3c | Not supported | H3c | Not supported |
| H3d | Not supported | H3d | Not supported |
| **DV: Organizational outcomes (PO-Fit)** | | | |
| H3a | Fully supported | | |
| H3b | Fully supported | | |
| H3c | Partially supported | | |
| H3d | Fully supported | | |

## Study 2: Discussion

Study 2 further investigated the nuanced role of emojis in leadership communication, focusing on the introduction phase where leaders communicate their orientation and expectations to subordinates. The emojis used in study 2 included stronger emotions (i.e., heart-loving eyes, open mouths) than those used in study 1. Comparatively across both studies, we found some unique and overlapping effects. Similar to study 1, emojis generally had a positive influence on perceptions of leadership warmth, with South Africa being the only unaffected country group (again). This finding is consistent with the literature (Aretz & Mierke, 2019; Riordan & Glikson, 2020; Choi et al., 2023; Liegl & Furtner, 2024). All leadership styles significantly moderated the emoji-warmth relationship, but humane orientation and self-protective leadership did so in a negative direction.

In contrast to study 1, we did find significant effects of leadership emoji use on perceptions of competence, but with an inverse relationship. All leadership styles significantly moderated the emoji-competence relationship. Charismatic and participative leadership styles negatively moderated this relationship whereas humane orientation and self-protective leadership styles did so in a negative direction. Our also data shows an adverse effect of emoji use in three out of four countries, again with South Africa being unimpacted by their use. Thus, study 2 highlights emojis as a double-edged sword: capable of enhancing perceived warmth

of leaders, yet potentially negatively affecting perceptions of competence. Such variation highlights the importance of considering the emotional charge (i.e., heart-loving eyes) and cultural nuances when incorporating emojis into professional communication.

Beyond warmth and competence, study 2 found similar patterns as those observed in study 1 in terms of leadership emoji use on organizational outcomes across our four-country sample. All leadership styles significantly moderated the emoji-PO-fit relationship, with humane orientation and self-protective leadership doing so in a negative direction. Again, Germany was the only country where emoji use led to increased perceptions of organizational outcomes. Specifically, emojis seem to positively influence perceived PO-fit for Germans. Overall, German participants were the most impacted by leadership emoji use whereas South African participants were the least impacted. Understanding these differences is crucial for fostering inclusive and respectful leadership communication practices in diverse work environments. Our overall discussion follows.

## General Discussion

This research explored perceptions of leadership emoji use across four countries. Over two controlled experimental studies, we asked participants to read workplace scenarios (with or without emoji) and evaluated their perceptions of leadership warmth, competence, and organizational outcomes. We used four different types of emojis (Study 2 used more emotionally charged emojis than those used in study1) and found significant effects. Across both studies, we found evidence to suggest that leadership emoji use increases perceived warmth, for all countries except for South Africa, where only slightly higher mean scores were observed. This finding was not aligned with our predictions, that participants from collectivist/high power distance societies would respond most favourably to leadership emoji use. Previous research suggests that East Asians tend to use emojis more frequently than western cultures (Guntuku et al., 2019; Togans et al., 2021). Although Asian participants in the present study welcomed leadership emoji use (i.e., significant effects observed) they reported the lowest mean scores across our four-country sample. It may be that their familiarity (i.e., high frequency use) created less impact on their leadership perceptions; whereas participants in our study from those cultures that tend to use emojis less (i.e., Germany) were more strongly impacted by leadership emoji use. Another possible explanation for our results draws upon GLOBE leadership scores (House et al., 2004). According to GLOBE, Germany (and Spain) has the strongest preference for charismatic, team-oriented, and participative leadership styles, whereas South Africa scores lowest on these dimensions (see Appendix 3). Leadership emoji use may have resonated less with South African participants in our study due to a lower preference for these leadership styles (i.e., emotional, non-hierarchical).

While study 1 did not provide evidence for a trade-off effect between warmth and competence, study 2 clearly demonstrated this phenomenon. This finding aligns with the compensation effect, which describes a negative relationship between warmth and competence in impression formation (Judd et al., 2005; Kervyn et al., 2009). For instance, the use of emojis, by introducing a more playful and informal tone, may enhance perceptions of friendliness and approachability, thereby increasing perceived warmth. Although positive emoji use tends to enhance leader perceptions (Liegl & Furtner, 2024), we found evidence to support their capacity to have unintended consequences (Ernst et al., 2022). For example, in study 2 the use of strong positive emoji (i.e., heart-shaped eyes) led to a reduction in perceived leadership competence.

For both warmth and competence perceptions, South Africa seems to be an outlier among the sampled countries. The lack of significant difference in perceptions of warmth and competence in response to leadership emoji use among South African participants, unlike the other countries, could be attributed to several cultural and contextual factors inherent to South African society. The findings suggest that South Africans might have a more flexible or inclusive approach to leadership communication (Kamper, 2008), which could stem from a unique interplay of cultural characteristics such as high levels of diversity and tolerance for differences in the workplace (Robbins, 2009). Moreover, our data revealed that South African participants deemed discussing politics and religion (Van der Walt & De Klerk, 2014) more appropriate in workplace settings compared to participants from other countries. This indicates a broader tolerance for a range of communication styles (i.e., emoji use) and topics (i.e., religion, drinking, politics) in professional contexts. This tolerance and adaptability might make South African employees more receptive to varied forms of expression, including the use of emojis, without it affecting their judgment of leadership qualities. In terms of organizational outcomes, only German participants in our study were significantly impacted by leadership emoji use. Positive effects were observed across both studies. The positive effects of emoji use on civility, Welfare, and PO-fit for German participants, as opposed to the other countries, may reflect underlying cultural communication preferences and practices (House et al., 2004). German communication culture is often perceived as formal and direct (Hall, 1976), but within the GLOBE leadership framework (see Appendix 3), there is also a value placed on charismatic, participative, and team-oriented communication. Leadership emoji use in our study may have been interpreted by German participants as efforts to maintain polite and considerate communication, and to mitigate the potential for (emotional) misunderstanding in digital communications. This could explain why German participants viewed leadership emoji use positively in terms of enhancing organizational outcomes (Kovjanic et al., 2012).

## Implications

We believe our research findings have several implications for theory and practice. First, we contribute to the limited but growing body of literature on emoji use in cross-cultural organizations (Guntuku et al., 2019; Togans et al., 2021; Sampietro et al., 2022). Specifically, we provide insights into how employees from

various cultural backgrounds perceive leadership emoji use in online communication. Our research has practical relevance for organizations and people in charge of managing diverse teams communicating through computer-mediated platforms (Shachaf, 2008; Pinjani & Palvia, 2013). Organizations' increasing reliance on technology for employee communications often come with unintended consequences. Our findings may thus be used to inform diversity management training programs for organisations invested in EDI communication practices. Our focus on computer mediated communication channels and leadership emoji use provides a modern perspective of how these tools are perceived by employees from various cultural backgrounds.

Further, our research contributes to the literature on leadership emoji use (Saputra, 2021; Ernst et al., 2022; Choi et al., 2023; Liegl & Furtner, 2024). Our findings offer insights for leaders and managers operating in increasingly digital and culturally diverse workplace environments. The generally positive impact of emoji use on perceived leadership warmth and competence observed in this research suggests that emojis can be a powerful tool for enhancing relational dynamics in virtual settings. Leaders should, therefore, consider incorporating emojis thoughtfully in their digital communications to foster a more approachable and humanized leadership presence. However, given the variability in how emojis impact perceptions of competence across different cultures, leaders must be mindful of the cultural backgrounds of their team members when using emojis. Tailoring communication styles to suit these cultural nuances can enhance the effectiveness of digital leadership communication.

In addition, the findings related to the appropriateness of discussing various workplace topics and the differential effects of emoji use on organizational variables in different cultural contexts provide a compelling case for the development of culturally aware communication policies. We acknowledge that this portion of our research design was exploratory, but the initial insights could spark interest for future studies. Organizations could benefit from training programs that educate leaders on the complexities of cross-cultural communication in digital environments, including the strategic use of emojis as a nuanced tool (Von Solms & Von Solms, 2004; Sharma, 2016; Kimura-Thollander & Kumar, 2019).

Our findings have implications for fostering inclusive communication and diversity management practices (Roberson, 2019). Cross-cultural communication competence entails not only knowledge of the culture and language, but also affective and behavioral skills such as empathy, human warmth, charisma, and the ability to manage anxiety and uncertainty (Gudykunst, 1998). Additionally, understanding the strategic use of emojis in multicultural online conversations can enhance team cohesion and improve organizational outcomes. Our findings provide insights into the complexity of managing multicultural communication within contemporary digital professional settings (Sharma, 2016).

Finally, we contribute to the field of leadership science which examines how leaders effectively influence others (Bass, 1985). Our research explores how leader emoji use impacts employee perceptions of

leadership warmth, competence, and organizational outcomes. Such findings are relevant for diversity management practitioners looking to address important HR outcomes such as job satisfaction, psychological safety, organizational commitment, and turnover intentions. For example, Kimura-Thollander and Kumar (2019) stress the significance of designing culturally resonant emojis to ensure efficacy and inclusivity in digital communication. Our findings suggest that the impact of leadership emoji use may be greater for leadership perceptions, rather than organizational outcomes in digital environments.

## Limitations & Future Research

This study illuminates the role of emojis in leadership communication within varied cultural frameworks, revealing patterns that suggest a complex relationship between digital expressions and cultural interpretations. However, it also highlights the need for further investigation into the underlying mechanisms of these findings. Specifically, the high agreeableness observed in African regions, as reported by Schmitt et al. (2007), hints at cultural influences on emoji interpretations, pointing to a broader, multifaceted cultural matrix influencing digital communication.

Our observations suggest that responses to leadership emoji use could be linked to, and perhaps shaped by, GLOBE leadership styles (House et al., 2004), with potential variances in emoji reception across different global regions and countries. This variation underscores the need for expanded research efforts to systematically explore these cultural dimensions and their implications for leadership communication in a digital age. The potential for significant individual differences within cultures also exists, which may eclipse the differences between cultures, thereby suggesting a fertile ground for future investigations into these intra-cultural dynamics.

Moreover, the medium of communication—whether emails or chat/messenger platforms—along with the situational context, can significantly influence the interpretation and impact of emojis (Walther, 1996). Our initial findings suggest that different contexts may lead to nuanced outcomes, advocating for a comprehensive exploration of various situational contexts and communication mediums to unravel the complexities of emoji use in leadership.

Lastly, a diverse methodological approach, including quantitative and qualitative research, and potentially longitudinal studies, could provide deeper insights into the effective integration of emojis in leadership practices. This approach will not only enrich our understanding of the digital communication landscape but also offer practical guidelines for navigating the challenges of leading in culturally diverse and digitally mediated environments.

## Conclusion

This research sought to understand how leadership emoji use is perceived as a communication style by employees of contrasting cultural backgrounds. Over two studies, we conducted used a randomized controlled experimental approach to assess how participants from four countries perceive leadership emoji use and its subsequent impact on organizational outcomes. We drew upon recent literature, as well as cross-cultural leadership and communication theories to predict participant reactions to leadership emoji use. Although we failed to find support for the majority of our predictions, we did find several significant effects of leadership emoji use, underscoring the importance of comprehending communication nuances in our digital and globalized world. Perceptions of leadership emoji use were more aligned with GLOBE (House et al., 2004) leadership styles, with German participants reacting most positively to their use. South African participants, on the other hand, were mostly ambivalent to leadership emoji use. These insights are essential for understanding the impact of leadership communication styles on employees from diverse backgrounds, as well as the increasing prevalence of virtual interactions within organizational teams (Van Knippenberg & Mell, 2016).

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**Table 2.** Descriptive statistics and pairwise correlations (Study 1)

| | Variable | Mean | S.D. | Min | Max | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Individual level** | | | | | | | | | | | | | | | | | |
| **1** | Warmth | 5.62 | 1.09 | 1.67 | 7 | 1 | | | | | | | | | | | |
| **2** | Competence | 5.89 | 0.89 | 2 | 7 | 0.65 | 1 | | | | | | | | | | |
| **3** | Civility | 4.58 | 0.61 | 2 | 5 | 0.34 | 0.37 | 1 | | | | | | | | | |
| **4** | Leader | 4.31 | 0.82 | 1 | 5 | 0.38 | 0.42 | 0.49 | 1 | | | | | | | | |
| **5** | PO-Fit | 3.69 | 0.91 | 1 | 5 | 0.36 | 0.31 | 0.39 | 0.48 | 1 | | | | | | | |
| **6** | Scenario | 0.53 | 0.50 | 0 | 1 | 0.18 | 0.07 | 0.05 | 0.00 | 0.04 | 1 | | | | | | |
| **7** | Age | 34.41 | 8.75 | 20 | 65 | -0.04 | -0.04 | -0.07 | -0.03 | 0.04 | -0.02 | 1 | | | | | |
| **8** | Gender | 0.52 | 0.50 | 0 | 1 | -0.07 | -0.12 | -0.13 | -0.10 | -0.01 | -0.01 | 0.11 | 1 | | | | |
| **Country level** | | | | | | | | | | | | | | | | | |
| **9** | Charismatic | 0.00 | 0.88 | -1.29 | 0.83 | -0.17 | -0.21 | -0.12 | -0.11 | -0.17 | 0.01 | 0.18 | 0.27 | 1 | | | |
| **10** | Participate | 0.00 | 0.86 | -0.67 | 1.48 | -0.06 | -0.14 | -0.04 | -0.03 | -0.08 | 0.04 | 0.01 | 0.18 | 0.56 | 1 | | |
| **11** | Human-oriented | -0.01 | 0.87 | -1.16 | 0.94 | 0.12 | 0.18 | 0.06 | 0.06 | 0.11 | -0.02 | -0.12 | -0.27 | -0.91 | -0.84 | 1 | |
| **12** | Self-protective | -0.02 | 0.86 | -1.04 | 0.92 | 0.09 | 0.14 | 0.02 | 0.03 | 0.07 | -0.01 | -0.13 | -0.26 | -0.88 | -0.78 | 0.98 | 1 |

N = 747.

**Table 3.** Results of multilevel regressions: predicting Warmth and Competence (Study 1)

| | **Warmth** | | | | **Competence** | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
| **Individual level** | | | | | | | | |
| Emoji | 0.40*** | 0.40*** | 0.40*** | 0.40*** | 0.14* | 0.14* | 0.14* | 0.14* |
| Age | -0.00 | 0.00 | -0.00 | -0.00 | -0.00 | 0.00 | -0.00 | -0.00 |
| Gender | -0.05 | -0.05 | -0.05 | -0.05 | -0.12$^{+}$ | -0.11$^{+}$ | -0.11$^{+}$ | -0.11$^{+}$ |
| **Country level** | | | | | | | | |
| Charismatic | -0.20 | | | | -0.21 | | | |
| Participate | | -0.07 | | | | -0.14 | | |
| Human-oriented | | | 0.13 | | | | 0.17 | |
| Self-protective | | | | 0.10 | | | | 0.14 |
| **Interactions** | | | | | | | | |
| Emoji × Charismatic | 0.19* | | | | 0.03 | | | |
| Emoji × Participative | | 0.10 | | | | 0.06 | | |
| Emoji × Human-Oriented | | | -0.16$^{+}$ | | | | -0.05 | |
| Emoji × Self-Protective | | | | -0.14 | | | | -0.06 |
| Intercept | 5.61*** | 5.61*** | 5.61*** | 5.61*** | 5.88*** | 5.88*** | 5.88*** | 5.88*** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| $\chi^2$ | 16.98*** | 28.93*** | 28.93*** | 33.35*** | 17.89*** | 35.59*** | 26.97*** | 35.36*** |
| ICC | 0.04 | 0.07 | 0.07 | 0.08 | 0.04 | 0.08 | 0.06 | 0.08 |

Notes: N = 747. + p < .10, * p < .05, ** p < .01, ***p < .001

**Table 7**. Descriptive statistics and pairwise correlations (Study 2)

| | Variable | Mean | S.D. | Min | Max | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Individual level** | | | | | | | | | | | | | | | | | |
| **1** | Warmth | 5.47 | 1.06 | 2 | 7 | 1 | | | | | | | | | | | |
| **2** | Competence | 5.22 | 1.11 | 1.33 | 7 | 0.49 | 1 | | | | | | | | | | |
| **3** | Civility | 4.22 | 0.79 | 1 | 5 | 0.48 | 0.41 | 1 | | | | | | | | | |
| **4** | Leader | 3.85 | 0.84 | 1 | 5 | 0.42 | 0.52 | 0.46 | 1 | | | | | | | | |
| **5** | PO-Fit | 3.69 | 0.91 | 1 | 5 | 0.54 | 0.46 | 0.54 | 0.51 | 1 | | | | | | | |
| **6** | Scenario | 0.50 | 0.50 | 0 | 1 | 0.22 | -0.14 | 0.00 | -0.03 | 0.09 | 1 | | | | | | |
| **7** | Age | 34.08 | 8.60 | 22 | 64 | -0.01 | 0.00 | -0.01 | 0.05 | 0.06 | -0.03 | 1 | | | | | |
| **8** | Gender | 1.52 | 0.54 | 1 | 3 | 0.11 | 0.10 | 0.02 | 0.04 | 0.08 | 0.05 | -0.04 | 1 | | | | |
| **Country level** | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **9** | Charismatic | 0.01 | 0.87 | -1.29 | 0.83 | -0.16 | -0.17 | -0.09 | -0.16 | -0.20 | 0.01 | 0.12 | -0.23 | 1 | | |
| **10** | Participate | 0.00 | 0.86 | -0.67 | 1.48 | -0.04 | -0.15 | -0.02 | -0.08 | -0.12 | 0.02 | -0.09 | -0.27 | 0.56 | 1 | |
| **11** | Human-oriented | -0.01 | 0.86 | -1.16 | 0.94 | 0.09 | 0.14 | 0.03 | 0.12 | 0.15 | -0.01 | -0.03 | 0.28 | -0.90 | -0.84 | 1 |
| **12** | Self-protective | -0.02 | 0.86 | -1.04 | 0.92 | 0.05 | 0.09 | -0.02 | 0.09 | 0.11 | -0.01 | -0.04 | 0.27 | -0.88 | -0.78 | 0.98 | 1 |

Notes: N = 728.

**Table 8.** Results of multilevel regressions: predicting Warmth and Competence (Study 2)

| | **Warmth** | | | | **Competence** | | | |
|---|---|---|---|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
| **Individual level** | | | | | | | | |
| Emoji | 0.46*** | 0.46*** | 0.46*** | 0.45*** | -0.32*** | -0.32*** | -0.32*** | -0.32*** |
| Age | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Gender | 0.16* | 0.17* | 0.16* | 0.16* | 0.16* | 0.15* | 0.16* | 0.16* |
| **Country level** | | | | | | | | |
| Charismatic | -0.20 | | | | -0.22 | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Participate | | -0.05 | | | | -0.18 | | |
| Human-oriented | | | 0.10 | | | | 0.17 | |
| Self-protective | | | | 0.06 | | | | 0.11 |
| **Interactions** | | | | | | | | |
| Emoji × Charismatic | 0.18* | | | | -0.24** | | | |
| Emoji × Participative | | 0.21* | | | | -0.16+ | | |
| Emoji × Human-Oriented | | | -0.22** | | | | 0.20* | |
| Emoji × Self-Protective | | | | -0.21* | | | | 0.16+ |
| Intercept | 5.47*** | 5.47** | 5.47** | 5.47** | 5.21** | 5.21** | 5.21** | 5.21** |
| $\chi^2$ | 39.79*** | 60.06*** | 54.98*** | 59.45*** | 55.57*** | 62.05*** | 63.77*** | 73.37*** |
| ICC | 0.09 | 0.14 | 0.13 | 0.14 | 0.13 | 0.14 | 0.15 | 0.16 |

Notes: N = 728. $^{+}$ p < .10, * p < .05, ** p < .01, ***p < .001

**Appendix 1 – Performance Evaluation Workplace Scenario (including emoji)**

Study 1

[prompt] Imagine that you are an employee of a multinational corporation. Recently, you received performance feedback from your supervisor. There was something you did not agree with, so you decided to talk to your supervisor through the corporate messenger/chat system. Imagine yourself experiencing the following interactions on the chat platform.

**You**: Hi Jennifer, can I talk to you about something urgent?

Jennifer: Hi Jessie, sure what is it? 😊

**You**: I think that the performance evaluation you gave me last week was unfair. I feel like you criticized my personality by saying that I needed to make 'more effort' at getting along with my team. That for me to gain their respect and acceptance, I would need to adjust my attitude. But I don't think there's anything wrong with my attitude. Yeah sure, I was late to a few team-meetings, and maybe that's why some members dis-like me, but I don't think my attitude has anything to do with this.

Jennifer: Well Jessie, I'm sorry that you feel the evaluation was unfair, but your teamwork compatibility has become a growing concern for me. In order to succeed in this company, everyone needs to work well with each other. Aside from being late a few times, your individual performance has been great. My job is to coach you on how to succeed in all areas, including teamwork. 😳

**You**: OK, well it makes me feel better to hear that you recognize my strong individual performance. Could we have another meeting to talk about which 'attitudes' you think I need to change, and or other strategies you believe might help me succeed with the team?

Jennifer: Gladly. I'll contact you after lunch once I look at my schedule and find some time for us to chat. Would you like me to invite a Coaching representative from HR to join us? They are also here to support you. 😳

**You**: Sure Jenn, that would be awesome.

Jennifer: Great Jessie, I'll be in touch 😊

[Organizational construct ratings]

**Appendix 2 – New Sales Director introduction (including emoji)**

Study 2

1) Employee orientation

ABC Software Company has just hired Marco De Fuentes from Brazil to fill a position of Sales Director. Marco's reputation as the National Sales Manager of the ABC Software branch in Brasil gave him the opportunity to start working at the head office in Montreal, Canada. The head office in Montreal has a staff of diverse cultures. During Marco's employee orientation, he meets his new colleagues via online chatroom messenger. Given that many employees work remotely, ABC uses this communication tool frequently. In the chatroom, Marco introduces himself to his new colleagues, most of whom are co-workers that he will be supervising:

"Hello everyone, I am excited to be working with you as your new National Sales Director 😀. I'm here to help the sales team increase their profit margins by 10% and lower the customer acquisition costs. I hope that you find me approachable and easy to get along with 😍."

[Organizational construct ratings]

**Appendix 3 – GLOBE Leadership Scores for six styles across four countries**

| | Germany | South Africa | East Asia* | Spain |
|---|---|---|---|---|
| Charismatic | 5.87 | 5.16 | 5.49 / 5.53 | 5.90 |
| Team Oriented | 5.51 | 5.23 | 5.56 / 5.52 | 5.93 |
| Participative | 5.70 | 5.04 | 5.07 / 4.92 | 5.11 |
| Humane Oriented | 4.60 | 4.79 | 4.68 / 4.87 | 4.66 |
| Autonomous | 4.35 | 3.94 | 3.67 / 4.21 | 3.54 |
| Self-Protective | 3.32 | 3.62 | 3.60 / 3.67 | 3.38 |

*Denotes Japanese / Korean leadership values

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# REMOTE WORK AND EMPLOYEE WITHDRAWAL COGNITIONS DURING THE LATE DAYS OF THE COVID-19 PANDEMIC: EXPLORING THE DUAL ROLES OF JOB SATISFACTION AND PSYCHOLOGICAL STRAIN

We examined withdrawal cognitions among both remote and on-site employees working at a large Atlantic Canadian health centre during the late stages of the COVID-19 pandemic. Using a job demands-resources (JD-R) framework, we explored the dual pathways of job satisfaction and psychological strain as explanatory mechanisms for observed differences in withdrawal cognitions between remote versus on-site employees. We found remote employees reported weaker withdrawal cognitions than on-site employees – and that this relation was statistically mediated both by increased job satisfaction and reduced psychological strain. Consistent with the JD-R, we also found evidence to suggest that structural and personal resources both help alleviate psychological strain – and that support provided at the leadership (versus peer) level is effective at bolstering perceived support.

## Introduction

Once considered a niche working arrangement reserved mainly for a few relatively affluent fields (Desilver, 2020), remote work has become an organizational norm across a wide range of industries since the onset of the COVID-19 pandemic. The COVID-driven shift towards remote work was borne of necessity – and the experience of workers during this time has been one of significant adjustment. The circumstances of the pandemic led to a rapid broadening of the remote work population, including employees who had no previous experience working remotely – some of whom would not have self-selected into the arrangement (Henke et al., 2022). On the organizational end, many employers were also left scrambling to implement remote work practices in short order – and were in no position to fully consider employees' preparedness or capacity for self-regulation (or the technical requirements they would have to navigate; Dettmers & Mülder, 2020). Consequently, employees needed to adjust (often without clear guidance) to higher degrees of self-regulated work, as well as to the challenges inherent in technologically-mediated forms of communication (van Zoonen et al., 2021; Babapour Chafi et al., 2021). Many employees did so while also facing high degrees of work-to-home conflict (Adisa et al., 2021), as they juggled their work tasks against child- and homecare responsibilities (Toscano & Zappalà, 2021; van Veldhoven et al., 2020; Wood et al., 2020), and shifted to using (often ill-prepared) at-home workstations (Adisa et al., 2021).

Given the far-reaching consequences of this shift, organizations would benefit from evidence-based insight to help navigate their transition to (and continuation of) remote work practices into the post-pandemic era. However, many of the classic assumptions about remote work and its outcomes are derived from empirical work conducted pre-pandemic. This is problematic, as the bulk of remote work research conducted prior to 2020 was based on a growing but still relatively small population of workers spanning a smaller subset of (mainly white collar) industries – most of whom engaged in the practice by choice. This is no longer the case, as the remote work population has shifted dramatically as part of its expansion and mass proliferation

during the pandemic (Galanti et al., 2021). Consequently, models developed prior to 2020 may be poorly suited to understanding remote workers' experiences, attitudes, and well-being at present. Moreover, remote work research since 2020 has yielded mixed results. Although remote work arrangements continue to be associated with higher job satisfaction than on-site work (Beckel & Fisher, 2022), the volatility and uncertainty of the pandemic context also led to considerable strain among newly-remote workforces. Indeed, one survey found that 69 percent of workers considered COVID-19 to be the most significant stressor in their entire career (Ginger, 2020).

This mix of both greater satisfaction and greater strain may perhaps be best explained using a job demands-resources perspective. According to the job demands-resources (JD-R) model, all work characteristics can be classified either as demands that cause workers strain, or as resources that buttress against the effects of that strain (Bakker & Demerouti, 2017). Remote work is an interesting job characteristic, in that it simultaneously provides employees with both resources (e.g., in the form of increased autonomy, flexibility, and reduced commuting costs) as well as demands (e.g., in the form of leaner communication, a lack of feedback, heightened ambiguity, and work intensification; Bilotta et al., 2021). If this is the case, then remote workers in the COVID and post-COVID era are likely to still draw satisfaction from the benefits of remote work arrangements – while simultaneously facing greater job demands and strain. In this way, remote work is likely to have both positive and negative effects on employee work attitudes, well-being, and retention, due to the presence and coexistence of bolstering and deleterious elements within remote work arrangements.

Our study contributes to the growing body of pandemic and post-pandemic remote work research in a few ways. First, we examine the effects of remote versus on-site work during the late stages of the COVID-19 pandemic on employee withdrawal-related outcomes (in this case, early withdrawal cognitions). Employee withdrawal is an outcome of particular interest from a practice perspective, as the pandemic fueled fears of mass employee resignations. We study this relation among job incumbents within the healthcare sector, which faced significant retention issues throughout the pandemic (Poon et al., 2022). To better explore the potentially mixed effects of remote work on employee withdrawal, we apply a job demands-resources perspective, and investigate the dual pathways of job satisfaction and psychological strain to understand the impact of remote work on withdrawal cognitions. Furthermore, in line with Propositions 3 and 5 of the JD-R model, we also investigate the mitigating effects of both structural (i.e., job) and personal resources on psychological strain.

Our study may be particularly relevant to remote worker retention within an Atlantic Canadian context, as we collect data specifically from job incumbents working for a large Maritime Canadian healthcare provider. Within the context of this organization, we explore how support specifically at the peer-, supervisor-, and senior leadership levels, as well as different resources put in place as part of the organization's pandemic response, impacted the strain faced by both their on-site and remote workers. Our goal in doing so is to not only provide an exploration of the demands that this population of workers faced during the organization's shift to remote work – but also explore practicable solutions that similar organizations may offer to help minimize the strain placed on their on-site and remote employees.

## Remote Work, Job Satisfaction, and Employee Withdrawal

A large body of prior work links remote work arrangements to greater job satisfaction among employees. For example, in a seminal meta-analysis of 28 studies, Gajendran and Harrison (2007) found an overall positive relation between employees' use of remote work options and their job satisfaction. In their paper, Gajendran and Harrison suggested that this effect occurs for multiple reasons, including reduced job demands in the form of lessened transportation costs and time commitments, as well as boosts in job resources (such as perceived autonomy and felt support). Moreover, if enacted voluntarily, remote work

opportunities can help demonstrate that an employer is willing to alter a job incumbent's work environment to better suit the incumbent's needs, which may enhance their perceptions of person-job and person-organization fit (Baltes et al., 1999).

Previous work also draws strong links between employee job satisfaction and retention. In a review aggregating 155 independent studies, Tett and Meyer (1993) found that job satisfaction uniquely predicted employee withdrawal cognitions even more strongly than organizational commitment (and ultimately, predicted actual turnover behaviours indirectly via withdrawal cognitions).

Given these findings, it is likely that employees who primarily work remotely should experience greater job satisfaction than employees who primarily work on-site. Greater job satisfaction should, in turn, be negatively related to employees' withdrawal cognitions – and should at least partly mediate the indirect relation between remote work and withdrawal cognitions (such that employees who work remotely should experience weaker withdrawal cognitions due to feeling more satisfied in their jobs):

**Hypothesis 1a.** Employees who work remotely will experience greater job satisfaction than employees who work on-site.

**Hypothesis 1b.** Job satisfaction will mediate the indirect relation between remote work and withdrawal cognitions, such that employees who work remotely will experience weaker withdrawal cognitions than employees who work on-site, due to experiencing greater job satisfaction.

## Psychological Strain and Remote Employee Withdrawal during the COVID-19 Pandemic

It bears noting that Gajendran and Harrison's (2007) meta-analysis was conducted well before the COVID-19 pandemic – and forms part of a corpus of remote work research that assumes remote work arrangements are mainly voluntary. This is an important caveat, as the *involuntary* shift to remote work arrangements in 2020 may have impacted some of the moderators that drive the remote work-job satisfaction relation. For example, in their research, Golden and Veiga (2005) found the relation between remote work intensity and job satisfaction was curvilinear, with the positive relation between remote work intensity and job satisfaction plateauing once employees began to work predominantly remote hours. This relation also appears to be moderated by leader- and team member exchange quality, as well as by work-to-family conflict (Golden, 2006) – the latter of which worsened for many remote employees during the pandemic, due to at-home schooling (Toscano & Zappalà, 2021; van Veldhoven et al., 2020; Wood et al., 2020) and the inadequacy of many (previously on-site) employees' at-home workstations (Adisa et al., 2021). Consequently, the remote work-job satisfaction relation is likely to be heavily impacted by job characteristics (Beckel & Fisher, 2022), and may enact differently – or at least require a more nuanced assessment – in the context of the COVID-19 pandemic response, during which employees often had less control over the extent to which they were expected to perform their jobs remotely versus on-site.

Broadly speaking, even if remote work is likely to enhance job satisfaction in general, its incorporation at such a rapid pace and with such intensity may have also engendered greater job demands, exacerbating employees' psychological strain. Job demands, as defined by the JD-R model, represent physical, psychological, social, or organizational elements of a job that require sustained effort on the part of the job incumbent – and in doing so, cause psychological strain (Demerouti et al., 2001). Psychological strain, in turn, is a strong predictor of withdrawal cognitions, intentions, and behaviours (Schaubroeck et al., 1989). For example, in a meta-analysis of 183 independent samples, Podsakoff and colleagues (2007) found that job demands (and the subsequent strain they caused) were negatively related to job attitudes associated with retention – and positively related to withdrawal cognitions, intentions, and behaviours (see also Fisher & Gitelson, 1983; Griffeth et al., 2000; Jackson & Schuler, 1985).

Remote work – especially when involuntary – can foster greater job demands; and, as a result, strain. Transitioning to remote work often engenders a greater degree of role ambiguity and conflict – especially if newly-remote workers are unsure how to adapt to the weakened boundaries between work and home; or, when they face simultaneous caretaking demands at home (as was often the case during the pandemic). Therefore, it is likely that – in addition to experiencing heightened job satisfaction – employees who primarily work remotely should *also* experience greater psychological strain than employees who primarily work on-site. Psychological strain should, in turn, be positively related to employees' withdrawal cognitions, and should at least partly mediate the indirect relation between remote work and withdrawal cognitions (such that employees who work remotely should experience stronger withdrawal cognitions, due to feeling greater psychological strain):

**Hypothesis 2a.** Employees who work remotely will experience greater psychological strain than employees who work on-site.

**Hypothesis 2b.** Psychological strain will mediate the indirect relation between remote work and withdrawal cognitions, such that employees who work remotely will experience stronger withdrawal cognitions than employees who work on-site, due to experiencing greater psychological strain.

## The Mitigating Effects of Perceived Organizational Support and Personal Resources

According to Proposition 3 of the JD-R, the negative effects of job demands are lessened when employees have access to sufficient structural job resources. Structural job resources – which can be understood as aspects of a job that are functional and conducive towards achieving work goals, reducing job demands, or stimulating personal development (Bakker, 2011; Bakker & Demerouti, 2007), allow employees to more effectively cope with the demands they face (Bakker & Demerouti, 2017). There is plentiful evidence for the mitigating effects of job resources in the research literature. For example, in a study of 148 organizations (and more than 12,000 employees), Bakker and colleagues (2010) found that 88 percent of possible job demand-resource interactions were statistically significant, such that the presence of job resources weakened the negative effects that job demands had on strain.

There are many potential job resources that could be relevant to remote workers; however, one key resource is an employee's perceived organizational support, which previous work has linked with lower strain (e.g., Richardson et al., 2008; Rhoades & Eisenberger, 2002). An organization's ability to support its remote workers is a valuable protective factor, and has been cited as central to remote workers' well-being and retention during the initial phases of the pandemic (Dolce et al., 2020; Wang et al., 2021). When remote workers feel adequately supported, they often feel more connected to their co-workers despite the physical distance (Straus et al., 2023), and enjoy access to greater emotional support, information, and feedback (all of which can help reduce the strain caused by their job demands; Buonomo et al., 2023). Consequently, perceived organizational support should be negatively related to psychological strain:

**Hypothesis 3a.** Perceived organizational support will be negatively related to psychological strain.

Moreover, according to Proposition 5 of the JD-R, personal resources (such as self-efficacy and optimism) function similarly to structural job resources, in that they mitigate the negative effects of job demands on employees' strain (Bakker & Demerouti, 2017). When employees are high in optimism and self-efficacy, they often feel more in control over their work environment; and, as a result, feel more capable of handling unforeseen or adverse events (Bakker & Demerouti, 2017). Consequently, optimism and self-efficacy should also be negatively related to the psychological strain:

**Hypothesis 3b.** Self-efficacy will be negatively related to psychological strain.

**Hypothesis 3c.** Optimism will be negatively related to psychological strain.

## Method

### Participants

Participants were drawn from the pool of employees at a large healthcare centre in Atlantic Canada, which employs approximately 3,400 individuals. Data were collected cross-sectionally in 2022 as part of the organization's pandemic response initiative. Although the organization has historically deployed a standardized engagement survey once every two years, in 2022, the organization developed a custom in-house survey meant to more specifically assess employee engagement and perceived organizational support as it pertained to the organization's COVID-19 pandemic response. There were 1,314 responses in total (all representing full-time job incumbents at the organization), with a final vetted sample of 1,022 respondents.

### Measures

***Overview.*** All measures in the present study were drawn from questions in the organization's 2022 engagement survey. The survey consisted of 16 questions. Respondents were asked to assess the extent to which they had worked remotely versus on-site during the pandemic up until that point, their satisfaction with the organization's pandemic response and available supports, and their perceived strain and efficacy throughout the pandemic.

It bears noting that the original purpose of this survey was to provide the organization with a measure of the effectiveness of their COVID-19 pandemic response – and the impact the organization's shift to remote work during the pandemic had on their employees. Measures were developed in-house by the organization for this purpose, and do not represent psychometrically-validated research instruments. Consequently, we reviewed the questions developed by the organization, and coded questions to operational variables when it was deemed that sufficient definitional overlap between the question and the theoretical construct of interest was found.

***Remote versus On-Site Work.*** Respondents' engagement with remote work was assessed by asking each respondent to answer the following question: "Since [organization name] began its pandemic response, where have you done the majority of your work?". Respondents were asked to select between the following options: 1) "Mostly onsite"; 2) "Mostly at home"; 3) "A mix of onsite and at home (at least one day/week or 20 percent in each location)"; or, 4) "Other, please specify" (in these cases, respondents were able to provide context for their response using an open-ended comment box).

Respondents who endorsed the "Mostly onsite" answer option were coded as working completely or primarily on-site, whereas respondents who endorsed the "Mostly at home" answer option were coded as working completely or primarily remotely. Respondents who endorsed the "Other, please specify" answer option were categorized by the researchers, based on any comments they provided. If a respondent's comments indicated they fit the definition of any of the other three options, they were categorized accordingly. Respondents who endorsed the "Other, please specify" option were removed from the sample if they failed to provide any explanatory comments, provided comments that did not make it clear to what extent they worked on-site versus remotely, or indicated being a homecare or other community worker (who could not operationally be considered equivalent to either the on-site [i.e., in-office] or remote [i.e., at home] respondents).

A total of 150 respondents either self-selected or were categorized into the "A mix of onsite and at home (at least one day/week or 20% in each location)" category. Unfortunately, the phrasing of this answer option did not differentiate levels of remote work intensity amongst the hybrid respondents (e.g., a respondent who generally works four days on-site and one day at home versus the opposite). As such, we could not assume that the hybrid workers in our sample meaningfully formed their own level of remote work intensity (or whether there were unmeasured sub-levels, in which some respondents were more akin to either fully on-site or fully remote workers versus others in their own category). To address this issue, hybrid respondents were removed from the sample as well, leaving a final sub-sample of 1,022 respondents (all of whom worked either primarily on-site or primarily remotely).

***Job Satisfaction.*** Job satisfaction refers to an overall, evaluative judgment of one's job, ranging from positive to negative (Judge & Kammeyer-Mueller, 2012; Judge et al., 2017). Respondents' job satisfaction was assessed using a single item, namely: "Overall, how would you currently rate [organization name] as a place to work?". Responses were captured using a five-point, Likert-type scale (1 = "Poor"; 5 = "Excellent").

***Psychological Strain.*** Psychological strain refers to feelings of mental impairment, such as anxiety, irritability, exhaustion, or cynicism (Bakker et al., 2003). Respondents' psychological strain was assessed using a single item, namely: "I am feeling overwhelmed with all the changes that have been taking place at work". Responses were captured using a five-point, Likert-type scale (1 = "Strongly Disagree"; 5 = "Strongly Agree").

***Withdrawal Cognitions.*** Hom and Griffeth's (1991) confirmatory factor analysis note that withdrawal cognitions comprise an employee's thoughts of quitting, intentions to search for new employment, and intentions to leave their job. Respondent's withdrawal cognitions were assessed using a single item, namely: "I have considered making a career change". Responses were captured using a five-point, Likert-type scale (1 = "Strongly Disagree"; 5 = "Strongly Agree").

***Self-Efficacy.*** Self-efficacy refers to one's perception regarding "how well one can execute courses of action required to deal with prospective situations" (Bandura, 1982, p. 122). Respondents' self-efficacy was assessed using a single item, namely: "I feel confident and ready to support the challenges and changes that are coming". Responses were captured using a five-point, Likert-type scale (1 = "Strongly Disagree"; 5 = "Strongly Agree").

***Optimism.*** Optimism refers to the tendency to believe that one will generally experience positive outcomes (Scheier et al., 2001). Respondents' level of optimism assessed using a single item, namely: "I feel optimistic about the future of my work at the IWK.". Responses were captured using a five-point, Likert-type scale (1 = "Strongly Disagree"; 5 = "Strongly Agree").

***Perceived Organizational Support.*** Perceived organizational support refers to an employee's belief that aid will be available from the organization when it is needed to carry out one's job effectively (George et al., 1993; Rhoades & Eisenberger, 2002). Respondents' perceived organizational support was assessed using a single item, namely: "I have felt well-supported to do the work I have been doing during the pandemic". Responses were captured using a five-point, Likert-type scale (1 = "Strongly Disagree"; 5 = "Strongly Agree").

***Sources of Support.*** In addition to assessing their level of perceived organizational support, respondents were also asked to indicate what level(s) within the organization they primarily received support from. To do so, respondents were asked to indicate which of the following levels (if any) they felt they had meaningfully received support from during the pandemic: peers, supervisors, managers, directors, senior leadership, or none (i.e., "Have not received any support"). Respondents were able to endorse more than

one source of support, if they felt they had been supported at multiple levels (e.g., an employee had received both peer support and support from their immediate supervisor).

From these responses, the following three categories of support were derived: 1) peer-level support (this included respondents who indicated receiving support at the peer-level); 2) proximal supervisor-level support (this included respondents who indicated receiving support at either the supervisor or manager levels); and, 3) distal leadership-level support (this included respondents who indicated receiving support at either the director or senior leadership levels).

***Engagement with Support Resources.*** Finally, respondents were asked to consider a series of six different resources that the organization had provided as part of its pandemic response, and indicate whether they found each of these resources to be helpful. The list of resources included: 1) updates provided via the organization's intranet; 2) daily COVID-19 email and newsletter updates; 3) town hall meetings; 4) the organization's "wellness hub"; 5) the organization's support line; and, 6) the organization's employee and family assistance (EAP) program. Respondents rated each of these six resources independent of their ratings for the others, using the following categories: 1) "Helpful"; 2) "Not Helpful"; or 3) "Did Not Access".

## Results

### Did Remote Work Predict Withdrawal Cognitions via Job Satisfaction (Hypothesis 1)?

Respondents who primarily worked remotely ($M$ = 4.03, $SD$ = 0.86) reported experiencing significantly greater job satisfaction than respondents who primarily worked on-site ($M$ = 3.43, $SD$ = 1.17), $t(1020)$ = 6.97, $p < .001$, *Cohen's d* = 0.53, *95% CIs* = [0.38, 0.69], supporting the *a*-path of Hypothesis 1's proposed mediation model. Moreover, respondents' job satisfaction was significantly and negatively related to respondents' withdrawal cognitions $t(1020) = -17.70$, $p < .001$, $r^2 = .23$, *95% CIs* = [.19, .28], $\beta = -0.48$, *95% CIs* = [-0.54, -0.43], supporting the *b*-path of Hypothesis 1's proposed mediation model. An indirect effect may be justified whenever both the predictor-mediator (i.e., *a*-path) and mediator-outcome (i.e., *b*-path) relations are evidenced (Shrout & Bolger, 2002). Consequently, we assessed indirect effects using bootstrap-based confidence intervals, in accordance with Preacher and Hayes' (2004) recommendations. The indirect path between remote versus on-site work and withdrawal cognitions via job satisfaction was significant $b = -0.39$, *95% CIs* = [-0.47, -0.29], $p < .001$, suggesting respondents who worked primarily remotely experienced weaker withdrawal cognitions due at least in part to their higher average job satisfaction. The residual direct relation between remote versus on-site work and withdrawal cognitions was non-significant after accounting for job satisfaction $b = 0.05$, *95% CIs* = [-0.12, 0.21], $p = .74$. Thus, Hypotheses 1a and 1b were both supported.

### Did Remote Work Predict Withdrawal Cognitions via Psychological Strain (Hypothesis 2)?

Contrary to Hypothesis 2, respondents who primarily worked remotely ($M$ = 2.63, $SD$ = 1.25) actually reported experiencing significantly less job strain than respondents who primarily worked on-site ($M$ = 3.15, $SD$ = 1.25), $t(1020) = -5.42$, $p < .001$, *Cohen's d* = -0.42, *95% CIs* = [-0.57, -0.26]. The indirect path between remote versus on-site work and withdrawal cognitions via psychological strain was significant $b = -0.24$, *95% CIs* = [-0.32, -0.12], $p < .001$, suggesting respondents who worked primarily remotely experienced weaker withdrawal cognitions also due at least in part to their lower average psychological strain. Again, the residual direct relation between remote versus on-site work and withdrawal cognitions was non-significant after accounting for psychological strain $b = 0.10$, *95% CIs* = [-0.29, 0.13], $p = .32$. Thus, the mediation model proposed in Hypothesis 2 was supported, in that psychological strain was found to statistically mediate the indirect effect of remote work on withdrawal cognitions; however, interestingly,

the direction of this effect was opposite to the one proposed in Hypothesis 2. Thus, Hypotheses 2a and 2b were not supported, given the direction of the observed effects.

**Did Structural Job (i.e., Perceived Organizational Support) and Personal (i.e., Self-Efficacy and Optimism) Resources Predict Lower Strain (Hypothesis 3)?**

To assess Hypothesis 3, respondents' perceived organizational support self-efficacy, and optimism were included as simultaneous predictors of respondents' reported psychological strain, so that the unique partial effects of each type of resource on strain could be evaluated. Self-efficacy $t(1018) = -8.23$, $p < .001$, $sr^2 = .05$, *95% CIs* = [.03, .08], $\beta = -0.32$, *95% CIs* = [-0.40, -0.25], and perceived organizational support $t(1018) = -4.37$, $p < .001$, $sr^2 = .01$, *95% CIs* = [.00, .03], $\beta = -0.15$, *95% CIs* = [-0.22, -0.08], both uniquely and negatively related to respondents' psychological strain to a statistically significant degree. Conversely, optimism $t(1018) = -1.14$, $p = .25$, $sr^2 = .00$, *95% CIs* = [.00, .00], $\beta = -0.05$, *95% CIs* = [-0.13, 0.03] did not have a statistically significant unique relation with strain. It bears noting that optimism did have a statistically significant, negative zero-order correlation with strain $r^2 = -.36$, *95% CIs* = [-.41, -.30], $p < .001$; however, this relation became non-significant in the presence of self-efficacy and perceived organizational support. This finding can be at least partly explained by the high degree of observed multicollinearity between optimism and self-efficacy (both of which represent personal resources, as per the JD-R; $r^2 = .69$, *95% CIs* = [.66. .72], $p < .001$). These results suggest that both self-efficacy (a personal resource) and perceived organizational support (a structural job resource) were uniquely effective in predicting reduced psychological strain among respondents. Thus, Hypotheses 3a and 3b were supported. Optimism, if examined in isolation, also negatively predicted psychological strain; however, it did not have a unique relation with strain in the presence of other personal resources (in this case, self-efficacy). Thus, Hypothesis 3c was not supported.

Means, standard deviations, and correlations between our measures are presented in Table 1.

**Table 1**

*Variable means, standard deviations, and correlations (with 95 percent confidence intervals)*

| Variable | *M* | *SD* | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|---|
| 1. Remote Work | 0.21 | 0.41 | | | | | | |
| 2. Support | 3.42 | 1.17 | .26** [.20, .31] | | | | | |
| 3. Self-efficacy | 3.25 | 1.06 | .16** [.10, .22] | .52** [.47, .56] | | | | |
| 4. Optimism | 3.30 | 1.18 | .21** [.15, .27] | .57** [.53, .61] | .69** [.66, .72] | | | |
| 5. Job Satisfaction | 3.56 | 1.13 | .21** [.15, .27] | .63** [.59, .67] | .52** [.48, .57] | .64** [.60, .67] | | |
| 6. Strain | 3.04 | 1.27 | -.17** [-.23, -.11] | -.35** [-.40, -.29] | -.43** [-.48, -.38] | -.36** [-.41, -.30] | -.31** [-.36, -.25] | |
| 7. Withdrawal | 3.10 | 1.52 | -.09** [-.15, -.03] | -.43** [-.48, -.38] | -.45** [-.50, -.40] | -.57** [-.61, -.53] | -.48** [-.53, -.44] | .39** [.34, .44] |

*Note.* Remote Work is dummy-coded, such that, 1 = "Remote" and 0 = "On-site". * indicates $p < .05$. ** indicates $p < .01$.

**The Impact of Different Sources of Organizational Support (Exploratory Research Question 1)**

As an additional exploratory outcome, we were interested in the extent to which different sources of support helped bolster respondents' perceived organizational support. To address this question, respondents' self-reported presence of peer-, proximal manager-, and distal leadership support (each dummy-coded) were included as simultaneous predictors of respondents' perceived organizational support, so that unique partial effects could be evaluated.

The presence of both proximal supervisor support $t(1098) = 17.19$, $p < .001$, $sr^2 = .19$, *95% CIs* = [.15 .23], $\beta = 0.44$, *95% CIs* = [0.39, 0.49] as well as distal leadership support $t(1098) = 10.24$, $p < .001$, $sr^2 = .07$, *95% CIs* = [.04, .09], $\beta = 0.26$, *95% CIs* = [0.21, 0.31] each uniquely predicted variance in respondents' perceived organizational support. However, the presence of peer support was not found to uniquely predict perceived organizational support $t(1098) = -0.34$, $p = .74$, $sr^2 = .00$, *95% CIs* = [.00, .00], $\beta = -0.01$, *95% CIs* = [-0.06, 0.04]. Direct supervisor support was found to be more strongly predictive of perceived organizational support (i.e., had non-overlapping confidence intervals) compared with distal leadership support. These results suggest that support received specifically at the leadership levels (both proximal and distal) were uniquely important for enhancing respondent's perceived organizational support.

**The Impact of Different Support Resources (Exploratory Research Question 2)**

We were also interested in exploring the extent to which different structural supports that the organization put into place during its pandemic response affected the extent to which employees felt supported. To address this question, for each support resource, we used an analysis of variance to explore the mean differences in perceived organizational support between respondents who: 1) accessed the resource and found it to be helpful; 2) accessed the resource and found it to be not helpful; and, 3) did not access the resource. The ANOVA results are presented in Table 2.

**Table 2**

*Omnibus (F-value) and local (q-value) effects of different support resources on perceived support*

| Variable | *F* (Overall) | *q* (Helpful-Not Helpful) | *q* (Helpful-Did Not Access) | *q* (Not Helpful-Did Not Access) |
|---|---|---|---|---|
| 1. Intranet Updates | 10.49** | 4.53** | 1.07 | -2.47* |
| 2. Email Updates | 48.30** | 9.64** | 2.72* | -4.45** |
| 3. Wellness Hub | 31.80** | 7.82** | 2.24 | -7.08** |
| 4. Town Halls | 56.26** | 10.41** | 6.33** | -6.75** |
| 5. Support Line | 18.05** | 5.78** | 2.16 | -5.52** |
| 6. EAP | 25.13** | 6.14** | 0.70 | -7.00** |

*Note.* * indicates $p < .05$. ** indicates $p < .01$.

As shown in Table 2, across all six resources, there was a statistically significant omnibus difference in perceived organizational support. However, after conducting a series of Tukey's Honestly Significant Difference (HSD) tests between each level of the support resource variable, we found that these differences were generally driven by respondents who reported accessing the resource and *not* finding it helpful. That is, respondents' perceived organizational support was found to decrease in cases where they accessed a support and did not find it helpful (versus either finding it helpful *or* not accessing it at all). In most cases, there was no statistically significant difference in perceived organizational support between respondents who accessed each resource and found it helpful, relative to respondents who did not access the resource.

The two exceptions to this pattern were the daily email updates and COVID-19 town halls hosted by the organization. In these cases, respondents who accessed and rated these resources as helpful also reported

greater perceived organizational support than respondents who did not find them helpful, as well as respondents who did not access them.

## Discussion

### Summary of Findings and Theoretical Implications

We found support for our hypotheses that employees who primarily work remotely (rather than on-site) experience greater job satisfaction; and, in turn, weaker withdrawal cognitions. Our findings are consistent with previous work, which suggests that when remote work options are provided, employees often perceive greater person-job and person-organization fit, increasing their overall satisfaction with their jobs (e.g., Gajendran & Harrison, 2007; Baltes et al., 1999).

That said, our findings regarding the relation between remote work and psychological strain ran contrary to our hypotheses. Specifically, respondents who primarily worked remotely actually reported perceiving *less* strain than employees who primarily worked on-site. As hypothesized, psychological strain was found to statistically mediate the indirect relation between remote work and withdrawal cognitions; however, given the negative direct relation between remote work and psychological strain, this effect was also in the opposite direction than we had hypothesized.

This result calls into question some of the assumptions made about the challenges of remote work during the COVID-19 pandemic, and supports the idea that working populations are rapidly evolving to the "new normal" found in remote work arrangements, even as these arrangements proliferate and normalize across industry. It bears noting that the current construal of remote work as a source of strain is grounded most prominently in remote work literature spanning the early days of the pandemic lockdowns. In the pre-pandemic literature, remote work (which, at the time, was largely considered a niche, discretionary arrangement) was operationalized more as a job resource; one which provided workers with greater flexibility, reduced interference from co-workers, and lessened commuting costs (see Gajendran & Harrison, 2007). Indeed, Gajendran and Harrison's (2007) meta-analysis actually posited that one of the reasons remote work can improve job satisfaction is by *decreasing* job demands. However, during the COVID-19 lockdowns, non-discretionary remote arrangements were foisted upon a much broader and diverse working population (many of whom had no previous experience with or desire to telecommute; e.g., Henke et al., 2022). During this period, newly-remote workers often needed to adjust to leaner, sometimes asynchronous forms of technologically-mediated communication (van Zoonen et al., 2021; Babapour Chafi et al., 2021), ill-prepared at-home workstations (Adisa et al., 2021), and heightened work-family interference due to simultaneous remote schooling (Toscano & Zappalà, 2021). Moreover, these remote arrangements were generally mandatory, subverting the traditional narrative of remote work as a discretionary perk, as it had been previously construed.

Our results – collected during the late stages of the pandemic and return to partially on-site/hybrid arrangements – suggest that workers who have continued to work remotely through this period of initial adjustment may be returning to a state where remote work is, by and large, beneficial to employees' well-being; and that even the initial strain caused by shifting to remote work can be effectively managed over time if remote workers are given sufficient resources and time to adjust thereto. If this is true, then – although the remote work population has indeed broadened and diversified since 2019 – the outcomes of remote work in the post-pandemic era could nonetheless approximate something more akin to those seen when remote arrangements were mainly discretionary. Given the rapidly shifting remote work context, future research on remote worker outcomes should be interpreted carefully within context of the ubiquity and (in)voluntary nature of such arrangements at the time – as well as employees' potential to adjust, which all likely moderate the extent to which remote work can dually function as both a source of job demands and job resources.

## Practical Implications

The COVID-19 pandemic saw major shortages in the healthcare sector, due in part to high employee turnover (Poon et al., 2022). Among healthcare workers during this period, psychological strain was found to be a strong predictor of both withdrawal cognitions and turnover (e.g., Al-Mansour, 2021; Cole et al., 2021); whereas both job satisfaction (e.g., Abd-Ellatif et al., 2021; Varasteh et al., 2021) and psychological resilience (e.g., Naja et al., 2021) were negatively related to withdrawal and turnover.

As the healthcare sector (and industry more broadly) moves into an era of post-pandemic normalcy, it would behoove employers to remain mindful of the work attitudes and strain that remote versus on-site work arrangements can engender. We found that allowing employees to work remotely enhanced their job satisfaction (and, subsequently, reduced their withdrawal cognitions), while also *reducing* – not enhancing – their perceived psychological strain. These findings support the continuation of remote work options into the post-pandemic era to improve retention – a finding that closely aligns with industry survey work conducted by Canadian recruitment agency Robert Half during the late days of the pandemic, which found that over 50 percent of employees surveyed reported intending to leave their current employer if recalled to fully on-site work (Robert Half, 2022).

Beyond supporting the continuation of remote work options into the post-pandemic era, our exploratory analyses also highlight the need for organizational supports specifically at the leadership level during periods of rapid organizational change and uncertainty, like that experienced during the pandemic. In the present study, we found that it was not sufficient for employees to receive support solely at the peer level (which failed to predict statistically significant differences in perceived organizational support). Conversely, support provided at the direct supervisor level and, to a lesser extent, distal leadership level, was predictive of greater perceived organizational support. These findings suggest that, during periods such as those seen during the pandemic, employees may look more to leadership for clarity, direction, and structural support. Ensuring adequate supervisor support is provided may thus help bolster employees' perceived job resources, allowing them to cope more effectively with the heightened psychological strain they may otherwise experience.

Finally, our results highlight that, when organizational supports are provided by leadership, they must be carefully designed with the needs of the target audience in mind. We found that, across all resources provided by the organization during its pandemic response, employees who accessed them and found them unhelpful saw *decreases* in their perceived support, even below that of employees who did not access the same resources. These findings suggest that providing well-meaning but ineffective resources may ironically be more harmful than failing to provide resources at all. Consequently, it is important to conduct regular evaluations of support initiatives, to enhance employee satisfaction with any resources provided – as negative employee reactions to available resources may ultimately exacerbate – not lessen – their psychological strain.

## Limitations and Future Directions

***Cross-sectional Evidence Collected Late into the Pandemic Response.*** Although the organization conducts an employee engagement survey once every two years, data for the present study were only available specifically from the organization's 2022 survey (as a different, third-party proprietary survey instrument had been used in prior years, for which individual data were not available). This limitation has two broad implications. First, although our hypothesized relations are consistent with previous research – and in line with multiple propositions in the JD-R (see Bakker & Demerouti, 2017) – empirically, we are only able to provide cross-sectional evidence for these relations, from which causal inferences cannot be derived. Second, this cross-sectional evidence was collected two years after the initial onset of the COVID-19 pandemic (and resulting lockdown measures). During this period, remote work measures were still in place;

however, some employees had also returned to either hybrid or mainly on-site work arrangements. It is possible that much of the initial adjustment required during the early days of the pandemic had already settled by the 2022 survey – and as a result, the period during which remote work would have been most likely to engender greater psychological demands (consistent with Hypothesis 2) had ended. Consequently, the results of our study must be contextualized and understood within the late days of the COVID-19 pandemic response specifically; and consequently, are most applicable to the post-COVID era of flexible, already proliferated work arrangements (rather than the shift thereto during the pandemic's early days).

Future work could consider collecting job incumbent data on these variables over the span of multiple engagement surveys. Doing so would strengthen the directional hypotheses in our study by allowing tests of potential reverse causality via a cross-lagged analysis. Moreover, this approach would allow for the stability of our hypothesized relations – or alternatively, their change over time as employees settle into the "new normal" of remote work arrangements to be modelled.

***The Use of Single-item Measures Developed by the Organization.*** The present study was also conducted using archival data gathered as part of the organization's pandemic response. The survey questions for our study were developed in-house by the organization. In all cases, single items from the survey were used to operationalize our variables of interest. Many methodologists and psychometricians prefer the use of multi-item measures (see Nunnally & Bernstein, 1994; Churchill, 1979), and criticize single-item measures for poorly capturing the breadth of many constructs, lacking sensitivity, and precluding the calculation of internal consistency indices (Sauro, 2018).

In general, there is evidence to suggest that single-item measures can be as predictive as multi-item measures (Bergkvist & Rossiter, 2007), and have appropriate use cases where the constructs being assessed are relatively simple and homogeneous (Loo, 2002). While this is likely the case for some of the variables in the present study (e.g., job satisfaction), other variables would benefit from more nuanced measurement approaches. Thus, although the items drawn from the survey did align with our operational definitions of their corresponding constructs, it would be helpful in the future to replicate our results using multi-item, psychometrically-validated research instruments, to help capture a wider array of potential job resources and withdrawal-related affects, cognitions, and behaviours.

## Conclusion

Even prior to the pandemic, remote work was a growing – if still relatively uncommon – trend (Kossek & Lautsch, 2017). More research-backed and evidence-based suggestions are needed to help navigate this shift, especially as employers move beyond the question of whether to implement remote work at all, to instead asking how to best support their remote and hybrid workers moving forward. In the present study, we provide evidence to suggest that ongoing remote work options through the latter parts of the pandemic were related to greater job satisfaction, without necessarily enhancing job demands – ultimately predicting weakened withdrawal cognitions. We also found evidence to support the role of support specifically at the supervisor- and senior leadership-levels for building a sense of perceived organizational support during the COVID transition. We hope that this line of work will provide an accessible and straightforward catalyst for more longitudinal and nuanced research regarding the interplay of different forms of organizational support, job demands, and job resources among both remote and on-site workforces operating within the new industrial epoch.

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# NONSTANDARD WORK AFTER RETIREMENT: A CONCEPTION MODEL TO IDENTIFY THE DETERMINANTS OF JOB QUALITY

## Abstract

Nonstandard and bridge jobs are growing trends in the modern labor market, often perceived as undesirable or involuntary, particularly for vulnerable workers (Appelbaum et al., 2019). Research suggests that older workers may be pushed into nonstandard employment due to factors like ageism (Feldman & Kim, 2000). However, some studies reveal that retirees returning to work (bridge employees) may prefer nonstandard jobs for their flexibility. This inconsistency highlights the need for a nuanced understanding of how bridge employees perceive job quality. This paper leverages existing research on bridge employment and nonstandard work to identify factors influencing retirees' attitudes towards nonstandard jobs. Using Social Cognitive Career Theory (SCCT), it proposes a conceptual model to understand job quality based on self-efficacy, outcome expectations, and goals.

**Key words:**
Bridge employment, nonstandard work, job quality, Social cognitive career theory

## Introduction

"Alternative, non-traditional, market mediated, vulnerable, contract, freelance, e-lance, contingent, disposable, temporary, nonstandard, and telecommuting" and "gig work", these are a few examples of how nonstandard work has been coined in various academic and practitioner literature (Ashford et al., 2007, p. 68; Petriglieri et al., 2019). The meaning of the work arrangement varies depending on the multiple ways job contracts are devised in different countries. US department of labor defines nonstandard workers (popularly termed contingent workers in USA) as people who do not expect their employment to last for an indefinite time (*Contingent and Alternative Employment Arrangements, February 2005*, 2005). Vosko et al., (2003) termed such jobs as precarious jobs and had proposed four dimensions which can be used to determine precariousness of a job: degree of job security, access to union protection, access to regulatory protection and level of income. Statistics Canada defines standard work as an employment model where "..a worker has one employer, works full year, full time on the employer's premises, enjoys extensive statutory benefits and entitlements, and expects to be employed indefinitely" (Vosko et al., 2003). Employment models that differ from the standard are termed as nonstandard employment.

It is a common practice to define nonstandard work situating it as the opposite of typical (aka standard) work arrangements characterized by a fixed schedule, availability of employment benefits and an expectation of continued employment. However, this approach is grounded on the work contract of a typical worker in the 1950s (Ashford et al., 2007). Traditionally, women, racially disadvantaged workers and young workers have constituted a large portion of nonstandard workforce (Chen & Mehedi, 2018).

However, a pool of employees who have made a steady entry into this labor market since around 1980s are the retirees who return to paid work (Fitzpatrick, 2019; Lain, 2012; Lain & Loretto, 2016; Loretto & Vickerstaff, 2015; PLATTS et al., 2019)(Lain, 2012; Loretto & Vickerstaff, 2015; Shultz, 2001). Retirees' return to paid employment after regular full-time employment and before complete withdrawal from income generating activities is called *bridge employment* (Wang et al., 2008).

Current research indicates bridge employees often prefer flexible work arrangements, which sometimes fall in the category of nonstandard work (August, 2011; Bal et al., 2012; Mazumdar et al., 2024). Bal et al.'s (2012) survey on more than 1,000 health care workers reveal that flexibility in schedule is one of the deciding factors for older employees to remain in workforce after retirement. Nonstandard jobs are often categorised as precarious or bad quality jobs as they lack extrinsic rewards like equitable compensation, job security, access to employee development opportunities and union protection — features that are commonly available to employees with a standard job (Chen & Mehedi, 2018). This argument, however, may not apply for bridge employees many of whom take on bridge jobs for intrinsic need fulfillment, rather than extrinsic ones (Mazumdar et al., 2020). Exploratory studies among bridge job holdres repeatedly reveal that bridge employees are more motivated by control over their time, stress-free work role, high quality social interaction and availability of ample leisure opportunity than higher pay and job security (see for example August 2011; Mazumdar et al.; 2024; Nobahar et al., 2015). Thus, job quality in bridge employment context may depend on the unique post-retirement life adjustment goals of retirees.

In this paper, I review literature on bridge employment as well as on nonstandard work to understand the individual and environmental level determinants that have the potential to affect the decision-making heuristics of retirees and to shape their assessment of job quality. Perception of job quality by employees is a predictor of their personal and work-related outcomes like job satisfaction and well-being (Brown et al., 2008; Findlay et al., 2013; Olsen & Kalleberg, 2004). As bridge jobs are an important retirement adjustment step for retirees' (Lahlouh et al., 2019; Wang & Wanberg, 2017), perception of job quality will be a significant contributor to well-being for the retirees. Additionally, an understanding of job attitude towards nonstandard work after retirement will be a critical addition to literature on bridge employment and nonstandard work.

## Bridge Employment

Research on bridge employment is gaining momentum in the recent years due to the anticipation of retirement of the baby boomers: a large proportion of members of the labor force. On national level, developed countries in North America, Asia, and Europe are contemplating on a number of economic impacts caused by retirement of baby boomers. In many countries, the old-age entitlement programs (e.g. medicare and social security in USA) are financed by current workers (Feldman & Beehr, 2011; Scherger, 2016). Projection of a disproportionate increase in retirees compared to workers who provide funding for pension and social security programs threatens the feasibility of the system. Also, decreasing number of labor supply due to baby boomers' exit from labor pool threatens economic growth potential and overall standard of living (Scherger, 2015). Strategies proposed to combat this issue include increasing birth rate, bringing in immigrant labor force and encouraging retirees to re-engage in work etc. OECD is urging its member nations to pursue the last strategy as an immediate respite for restoring economic balance (Saba, 2014). Bridge employment, thus, is a prominent concern on a national level.

On organizational level, employers are bracing for the impact of an imminent labor shortage resulting from the retirement of baby boomers (Scherger, 2014). Re-engaging retirees in the form of bridge employees will also warrant safe keeping of corporate memory and availability of a workforce endowed with various positive work attitudes (Zhang & Zhang, 2015). On individual level, retirees are now faced

with a maze of issues in planning their retirement fund. Growth in defined contribution pension funds, fluctuation in real estate price and increase in health care costs has made calculation of asset value and fund sufficiency at retirement very challenging (Feldman & Beehr, 2011). Additionally, due to the trend of starting family at a later age coupled with the increase in life expectancy, many retirees have to These challenges make relying only on the traditional three legs of the retirement stool—social security, pension fund and prior savings — and bridge employment is thus frequently termed as the fourth leg of retirement fund planning (Cahill et al., 2015).

Bridge employment has been categorized in multiple ways. Depending on the type of career retirees pursue, Wang and colleagues (2008) categorized bridge employment into two primary types: career bridge employment (retirees engaging in profession similar to their pre-retirement career) and non-career bridge employment (retirees engaging in profession different from their pre-retirement career). Mariappanadar (2013) clustered bridge jobs into two types: flexible work arrangements and contingent work. Flexible work arrangement refers to the "ongoing relationship with the current employer during transition to retirement, including job-sharing and part-time retirement employment" (Mariappanadar, 2013, p. 178). Contingent work, on the other hand, refers to work with previous employer or different employer with an arrangement separate from previous job contract.

Research indicates that retirees who are younger, perceive their health as good, are skilled or highly educated and had retired from a white-collar job are more likely to engage in bridge jobs (Chua & Ayoko, 2021; Platts et al., 2019; Templer et al., 2010). Retirees come back to work after retirement driven by various motives like social engagement, mentoring younger generation, develop new competencies (Henkens & van Solinge, 2021; Mazumdar et al., 2024; Solinge et al., 2021). Overall, bridge employment yields positive outcome for retirees, especially if they are not driven back to the workforce by financial needs (Carlstedt et al., 2018; Settels, 2013; Zhan et al., 2009).

## Nonstandard Employment

Nonstandard work has long ceased to be a peripheral phenomenon of labor market. Roughly 52 million people in USA were employed as contingent workers in 2020 and nonstandard work is on the rise among older people (Appelbaum et al., 2019; *The US Gig Economy - 2021 Edition*, 2022). In 2017, more than three million Canadians were engaged in part-time work, and older people constituted almost 23% of the total part-time workers (Government of Canada, 2018). This employment arrangement is also gaining popularity in Asian and European countries. According to Ashford et al., (2007), " ……Nonstandard work appears to be here to stay" (p. 74).

Reasons contributing to wide-spread popularity of nonstandard work are manifold. Firstly, technological advance has made it possible to minimize the requirement of temporal and physical proximity alignment with employers effectively making eight hour shifts in an office building an outdated requisite of job (Van Yperen & Wörtler, 2017). Secondly, employers often recruit on a nonstandard basis to minimize short term (e.g. wages, bonus) as well as long-term labor costs (e.g. pension, health insurance, training and development etc.) (Ashford et al., 2007). Thirdly, firms resort to contracts or agency workers for outsourcing various non-core processes to ensure better focus on core processes. In uncertain market conditions, nonstandard workforce allows firms to maintain flexibility.

Nonstandard workers were historically employed in mundane, hazardous jobs and jobs with little or no career prospect (Boyce et al., 2007). They get lower return on their skills and efforts than standard workers (Krausz & Stainvartz, 2005). Nonstandard employees are also out of the core band of human resources in an organization (Silla et al., 2005). They typically get limited or no access to training and

development opportunities, hold lower ranks and are often subjected to mistreatment and ostracism in workplace (Ojala et al., 2018; Wilkin, 2013)).

Just as nonstandard jobs are popularly believed as *bad jobs*, nonstandard workers are stereotypically considered to have low skills and inferior work ethics (Boyce et al., 2007). These stereotypes partially explain the fact that nonstandard workers are not always the in-group in work settings. It is thus not surprising that nonstandard workers often find themselves in the uncomfortable position of "simultaneously both part of and outside of the social fabric of the organization" (Ashford et al., 2007, p. 95)

**Job Quality in Nonstandard Jobs**

Existing researcher frequently consider nonstandard jobs on the same level as bad quality jobs. Harrison (1997) had called the rise in nonstandard jobs the "dark side" of the economy as it promotes insecurity in employment and pay prospect (p. 259). The situation has not much improved since. Nonstandard job is still portrayed as a "hyphenated job" and is synonymous to bad quality job simply by virtue of the temporary status (McGovern et al., 2004). Kalleberg et al. (2000) utilized 1995 population survey in USA and categorised jobs that had low pay and no access to health insurance or pension benefits as bad quality jobs. They did not, however, put continuance of job tenure as an essential indicator of job quality. Nonetheless, research has not advanced much beyond the outlook that managers treat nonstandard workers as either a disposable talent pool to share work load of regular workforce or an incompetent supply of labor to be utilized for jobs that do not require skills or proficiencies Consequently, there is an ample reservoir of literature portraying nonstandard jobs as ubiquitously bad quality jobs and nonstandard workers as demotivated, dissatisfied workers with little or no commitment (Lain, 2012; McGovern et al., 2004; *Non-standard employment around the world*, 2016).

Tilly (1996) was the one of the pioneers among academics to distinguish between good and bad quality nonstandard work. According to him, nonstandard jobs can be categorised into two types: jobs located in primary job market and designed to retain valued employees (Retention jobs) and jobs located in secondary job market with no prospect of growth (secondary job) (Broschak et al., 2008). Retention jobs are typical good jobs where employees are provided training and development and future growth prospect, whereas secondary jobs are do not have such perks and/or future potential for advancement. Broschak et al.'s (2008) study reinforces such categorization and claims that failure to account for the difference in job quality is the reason behind the contradictory findings in job attitudes of nonstandard workforce.

There is yet another outlook towards job quality that may explain the anomaly in study findings regarding job attitudes of nonstandard workers — utilizing the broader social context of a job to ascertain job quality for a specific person. According to researchers of this school of thought, job quality can only be understood after placing the job in the context of a person's family, self and community roles (Cooke et al., 2013; Nekola et al., 2018). Zeytinoglu and colleagues (2013) conducted a qualitative study in the rural areas of Ireland and Canada. Many respondents in their study were satisfied in jobs that would not qualify as typical good jobs because the respondents had different priorities and outlooks towards life. A separate study by Cooke et al. (2008) found that when nonstandard works are fashioned after the needs of the employees, such jobs yield positive job outcomes. Loretto and Vickerstaff, (2015) came to the same conclusion after conducting a qualitative study among retirement age workers. Their respondents considered freedom, leisure and family time more desirable than typical economic yardsticks of job quality (e.g. pay and promotion). The following quote summarizes the point in a neatly manner: "I want to be in the position where I want the job to suit me more than me suiting the job … You know, three days a week would be fine, so that it gives me the freedom to have my life, because I don't want my life

to revolve around work anymore. I want it to be the other way round." (Loretto & Vickerstaff, 2015, p. 240). Such sentiment and pr-flexibility mindset is very relatable for bridge employees. In fact, many retirees deliberately choose to engage in nonstandard jobs to take advantage of the variety, flexibility and free time it affords them (Mariappanadar, 2013; Nakai et al., 2011).

More and more retirees are returning to paid work and a good percentage of them are returning as nonstandard workers with their previous employer or new employers (Appelbaum et al., 2019; Armstrong-Stassen & Schlosser, 2008, Government of Canada, 2018). Currently, people often engage in nonstandard jobs to take advantage of the flexibility and low-commitment of such work. During 2019, nearly one million people in Canada aged 55 years and over had engaged in part-time work and more than 65% of them had preferred such work over standard work (Government of Canada, 2022). Nonstandard jobs often allow people to prioritize non-work demands of life. Besides, flexibility of schedule, lower job demand, lower stress, freedom from conflict, relatively less vulnerability to organizational politics, variety in job assignment and sometimes higher pay make nonstandard work a lucrative option for people (Broschak et al., 2008).

Qualitative studies by Loretto and Vickerstaff, (2015) and Zeytinoglu et al., (2013) provides an insight into the sense-making process of older people considering their unique needs, priorities and working capacities. The studies reveal that when engagement in nonstandard work satisfied their needs, did not interfere with their priorities and were commensurate with their physical and mental capacity, people were actually satisfied with their work and the accompanying perks. Voluntariness of accepting nonstandard work plays an important role in nonstandard worker's attachment with their organization and their satisfaction with their job and perception of job quality (Connelly et al., 2011). Such outlook is especially pertinent for post-retirement work

Retirement is considered an important transition phase of people's lives. Retirement functions as a reminder of deteriorating physical and psychological capabilities and the finite nature of life (August, 2011). Retirement often prompts people to readjust their priorities and choose meaningful work and intrinsic rewards over career progression and extrinsic rewards (August, 2011; Nobahar et al., 2015). Thus, in bridge employment context, attitude towards nonstandard work will be a function of retirees' assessment of their abilities and their aspirations. Given the significance of retirement as a transitional phase, it is essential to understand how individuals assess their abilities and aspirations when making decisions about bridge employment. Social Cognitive Career Theory (SCCT) provides a framework to explore how self-efficacy, outcome expectations, and personal goals influence retirees' attitudes towards nonstandard work. By applying SCCT, we can gain deeper insights into how retirees navigate this new chapter of their lives, balancing their capabilities with their desire for meaningful work

## Social Cognitive Career Theory

Social Cognitive Career Theory (SCCT) posits that an individual's choice of career related actions are guided by interaction between environmental variables and cognitive-person level variables (e.g., self-efficacy, outcome expectation and goals) (Lent & Brown, 1996). The environmental variables may be distal (e.g., opportunity for re-skilling, favorable pension system) or proximal (e.g., availability of network and resources for job search, ageism among employers) in nature and can pose either challenge or opportunities for attainment of individual's objective. Among the cognitive level variables, self-efficacy is defined as "people's judgements of their capabilities to organize and execute courses of action required to attend designated types of performances" (Bandura, 1986, p. 391). Outcome expectations refer to individual's beliefs about consequences of their actions taken towards their goals and personal goals can be defined as individual's intention towards certain activity or outcome (Lent & Brown, 1996). In the

subsequent paragraphs, I critically examine the extant literature on bridge employment and nonstandard work through the lens of Social Cognitive Career Theory (SCCT). Additionally, I introduce a conceptual model (Figure 1) aimed at elucidating bridge employees' perceptions of job quality.

Insert Figure 1 About Here

**Distal Environmental Variables**

The macro-level environmental factors, such as pension systems, employment policies, and the availability of re-skilling opportunities, play a pivotal role in shaping retirees' employment choices. These factors vary significantly based on geographical location, which further complicates the decision-making process for retirees considering post-retirement employment. For instance, restrictive pension systems that penalize retirees for engaging in full-time work can act as a significant deterrent job (Adams & Rau, 2004; Fitzpatrick, 2019). The example of Canadian school teachers, who can only work limited hours post-retirement before their pension payments are interrupted, illustrates how such policies can discourage retirees from pursuing standard employment opportunities (Mazumdar et al., 2020). Similarly, employment policies that prevent retirees from returning to their pre-retirement organizations and a lack of tailored employment-choice counseling during the retirement transition can further limit their options. These factors can have a direct impact on the self-efficacy and outcome expectations of retirees, as outlined by SCCT. The restrictive nature of pension systems and employment policies may lead retirees to question their ability to re-enter the workforce in a meaningful way, thereby lowering their self-efficacy. When retirees perceive that their options are limited by external constraints, their confidence in securing desirable employment diminishes (Mazumdar et al., 2024). This lowered self-efficacy can lead to more conservative outcome expectations, with retirees potentially anticipating that the best they can hope for is part-time or nonstandard work, rather than pursuing more ambitious employment goals.

On the other hand, opportunities for re-skilling and the presence of supportive networking organizations, such as those targeting individuals aged 50 and above, can positively influence retirees' self-efficacy and outcome expectations (Alcover et al., 2014; Peng, 2022; Solinge et al., 2021). Access to re-skilling programs can empower retirees by enhancing their job-related skills, thereby boosting their confidence in navigating the job market and increasing their self-efficacy. This enhanced self-efficacy is likely to lead to more optimistic outcome expectations, with retirees believing that they can find employment that aligns with their skills and interests, even if it involves nonstandard work.

The local unemployment rate is a key determinant of the labor market's receptivity to retirees. In areas with high unemployment, the competition for available jobs intensifies, potentially limiting the opportunities for retirees to secure positions that align with their skills and preferences (Galarneau et al., 2015). In regions with low unemployment rates, retirees may find it easier to obtain employment, as the demand for labor may prompt employers to consider older workers more favorably. The labor supply, or the availability of workers in a given area, also plays a crucial role. In communities with a surplus of younger, more economically active individuals, retirees may face increased competition and age-related biases, whereas in areas with a shrinking workforce, retirees may be viewed as a valuable resource to fill labor gaps (Adams & Rau, 2004; Bartkowiak et al., 2021; Kanfer et al., 2020).

The broader economic cycle further compounds these dynamics. During periods of economic expansion, the demand for labor generally increases, providing more opportunities for retirees to engage in bridge employment. In contrast, economic recessions tend to reduce job availability, as companies often downsize or implement hiring freezes, making it more challenging for retirees to find suitable

employment (Scherger, 2016). This cyclical nature of the economy can thus create fluctuating opportunities for bridge employment, requiring retirees to be adaptable and resilient in their job search strategies. The availability and diversity of industries within a community also profoundly impact retirees' employment prospects. Communities with a robust and diverse industrial base can offer a wider array of job opportunities, increasing the likelihood that retirees will find positions that match their physical and psychological capabilities (Alcover et al., 2014; Scherger, 2016).

In addition to affecting availability of job opportunities, distal environmental factors also influence retirees' cognitive and motivational processes. High unemployment rates and limited job diversity can erode retirees' self-efficacy, leading to decreased confidence in their ability to secure meaningful employment. This diminished self-efficacy, in turn, affects retirees' outcome expectations, as they may anticipate negative results from their job search efforts, such as rejection or underemployment. These expectations then shape their career goals, potentially lowering their aspirations and leading them to settle for less desirable or lower-quality work. Conversely, in environments where job opportunities are plentiful and diverse, retirees are likely to experience higher self-efficacy, fostering positive outcome expectations and more ambitious career goals. The presence of supportive community policies, such as job placement services or re-skilling programs, can further enhance these cognitive processes, enabling retirees to pursue bridge employment that not only aligns with their abilities and preferences but also contributes to their overall sense of purpose and well-being.

**Proximal Environmental Variables**

Many job search constraints relevant for younger workers are also prominent for retired workers, namely, availability of dependent-care, transportation, infrastructure and equipment (e.g., laptop, smartphones and internet connection) (Adams & Rau, 2004). Older workers may also face additional constrains like ill-health or financial hardship. One pervasive impediment to employment of older workers is ageism or age stereotype. Bridge employees often find themselves in a disadvantaged position in securing desired jobs because of the prevalence of negative age-related stereotypes among employers. Age discrimination is the most widely experienced form of discrimination in Europe; it is also prevalent in North America (Staying Ahead of the Curve 2013, 2014; Taneva et al., 2016). This may be due to negative perceptions of productivity of older workers. It is commonly believed that the advantage of older people over younger people is in their soft skills (Dalen et al., 2010). However, in negotiating job contracts, hard skills take prevalence over soft skills, meaning that older people often find themselves in a disadvantaged position. Even when they are hired, studies show that retirees are seldom the preferred first choice of employers and employers expect them to accept lower salaries when entering into a job contract (Loretto & White, 2006; Mulders et al., 2018; Oude Mulders et al., 2014; Tunney & Oude Mulders, 2022).

A major market force that can have significant impact in shaping the employment choice of retirees is the increase in blended and/or remote work induced by the pandemic. Blended work refers to “smooth and seamless time-independent working (flexibility in when and how long workers engage in work-related tasks) and location-independent working (flexibility in where work gets done)” (Van Yperen & Wörtler, 2017, p.102). While blended work may facilitate prolonging work life after retirement by extending their employability, it may pose some challenges too as retirees may not be willing or able to adapt to the new technology. Moreover, employers might be reluctant in investing resources to facilitate blended work opportunities for older workers (Van Yperen & Wörtler, 2017). Lastly, perceived and actual health and safety risks and procedures (e.g., mask usage, increased vulnerability due to age and health status, inability to take/lack of access to vaccines) imposed by pandemic may also make employers reluctant to hire retirees.

## Self-efficacy

According to Bandura (1977), an individual's self-efficacy beliefs are formed and adapted through information gained from (a) personal accomplishments, (b) vicarious learning, (c) social persuasion, (d) emotional and physiological state. Personal accomplishment, in bridge employment context, refers to retirees' recollection of their experience in pre-retirement career as well as in job searching. If retirees recollect either their past experience in career employment or their post-retirement job search negatively, they might have lower self-efficacy regarding finding a job or performing well in their pre-retirement job (Nurmeksela et al., 2023). Vicarious learning, or learning through the observation of others, also significantly impacts self-efficacy. Retirees may look to the experiences of their peers who have successfully transitioned into post-retirement employment. Observing others who have navigated similar challenges and found fulfilling work can bolster a retiree's belief in their ability to do the same (Sullivan & Al Ariss, 2019). For instance, retirees who witness former colleagues thriving in bridge employment roles may be more inclined to believe that they too can succeed in such positions. However, if retirees observe others struggling to find or maintain post-retirement employment, this can negatively impact their self-efficacy, making them less likely to pursue job opportunities or more likely to approach their job search with apprehension. Social persuasion, which involves verbal encouragement or discouragement from others, also plays a crucial role in shaping retirees' self-efficacy. Positive reinforcement from family, friends, and former colleagues can significantly boost a retiree's confidence in their ability to secure a job after retirement. For example, if a retiree's social network expresses confidence in their skills and encourages them to pursue new opportunities, the retiree is likely to feel more capable and motivated to engage in the job search process. On the other hand, negative feedback or discouragement—such as suggestions that a retiree is "too old" to work or that jobs are scarce—can undermine self-efficacy, leading to reduced effort in job-seeking activities or even withdrawal from the labor market entirely. Social norms and cultural attitudes towards retirement and aging also influence social persuasion; in cultures where continuing to work after retirement is valued, retirees may receive more positive reinforcement, enhancing their self-efficacy. Mazumdar et al.'s (2020) work depicted that retirees often face social disapproval and discouraging feedback from society when they break the traditional pattern of retirement as a complete withdrawal from work. Retirees in their research depicted that society often wrongly perceives that retirees are depriving the younger generation from work and income by taking away the jobs (Mazumdar et al., 2020). Such feedback can deteriorate retirees' morale and lower their self-esteem. Lastly, self-appraised emotional and physiological health of retirees will affect their self-assessment and confidence.

## Outcome expectation

Outcome expectation in the context of this study refers to retirees' beliefs about the potential consequences of engaging in either standard or nonstandard work. According to current literature, retirees often seek bridge jobs to gain various resources such as financial benefits and social connections (Nakai et al., 2011). This motivation is particularly significant as many retirees find themselves in need of supplementary income or wish to remain socially active post-retirement. Furthermore, since retirement typically involves a reduction in work commitment, retirees are inclined to choose jobs that allow for a better balance between work and life (August, 2011). The ability to manage this balance is crucial, as it permits retirees to maintain a sense of purpose and engagement without compromising the leisure and freedom that retirement is supposed to offer.

Additionally, a significant number of retirees engage in bridge jobs to enhance their self-image, either by taking on meaningful and challenging work or by mentoring younger generations (Armstrong-Stassen et al., 2012). Retirees also return to workforce to develop new skills and continue self-development (Solinge et al., 2021). The drive for self-actualization is a critical component of post-retirement employment, as it

reflects the retirees' desire to continue contributing to society and to retain a sense of identity and purpose that was tied to their pre-retirement careers and post-retirement identity.

These unique priorities significantly influence bridge employees' intentions regarding standard versus nonstandard work. Different types of work engagements offer varying combinations of benefits and responsibilities, which in turn shape retirees' decision-making processes. Standard work, while typically offering better financial resources and opportunities for self-development, often lacks the flexibility that many retirees seek. This rigidity can be a deterrent, as retirees may prefer more adaptable work schedules that accommodate their desire for leisure, travel, or other personal pursuits.

On the other hand, nonstandard work arrangements, such as part-time or freelance positions, may provide the flexibility retirees value, enabling them to take on roles that align more closely with their post-retirement lifestyle preferences. However, these roles may come with trade-offs, such as lower income and fewer opportunities for professional development. Retirees must weigh these factors when considering their options, making outcome expectations a central element in their decision-making process.

**Goals**

According to Social Cognitive Career Theory (SCCT), career goals are fundamentally determined by an individual's self-efficacy beliefs and outcome expectations. In the context of bridge employment, retirees' intentions to engage in either standard or nonstandard work are influenced by two key factors: (a) their self-assessed ability to secure and effectively perform a standard or nonstandard job, and (b) their evaluation of whether the job they choose aligns with their priorities in post-retirement life.

Understanding the intricate connections between the various facets of SCCT is crucial for comprehending how retirees make decisions about post-retirement employment. Proximal and distal environmental variables—such as age, health, financial needs, and labor market conditions—significantly shape cognitive-person variables like self-efficacy, outcome expectations, and goal-setting. These cognitive-person variables are not static; rather, they interact in a dynamic process that continuously influences a retiree's career-related decisions. For instance, self-efficacy not only directly affects outcome expectations and goal-setting but also evolves based on feedback from these outcomes and goals.

For example, retirees may adjust their self-assessment of their abilities based on their priorities at the outcome expectation level. A retiree who prioritizes flexible work and more leisure time over financial gains may rationalize that they are not capable of taking on a full workload, even if they are in good health and have access to employment opportunities. This self-assessment, influenced by their outcome expectations, may lead them to pursue nonstandard work arrangements that align with their desired lifestyle.

In light of existing literature, it can be surmised that retirees' perceptions of nonstandard jobs as either positive or negative will largely depend on whether their engagement in such work is a matter of personal choice or the result of internal or external constraints. Bridge employees who deliberately choose nonstandard work to take advantage of lower job demands and increased flexibility are likely to view such employment favorably. In contrast, those who desire the freedom and flexibility of nonstandard work but find themselves compelled to accept standard jobs due to financial or contextual constraints may develop negative attitudes toward their employment situation.

## Discussion

In this paper, I argue that to create a comprehensive model of retirees' perception of job quality, we should consider the interplay of various factors that shape their evaluations of post-retirement employment options. I present a model (Figure 1), grounded in Social Cognitive Career Theory (SCCT), conceptualizes how different elements interact to influence retirees' perceptions of job quality, integrating SCCT's core components—self-efficacy, outcome expectations, and career goals—while also considering environmental variables.

At the core of this model are the components of SCCT. Self-efficacy, which refers to retirees' beliefs about their ability to secure and perform well in a job, is shaped by several factors. These include personal accomplishments, such as successes or failures in past job searches and career achievements; vicarious learning, which involves observing the experiences of peers in similar situations; social persuasion, which encompasses feedback from society, family, and peers regarding their capability; and the emotional and physiological state of retirees, including their health, energy levels, and emotional well-being. Current literature portrays how retirees are often trapped in nonstandard work because they are unsure of their competence or are intimidated by perceived job search constraints (Adams & Rau, 2004; Mazumdar et al., 2020b)

Outcome expectations are another critical component, reflecting retirees' beliefs about the consequences of engaging in standard or nonstandard work. Existing research supports that motives behind unretirement are manifold. Such motived include financial rewards, such as income and benefits associated with the job; work-life balance, or the degree to which the job allows for flexibility and leisure; social connections, which involve opportunities for social interaction and community engagement; and self-image enhancement, which includes opportunities for meaningful work, mentoring, or continued professional growth (see Fasbender et al., 2014; Wang, 2007; Wang et al., 2011; Wang & Shultz, 2010; Zhan et al., 2009).

Career and life goals, the third component, are retirees' desired work outcomes based on their self-efficacy and outcome expectations. These goals reflect work preferences, such as the choice between standard and nonstandard work based on desired flexibility, workload, and personal priorities. They also consider the alignment with post-retirement priorities, or the extent to which job opportunities match retirees’ desired lifestyle, health status, and financial needs.

Environmental variables play a significant role in shaping retirees' perceptions of job quality. Proximal environmental variables are immediate factors that directly influence job quality perception. These include the availability of jobs, which refers to local labor market conditions and job openings; access to resources, such as transportation, dependent-care, technology, and skill-upgrading opportunities; and the workplace environment, including employer policies, work culture, and age-related discrimination (e.g., ageism). Distal environmental variables are broader factors that indirectly influence job quality perception. These include the economic and policy context, such as pension systems, unemployment rates, and labor laws that affect retirees' ability to work; community resources, including networking organizations, re-skilling programs, and support systems for older workers; and social and cultural norms, which encompass societal attitudes towards retirees working and the perceived appropriateness of continuing work post-retirement.

The interaction between these components creates a dynamic feedback loop. Self-efficacy influences retirees' outcome expectations and career goals, while experiences in these areas feed back to reinforce or modify self-efficacy beliefs. Outcome expectations shape career goals, which in turn influence job search

behaviors and job acceptance decisions. These experiences provide feedback that can either strengthen or weaken retirees' self-efficacy. Environmental variables shape retirees' cognitive-person variables. For example, positive social persuasion, such as encouragement from family or peers, can boost self-efficacy, while negative workplace experiences, like ageism, can diminish it.

The perception of job quality, therefore, is the perceived value of a job in meeting the retiree's personal and professional needs. This perception is influenced by several factors, including the alignment with career goals and outcome expectations, the balance between flexibility and stability (e.g., income, benefits), and the perceived control over job choices, which is shaped by self-efficacy and environmental constraints. Ultimately, the satisfaction and well-being derived from the job are influenced by how well the job aligns with personal priorities and the quality of the work environment.

## Limitations and Implications for Future Research

This paper is subject to the inherent limitations common to conceptual studies, particularly those stemming from reliance on existing research findings. The premises and propositions outlined are constrained by the depth and quality of the extant literature. The scarcity of longitudinal studies in the areas of bridge employment and nonstandard work presents a significant challenge, limiting the ability to establish causal relationships. Consequently, my examination of the interrelationships among constructs might be incomplete. Additionally, the relatively underexplored connections between bridge employment, nonstandard work, and job quality suggest that other relevant variables and contextual factors may not have been fully captured within the proposed model. Future empirical research, especially exploratory studies, will be essential in uncovering the underlying motivations and sense-making processes of retirees.

While this paper has discussed a range of cognitive-personal and environmental variables influencing retirees' goal development processes, these lists are not exhaustive. Further research could explore additional person-level factors such as gender, family status, income, work centrality, personality type, job attitudes, and supervisory relationships in previous employment contexts. To enhance the robustness of the model, there is also scope for examining various mediators and moderators. One particularly relevant moderator is underemployment, which significantly affects both bridge employees' and nonstandard workers' job attitudes. Underemployment, characterized by the engagement in work that is below an individual's qualifications or fails to meet their goals and expectations, is a critical issue impacting job satisfaction and the well-being of retirees (Armstrong-Stassen, 2008; Connelly et al., 2011), as well as nonstandard workers more broadly (Connelly et al., 2011).

## Implications

This paper offers significant contributions to theory building, particularly in the context of bridge employment and nonstandard work—two rapidly expanding trends within the contemporary labor market. Both types of employment share common challenges and opportunities. Employees engaged in these forms of work are often subject to stigma, and research on their experiences and attitudes tends to yield inconclusive results. The intersection of these two thriving yet under-researched fields presents a critical gap in the literature. By employing the theoretical framework of Social Cognitive Career Theory (SCCT), this paper lays a foundational understanding of job quality from the perspective of a specialized group of

employees: retirees returning to the workforce through nonstandard employment. This focus is crucial not only from an economic standpoint, as previously discussed, but also from the retirees' perspective, where engagement in bridge jobs serves as an essential adjustment phase post-retirement. Thus, developing a model to comprehend how retirees perceive job quality is a vital academic contribution.
The theoretical implications of this paper are multifaceted. Firstly, it advances the literature on bridge employment and nonstandard work by providing a nuanced understanding of how retirees, as a specific subset of nonstandard employees, evaluate job quality. The integration of SCCT into this discussion allows for a more comprehensive exploration of the factors that influence retirees' employment decisions and job satisfaction. By highlighting the role of self-efficacy, outcome expectations, and career goals in shaping retirees' perceptions, this paper offers a robust framework for future research. The model proposed here suggests that retirees' engagement in nonstandard work is not merely a response to economic necessity but is also influenced by personal and contextual factors, thereby challenging the traditional notion that nonstandard work is inherently undesirable.

Moreover, the paper underscores the potential for bridge employment and nonstandard jobs to act as catalysts for each other's growth. As the labor market continues to evolve, understanding goal-setting processes in one domain can inform and enrich the literature in the other. This cross-pollination between the fields of bridge employment and nonstandard work contributes to a more integrated theory of employment in later life, bridging gaps between disparate strands of research and offering new avenues for exploration.

Furthermore, this paper contributes to resolving the contradictory findings in the literature regarding employee attitudes toward nonstandard work. By positing that a job holder's self-assessed ability, personal traits, and contextual variables play a crucial role in their assessment of job quality, this research challenges the one-size-fits-all perception of nonstandard employment. It suggests that nonstandard work can be a desirable arrangement for many retirees, especially those who prioritize work-life balance and reduced workload over traditional job security and financial rewards. This theoretical insight invites further empirical research to explore the diverse motivations and outcomes associated with nonstandard employment among different demographic groups.

From a practical standpoint, this paper offers valuable insights for human resource (HR) managers and organizational leaders. Understanding what drives both current and potential employees towards certain jobs is crucial for designing roles that align with employee aspirations and for developing effective motivational strategies. As Latham and Pinder (2005) note, aligning job design with employee motivations is key to enhancing job satisfaction and organizational performance. The findings of this paper suggest that retirees engaged in nonstandard work are not merely filling a gap in the labor market; they are actively seeking work arrangements that align with their post-retirement goals and lifestyle preferences.

For HR managers, this means recognizing that nonstandard work should not be viewed or treated as a second-rate option. Instead, it should be approached as a legitimate and potentially desirable form of employment that can attract and retain skilled workers who value flexibility and balance. HR strategies should therefore be tailored to meet the unique needs of nonstandard employees, offering opportunities for engagement, loyalty, and creative contribution comparable to those expected from standard employees. This approach could include offering more flexible work arrangements, providing opportunities for professional development, and fostering a work environment that values and respects the contributions of all employees, regardless of their employment status.

Additionally, the insights from this paper could inform policy development aimed at supporting retirees who wish to continue working in nonstandard roles. Policymakers could consider creating incentives for

employers to offer more flexible and meaningful work opportunities for older adults, as well as implementing programs that help retirees transition into new roles that align with their skills and interests. By doing so, organizations and societies at large could better harness the experience and expertise of retirees, while also enhancing their quality of life and sense of fulfillment in their later years.

## Conclusion

Bridge employment is thriving and so is nonstandard employment. And as Shultz (2001) had predicted more than a decade ago, bridge employees as a nonstandard workforce is helping employers fill critical roles when they need matured hands. But maintaining a work environment where such employees are fruitfully integrated in the human resource management system and at the same time ensuring optimum well-being of such employees will require an extensive and refined understanding of the motives, traits and aspirations of such employees. As a first step towards such goal, academics have to step back from the tendency of overgeneralizing bridge employees as a group of retirees without the means to score a desired job and nonstandard workers as a pool of exploited employees, who desire, yet are denied standard work options. Such views are myopic and unyielding for both academic and practitioners in the context of present socio-economic state of affairs.

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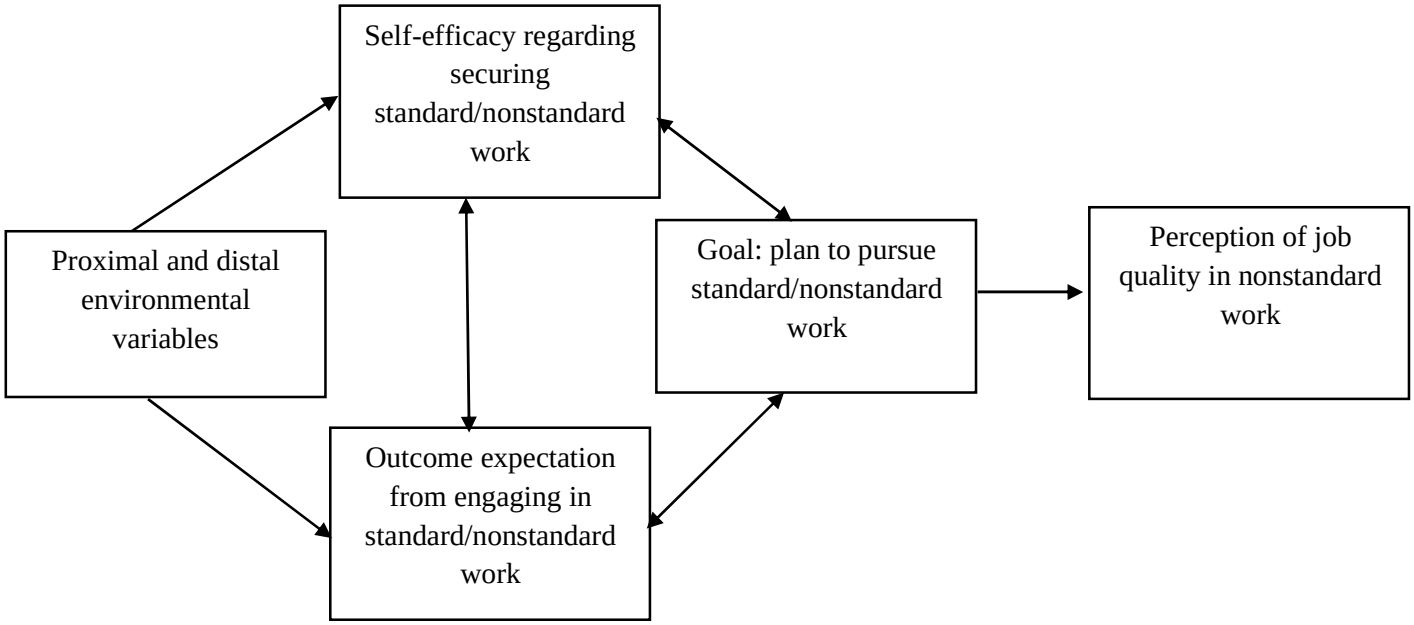
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Zhang, Z., & Zhang, J. (2015). Social Participation and Subjective Well-Being Among Retirees in China. Social Indicators Research, 123(1), 143–160. https://doi.org/10.1007/s11205-014-0728-1

Zeytinoglu, I. U., Cooke, G. B., & Mann, S. L. (2009). Flexibility: Whose Choice Is It Anyway? ¿La Flexibilidad: Para Quién?, 64(4), Article 4.

**FIGURE 1**

**A Conceptual Model for Understanding Job Quality in Nonstandard Job From Bridge Employee's Perspective**



# MANAGEMENT & INFORMATION SYSTEMS

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# ONLINE GROCERY DELIVERY SERVICES USAGE INTENTION IN CANADA: AN ASSESSMENT WITH AN EXTENDED THEORY OF PLANNED BEHAVIOR

## Abstract

The use of online grocery delivery services (OFDS) is growing worldwide. This study was designed to explore factors influencing Canadians' OGDS usage intention. An extended theory of planned behavior fused with two constructs, perceptions of customer service (PCS) and a construct of socio-demographic variables (SDV), was used to guide the research effort. A research model was proposed, and data was collected from 213 Canadians. The partial least squares structural equation model (PLS-SEM) technique was used for data analysis. The results showed that attitude, subjective norms, and PCS positively affect OGDS usage intention. Perceived behavioral control and SDV were insignificant in the model. Attitude toward OGDS was the most important factor influencing the dependent construct. The study's contributions and implications are discussed.

## Introduction

Groceries are essential commodities for everyone. They include perishable (e.g., food products) and non-perishable household goods (e.g., cleaning products). The purchase of such products constitutes a big chunk of consumer spending worldwide. For example, Picodi.com (2023) shows that, on average, Canadians spend about 10% of their monthly income on groceries. The report also revealed that Canadians spend about $231 per month on groceries, which is second only to the amount consumers spend in the US. People can purchase groceries from various outlets, offline and online (Lodni et al., 2021). Evidence indicates that online grocery delivery services (OGDS) or platforms experienced tremendous growth during the Coronavirus (COVID-19) pandemic due to health safety measures implemented to help curb the spread of the disease (Bezirgani & Lachapelle, 2021; Tyrväinen & Karjaluoto, 2022; Galushko & Riabchyk, 2024). Even though many offline grocery outlets were kept physically operational during this period, many consumers worldwide, including Canadians, trouped to online grocery platforms for fear of not contracting the disease (Charlebois, 2020; Kulkarni & Barge, 2020; AbdulHussein et al., 2024). Powell (2022) cites a Canadian study indicating that "only 19 percent of Canadians engaged in online grocery shopping pre-pandemic." The preceding insights suggest that OGDS platforms and their usage in Canada were low before the pandemic started in March 2020.

At the end of the pandemic in May 2023, some commentators in Canada implied that because people's online grocery shopping habits changed during the pandemic OGDS usage may become more widespread in the country. For instance, Bezirgani and Lachapelle (2021) comment, "the recent COVID-19 related surges in forced [OGDS] might trigger wider longer-term adoption in this population segment." Another commentator asserts that because people formed the habit of using OGDS during the pandemic, they could

sustain this habit after the pandemic (Charlebois, 2020). A Toronto retail analyst commented, “Some people got used to the convenience of grocery shopping online and they stuck with it even after the COVID-19 pandemic” (Consumers Council of Canada News, 2024). Others elsewhere opined that OGDS is a new normal (McKinsey, 2020; Roggeveen & Sethuraman, 2020). Research is needed to assess realities in Canada. Understanding factors that stimulate consumers’ intention to use OGDS in Canada would be worthwhile.

Previous studies on OGDS usage intention indicate that factors such as attitude toward OGDS, subjective norms (views of referent others), and perceived individual abilities directly influence usage intentions of such platforms (e.g., Troise et al., 2021; Tyrväinen & Karjaluoto, 2022; Shukla & Pandey, 2023). While the information on the impacts of such factors has been explored in other settings, more research focusing on perspectives from Canada is needed. Our literature study found that only the work of Bezirgani and Lachapelle (2021) investigated the views of Canadian users of OGDS. Our work complements their effort as they did not provide information on the roles of perceptions of customer service that shoppers value when shopping online or offline (e.g., Lu o et al., 2012; Kumar et al., 2023). Indeed, Kovacevic (2024) suggests that consumers in Canada value such services when using OGDS.

This study primarily seeks to contribute to the growing OGDS literature with added insights from Canada. The theory of planned behavior (TPB) proposed by Ajzen (1991) will guide the study. The theory will be extended by perceptions of customer service and a construct of socio-demographic variables (SDV). Perception of customer service is reported to be an essential driver of technology usage in e-commerce platforms (Luo et al., 2012; Saad et al., 2023), and socio-demographic variables matter for the adoption of OGDS in general (e.g., Droogenbroeck & Hove, 2017; Gomes & Lopes, 2022). We believe that considering the noted factors will enrich our understanding of the determinants of consumers' intention to use such platforms in Canada. It is hoped that the study’s contributions will be useful to practitioners seeking ways to grow OGDS use in Canada and comparable settings. Also, researchers’ knowledge of pertinent factors to focus on or incorporate into future investigations of enablers of OGDS is enhanced. Knowledge of paramount constructs would allow Canadian OGDS practitioners to know areas requiring attention as they manage consumers’ willingness to use such platforms. Thus, the two specific questions that this study seeks to answer are posed as follows:

**RQ1**: What factors influence Canadian consumers’ OGDS use intention?

**RQ2**: Which factor(s) are more critical to enhancing consumers’ OGDS use intention?

## Background and Related Work

### Background

Businesses providing OGDS allow consumers to order products online through websites or mobile applications (apps). OGDS is sometimes called online grocery shopping (OGS), e-grocery, or virtual grocery shopping (VGS) (Hansen et al., 2004; Hui & Wan, 2019; Martín et al., 2019; Thomas-Francois & Somogyi, 2022). OGDS includes three categories, i.e., retail delivery (e.g., Amazon Fresh, Instacart), click and collect model (e.g., Walmart, Loblaw companies), and meal kit delivery model (e.g., HelloFresh) (Statista, 2023). Instacart is the most popular OGDS for retail delivery, while Walmart is the top click-and-collect OGDS in Canada (Statista Research Department, 2024). According to Statista (2024), the OGDS market in Canada will earn a revenue of US$6.54bn in 2024. This is projected to be US$10.84 billion by

2029. The current user penetration rate of OGDS in Canada is estimated at 30.8% in 2024; this will grow to 16.9 million users in 2029 (Statista, 2024).

### Related Work

Some research on OGDS and related areas has been conducted in Canada. For example, Galushko and Riabchyk (2024) illuminated the extent to which COVID-19 has induced changes in Canadian consumers' OGS behavior. Their study of 600 Canadians revealed that 72% of the survey participants had to alter their grocery shopping habits because of the COVID-19 pandemic. They concluded that constructs of TPB influence OGDS use intentions in Canada. Jacobson et al. (2023) used a thematic analysis to examine Canadian grocery retailers' website messaging activities during the COVID-19 pandemic. Hossain et al. (2022) investigated in-person, online grocery shopping, and meal consumption activities after COVID-19 in Canada; they found that Canadians with lower income and with children are likely to do grocery shopping in person and individuals who do not own cars are more likely to use OGDS. During the pandemic, Bezirgani and Lachapelle (2021), using the TPB, examined the OGS behavior among the aged in Quebec; they showed that attitudes and subjective norms are strong drivers of OGS intention formation for the elderly. Thomas-Francois and Somogyi (2022), using an expanded technology acceptance model (TAM), demonstrated that Canadian consumers' attitudes towards VGS and convenience motivation impact their intention to adopt VGS. AbdulHussein et al. (2024), using national data collected during the pandemic (November 2020 and March 2021), showed that males, college-educated, employed, and those with higher incomes are more likely to have increased OGS activities during the period.

Researchers in other settings have also educated on the relevance of key factors in influencing OGDS use intentions. For example, using data from Vietnam and an extended TPB, Tran (2021) showed that subjective norms significantly positively impacted behavioral intention to use mobile food delivery apps. A study of OGS in India that used TPB reported that convenience, attitude, and subjective norms significantly positively affect OGS purchase intention (Khan & Khan, 2020). Using TPB with data collected in Sweden and Denmark, Hansen et al. (2004) reported that social norms and attitudes positively impact consumer OGS purchase intentions. Shukla and Pandey (2023) demonstrated that the intention to use OFDS in India positively benefits from antecedents such as attitude and perceived behavioral control. Troise et al.'s (2021) study of OFDS use intention in Italy showed that subjective norms, attitude, and perceived behavioral control positively influenced behavioral intention to use such platforms.

Nakano (2023), using Japanese data, demonstrated that online grocery purchases are affected by search cost, price consciousness, and quality consciousness. Likewise, Raijas (2002) explored OGS in Finland and reported that convenience, product selection, time-saving, and easiness are among the key motivators influencing the adoption of such services. Socio-demographic indicators (e.g., age, education, gender, and income) have also been found to determine decisions to use OGDS (Verhoef & Langerak, 2001; Droogenbroeck & Hove, 2017; Gomes & Lopes, 2022). Not many prior studies of OGDS in Canada and elsewhere have used perceptions of customer service alongside TPB's construct to assess OGDS usage intention. Our current work is motivated to fill this gap in literature.

## The Theoretical Foundations and Incorporated Constructs

### The Theory of Planned Behavior

Ajzen and Fishbein (1975) proposed the theory of reasoned action. The theory was further refined into the theory of planned behavior (Ajzen, 1991). TBP posits that three antecedents (attitude, subjective norms,

and perceived behavioral control) predict intention, which predicts behavior. TPB has been used extensively in many academic disciplines, including information systems (IS), marketing, and healthcare (e.g., Armitage & Conner, 2001; Bezirgani & Lachapelle, 2021; Troise et al., 2020). A meta-analytic study showed that TPB explained about 39% and 27% of the variance in intention and behavior (Armitage & Conner, 2001). This study only considered intention (usage intention) and not behavior, as that would enable us to gauge willingness to use such platforms in the future. Moreover, literature has continually confirmed a high relationship between intention and behavior (Sheeran, 2002).

TPB constructs used in this study are described as follows: Attitude refers to favorable or unfavorable feelings toward using OGDS. Subjective norms describe the views of significant others (e.g., colleagues, family, or friends) about OGDS use. Perceived behavioral control encapsulates an individual's perception of the ease or difficulty of using OGDS. Usage intention describes a willingness to use OGDS.

**Perceptions of customer service and a construct of socio-demographic variables**

Perceptions of customer service refer to opinions, feelings, and beliefs that customers have about essential quality features or attributes (e.g., meeting product expectations, delivery speed, product availability, fair price, order tracking) that customers value when using e-based services such as OGDS (Luo et al., 2012; Kumar et al., 2023; Saad et al., 2023; Nakano, 2023). Our perceptions of customer service borrow from Luo et al.'s (2012) work on the effective characteristics of online shopping. Past studies have shown that customers' purchases in online settings, particularly OGDS, benefit from these noted characteristics (Luo et al., 2012; Saa et al., 2023; Warganegara & Hendijani, 2022; Kumar et al., 2023; Kovacevic, 2024). Socio-demographics represent the characteristics of a population. It may include age, gender, education level, income, location (urban-rural), etc. As previously noted, some of these variables have been shown in previous studies to impact OGDS usage intention or adoption (e.g., Droogenbroeck & Hove, 2017; Gomes & Lopes, 2022; Hossain et al., 2022; AbdulHussein et al., 2024).

**Research Model and Hypotheses Development**

Figure 1 shows the study's proposed research model with the hypothesized paths. The study's constructs (formative and reflective) are delineated; the bold image is the study's formative construct. Next, each hypothesis is discussed.

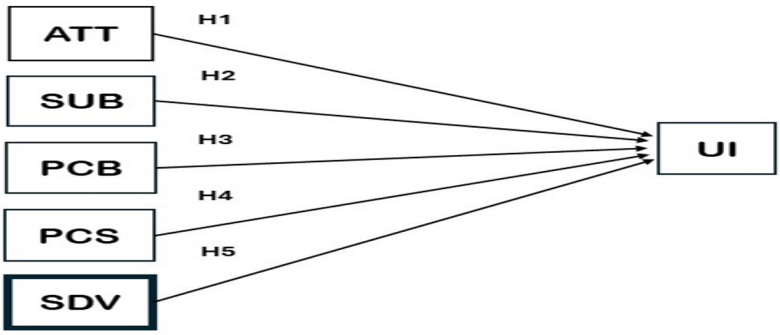



**Figure 1**. The research model

Individuals with favorable attitudes toward a behavior will engage in it, and those with unfavorable attitudes will likely shun it (Ajzen & Fishbein, 1975; Ajzen, 1991). Prior studies observed favorable attitudes toward OGDS influence such platforms' usage intentions or acceptance (Hansen et al., 2004; Tyrväinen & Karjaluoto, 2022). Indeed, prior studies showed that attitude had the most significant effect on the intention

to use OGDS and related services (e.g., Hansen et al., 2004; Tyrväinen & Karjaluoto, 2022; Khan & Khan, 2020; Shukla & Pandey, 2023; Bezirgani & Lachapelle, 2021). Thus, we predict:

H1: Attitude toward OGDS (ATT) will positively affect OGDS usage intention (UI).

The views and pressures of others matter when adopting a behavior (Ajzen & Fishbein, 1975; Ajzen, 1991) or e-platform service (e.g., Tran, 2021; Bezirgani & Lachapelle, 2021). This is because the opinions of significant others, especially those with prior OGDS experiences, could help shape the perception of individuals trying such for the first time (Hansen et al., 2004). Several past scholars have demonstrated that subjective norms has a significant positive influence on the use intention of OGDS and related services (Troise et al., 2021; Hansen et al., 2004; Bezirgani & Lachapelle, 2021; Tran, 2021). Thus, we predict:

H2: Subjective norms related to OGDS (SUB) will positively affect OGDS usage intention (UI).

Perceived behavioral control (PCB) describes an individual's confidence in performing a behavior. Those with high PCB effortlessly perform the behavior, and those with low PCB or lacking PCB struggle to do so (Ajzen & Fishbein, 1975; Ajzen, 1991). Research has confirmed that PCB is positively linked to an individual's intention to use OGDS and related services (Hansen et al., 2004; Shukla & Pandey, 2023; Bezirgani & Lachapelle, 2021; Tran, 2021). Thus, we predict:

H3: Perceived behavioral control related to OGDS (PCB) will positively affect OGDS usage intention (UI).

Individuals using online services and applications tend to be content where quality services are perceived as high and available (Luo et al., 2012; Khan & Khan, 2020). Notably, convenience, time-saving, and interactivity enhanced online grocery purchase intention (Khan & Khan, 2020). Raijas (2002) reported that convenience, product selection, time-saving, and ease of use of OGDS are motivators of OGDS adoption. Price and quality consciousness also matter for OGDS usage (Nakano, 2023). Similarly, Kumar et al. (2023) demonstrated that tracking orders matters for the users of OGDS. In brief, perceptions of customer service encapsulating the noted characteristics will bode well for OGDS usage intention. Thus, we predict:

H4: Perceptions of customer service (PCS) will positively affect OGDS usage intention (UI).

According to Droogenbroeck and Hove (2017), personal-level related variables such as income, age, educational level, and gender should not be downplayed when exploring the adoption of OGS because such factors generally influence the adoption of technologies. These researchers showed that socio-demographic variables (i.e., young males, more educated, and more economically endowed individuals) affected the adoption of OGS. Gomes and Lopes (2022) also confirmed the import of these variables for OGDS use. A study in Canada reported that males, college-educated, and people with higher incomes increased their OGS activities during the pandemic (Abdul Hussein et al., 2024). However, others have offered differing results; for example, Shen et al.'s (2022) study in the US found that females and people with higher incomes have more tendency to choose OGS during and after COVID-19. Hui and Wan (2009) found age and income to be significant factors influencing OGS acceptance, but gender was not. Regardless, we expect the socio-demographic construct to be positively associated with OGDS usage intention. Thus, we predict:

H5: A construct of socio-demographic variables (SDV) will positively affect OGDS use intention (UI).

## Research Methodology

This study collected data using a cross-sectional survey, which allows for the use of validated measures from existing studies. Attitude was operationalized with a four-item scale adapted from Warganegara &

Hendijani (2022). Subjective norms and perceived behavioral control were each represented by a three-item scale modified from the study by Rajeh et al. (2021). The construct of perceived custom service was measured with five items taken from Luo et al. (2012). We adapted four items from Prasetyo et al. (2021) for the usage intention construct. All the measures were assessed on a Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (5). The descriptive statistics of constructs' measuring items are shown in Table 1.

Table 1. Questionnaire items, descriptive statistics, and factor loadings

| Construct | Indicator | Mean | Standard deviation | Factor loading | CRA | CRO |
|---|---|---|---|---|---|---|
| Attitude toward OGDS (ATT) **AVE = 0.68** | ATT1- Purchasing groceries from ODGS is a good idea. | 3.87 | 0.80 | 0.839 | 0.84 | 0.89 |
| | ATT2 - Purchasing groceries from online OGDS is a wise idea. | 3.72 | 0.88 | 0.858 | | |
| | ATT3 - I think purchasing from OGDS is beneficial for me. | 3.69 | 0.99 | 0.863 | | |
| | ATT4 - Buying from an OGDS provider is better than buying from a physical store/shop. | 3.14 | 1.04 | 0.717 | | |
| Subjective norms (SUB) **AVE = 0.74** | SUB1 - People important to me support my use of OGDS. | 3.55 | 0.90 | 0.823 | 0.82 | 0.89 |
| | SUB2 - People who influence me think I should use OGDS. | 3.25 | 0.97 | 0.891 | | |
| | SUB3 - People whose opinions I value prefer I use OGDS. | 3.26 | 0.96 | 0.861 | | |
| Perceived behavioral control (PCB) **AVE = 0.76** | PCB1 - Using OGDS was entirely within my control. | 4.04 | 0.92 | 0.820 | 0.84 | 0.91 |
| | PCB2 - I have the resources, knowledge, and ability to use OGDS. | 4.17 | 0.90 | 0.899 | | |
| | PCB3 - I can use OGDS to shop for groceries online. | 4.12 | 0.94 | 0.897 | | |
| | | | | | | |
| Perceptions of customer service (PCS) **AVE = 0.53** | PCS1- My preferred OGDS provider delivers orders speedily. | 3.74 | 0.82 | 0.715 | 0.79 | 0.85 |
| | PCS2 - I like the amount I pay for the groceries offered by my preferred OGDS provider. | 3.41 | 1.00 | 0.745 | | |
| | PCS3 - My preferred OGDS provider always has available the groceries I buy. | 3.39 | 0.99 | 0.695 | | |
| | PCS4 - My preferred OGDS provider has a suitable order-tracking mechanism. | 3.75 | 0.94 | 0.742 | | |
| | PCS5 - My preferred OGDS provider always delivers what I ordered. | 3.54 | 1.00 | 0.750 | | |
| Usage intention (UI) **AVE = 0.77** | I intend to use OGDS to purchase groceries in the near future. | 3.71 | 0.98 | 0.869 | 0.90 | 0.93 |
| | I predict that I will extensively use OGDS in the future. | 3.67 | 1.01 | 0.883 | | |
| | I will always try to use OGDS when shopping for groceries. | 3.53 | 1.02 | 0.840 | | |
| | I plan to continue to use OGDS frequently. | 3.54 | 1.02 | 0.918 | | |

Note: CRA = Cronbach's alpha, CRO = composite reliability (rho_c)

We used a single item to collect information on gender, age, educational level, income, and location; their breakdown is shown in Table 2. Ethics clearance for the study was obtained, and the survey was hosted on Qualtrics. A pilot study was conducted with fifty-two (52) master's level students; feedback helped improve the quality of the final questionnaire used in the main study.

**Data Collection, Screening, and Participants**

The main study's data was collected between January 2 and March 14, 2023. We used Amazon Mechanical Turk, an online panel company, to gather the study's data. The benefits of this data source have been recognized, and useful recommendations for using it are suggested (Hunt & Scheetz, 2019). The company was instructed to collect data from Canadians of all ages who have used OGDS in the last few months. In screening the obtained data, we excluded responses that were completed in a hurry, those with more than 20% missing data, and responses with a monotone pattern (e.g., 3, 3, 3, 3) for all questions. Responses that failed three attention check questions included in the survey were all removed. At the end of the screening exercise, the study had 213 usable responses out of the initial 268 obtained. The sample size is adequate for a study of this sort (Hair et al., 2019). The data has a few missing numbers. Table 2 summarizes the participants' demographic profiles with information on their ages, gender, income, education, location, Internet experience, and monthly OGDS usage. We collected the income data using guidelines from The Globe and Mail's (2023) Canadian income classifications. Per location, i.e., urban and rural, information classifying a rural setting in Canada with a population of less than 10,000 people (ROI, 2023) was followed. Our data shows that Walmart, Amazon, Loblaw companies, and Instacart - in that order - are among the most frequently used OGDS in the sample.

Non-response bias was assessed by following Iacobucci and Churchill's (2010) recommendation. The data was split into two halves (i.e., early and late responses), and the Chi-square ($\chi 2$) test (significant at the 0.5 level) was carried out on key demographic data (e.g., gender, language, age, and education). The test result indicated that non-response bias was not a problem for the data.

**Common Method Bias**

Common method bias (CMB) can arise in studies when the same response method captures both independent and dependent constructs (Podsakoff et al., 2003). We used several measures to minimize CMB. Namely, the questions were intermixed, respondents were told that there were no correct or wrong answers, and the data collection source ensured respondents' confidentiality and anonymity. We also explored whether CMB was an issue for our data using the full collinearity approach (Kock, 2015). All generated variance inflation factors (VIF) for the constructs ranged from 1.02 to 3.5, with none greater than the threshold of 5, indicating that CMB is not a problem for the data (Kock, 2015).

Table 2. Descriptive statistics of the respondents

| Characteristics | Category | Number (N) | Percent (%) |
|---|---|---|---|
| Gender | Male | 116 | 54.5 |
| | Female | 94 | 44.1 |
| | Non-binary | 2 | 0.9 |

| | | | |
|---|---|---|---|
| Age | Less than 24 years | 7 | 3.3 |
| | 25 – 40 years | 103 | 48.4 |
| | 41- 55 years | 77 | 36.2 |
| | 56 years and above | 25 | 11.7 |
| Educational level | High school | 25 | 11.7 |
| | Associate Diploma (College) | 68 | 31.9 |
| | Graduate | 80 | 37.6 |
| | Post-graduate | 39 | 18.3 |
| Income | Not high – i.e., Less than $20,000 | 15 | 7 |
| | Low income – i.e., $20,001 to $44,999 | 31 | 14.6 |
| | Middle class – i.e., $45,000 to $139,999 | 96 | 45.1 |
| | Upper middle class – i.e., $140,000 to $149,999 | 30 | 14.1 |
| | High income – i.e., $150,000 to $199,999 | 29 | 13.6 |
| | Very high income – i.e., $200,000 and above | 11 | 5.2 |
| Location | Rural | 9 | 4.2 |
| | Urban | 203 | 95.3 |
| Internet experience | 1 – 3 years | 8 | 3.8 |
| | 4 – 10 years | 15 | 7.1 |
| | 11 – 20 years | 60 | 28.2 |
| | 21 years and above | 129 | 60.6 |
| Monthly OGDS usage rate | 1–5 times in a month | 154 | 72.3 |
| | 6–10 times in a month | 37 | 17.4 |
| | 11–15 times in a month | 15 | 7 |
| | 16–20 times in a month | 4 | 1.9 |
| | 21–25 times in a month | 1 | 0.5 |
| | 26 times and above in a month | 1 | 0.5 |

## Data Analysis and Results

The partial least squares structural equation model (PLS-SEM) technique, suitable for theory testing and prediction (Hair et al., 2019), was used to analyze the data. PLS-SEM has been used in similar studies (e.g., Ifinedo, 2008; Troise et al., 2021; Warganegara & Hendijani, 2022). The use of PLS-SEM is in line with the objective of this study, which is designed to examine the effect of select endogenous constructs on an exogenous construct: OGDS usage intention. Unlike covariance-based SEM packages, PLS-SEM can also handle both formative and reflective constructs in a model (Ringle et al., 2012); our model has both. The PLS-SEM software package used is SmartPLS 4.0 (Ringle et al., 2024). When using PLS-SEM, a two-step approach (i.e., measurement and structural assessments) is recommended to be followed (Hair et al., 2019).

### Measurement Model Assessment

The study's inner model covering reliability and validity metrics was assessed. Item reliability is adequate if Cronbach's alpha and composite reliability are higher than 0.7 (Hair et al., 2011). All the study's constructs meet this criterion (Table 1). Convergent validity was analyzed using the average variance extracted (AVE) recommended threshold value 0.5 (Hair et al., 2011). The results shown in Table 1 indicate that the scales have good convergent validity. Two approaches were used to assess discriminant validity.

First, the item loadings are checked. Items should load more strongly on latent constructs they describe (Chin, 1998a). Table 1 shows that each item loads strongly on its associated latent construct. Second, the heterotrait-monotrait ratio of correlations (HTMT) approach (Henseler et al., 2015) was used. HTMT ratios of less than 0.90 are considered adequate; this discriminant validity assessment is also satisfied (Table 3). The discriminant validity results show that the study's constructs are distinct.

Table 3. Heterotrait-monotrait ratio of correlations (HTMT) results

| | **ATT** | **PCB** | **PCS** | **SUB** | **OGDS UI** |
|---|---|---|---|---|---|
| Attitude toward OGDS (ATT) | | | | | |
| Subjective norms (SUB) | 0.559 | | | | |
| Perceptions of customer service (PCS) | 0.753 | 0.538 | | | |
| Subjective norms (SUB) | 0.719 | 0.250 | 0.666 | | |
| OGDS Usage intention (UI) | 0.909 | 0.434 | 0.707 | 0.748 | |

Concerning the psychometric measures of the formative construct of socio-demographic variables (SDV), Hair et al. (2019) recommended that the VIFs of formative construct items should ideally be less than 3. The following VIF values were obtained for constituting items of SDV: location (1.04), age (1.03), income (1.06), gender (1.02), and education (1.09). A p-value of 0.05 is also recommended; in that aspect, we obtained the following results: income (0.06[not significant(ns)]), location (0.18ns), age (0.03, significant), gender (0.06ns), and education (0.51ns). Besides location and education, the other items are close to the recommended p-value. Hair et al. (2021) assert that items should not be dropped from formative constructs because they did not satisfy published requirements. The items considered for our formative construct were retained insofar as they met our research objective, i.e., assessing the effect of SDV in the proposed model. Hair et al. (2019) also noted that loadings greater than 0.50 are relevant for non-significant weights. Approximately three of the weights have loadings close to and greater than 0.05. The weights of the items are presented as follows: location (0.33), age (0.60*), income (0.52*), gender (0.46), and education (0.18). Thus, the measures used to assess the validity of the study's formative construct are adequate for our purposes.

**Structural Model Assessment**

After adequately assessing the measurement model, information on the structural model is presented next. The path coefficients (β) and variances explained ($R^2$) are highlighted. Chin (1998b) suggests that $R^2$ of between 0.19 and 0.33, 0.34 to 0.67, and 0.67 and above indicate weak, moderate, and high, respectively. To check the significance of the hypotheses, a nonparametric bootstrapping process with 5,000 subsamples was used (Hair et al., 2019). The predictive relevance of the path model was also assessed using Stone and Geisser's ($Q^2$); a value above zero is considered adequate. Furthermore, Hair et al. (2013) suggest that $Q^2$ of 0.02, 0.15, and 0.35 indicate weak, moderate, and strong predictive relevance, respectively. Additionally, we assessed the path's effect size ($f^2$) following Cohen's (1998) guidelines, i.e., values of 0.02, 0.15, and 0.35 indicate small, medium, and large effect sizes.

The obtained $R^2$ of the model is 69%, which is high. Likewise, the study's $Q^2$ is 0.67, showing that the model has strong predictive relevance. Three out of the five hypotheses were confirmed. Attitude toward OGDS positively influenced OGDS usage intention ($\beta = 0.59$, $p < 0.001$) to support H1. Subjective norms positively influenced OGDS usage intention ($\beta = 0.25$, $p < 0.001$) to support H2. The prediction that perceived behavioral control would affect OGDS usage intention positively was not confirmed ($\beta = -0.00$, $p = 0.99$); thus, H3 is unsupported. The results supported H4, which predicted that perceptions of customer service would positively affect OGDS usage intention ($\beta = 0.14$, $p < 0.05$). The data did not support H5, which proposed that the construct of socio-demographic variables (SDV) and OGDS use intention would have a positive relationship ($\beta = 0.05$, $p = 0.33$). A post hoc analysis was conducted with the direct effect of each socio-demographic variable examined; none has a significant effect on the dependent construct. Table 4 summarizes the PLS-SEM results of the model, and Figure 3 shows path coefficients (β).

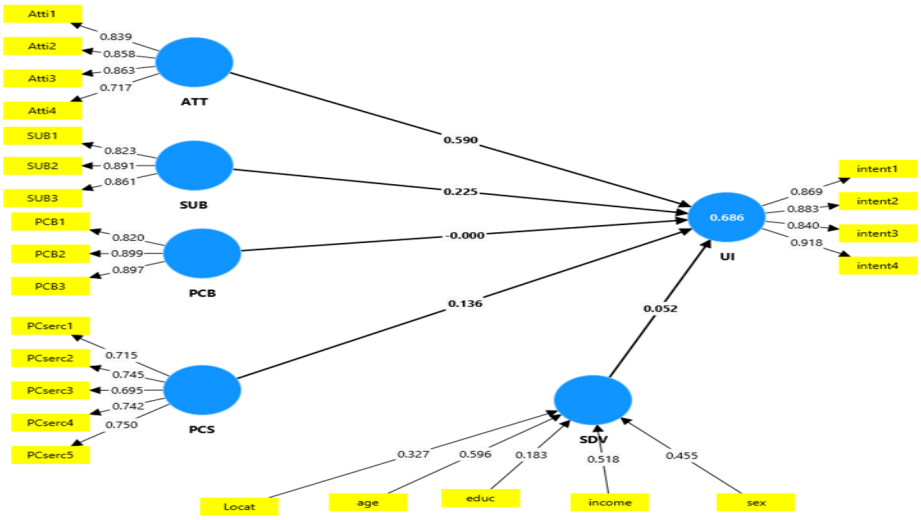



**Figure 2.** PLS-SEM results

Table 4. Summary of PLS-SEM results for the research model

| Hypothesis | Path | Beta (β) | Sig. level p-value | Effect size ($f^2$) | Outcome supported? |
|---|---|---|---|---|---|
| H1 | ATT → OGDS UI | 0.59 | $p < 0.001$ | 0.48 | Yes |
| H2 | SUB → OGDS UI | 0.23 | $p < 0.001$ | 0.09 | Yes |
| H3 | PCB → OGDS UI | -0.00 | $p = 0.99$ | 0.00 | No |
| H4 | PCS → OGDS CUI | 0.14 | $p < 0.05$ | 0.03 | Yes |
| H5 | SDV → OGDS CUI | 0.05 | $p = 0.33$ | 0.00 | No |

### Importance Performance Map Analysis (IPMA)

SmartPLS 4.0 provides information on the importance-performance map analysis (IPMA), which highlights the relative importance of constructs in explaining other constructs in a structural model (Hair et al., 2024). IPMA identifies areas of improvement requiring attention and uses two dimensions (i.e., importance and performance) to offer suggestions. Figure 4 shows the level of importance on the horizontal axis and the performance percentage on the vertical axis. Martilla and James (1977) proposed four quadrants to evaluate

IPMA results: quadrant 1 in the upper-left corner (i.e., concentrate here or top priority), quadrant 2 in the upper-right corner (i.e., keep up the good work or work to be maintained), quadrant 3 in the lower-left corner (i.e., low priority), and quadrant 4 in the lower-right corner (i.e., possible overkill). Figure 4 shows that our results fall under two quadrants, i.e., keep up the good work and concentrate here or top priority.

All the constructs account for 65.3% of the variance in OGDS UI. PCB has the highest performance (75.3%) but is unimportant to UI. However, considering both dimensions simultaneously, the most important construct for OGDS UI is ATT (63.2%), followed by SUB (54.8%) and PCS (62%). These results imply that a point increase in ATT and SUB will result in a 0.59, 0.23, and 0.14 increase in the total effect of OGDS usage intention, respectively. Likewise, the results suggest that the constructs of PCB and SDV were of minor relevance to OGDS UI.

Table 5. Importance-performance matrix analysis (IPMA) results for OGDS usage intention

| **Latent Construct** | **OGDS Usage Intention** | |
|---|---|---|
| | **Importance** (total impact) | **Performance** (index value) |
| Attitude toward OGDS (ATT) | 0.59 | 63.2 |
| Subjective norms (SUB) | 0.23 | 54.8 |
| Perceived behavioral control (PCB) | 0.00 | 75.3 |
| Perceptions of customer service (PCS) | 0.14 | 62.0 |
| Socio-demographic variables (SDV) | 0.05 | 64.2 |

## Discussions and Conclusion

### Findings

This study was designed to explore Canadian consumers' intention to use OGDS and to ascertain which important factors to focus on to bolster the growth of OGDS use in the country. TPB fused with perceptions of customer service and a construct of socio-demographic variables was used to guide the research effort. Regarding RQ1, we showed that attitude toward OGDS positively influenced OGDS usage intention. This finding is in line with observations in the country (Bezirgani & Lachapelle, 2021) and elsewhere (e.g., Hansen et al., 2004; Tyrväinen & Karjaluoto, 2022; Khan & Khan, 2020; Shukla & Pandey, 2023). We demonstrated that subjective norms has a positive effect on OGDS usage intention, a finding that aligns with the views of others in Canada (Bezirgani & Lachapelle, 2021) and elsewhere (e.g., Hansen et al., 2004; Tyrväinen & Karjaluoto, 2022; Khan & Khan, 2020; Shukla & Pandey, 2023). Our confirmed result related to the impact of perceptions of customer service on OGDS usage intention lends credence to observations in the literature, signifying the importance of items used to represent perceptions of customer service (Raijas, 2002; Khan & Khan, 2020; Tyrväinen & Karjaluoto, 2022; Nakano, 2023; Kumar et al., 2023).

Our analysis did not support the roles of perceived behavioral control and the construct of socio-demographic variables in influencing Canadian consumers' OGDS usage intention. Plausible explanations for these unsupported hypotheses could be linked to extraneous influences. The sampled participants may believe they do not have adequate skills and resources to give them mastery of OGDS usage. The study by Bezirgani and Lachapelle (2021), exploring a comparable theme in a part of Canada, also revealed an insignificant relationship between perceived behavioral control and OGS usage. Our results suggest that the construct of socio-demographic variables, as conceptualized herein, did not cause a significant variation in the dependent construct. Nonetheless, further research may be needed to refine knowledge regarding

unsupported predictions. Concerning RQ 2, the IPMA results show that attitude toward OGDS is the most important factor that stimulates consumers' OGDS usage intention.

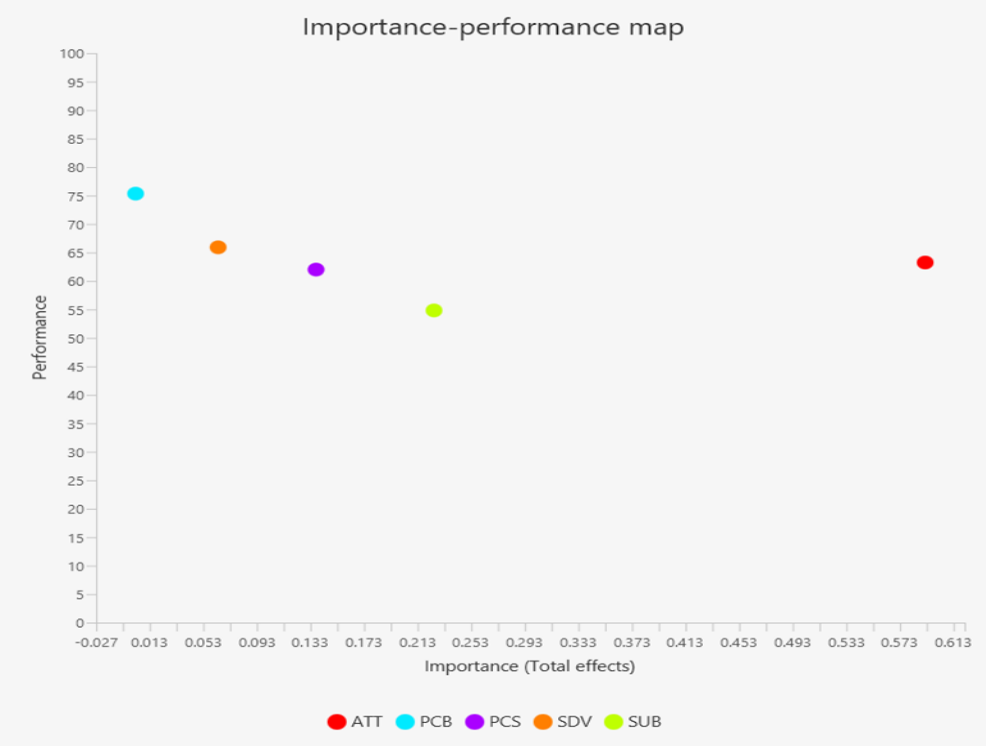



**Figure 3.** IPMA for OGDS usage intention

### Theoretical Contributions

This study has contributed to the literature on OGS/OGDS in some useful ways. It supports prior studies (e.g., Hansen et al., 2004; Bezirgani & Lachapelle, 2021; Tran, 2021; Tyrväinen & Karjaluoto, 2022; Shukla & Pandey, 2023) that used TPB to examine the intention and usage of OGDS. We showed that extending TPB with perceptions of customer service and a first-order construct of socio-demographic variables yielded a strong predictive model of OGDS usage intention. The variance explained when using TPB for most studies went up from about 39% to 69%, as seen in this work. To that end, this study has responded to calls made by researchers (e.g., Gifford & Nilsson, 2014) for TPB to be extended to include other relevant factors.

Our work also contributes to the literature by showing that the attitude construct is the most important influencing Canadian consumers' OGDS usage intention, supporting observations made by others elsewhere (Hansen et al., 2004; Tyrväinen & Karjaluoto, 2022). To the best of our knowledge, this work is among the first few to consider and utilize perceptions of customer service in OGDS usage intention research, thus contributing to research with its conceptualization. Others could be spurred to use or revise this study's proposed model in similar future inquiries.

### Practical Implications

The findings from this study offer information that could benefit practitioners in Canada and comparable contexts. To increase willingness or intention to use OGDS, business owners of such platforms could find

ways to improve customers' attitudes toward such services. For example, OGDS operators could instruct their web and app developers to design simple platforms with high navigational capacity to make it easy for customers to interact with them. Our result showed that OGDS managers need to focus more on customers' attitudes toward OGDS use as it is the most critical factor driving intention to use such platforms. Dedicated strategies to improve attitudes toward OGDS would be rewarding.

OGDS managers could also leverage social interactions to promote ODGS usage intentions. Programs that encourage online social grocery buying could be explored. Social media platforms and how such could be linked to OGDS usage could be explored. Rewards and coupons could be offered to customers who introduce family, colleagues, and friends to OGDS outlets. Our results suggest that OGDS practitioners should pay attention to customer service attributes, including the availability of quality products that are reasonably priced, delivered on time, and that can be tracked online. When customers positively perceive such features, usage intentions of such platforms are accordingly enhanced. Although PCB was unimportant in the study, given its high performance IPMA score, OGDS operators could consider creating trial apps for customers to use to help build familiarity with their services before visiting their websites or using their apps.

## Study's Limitations and Future Research

This study gathered data using a cross-sectional survey. Admittedly, the research effort might have missed other beneficial insights, such as habits not captured in the survey. Future studies could use longitudinal surveys and interviews to enrich knowledge. The data used for the study came from one economically advanced country, Canada. As perspectives on technology usage vary across contexts, generalizing this study's findings to other countries may be done cautiously. Future studies could explore OGDS managers' views on the growth of the sector vis-à-vis consumer usage and post-usage behavior, as opinions may differ, differing executive cohorts should be sampled (Ifinedo & Nahar, 2006). Future studies in diverse countries are needed. Moreover, factors such as habits, trust, and loyalty could be incorporated into the research model to deepen an understanding of the influences of OGDS usage intention. Future studies could investigate the continuous use of OGDS with data collected beyond the pandemic years.

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# SUPPLIER SELECTION AND ORDER ALLOCATION USING SWOT ANALYSIS WITH TFN AND LINEAR PROGRAMMING MODEL

This paper explores supplier selection and order allocation (SSOA) using SWOT with TFN, and Linear Programming model. Gradient Boosting Machine (GBM) and Triple Exponential Smoothing (TES) are used for Demand prediction. Here, the white meat consumption data in Nova Scotia is considered for calculations. Supplier selection is performed through SWOT analysis with Trapezoidal Fuzzy Numbers (TFN) to handle qualitative criteria. The final step involves optimizing order allocation using a Multi-Objective Linear Programming (MOLP) Model, while balancing supplier performance, capacity, and cost. Using such advanced forecasting and optimization techniques, this integrated approach addresses the complexities of managing multiple suppliers and products, offering a structured solution to increase decision-making accuracy and improve supply chain efficiency.
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## 1. Introduction

Supplier Selection (SS) Process enables organizations to evaluate, prioritize and locate potential suppliers. The assessments are carried out using a combination of qualitative and quantitative standards which are preset and derived from business contexts and goals. Conflicting criteria, like cost and quality, are typically subsumed by the SS criteria (Naqvi and Amin, 2021). After the identification of potential suppliers, the two parties may decide on an Order Allocation which will allow them to meet the needs of the business and so place a contract. A productive SCM integrates both SS and OA procedures (Islam et al., 2024). The purpose of this research is to offer an integrated approach to solving the SSOA problem. In the conventional Supply Chain, Qualitative factors can be used to select the suppliers apart from Cost, Quality, Service level, and Lead time (Aditi et al., 2023). In addition, Environmental laws compel businesses to implement environmental standards, also referred to as "Green Criteria". Order quantities in SSOA are decided upon from the chosen providers based on a number of criteria, including Cost.

In general, an objective function is often defined for every factor, which may be either maximization or minimization. Several models have been widely used by researchers to tackle the SSOA problem, such as "Linear Programming (LP), Integer Linear Programming (ILP), Multi-Objective Linear Programming (MOLP), Mixed-Integer Linear Programming (MILP), Mixed-Integer Non-Linear Programming (MINLP), and Goal Programming (GP)". Since the order allocation and demand are intricately linked, faulty demand assumptions could lead to errors in the SSOA processes. Accurate demand forecasting is necessary for an effective SSOA planning (Hosseini et al., 2023). This paper proposes a three-stage methodology to handle the challenges of the SSOA planning problem. The first step involves developing a Forecasting framework using Triple exponential smoothing (TES) and Gradient Based Machine (GBM).

As a second step, introducing fuzzy supplier assessment method based on SWOT model (Strengths, Weaknesses, Opportunities, and Threats) using TFN (Trapezoidal Fuzzy Numbers) and the qualitative criteria weights can be calculated accordingly. As a stage 3, the orders are assigned to the top vendors using a MOLP model, based on a combination of qualitative internal and external criteria.

## 2. Literature Review

In recent years, there are multiple methodologies and frameworks developed to deal with Supplier Selection & Order Allocation. This domain has attracted more attention as businesses strive to improve their supply chain effectiveness. This literature review discusses both SS and SSOA, focusing on recent progress and areas that still need further exploration.

### 2.1. Supplier Selection (SS)

Major companies are more concentrating on enhancing the sustainability and dependability of their supply chains to satisfy consumer demands and adhere to environmental laws. In 2020, Tirkolaee and colleagues presented a mixed model incorporating fuzzy logic, consisting of FANP, DEMATEL, and TOPSIS, which proposes enhancing supply chain dependability, product worth, and cost minimization. Here, TOPSIS does not have tools for evaluating consistency or deciding on weights. Rashidi et al. (2020) found some deficiencies in sustainable SS literatures, such as the necessity for further investigation into supplier innovation capabilities and global sourcing.

Chai et al. (2020) examined the criteria for SS, recognizing the complications of decision-making methods like AHP, ANP, and fuzzy techniques. They highlighted the need for future studies to focus on the difficulties and reliability issues related to these techniques. Borjalilu et al. (2021) created a fresh strategy for decision-making by merging Entropy and VIKOR methods for assessing supplier efficiency, advising the inclusion of fuzzy techniques such as Fuzzy PROMOTHEE and Fuzzy TOPSIS. Nevertheless, decision-makers face a challenge with the PROMOTHEE model due to the absence of clear instructions on weight allocation.

Aazagreyir et al. (2022) introduced a fuzzy VIKOR-DEMATEL-TOPSIS model to assess the quality of online services, highlighting concerns regarding consistency and decision-maker pressure. Agrawal et al. (2023) focussed the key factors for successful implementation of Sustainable Green Supply Chain Management (SGSCM), underscoring the significance of top management involvement and reverse logistics. The research employed AHP, TOPSIS, and DEMATEL, but faced constraints in incorporating specific criteria into the decision-making procedure.

### 2.2. Supplier Selection and Order Allocation (SSOA)

Schramm et al. (2020) examined methods for sustainable supplier selection, which including the economic, environmental, and social factors, with AHP and DEA as popular techniques. They pointed out the difficulties in comparing various MCDM techniques. In a study by Hosseini and colleagues (2022), sustainable order allocation in multi-product and multi-period situations were tackled by employing bi-objective model and hybrid BWM-ER method, showing improved outcomes over conventional approaches.

Bektur (2020) suggested a SSOA model with four phases which incorporated F-AHP, F-PROMETHEE, and fuzzy multi-objective optimization, while also pointing out difficulties in establishing correct weights and thresholds. Jia et al. (2020) presented a GP model for sustainable SSOA that is distributionally robust, able to manage conflicting goals, and offering efficient computational solutions.

Ventura et al. (2021) examined how SSOA can be applied in a two-stage supply chain, focusing on issues with demand prediction sensitivity to product costs and limitations in production capacity. In their research, Nasr et al. (2021) introduced a dual-phase fuzzy SSOA framework for closed-loop supply chains, employing BWM and MOMILP to address both sustainability and cost factors. Lyu and colleagues (2021) introduced a decision-making framework for service-oriented manufacturing that employs an innovative method to assess suppliers across various criteria.

In their study, Naqvi and Amin (2021) examined SSOA criteria in their different research papers and recommended employing advanced Machine Learning methods for forecasting uncertain parameters in SS models. Rezaei et al. (2021) proposed a model for centralized supply chain SSOA with MINLP and risk mitigation tactics but acknowledged the challenge in identifying viable solutions. Dewi and Zagloel (2023) conducted a thorough analysis of sustainable SSOA research, finding that hybrid MCDM-mathematical programming methods like TOPSIS, AHP, and BWM were known as commonly used techniques. Chakraborty et al. (2024) evaluated different MCDM techniques combined with fuzzy logic and found that all approaches yielded similar results in situations with uncertainty.

The reviewed studies highlight the importance of accurately predicting demand, a key factor in SSOA, and several potential models developed so far in Supplier Selection and Order Allocation.

**Table 1**

*Literature Review*

| Authors | SS | OA | Problem Scenario | | | Uncertainty Handling | Demand | Proposed models |
|---|---|---|---|---|---|---|---|---|
| | | | Multi-sources | Multi-products | Multi-periods | | | |
| Tirkolaee et al., (2020) | ✓ | | ✓ | | ✓ | FANP, Fuzzy DEMATEL & Fuzzy TOPSIS | | MOMILP & WGP |
| Bektur, (2020) | ✓ | ✓ | ✓ | ✓ | ✓ | TFN & AHP | Fuzzy | Fuzzy PROMOTHEE, FMOO, AUGMECON, LP & TOPSIS |
| Ventura et al. (2021) | ✓ | ✓ | ✓ | | ✓ | | Assumed | MINLP |
| Borjalilu et al., (2021) | ✓ | | ✓ | | | EWM | | Entropy & VIKOR |
| Nasr et al., (2021) | ✓ | ✓ | ✓ | ✓ | ✓ | TFN | Simulated | Fuzzy BWM & MOMILP |
| Lyu et al., (2021) | ✓ | | ✓ | | | | | Entropy & Deviation Function model |

| Authors | SS | OA | Problem Scenario | | | Uncertainty Handling | Demand | Proposed models |
|---|---|---|---|---|---|---|---|---|
| | | | Multi-sources | Multi-products | Multi-periods | | | |
| Aazagreyir et al., (2022) | ✓ | | ✓ | | | | | Fuzzy VIKOR-DEMATEL-TOPSIS |
| Hosseini et al., (2022) | ✓ | ✓ | ✓ | ✓ | ✓ | ER | Assumed | BWM & MOGP |
| Shang et al., (2022) | ✓ | | ✓ | | | FST with MULTIMOORA | | BWM, Fuzzy SEM & MULTIMOORA |
| Tong et al., (2022) | ✓ | | ✓ | | | PLTS | | PROMOTHEE II |
| Khanam et al., (2022) | ✓ | | ✓ | ✓ | | Fuzzy TOPSIS | | MCDM |
| Sun et al., (2022) | ✓ | ✓ | ✓ | | ✓ | Multi Echelon | Assumed | MINLP |
| Aouadni & Euchi, (2022) | ✓ | ✓ | ✓ | ✓ | | Fuzzy TOPSIS & MCGP | Forecasted | BWM & MMD-TOPSIS |
| Agrawal et al., (2023) | ✓ | | ✓ | | | | | AHP, TOPSIS & DEMATEL |
| Nasri et al., (2023) | ✓ | | ✓ | | | | | Fuzzy DEMATEL–ANP–DEA |
| Nazari-Shirkouhi et al. (2023) | ✓ | ✓ | ✓ | ✓ | ✓ | Robust Fuzzy | Assumed | Robust Fuzzy Optimization |
| Shidpour et al. (2023) | ✓ | ✓ | ✓ | ✓ | ✓ | Linguistic Terms & Fuzzy Numbers | Fixed | MOO, BWM, AUGMECON, Heuristic method |
| Kayani et al., (2023) | ✓ | ✓ | ✓ | | | Fuzzy MOMINLP | Assumed | FE-AHP, Fuzzy TOPSIS, Fuzzy MOMINLP & AUGMECON 2 |
| AmirSalami & Alaei, (2023) | ✓ | ✓ | ✓ | | | Bi-objective Optimization model | Assumed | Fuzzy DNP & Fuzzy TOPSIS |

| Authors | SS | OA | Problem Scenario | | | Uncertainty Handling | Demand | Proposed models |
|---|---|---|---|---|---|---|---|---|
| | | | Multi-sources | Multi-products | Multi-periods | | | |
| Chakraborty et al., (2024) | ✓ | | ✓ | | | Fuzzy MABAC | | TOPSIS, WASPAS, CoCoSo, VIKOR & IF |
| Vaezi et al. (2024) | ✓ | ✓ | ✓ | ✓ | ✓ | | Assumed | BWM, MULTIMOORA & MILP |
| Islam et al. (2024) | ✓ | ✓ | ✓ | ✓ | ✓ | Fuzzy PCA | Forecasted | PCA, LSTM & MOMILP |
| Goudarzi & Gholamian, (2024) | ✓ | ✓ | ✓ | | | | Assumed | PROMOTHEE, GBWM & MCGP |
| Mukti et al., (2024) | ✓ | | ✓ | | | | | VPI & AHP |
| Khorram et al (2024) | ✓ | | ✓ | | | | | Fuzzy DEMATEL, QFD, TOPSIS & VIKOR |
| Ghazvinian et al. (2024) | ✓ | | ✓ | | | MCDM | | IF & TOPSIS |
| **This Paper** | ✓ | ✓ | ✓ | ✓ | ✓ | **TFN** | **Forecasted with TES & GBM** | **SWOT, TFN & LP** |

**Table 2**

*List of Abbreviations from Literature Review Table*

| Abbreviations | Descriptions |
|---|---|
| AHP | Analytical Hierarchy Process |
| ANP | Analytic Network Process |
| AUGMECON | Augmented Epsilon (ε)-constraint method |
| BWM | Best-Worst Method |
| CoCoSo | Combined Compromise Solution |
| DEA | Data Envelopment Analysis |
| DEMATEL | Decision Making Trial and Evaluation Laboratory |

| Abbreviations | Descriptions |
|---|---|
| DHHLTS | Double Hierarchy Hesitant Linguistic Term Sets |
| EWM | Entropy Weight Method |
| FANP | Fuzzy Analytic Network Process |
| FE-AHP | Fuzzy Extended-Analytical Hierarchy Process |
| FMOO | Fuzzy Multi-Objective Optimization |
| FST | Fuzzy Set Theory |
| GBWM | Group Best-Worst Method |
| GP | Goal Programming |
| IF | Intuitionistic Fuzzy |
| LP | Linear Programming |
| LSTM | Long Short-Term Memory |
| MABAC | Multi-Attributive Border Approximation Area Comparison |
| MCDM | Multi-Criteria Decision Making |
| MCGP | Multi-Choice Goal programming |
| MILP | Mixed Integer Linear Programming |
| MINLP | Mixed-Integer Non-Linear Programming |
| MMD | Meaningful Mixed Data |
| MOGP | Multi-Objective Goal Programming |
| MOLP | Multi-Objective Linear Programming |
| MOMILP | Multi-Objective Mixed-Integer Linear Programming |
| MOMINLP | Multi-Objective Mixed-Integer Non-Linear Programming |
| MULTIMOORA | Multi-objective Optimization by Ratio Analysis |
| PCA | Principal Component Analysis |
| PIPRECIA | PIvot Pairwise Relative Criteria Importance Assessment |
| PLTS | Probability Language term Set |
| PROMOTHEE | Preference Ranking Organization Method for Enrichment Evaluations |
| QFD | Quality Function Deployment |
| SEM | Shannon Entropy Method |
| TrFN | Triangular Fuzzy Numbers |
| TFN | Trapezoidal Fuzzy Numbers |
| TOPSIS | Technique for Order of Preference by Similarity to Ideal Solution |
| VIKOR | VIekriterijumsko KOmpromisno Rangiranje |

| Abbreviations | Descriptions |
|---|---|
| VPI | Vendor Performance Indicator |
| WASPAS | Weighted Aggregated Sum Product Assessment |
| WGP | Weighted Goal Programming |
| TES | Triple Exponential Smoothing |
| GBM | Gradient Boosting Machine |

## 3. Problem Statement

The SSOA (Supplier Selection and Order Allocation) framework consists of four distinct scenarios. The first scenario involves a straightforward process with a single supplier providing a sole product. In the second scenario, a single supplier fulfils the needs of multiple products, presenting challenges related to market monopoly due to the lack of competition. The third scenario features multiple suppliers for a sole product, where the main challenge lies in establishing criteria for selecting suppliers. The most complex scenario, scenario four, deals with multiple suppliers and multiple products, posing significant challenges in selecting the right suppliers for various products and finding the appropriate order quantities from those suppliers. This research focuses on the fourth scenario, addressing the complexities of meeting the demands for multiple products from multiple suppliers.

This study is centred around the SSOA planning for a Canadian meat processing company targeting the Nova Scotia market, a region noted for its diverse demographic and consumption patterns. The Canadian white meat industry, with a growth to $9.1 Billion and a steady 5.3% compound annual growth rate over the past five years, sets a lucrative backdrop for this research (Agriculture and Agri-Food Canada, 2023a). Specifically, the white meat market experienced a 2.83% growth in demand from 2021 to 2022 (Agriculture and Agri-Food Canada, 2023b). Aiming to capture 10% of the white meat market in Nova Scotia, this study focuses on Chicken, Turkey, and Duck, using the Nova Scotia province's 73 provincially licensed meat plants, many of which are poultry-centric (Data Nova Scotia, 2023). Considering the varying production capacities influenced by livestock contracts and facility sizes, this research addresses the dynamic demand for white meats, which fluctuates based on seasonality, trends, and health concerns among livestock.

The objective is to accurately forecast the demand for these meats for the upcoming time period. Through precise demand prediction, the capable suppliers can be identified who fulfil the one-tenth of the anticipated demand, while also determining the optimal order quantities. Given the competitive pricing and minimal cost variations among suppliers, selecting suitable suppliers becomes a significant challenge. Factors such as plant capacity, delivery performance, hygiene standards, health and safety compliance, and packaging accuracy are crucial in this selection process.

## 4. Methodology

### 4.1. Demand Forecasting

In this paper, Triple Exponential Smoothing (TES) and Gradient Boosting Machine (GBM) are used for the demand forecasting. Exponential Smoothing is a time series forecasting method for univariate data that can be applied to generate forecasts. In exponential smoothing, recent observations are given

relatively more weight in forecasting than the older observations. Triple Exponential Smoothing (TES) Smoothing is an extension of Exponential Smoothing that explicitly adds support for trend and seasonality components. This method is sometimes called Holt-Winters Exponential Smoothing. The following is the forecasting formula:

$$A_{p+h|p} = X_p + hY_p + Z_{p+h-n(q+1)}$$

Here $A_{p+h|p}$ represents the forecasted value at time $p+h$, made at time $p$. Essentially, it is the predicted value of the time series $h$ periods into the future, whereas $X_p$ and $Y_p$ are the Level and Trend component. $Z_{p+h-n(q+1)}$ is the seasonal component at time $p + h - n(q + 1)$. It represents the seasonal effect for the forecast period, whereas $n$ is the length of the season, $q$ is the integer part of $(h - 1)/n$. It indicates the number of complete seasonal cycles between time $p$ and $p+h$. This term helps in adjusting the seasonal component based on the forecast horizon.

Gradient Boosting Machine (GBM) also used in this study. GBM uses two key strategies: Gradient-based One-Side Sampling (GOSS) and Exclusive Feature Bundling (EFB). The gradient of a data point shows how important it is for the next boosting phase. GOSS first sorts of data points by their gradient values. It then uses the high-gradient samples to calculate information gain, ensuring accurate results with fewer samples. This speeds up execution. In this study, GBM is implemented using the parsnip package in R, with tuning parameters like feature fraction, number of iterations, minimum data in a leaf, maximum tree depth, learning rate, minimum gain to split, and bagging fraction to improve accuracy. After training GBM with the training data, it is used to forecast periods like the testing data. The Root Mean Square Error (RMSE) is calculated from the differences between actual and forecasted values for the testing periods. GBM is then fine-tuned with the mentioned parameters to achieve a lower RMSE. Once the optimal tuning settings with the lowest RMSE are found, the model is used to forecast for the upcoming quarters.

**Figure 1**

*Historical Consumption Data of Three Different Type White Meats in Nova Scotia*

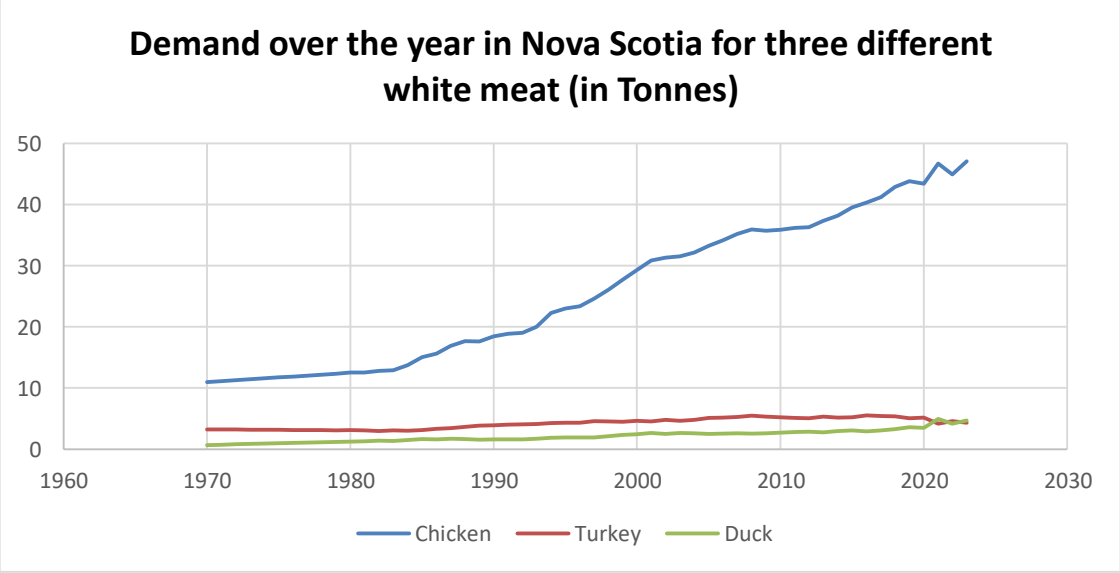


Fig 1 represents changes in consumer demand for white meat over a 70-year period. Few important points from this graph as follows:

- **Chicken (Blue Line)**: Chicken demand has significantly increased, starting close to 0 tonnes in 1960 and rising steeply to nearly 50 tonnes by 2024 (present date).
- **Turkey (Red Line)**: Turkey demand remains relatively stable, hovering around 10 tonnes throughout the years.
- **Duck (Green Line)**: Duck demand shows little change over time, remaining flat at the bottom of the graph.

Overall, this graph provides insights into the shifting preferences for white meat in Nova Scotia.

**Figure 2**

*Nova Scotia Duck Meat Demand Forecasts Using Exponential Smoothing*

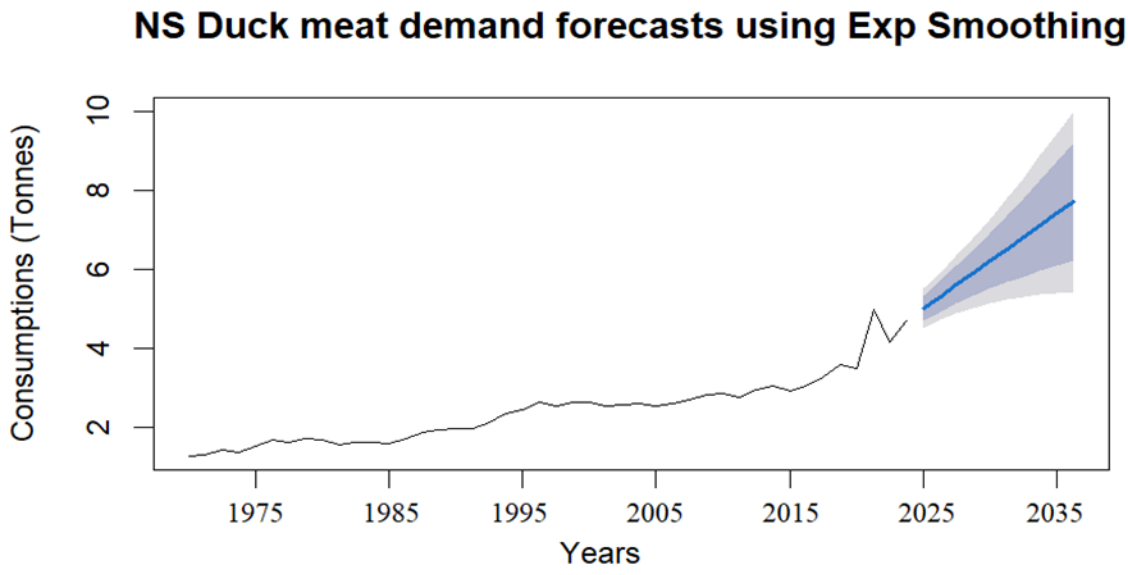



Fig 2 shows historical duck meat consumption in Nova Scotia. Consumption gradually increased from 1 tonne in 1975 to 3 tonnes in 2015 and then increased rapidly to nearly 6 tonnes by 2024 (present date). This is expected to increase up to 10 tonnes over the upcoming 10 years (2035). The forecast suggests continued growth, but with increasing uncertainty. Exponential smoothing was used for this demand projection.

**Figure 3**

*Nova Scotia Turkey Meat Demand Forecasts Using Exponential Smoothing*

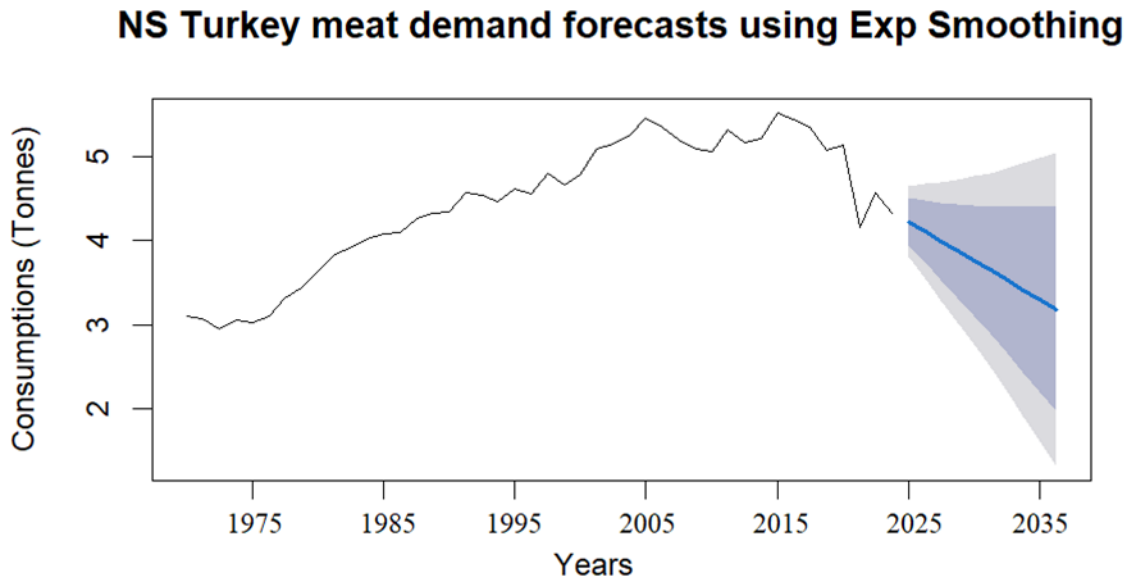



Fig 3 depicts the consumption of turkey meat in tonnes from 1975 to till date (2024). Historically, there was an increasing trend until around 2015, after which consumption decreased. The forecast suggests a decline in turkey meat consumption over the next decade.

**Figure 4**

*Nova Scotia Chicken Meat Demand Forecasts Using Exponential Smoothing*

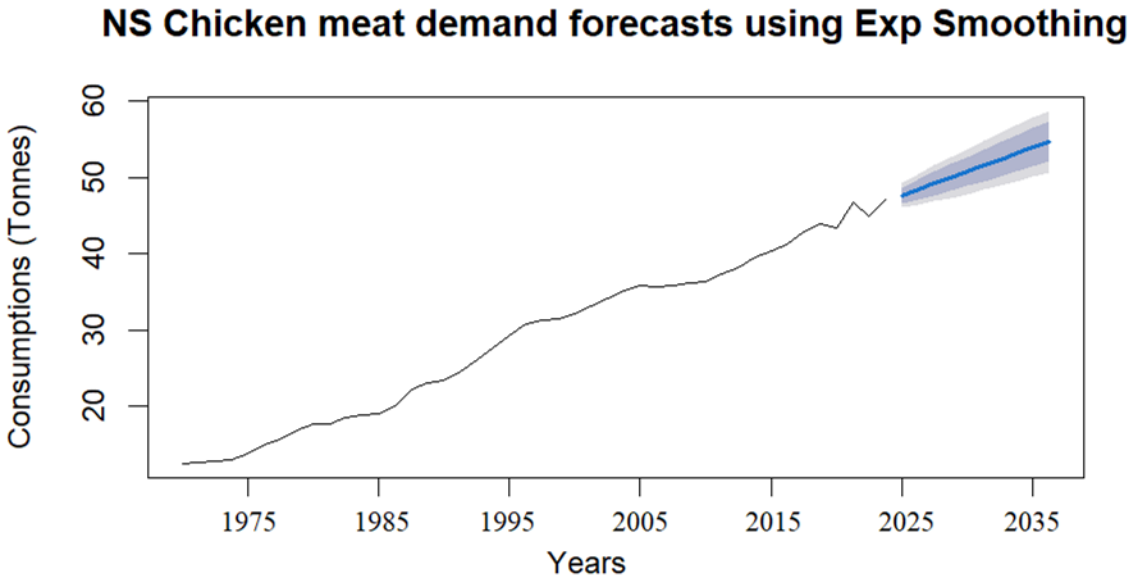


Fig 4 shows chicken meat consumption in tonnes from 1975 to 2035. Consumption has steadily increased over time. The shaded blue area represents forecasted variability. Overall, demand for chicken meat is expected to continue rising

The forecasting accuracy of the triple exponential smoothing model, and GBM are compared and presented in Table 3. Root Mean Squared Error is used as the error measure. It is observed that the GBM has the lower RMSE than the triple exponential smoothing model. Hence, the demand prediction of GBM is considered in the mathematical model.

**Table 3**

*Error Measures of Triple Exponential Smoothing and GBM*

| Error metric | Triple Exponential Smoothing | | | Gradient Boosting Machine (GBM) | | |
|---|---|---|---|---|---|---|
| | Chicken | Turkey | Duck | Chicken | Turkey | Duck |
| RMSE | 617.95 | 81.51 | 314.9 | 73.34 | 12.25 | 12.11 |

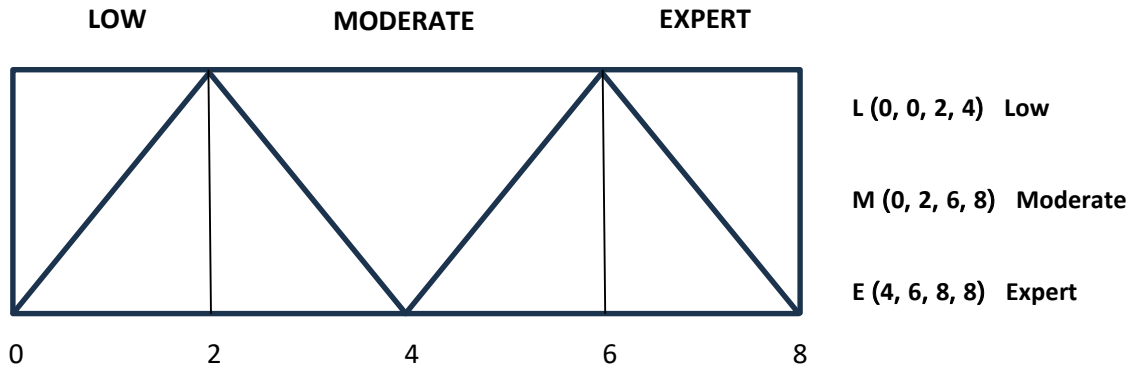
### 4.2. SWOT Analysis Using TFNs for the Qualitative Supplier Selection Factors

According to research papers like “Alagoz et al., 2022, Hemmati et al., 2021, Harale et al., 2023, and Adesina & Yazdi, 2024”, Vendor selection based on Qualitative Criteria is difficult as it involves human decisions which is lack of clarity and can be challenging to understand. Hence these papers adopted SWOT (Strengths, Weaknesses, Opportunities, and Threats) for the analysis of Qualitative factors in various sectors . In this paper, a hybrid approach utilizing Trapezoidal Fuzzy Numbers (TFN), and SWOT analysis is devised to interpret the Supplier Selection (SS) Qualitative standards and to find the vendors’ weights. The ambiguity of human mind is addressed by the TFN and the adoption of SWOT analysis in this study is due to its unique ability to consider both internal and external factors, such as opportunities.

This study considers Three decision managers ($M_1$, $M_2$, $M_3$) with varying experience levels comprise the decision-making body. By these decision managers, the qualitative criteria are evaluated. Their knowledge is essential for assessing the SS criteria. Decision managers’ years of experience are considered using a linguistic variable. The weighted experience levels are given as Low (0, 0, 2, 4), Moderate (0, 2, 6, 8), and Expert (4, 6, 8, 8). First, the qualitative criteria are determined by the DMs. In this Paper, there are different qualitative criteria considered which includes Internal factors like, Nutritional Value, Quality, and Taste & Flavour, External factors like Environmental factors, Competitive Landscape, and Market Demand. The products considered are white meats like Chicken, Turkey, and Duck. The following steps are employed to convert these criteria and calculate the weights of the vendors.

**Figure 5**

*Assessing the Decision Managers' Weights in Number of Years*

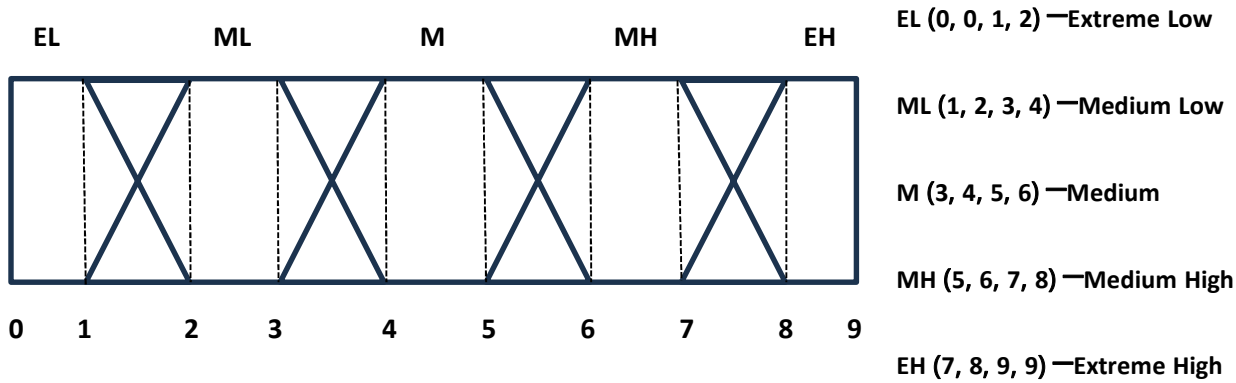



***Step-1.*** Decision Managers evaluate the qualitative criteria (internal and external) for available vendors. These ratings are transformed into numerical weights using a linguistic scale. In this research, a linguistic scale with five variables is used: Extreme Low (EL), Medium Low (ML), Medium (M), Medium High (MH), and Extreme High (EH). The Trapezoidal Fuzzy Numbers (TFNs) quantify these linguistic variables. When a decision manager delivers an assessment using any of the five variables (EL, ML, M, MH, EH) on the linguistic scale, the TFNs of the corresponding variable are multiplied first by the fuzzy numbers of the corresponding Decision Manager's competence. Assessments $M_1$, $M_2$, and $M_3$ are quantified in the same way. These quantitative numbers are added together for each variety of white meat and then divided by M. In this study, the TFNs are averaged to get the weighted criteria ($D_{vwx}$) using Equn. (1). In this formula, *v* represents vendors, *w* represents white meats, and *x* represents criterion.

$$D_{vwx} = \frac{D_{vwx1} + D_{vwx2} + \cdots + D_{vwxM}}{M} \quad (1)$$

**Figure 6**

*Assessing the Linguistic Variables*



This study consists of Six Qualitative criteria. Table 4 displays the weight assessment process for the "Meat Quality" criterion as an example. This study has five vendors and hence calculate the same for all six qualitative criteria. Using the centroid approach, the trapezoidal fuzzy numbers (TFNs) were Defuzzified. The defuzzification of the trapezoidal fuzzy number $\mu = \{l_1, l_2, l_3, l_4\}$ is evaluated using Equn. (1). Table 4 includes the Defuzzified weights of the Qualitative criteria.

$$\text{Defuzzified Value } (\mu) = \frac{1}{4}(l_1 + l_2 + l_3 + l_4) \quad (2)$$

**Table 4**

*Weight Assessment of Meat Quality*

| Vendor | Commodity | $M_1$ | $M_2$ | $M_3$ | Weight | Defuzzified Value |
|---|---|---|---|---|---|---|
| $V_1$ | Chicken | EL | M | ML | (1.3, 6.7, 18.7, 29.3) | 14.00 |
| | Turkey | EH | MH | EH | (9.3, 20, 44, 57.3) | 32.65 |
| | Duck | ML | M | EL | (0, 2.7, 14.7, 26.7) | 11.03 |
| $V_2$ | Chicken | ML | EL | MH | (6.7, 12, 22.7, 32) | 18.35 |
| | Turkey | EH | M | MH | (6.7, 14.7, 34.7, 49.3) | 26.35 |
| | Duck | MH | EH | M | (4, 13.3, 36, 50.7) | 26.00 |
| $V_3$ | Chicken | EL | ML | ML | (1.3, 5.3, 14.7, 24) | 11.33 |
| | Turkey | MH | ML | EL | (0, 1.3, 13.3, 26.7) | 10.33 |
| | Duck | MH | EH | MH | (6.7, 17.3, 41.3, 56) | 30.33 |
| $V_4$ | Chicken | EL | ML | EL | (0, 1.3, 9.3, 18.7) | 7.33 |
| | Turkey | MH | EH | EH | (9.3, 21.3, 46.7, 58.7) | 34.00 |
| | Duck | M | M | M | (4, 10.7, 26.7, 40) | 20.35 |
| $V_5$ | Chicken | ML | ML | L | (0, 1.3, 8, 16) | 6.33 |
| | Turkey | ML | M | EL | (0, 2.7, 14.7, 26.7) | 11.03 |
| | Duck | EH | MH | ML | (1.3, 8, 28, 44) | 20.33 |

**Table 5**

*Defuzzified Weights of Qualitative Criteria*

| Qualitative Criteria | Commodity | $V_1$ | $V_2$ | $V_3$ | $V_4$ | $V_5$ |
|---|---|---|---|---|---|---|
| **Internal Criteria** | | | | | | |
| Meat Quality | Chicken | 14.00 | 18.35 | 11.33 | 7.33 | 6.33 |
| | Turkey | 32.65 | 26.35 | 10.33 | 34.00 | 11.03 |
| | Duck | 11.03 | 26.00 | 30.33 | 20.35 | 20.33 |
| Communication and Responsiveness | Chicken | 30.98 | 14.00 | 14.00 | 29.33 | 15.65 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Turkey | 26.00 | 14.00 | 24.65 | 11.03 | 13.00 |
| | Duck | 21.35 | 30.98 | 29.35 | 23.70 | 26.35 |
| Financial Stability | Chicken | 10.33 | 9.33 | 14.00 | 22.00 | 15.68 |
| | Turkey | 18.65 | 34.00 | 32.00 | 21.03 | 22.00 |
| | Duck | 12.33 | 30.98 | 29.35 | 30.98 | 12.33 |
| **External Criteria** | | | | | | |
| Sustainability Factors | Chicken | 19.33 | 27.33 | 20.00 | 20.33 | 14.00 |
| | Turkey | 30.33 | 18.65 | 15.65 | 14.00 | 30.33 |
| | Duck | 15.65 | 18.65 | 27.33 | 26.65 | 10.65 |
| Competitive Landscape | Chicken | 16.00 | 29.03 | 23.70 | 21.65 | 29.33 |
| | Turkey | 16.68 | 15.65 | 21.65 | 15.65 | 23.68 |
| | Duck | 25.68 | 21.65 | 21.00 | 30.00 | 18.35 |
| Market Reputation | Chicken | 26.35 | 32.00 | 14.00 | 34.00 | 18.65 |
| | Turkey | 23.98 | 20.00 | 8.68 | 15.65 | 32.00 |
| | Duck | 14.00 | 26.00 | 29.03 | 30.98 | 22.68 |

***Step-2.*** Prior to deciding, it is crucial to comprehend the relative weights assigned to each criterion because their importance levels are not the same. In this step, the Decision Managers use the linguistic variables to compute the weights and give the importance level of each qualitative criterion. Defuzzification of those weights are obtained using Equn. (2) and then the Defuzzified weights are normalized using Equn. (3) to harmonize the scales of the key factors. $\lambda_{vwx}$ indicates the Normalized weights of criterion x, for vendor *v*, and white meat *w*. Table 5 contains the results.

$$\lambda_{vwx} = \frac{D_{spj}}{\mathrm{Max}\sum_v D_{vx}} \tag{3}$$

**Table 6**

*Importance Level of Criteria*

| Qualitative Criteria | $M_1$ | $M_2$ | $M_3$ | Weight | Defuzzified Value | Normalized weights |
|---|---|---|---|---|---|---|
| Meat Quality (Internal) | EL | ML | MH | (6.7, 13.3, 25.3, 34.7) | 20.00 | 0.17 |
| Communication and Responsiveness (Internal) | MH | ML | M | (4, 9.3, 24, 37.3) | 18.65 | 0.14 |
| Financial Stability (Internal) | EH | M | EH | (9.3, 18.7, 40, 52) | 30.00 | 0.23 |
| Sustainability Factors (External) | EL | ML | ML | (1.3, 5.3, 14.7, 24) | 11.33 | 0.10 |
| Competitive Landscape | ML | EL | EH | (9.3, 16, 28, 34.7) | 22.00 | 0.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| (External) | | | | | | |
| Market Reputation (External) | MH | M | M | (4, 10.7, 28, 42.7) | 21.35 | 0.17 |

***Step-3.*** In this step, Equn. (4) is used to normalize the Defuzzified vendor weights from Table 5. The Normalized weights of vendor v for white meat w and criterion x are represented by $Z_{vwx}$ in this formula. Additionally, $\mu_{vwx}$ represents the vendor's Defuzzified weights. Next, the normalized weights of vendors are multiplied by the corresponding normalized weights of the criterion from Table 6. The total of these multiplied values is calculated by the kind of white meat. As an example, the appropriate normalized weights of each internal criterion are multiplied by the normalized weights of Vendor-1 for Chicken. After that, a single value for Chicken is obtained by adding the multiplied values for each internal criterion. The same procedure is applied for the external criteria. Ultimately, the computed values are normalized so that the total weights of all vendors for a given type of white meat is equal to one. Equation (5) displays the total internal weighted values of the vendors. The normalized weights are represented by $\Psi$ in this equation, while the total weighted values for the internal criteria are denoted by $J_{vw}$ To obtain the total external weighted values ($H_{vw}$) for the vendors, the same procedure is conducted. Table 7 contains the outcomes of this step. The multi-objective optimization model makes use of the computed values of $J_{sp}$ and $H_{sp}$ from Table 7.

$$Z_{vwx} = \frac{\mu_{vwx}}{Max\ \mu_{vwx}} \tag{4}$$

$$J_{vw} = \frac{\sum_w \sum_x \lambda_{vwx} * Z_{vwx}}{\sum_v \sum_w \sum_x \lambda_{vwx} * Z_{vwx}} \tag{5}$$

**Table 7**

*Normalized Weights for Internal and External Qualitative Criteria*

| **Qualitative Criteria** | **Normalized weights of criteria** | **Commodity** | **Defuzzified weights of Vendors** | | | | | **Normalized weights of Vendors** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **$V_1$** | **$V_2$** | **$V_3$** | **$V_4$** | **$V_5$** | **$V_1$** | **$V_2$** | **$V_3$** | **$V_4$** | **$V_5$** |
| Meat Quality | 0.17 | Chicken | 14.00 | 18.35 | 11.33 | 7.33 | 6.33 | 0.76 | 1.00 | 0.62 | 0.40 | 0.34 |
| | | Turkey | 32.65 | 26.35 | 10.33 | 34.00 | 11.03 | 0.96 | 0.78 | 0.30 | 1.00 | 0.32 |
| | | Duck | 11.03 | 26.00 | 30.33 | 20.35 | 20.33 | 0.36 | 0.86 | 1.00 | 0.67 | 0.67 |
| Communication and Responsiveness | 0.14 | Chicken | 30.98 | 14.00 | 14.00 | 29.33 | 15.65 | 1.00 | 0.45 | 0.45 | 0.95 | 0.51 |
| | | Turkey | 26.00 | 14.00 | 24.65 | 11.03 | 13.00 | 1.00 | 0.54 | 0.95 | 0.42 | 0.50 |
| | | Duck | 21.35 | 30.98 | 29.35 | 23.70 | 26.35 | 0.69 | 1.00 | 0.95 | 0.77 | 0.85 |
| Financial Stability | 0.23 | Chicken | 10.33 | 9.33 | 14.00 | 22.00 | 15.68 | 0.47 | 0.42 | 0.64 | 1.00 | 0.71 |
| | | Turkey | 18.65 | 34.00 | 32.00 | 21.03 | 22.00 | 0.55 | 1.00 | 0.94 | 0.62 | 0.65 |
| | | Duck | 12.33 | 30.98 | 29.35 | 30.98 | 12.33 | 0.40 | 1.00 | 0.95 | 1.00 | 0.40 |
| **Total weighted values for** | | **Chicken** | | | | | | **0.22** | **0.19** | **0.18** | **0.25** | **0.17** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Internal Qualitative criteria** | | **Turkey** | | | | | | **0.22** | **0.23** | **0.21** | **0.19** | **0.14** |
| | | **Duck** | | | | | | **0.12** | **0.25** | **0.25** | **0.22** | **0.16** |
| Sustainability Factors | 0.10 | Chicken | 19.33 | 27.33 | 20.00 | 20.33 | 14.00 | 0.71 | 1.00 | 0.73 | 0.74 | 0.51 |
| | | Turkey | 30.33 | 18.65 | 15.65 | 14.00 | 30.33 | 1.00 | 0.62 | 0.52 | 0.46 | 1.00 |
| | | Duck | 15.65 | 18.65 | 27.33 | 26.65 | 10.65 | 0.57 | 0.68 | 1.00 | 0.98 | 0.39 |
| Competitive Landscape | 0.18 | Chicken | 16.00 | 29.03 | 23.70 | 21.65 | 29.33 | 0.55 | 0.99 | 0.81 | 0.74 | 1.00 |
| | | Turkey | 16.68 | 15.65 | 21.65 | 15.65 | 23.68 | 0.70 | 0.66 | 0.91 | 0.66 | 1.00 |
| | | Duck | 25.68 | 21.65 | 21.00 | 30.00 | 18.35 | 0.86 | 0.72 | 0.70 | 1.00 | 0.61 |
| Market Reputation | 0.17 | Chicken | 26.35 | 32.00 | 14.00 | 34.00 | 18.65 | 0.78 | 0.94 | 0.41 | 1.00 | 0.55 |
| | | Turkey | 23.98 | 20.00 | 8.68 | 15.65 | 32.00 | 0.75 | 0.63 | 0.27 | 0.49 | 1.00 |
| | | Duck | 14.00 | 26.00 | 29.03 | 30.98 | 22.68 | 0.45 | 0.84 | 0.94 | 1.00 | 0.73 |
| **Total weighted values for External Qualitative criteria** | | **Chicken** | | | | | | **0.17** | **0.25** | **0.17** | **0.22** | **0.19** |
| | | **Turkey** | | | | | | **0.22** | **0.18** | **0.16** | **0.15** | **0.28** |
| | | **Duck** | | | | | | **0.17** | **0.20** | **0.22** | **0.26** | **0.16** |

Before going to MOLP part, finding the Total average qualitative criteria weights from the table 7 as follows:

**Table 8**

*Normalized Weights for Total Qualitative Criteria*

| **Qualitative Criteria** | **Commodity** | **Normalized weights of Vendors** | | | | |
|---|---|---|---|---|---|---|
| | | **$V_1$** | **$V_2$** | **$V_3$** | **$V_4$** | **$V_5$** |
| Total weighted values for Internal Qualitative criteria | Chicken | 0.22 | 0.19 | 0.18 | 0.25 | 0.17 |
| | Turkey | 0.22 | 0.23 | 0.21 | 0.19 | 0.14 |
| | Duck | 0.12 | 0.25 | 0.25 | 0.22 | 0.16 |
| Total weighted values for External Qualitative criteria | Chicken | 0.17 | 0.25 | 0.17 | 0.22 | 0.19 |
| | Turkey | 0.22 | 0.18 | 0.16 | 0.15 | 0.28 |
| | Duck | 0.17 | 0.20 | 0.22 | 0.26 | 0.16 |
| **Total weighted values for Qualitative Criteria** | **Chicken** | **0.20** | **0.22** | **0.18** | **0.24** | **0.18** |
| | **Turkey** | **0.22** | **0.21** | **0.19** | **0.17** | **0.21** |
| | **Duck** | **0.15** | **0.23** | **0.24** | **0.24** | **0.16** |

### 4.3. Multi-objective Linear Programming Model (MOLP)

In this section, MOLP optimization model, a mathematical model which is developed to identify suitable suppliers for different types of white meat and determine the order quantities from each supplier. For the five suppliers considered in this example, the cost and quantity commitment details will be collected. The demand values are calculated based on the given forecast model. Using these collected data and the total qualitative weights for these five suppliers, the order quantities will be finalized by applying the weighted sum method, implemented in GAMS software. Usually, there are three following steps in MOLP:

***Step-1.*** Name the Decision Variables which are going to be used in this formulation,

**Table 9**

*Decision Variables and Descriptions Required for Linear Programming*

| Variable/Parameter | Description |
|---|---|
| $x_{vw}$ | Amount of product w ordered from vendor v |
| $c_{vw}$ | Cost per unit of product w from vendor v |
| $w_{vw}$ | Qualitative criteria weight of product w from vendor v |
| $B_w$ | Budget cost for product w |
| $D_w$ | Demand for product w |
| $Z_1$ | Total Ordering Cost |
| $Z_2$ | Total qualitative criteria weight |
| Z | Total Purchasing weight |

***Step-2.*** Develop the Objective function. $Z_2$

*1. Minimize the total ordering cost:*

$$Minimize, Z_1 = \sum_{v=1}^{5} \sum_{w=1}^{3} (c_{vw}\, x_{vw}) \quad (6)$$

*2. Maximize the total qualitative criteria weight:*

$$Maximize, Z_2 = \sum_{v=1}^{5} \sum_{w=1}^{3} (w_{vw}\, x_{vw}) \quad (7)$$

*3. Combined Objective:*

$$Minimize, Z = (\alpha + \beta)\ (Z_1/Z_2) \quad (8)$$

where $\alpha$ *and* $\beta$ are weighting factors to balance the importance of each objective. These weights can be adjusted based on the relative importance of cost and qualitative criteria.

***Step-3.*** Note the Constraints involved.

*1. Demand Constraint:* The total quantity of each product ordered meets the demand,

$$\sum_{w=1}^{3} x_{vw} = D_w \text{ Demand for each product } w \quad (9)$$

This constraint ensures that the total quantity of each product ordered equals the specified demand.

*2. Non-negativity Constraint:* Quantity ordered cannot be negative,

$$x_{vw} \geq 0 \quad (10)$$

This constraint ensures that the quantity ordered from each vendor for each product is non-negative.

*3. Total Qualitative Criteria Weight Constraint:*

$$\sum_{v=1}^{5}\sum_{w=1}^{3}(w_{vw}\, x_{vw}) \leq 100, Ideal\ Qualitative\ criteria\ weight \quad (11)$$

This constraint ensures that the total qualitative criteria weight for all products ordered from all vendors does not exceed the specified total qualitative criteria weight.

*4. Total Cost Constraint:* Ensure that the total qualitative criteria weight is considered while ordering,

$$\sum_{v=1}^{5}\sum_{w=1}^{3}(w_{vw}\, x_{vw}) \leq B_w, Total\ Budget\ Cost\ for\ product\ w \quad (12)$$

This constraint ensures that the total qualitative criteria weight for all products ordered from all vendors does not exceed the specified total qualitative criteria weight.

The proposed optimization model consists of two objective functions ($Z_1$ and $Z_2$). The first objective function ($Z_1$) minimizes the total ordering cost using Equn (6). The second objective function ($Z_2$) maximises the qualitative criteria weights. These weights of the suppliers obtained from the SWOT analysis are maximized by using Equn (7). The demands of each product $D_w$ used from the GBM model forecasting model. The sum of values of $\alpha$ and $\beta$ are considered as the total weight which is ideally equal to one ($\alpha + \beta = 1$). The collected data and the formulas will be used for weighted sum calculation in GAMS software. Finally, the optimal values of the Order Quantities and value of the weighted sum cost objective is obtained.

## 5. Conclusion

The aim of this project is to improve and simplify the Supplier Selection and Order Allocation (SSOA) process for companies. In this study, the white meat consumption data taken from meat industry in Nova Scotia Province in Canada. This study presents an integrated approach by using advanced forecasting and optimization techniques. The combination of supplier selection via SWOT analysis using Trapezoidal Fuzzy Numbers (TFN), along with demand forecasting through Triple Exponential Smoothing (TES) and Gradient Boosting Machine (GBM), provides a strong framework for increasing decision-making accuracy. By balancing supplier performance, cost, and qualitative factors, Multi-Objective Linear Programming (MOLP) is applied in order allocation, further enhancing the effectiveness of the model. The approach effectively handles the complexities of multi-supplier, multi-product and multi-period environments. This SSOA processes can be streamlined further as its applicability is in more extensive supply chain environments. Hence, there is a future research scope in MOLP framework or incorporating any other different optimization technique.

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# "FARMING IS NOW MORPHING": EXPLORING THE AGRICULTURAL REVOLUTION WITH THE INTERNET OF THINGS IN CANADA - A THEMATIC ANALYSIS OF CANADIAN FARMERS, INDUSTRY MEMBERS, AND GOVERNMENT PARTNERS

This study explores how IoT is diffused in farming by examining the recurring patterns in interviews with policy makers, farmers, and industry associations. the results contribute to the existing literature by 1) focusing on the Canadian context, 2) analyzing multiple stakeholders' perspectives, and 3) describing actors reaction to this technology. We interviewed 47 members of the Canadian agricultural community, including 32 farmers, 10 industry association members, and 5 government representatives. The results identified 12 key themes across two spectrums: rational vs. cultural legitimization and individual vs. structural opportunities. This study highlights how participants in agriculture view key opportunities around IoT, the overlap of those views, and multiple stakeholder perspectives reflecting both rational and cultural legitimization of those opportunities.

## Introduction

Agricultural IoT refers to the network of objects that are connected to the Internet to perform information exchange and communication (Xu et al., 2022). These technologies include satellite imaging, weather tracking, vertical farming, machine learning and analytics, RFID sensors and tracking, and agricultural robots (Lova Raju & Vijayaraghavan, 2020). Livelihood depends on the products of agriculture, and the efficiency, accuracy, and real-time results of IoT afford inconceivable benefits to participants in agriculture (Sanjeevi et al., 2020). No wonder that various governments have launched initiatives to impact the direction of adoption of smart farming technologies. However, there is recognition of several challenges in adoption (e.g., Dixit, Aashish, Amit, 2023; Afolabi, 2023; Caffaro, et al. 2020).

Current literature on the role of perceptions in the adoption of recent agricultural innovations has considered the perspective of customers/buyers and producers/sellers from publicly available data and literature (Tomičić-Pupek et al., 2020) Results indicate positive outcomes of IoT adoption including enhanced decision-making, and increased control, but that farmers were not cognizant of the consequences of adopting IoT (Lillestrøm, 2021). Findings also present a deficiency of support and knowledge among different stakeholders in the industry, which has the possibility of obstructing the acceptance of IoT in the agricultural industry (Lillestrøm, 2021). Unintended side effects and perceived risks of digitalization were found to be changes to the data rights, the restructuring of the value chain with new market concentrations, power structures and dependencies, the changing knowledge requirements for farmers, and information asymmetries (Zscheischler et al., 2022).

Our study contributes to this literature by adding 1) a Canadian context 2) a multiple stakeholder thematic analysis and 3) providing a descriptive view of this sociotechnical change. The Canadian context from farmers regarding the adoption of IoT has been reviewed in prior work (McCaig et al., 2022, 2023, 2023), and we expand on these findings with a focus on the interdependencies between stakeholder discourses. Drawing on qualitative evidence from interviews, we demonstrate how diverging and overlapping views of IoT reflect rational/cultural as well as individual/structural opportunity structures and legitimization of the technology. By identifying how different actors view IoT, this study contributes to a better understanding of socio-technical dimensions of change and the institutional practices that agricultural members experience (Cuppen et al., 2020).

The organisation of this paper is as follows. First, we present our theoretical framework. Second, we discuss the materials and methods. We define our interview protocol and describe the four-level coding hierarchy. Third, we display our results. Finally, we present our discussion on how the results add to the literature on loose coupling. We conclude with limitations and suggest future research areas. This research contributes to the interplay between persons, social behaviours, and technology relations that are reciprocal (Dryer et al., 1999). It further defines the tangible and intangible values and setbacks for the actors associated with adopting the technology and how they respond to those positive and negative impacts (Abedin & Qahri-Saremi, 2018).

**Theoretical Background**

The digitization of agricultural systems and the associated business transition has been a topic of interest for many years. A persistent question has been how technologies are accepted. Theories of diffusion and adoption of innovation consider psychological processes that explain individual choices for technology adoption. For example, the theory of reasoned action (TRA) uses attribution theory to explain the relationship between attitudes and actions (Fishbein & Ajzen, 1980). The technology acceptance model (TAM) is an extension of TRA and suggests two factors that influence the decision to accept a technology are perceived usefulness (PU) and perceived-ease-of-use (PEOU) (Davis, 1989). PU is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” p. 320 (Davis, 1989). This factor explains if the user believes that the system will bring them positive performance outcomes. PEOU is defined as “the degree to which a person believes that using a particular system would be free of effort” p. 320 (Davis, 1989). This factor explains that the less effort that needed to be expended than other technology, it is recognized as easier to adopt.

In contrast to these theories, the literature on social construction of technology has highlighted the role of socio-cultural and political influences during the selection of a technology (Bijker et al., 2012; Tushman and Rosenkopf, 1992; Garud and Rappa, 1994). Accordingly, acceptance of a technology is not just a function of economic or technological determinism but also impacted by community-level sociopolitical processes shaped by compromise and accommodation between suppliers, vendors, customers and governments (Constant, 1980). This process can be studied through the lens of socio-technical transition (e.g., Baskerville et al., 2022; Moberg et al., 2021). Technological innovations over time transform into viable products that are adopted (Kemp et al., 1998; Schot and Geels, 2008). Through time, this transition may change key parts of a socio-technical system, resulting in new rules and routines, institutions, and interrelations between societies and the emergent technologies (Geels and Schot, 2007). Within socio-technical transitions theory, Borras and Edler (Borrás & Edler, 2014) propose a three-pillar analytical framework that focuses on the interaction between institutional structures and agencies. The model offers a 3-pillar analytic framework for examining the 'who' (agents), 'how' (policy instruments) and 'why' (societal legitimacy) of the process of transition.

The first pillar, opportunity, focuses on the “who” and “what” elements leading the change (Borrás & Edler, 2014). This pillar focuses on the objectives and capability of the agents and their interactions with the

opportunity structures. The production of new opportunity structures, which includes technology and new knowledge and their effects, does not occur in a vacuum but in a particular social context defined by social institutions (Borrás & Edler, 2014). This pillar examines the approaches in which the different nature of opportunity structures and different actors offer different contexts on the governance of change (Borrás & Edler, 2014). The first pillar aims to understand the primary agents of change, the ability to inhibit/induce change, the resources and interpretive abilities, and the distribution of the agents' abilities within the system.

The second pillar, instrumentation, focuses on the specific ways and mechanisms by which agents induce change. This focus on "how" looks at traditional ST&I policy instruments and social agents' instruments, which include a variety of different mechanisms, modes or strategies of governance that evolve around techno-specific areas (Borrás & Edler, 2014). The second pillar aims to understand a broader perspective on governance instruments to understand their effectiveness in influencing change and the motivation and ability of agents to change the ST&I systems (Borrás & Edler, 2014). Questions arise concerning who is designing and shaping these instruments, how they were originally shaped and by whom, and how those practices are implemented.

The third pillar, legitimization, questions why socio-technical systems are (or not) accepted and why the process of governing change is (or is not) accepted (Borrás & Edler, 2014). To gain social acceptance and support ST&I systems must be legitimate, and the process of governing change must also be legitimate. Legitimacy describes if a change has been accepted. The ways in which ST&I systems are governed has become more diffused, with arrangements evolving rapidly (Borrás & Edler, 2014). Due to this accelerated shift, aspects of legitimacy require deliberate consideration. The perceptions of legitimacy correspond with societies' readiness to aid in the process and adhere to directions. The third pillar aims to understand the challenges for legitimacy emerging from actors, the cultural embedding of governance instruments and their alterations over time, how socially accepted the governance processes and outcomes are and why, and how the disputes surrounding the outcomes and processes should be handled (Borrás & Edler, 2014).

In summary, the concept of governance reflects a broader trend toward proactive and anticipatory policymaking designed to effectively address complexities surrounding socio-technical change (Stoker, 1998; Ludwig & Macnaghten, 2020). Governance focuses here on innovation systems and interrelationships between structures and agency and the conditions that facilitate thriving innovation. There is recognition that stakeholder dialogue and inclusion are essential for creating and legitimizing technological development and implementation (Ulnicane et al., 2021). There is a need to have interaction among the stakeholders in agriculture to disseminate technology (A. Singh & Jirli, 2019). This infrastructure can be framed as a complex system with a vast number of elements and connections (Chappin & van der Lei, 2014). The conceptual framework enables us to examine the social conventions in the context. An increased understanding of the discourses in this context can highlight the social trends, common problems and solutions (García-Valls et al., 2018), and provide a more comprehensive approach to policymaking in terms of business, education, regulation, and research and development (Pascu et al., 2008). Considering how various participants experience the opportunity structures for IoT in farming is essential as people are not passive users of technology, but instead actively influence technology (Bibby, 2008).

## Methodology

### Interviews

From November 2019 to September 2021, using purposeful sampling we interviewed 47 members of the Canadian agricultural community, including 32 farmers, 10 industry members, and 5 members of government. The majority of the interviews were conducted by phone, and on average lasted an hour. The

interviews were recorded and transcribed verbatim. Table 1 shows the participants who were farmers by industry. The interviews were semi-structured to have flexibility in probing. Adler and Adler suggest that the sample should be on average 30 participants, with samples ranging from 12 to 60 (Baker & Edwards, 2012). The sector of farm participants included those that practised farming within Ontario. This variation was directed to bring a diverse balance of farming sectors to the study and varied by farmers in the ability to participate. Interviews lasted between 29 minutes to 3 hours and 39 minutes in duration. The majority of the interviews took place via the telephone.

We began with an examination of the interview recordings. We were interested in the experiences of the participants with the technology, and their view of technology itself. We used the software NVivo to help organize the data. We first transcribed the audio data verbatim. Next, we manually went through the transcripts to review when participants discussed their experiences with IoT. We then reviewed and isolated those quotes, termed "Open codes" (Table 2). Then the open codes were given a title, an "axial code" that signified the content of the passage. After reviewing the axial codes, the patterns became present.

Examples of semi-structured interview questions included:

- Can you please tell me about your organization (Farm/Government association/Industry association)? Can you please tell me about your role in the organization?
- Does your organization collect any data? If so, what types?
- How would you describe a good farmer?
- Please explain your experiences with IoT in farming (for Farm/Government/Industry).
- What lessons can be learned from your experiences?
- Did the complexity of the project change over time?
- Why did you decide to work with them?
- Did the type of resources change over time?
- What were the outcomes of this partnership?

***Table 1: Participants by group***

| Industry | Participant Count |
|---|---|
| **Total Farmers (various farming industries including beef, sheep and cash crops, beef, dairy, tender fruit, swine, sheep, and poultry)** | **32** |
| **Industry (including tech organizations and farming partners)** | **10** |
| **Government (federal and provincial workers)** | **5** |
| **Total Participants** | **47** |

**Analysis**

During the interviews, we asked probing questions depending on the participants' experiences. Thematic analysis (Boyatzis, 1998) was applied through qualitative coding to understand the multiple perspectives of discourses (Saldaña, 2013). This examination of interviews reveals key concepts by grouping them into themes and categories to display observations (Fleming et al., 2018b).

Boyatzis (1998) thematic analysis method with aspects proposed by Corbin & Strauss (1990), we applied grounded theory using open, axial, and selective coding to reveal the recurring patterns. The process started with open coding, then moved to axial coding, and the final step was selective coding (Figure 1). In open coding, the concepts are broken down analytically, where themes are sorted based on similarities (Corbin & Strauss, 1990). Next, in axial coding, the categories are related to each other to group them into subcategories based on their relationships in the data (Corbin & Strauss, 1990). Lastly, in selective coding,

all categories are unified under a core set of groups (Corbin & Strauss, 1990). This type of coding occurs at the latest stages of the study (Corbin & Strauss, 1990).

The full table of axial and selective codes are found in Table 2.

***Figure 1: Example of Coding Process***

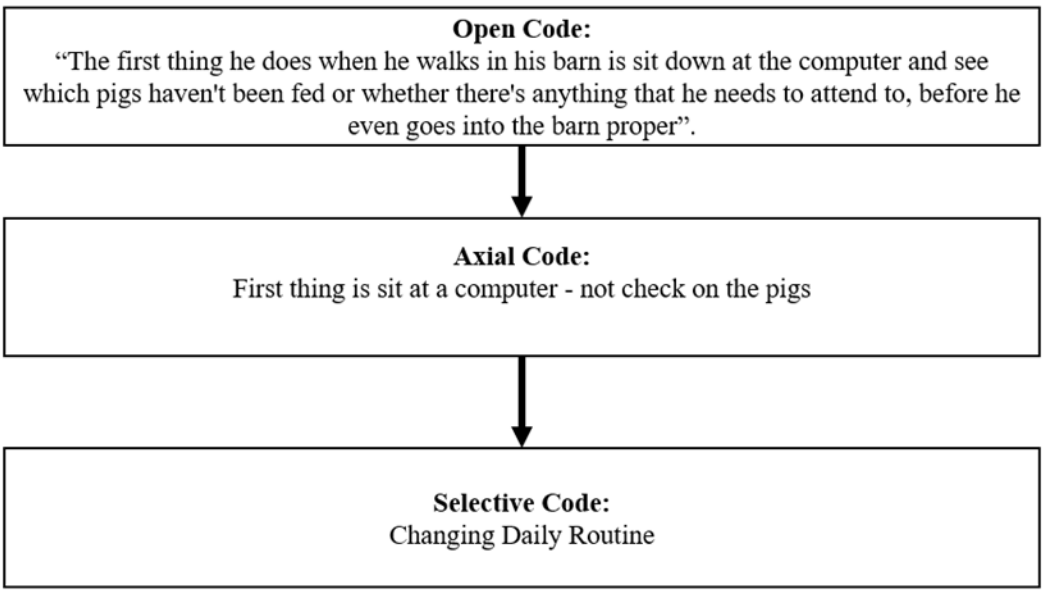



Figure 2 shows the movement from axial codes to selective codes in more detail. This example shows the process of moving from axial coding, to selective coding, to the final theme of individual opportunity. Finally, the selective codes were further grouped into the discourses continuum of individual versus structural opportunity and rational versus cultural elements. Table 2 below displays the selective codes and axial codes in more detail. This process was the same with each of the other 77 codes.

***Figure 2: Movement from axial codes to selective codes of "Need for simplicity"***

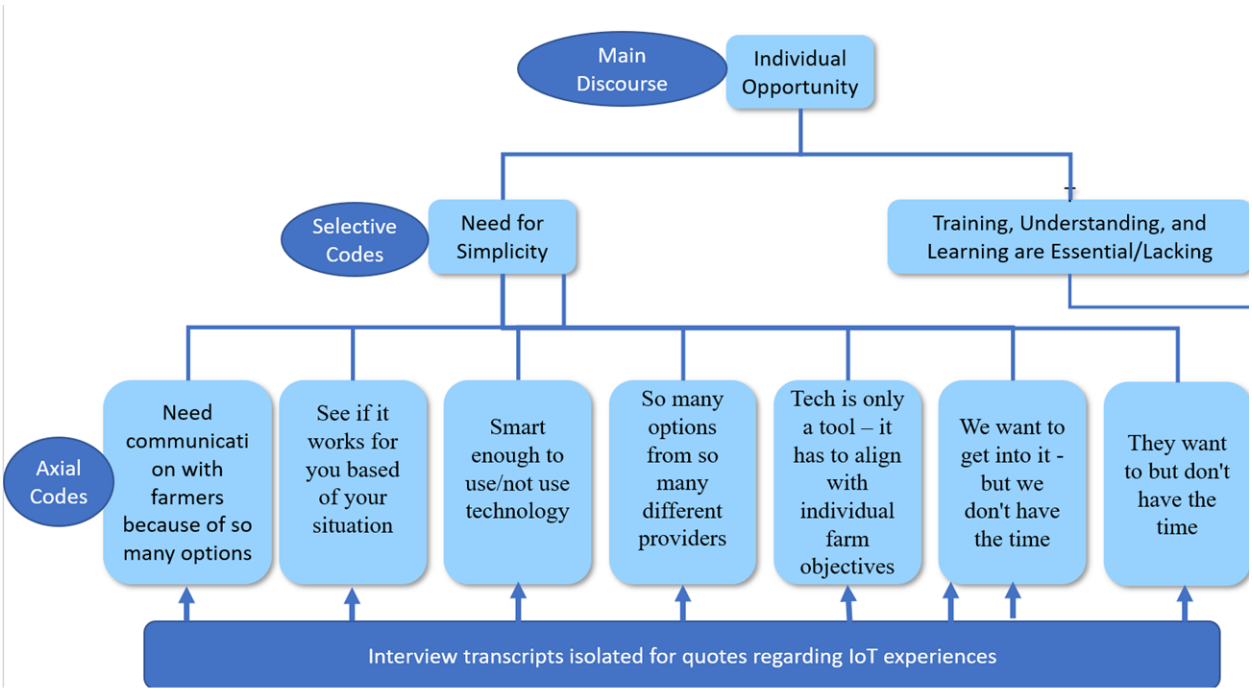



***Table 2: Coding Hierarchy Example from "The Move from Manual Labour" – Full Table in Supplementary Material***

| **Discourses (Selective Codes)** | **Axial Codes** |
|---|---|
| 1. The Move from Manual Labor | • Automation would be displacing talent, but hopefully instead we shift talent<br>• Can't carry on with no labour need IoT<br>• Finding labour is difficult and IoT can make their lives easier<br>• Labor savings as we used to milk the cows but now we look at the computer<br>• Manual work is against our religion<br>• Massive physical labor – we are looking for tech<br>• Its hard work and a lot of labor, you have to love it<br>• Tech is another employee – helps manage fewer people working on farm<br>• Tech minimizes work<br>• We have to use tech as we don't have a workforce anymore |

## Results

There were 12 themes present among participants titled: Training, Understanding, and Learning are Essential/Lacking, Changing Daily Routine, The Move from Manual Labour, Need Partner Encouragement, Tech is Changing the Structure of the Industry – Push back, Values and Big Ethical Questions, Need for Simplicity, Reliant on Tech, Smartphones Make Dumb Farmers, Beneficial to Human and Animal, Farming Is Still Farming, Not a Risk to Me – I Am Just a Farmer. These 12 themes emerged from 47 participants, that were grouped into the roles of farmer, government, and industry. Figure 3 shows how the themes overlap between groups. The themes were found in each of these groups, with the overlapping themes presenting themselves in multiple groups. For example, the theme "Reliant on Tech" was found among government, industry and farming participants. The "Need partner encouragement" theme was found between only government and industry. Figure 4 is another way of presenting the data, with lines connecting the stakeholder to the themes they presented. For example, the blue colored themes were present in government, industry, and farmers. The red selective codes were only present in government and industry.

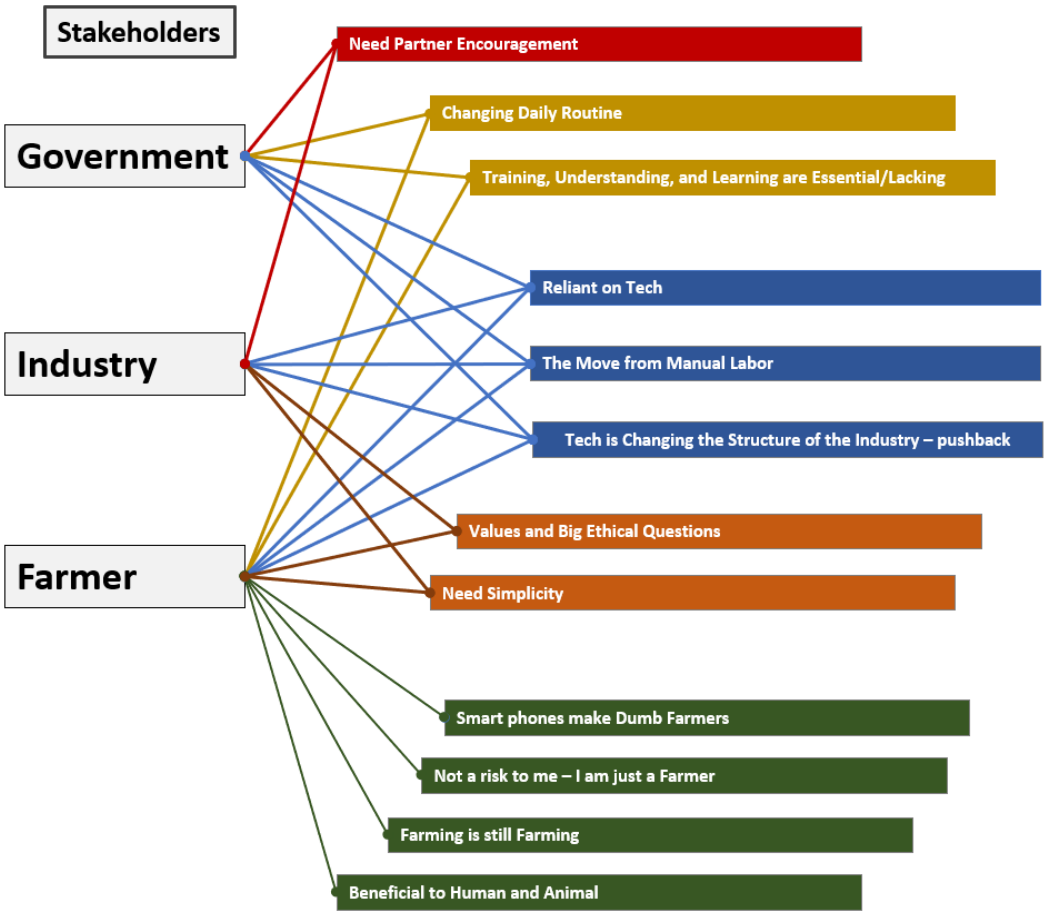



***Figure 3: Themes (selective codes) between groups in web diagram***

The following section describes the 12 themes in detail.

**Need for Simplicity**

The need for simplicity theme describes the complications regarding multiple options. The industry and farmer participants reflected on a need to increase communication, and tailor the solution for their individual farmer need:

> Having somebody do the homework I suppose for people who are the clients who are a little bit overwhelmed? By evaluating what's good, what I should adopt, where can I repair it? Where can I buy it? Why should I buy this one over any of the other five that seemed to do the same thing? Is it proven out? Do I have any colleagues who have used it in local geography that I can go and benchmark or ask opinions about that kind of thing? **That doesn't exist right now. So, things like that could be the future of extension could be the future of communication with farmers**. (Government worker)

This theme is shared by the members of industry and farmers. Farmers stressed the importance to have the right technology for their needs:

> Because growers don't have the time to, especially in the harvest months, when they want to be tracking their harvest, and but **they just don't have the time**. And they were finding that in the first couple of years, as we were evolving, like a grower that was really into the, into the program, like one of the like, maybe they were even part of the focus group, they'd get partway through a year apart, right through a harvest of having tract and then being like, you know, what, **I just got bogged down and got lost in not having the available time to do it**. So crossover kept evolving, evolving, you know, and then things, things became entries became quicker. And that was out of out of suggestions from that focus group saying, Can we just have us be able to click this, click that click this, can we just have this set up in order to that it's a five click thing, and it's in that kind of thing, you know, that those efficiencies arose out of necessity, in the in the fields and in the orchards? That's perfect. (Industry worker)

> People at [company] have technical solutions to some problems, but they're not, you have to be **smart enough to know whether that actually really works in your environment** in your situation. Or not …. And they take you down the wrong track. (Farmer)

**Training, Understanding, and Learning are Essential/Lacking**

The training, understanding, and learning are essential/lacking theme describes the need for increased understanding concerning IoT. Farmers expressed a need for increased training before they incorporated IoT into their operations:

> It's funny like the millennial in me and like "technology. Great. Awesome, exciting". And yet the farmer in me is like an old soul who's like "I don't trust it"…And so my short answer is yes, I would absolutely use it, but **I would need a lot better understanding of it all before I got there.** (Farmer)

Farmers reflected that “As time goes by, we will learn how to use that information” and that “I certainly think training farmers with the technology is going to go a long way”. The policy makers also engaged in these discourses, saying:

> It's important to understand that skill set that's involved in being able to understand the right questions and manipulate the data in a way that comes out of the volume of stuff. That you can look at is the thing that is really key to the success of all of these opportunities. I look at processors, and the basic measurement that you have to deal with from a key performance indicator is gross margin… The understanding of what the **actual utility of the Internet of Things it isn't really widely understood**. (Government worker)

**The Move from Manual Labour**

The move from manual labour theme describes the transition towards IoT. Participants describe their experiences as pro-active or reactive.

> It's we always say shovels, forks, buckets and small square bales are **against our religion on the farm. Because it adds a lot of work.** Yeah, we renovated the barn. That's really old barn. We renovated it. We made sure we could drive everywhere to clean out all the manure with the Skid's steer so we didn't have to fork anything. We could drive everywhere with our feed cart to bring everyone feed without having to carry a bucket for different groups or, you know, carry small square bales everywhere because that ends up taking a lot of time. (Farmer)

Other famers expressed that their move away from manual labour was not as consensual. These farmers claimed that they had to move away from manual labour reactively due to the limitations of labour in the workforce. The industry workers and government workers shared the discourse:

> I would say deliver on what they need, and maybe even be anticipatory about what's coming and what they need… Sometimes we come up with solutions. And they [farmers] go, Oh, yeah, that's fantastic. So our real goal, and our whole job is sort of making their lives easier. Because there's so many, there's **so many opposing forces right now** that that's making it more difficult, **rising costs, finding labour**, government regulations, pesticide controls, and all that. So, really, our responsibility is to try to make these, we could save them two hours a week. That to them is incredibly important. Really, that's what we see our responsibility (Industry worker).

> A lot of it came down to the fact that **they couldn't get labor to do the job**, because unless they're doing it themselves seven days a week, they were struggling to get people to come in and do it because it's not really a full time job if you're depending again, on the size of the firm. But there were they were struggling to like anecdotally example, being a farmer when he was going away on holidays on the Sunday. And then on the Saturday night is when there was a guy who was going to do the milking for him just said I got a different job. It's full time. So that was the fight. So he said that was the final straw. He said like I'm just I can't, can't carry

> on doing this. So there is other factors like that, for example. **And I guess the intensity of the labour is another reason sometimes technology or the Internet of Things is generally adopted** and sometimes maybe adopt (Government worker).

**Changing Daily Routine**

The changing daily routine theme describes how IoT disrupts the daily life of farmers, which was also recognized by government workers:

> I couldn't imagine my business right now without it for how much we use it ... I feel like minute-ly doesn't seem like a word, but in it we use it minute-ly and not hourly, but almost every few minutes in our packhouse and our spray records and everything else. We still reference it at least once or twice a week. And then beyond that, we started to get into some remote monitoring of soil conditions and weather conditions. So, we know exactly what's happening throughout the farm **without having to spent the time to drive around**, basically at glance sitting in your place, you can see an idea which was going on and make decisions in real time (Farmer).

> The **first thing he does when he walks in his barn is sit down at the computer** and see which pigs haven't been fed or whether there's anything that he needs to attend to. before he even goes into the barn (Government worker).

**Tech is Changing the Structure of the Industry – Push back**

As tech is changing the structure of the industry – push back describes the tension in the industry surrounding the move to IoT. Participants believed that the pushback coming in part from government involvement in farming:

> It's getting worse, because like, the amount of electronics in a tractor these days can actually cease halt on any one operation. If they don't do something right they can't plant period, if that computer's not working. And so that is a dangerous line, because you can bypass the computer and get a guy going on a very narrow window for planting. Yeah, that is bad business. And it happens all the time now. And so kind of **getting into an era where equipment is controlling a practice** (Government worker).

> The conversation in, in governments may not always be the most progressive conversation, including with respect to technology. Because it's a farming voice. So there's an awful lot of, "**Leave us alone. We know what we're doing**. We've been doing it for a long time". You know, that that kind of sentiment? Which I get it, but it's not progressive (Industry worker).

> Everything is scientific, they won't say they don't know their cows. But, they put them in certain areas for certain amount of days. And after those days, and at the age of pick a number 24 or 36 months, they're all shifted, regardless of what they loved. Because statistically, they'll win more than they'll lose, if that's what they do versus on the family farm or the cow and

> say, Well, okay, she's still good for another, another calf. And the other one lot more personal with the cow. But this is an industry it's not a hobby, **but it's run just like any other factory** (Farmer).

Other farmers in this category stated that "Farming is now morphing into the generation of everything" that they "don't trust it but am educated enough to understand it" and that the industries in farming were expropriating.

**Reliant on Tech**

The reliant on tech theme describes the increasing dependance on technology. Participants discussed the positive and negative implications of IoT dependency. This theme experienced some overlap with being reliant on tech appearing in the "Changing Daily Routine", "Values and Big Ethical Questions", "Smart phones make Dumb Farmers" and "The Move from Manual Labour". From the participants of the government and industry their focus was on the necessity of the Internet on farms. A government participants and industry members shared the discourse:

> Okay, this issue, fundamentally, is the **lack of broadband in rural**. But we're going to be moving aggressively on that front. I see that coming. You know, the if COVID has taught us nothing, it's the need for internet in rural Ontario (Government worker).

> Well, I think at its core, it's why I've seen the farm lobby say Internet's becoming an essential service… access to broadband internet to the bottom. So fix that. And so then circling back to somebody sold me a drone uses GPS technology, but it can only access GPS every point seven seconds or whatever, somebody … so the drone guy that developed it in California doesn't have the internet problems or the line-of-sight problems. There's a hill. I'm sorry that your technology doesn't work in the valley. Because you know why the site on **the internet industry starting to solve those things, but that's what's gotten in the way of tech adoption** (Industry worker).

Farmers in this category stated that they wouldn't know what to do without tech, that it was useful - but what happens when you are reliant on it?, and that you still need to have essential tools without tech – because what if it breaks?. Other farmers focused on their inability to fix the technology, saying that they don't know how to fix our equipment and they do not have the right to access it, that they wouldn't operate without technology when its not working, and they are not allowed to fix it.

**Smart phones make Dumb Farmers**

The smart phones make dumb farmers theme describes the view that farming is becoming less challenging because of technology. Farmers shared this discourse:

> But **how smart are they be they smart because they know where to sign it on their cell phone.** And there's some skills you can acquire (Farmer).

> Well. It'd be great if you can use your cell phone and stay on task and do the job and use the acknowledges that you need to help. But when it becomes that you're staring at your phone to rely on that, and then you

> have to bring somebody in, like, for example, automatic water growth, and your app doesn't tell you how to fix it. And you're stressing over that. This app should have told me that this was happening. But now that happened, I don't know how to fix. Now, I gotta have to pay a plumber to come in and do the work. So it's like, it kind of gets annoying when people rely on their phones (Farmer).

**Farming is still Farming**

The farming is still farming theme describes how although technology is becoming an aspect of farming, that the essence of farming does not change. Farmers stated that regardless of the technology incorporated it is still farming:

> And ultimately in an old guy said this to me years ago, **doesn't matter what your computer tells you, if Mother Nature doesn't want to put down rain, you're screwed.** Yeah, so, and ultimately, like rains, like weather is going to dictate everything, it doesn't matter what kind of technology you have, it's not going to improve your it's not going to, like make you out of good yield, you know what I mean? Or whatever, you can improve things. And you can streamline, seed rates and everything to that, and seed monitoring, seat spacing, and we do that right today, but you're kind of the left, the rest is left in Mother Nature (Farmer).

> But there's all this, there's animal sense skills that you can't walk into a barn and just noticing that somebody is not feeling right. Or, even walking through. I mean, I feel field crops and seeing that there's something just missing. So yeah, there's, there'll be a **different set of skills required with technology. And hopefully, the old skills don't get aren't necessarily replaced** (Farmer).

**Not a risk to me – I am just a Farmer**

The not a risk to me – I am just a farmer theme describes the perception that farmers are not holders of sensitive data. For example, one farmer stated:

> I'm generally pretty comfortable. There's always that concern of, you know, you hear, you know, some lawyers say, you know, don't take notes because what you write down can be used against you. Right. You know, not that I ever, you know, that I don't think I'm doing anything that could ever be used against me. But you never know, you know, law changes or a neighbor complains. And, you know, you have something that's a record. But most the time, the records help rather than hinder you, it's the whole thing. I'm not doing anything wrong. So why should I hide? But that doesn't mean I want all my information public. So putting everything out there, there is concern with this world of hacking and everything else that that stuff could get out. But in general, **I don't think I'm a targeted fish. So, it's hard to say that that's ever going to happen to us, not really on my radar of stuff to worry about** (Farmer).

**Beneficial to Human and Animal**

The beneficial to human and animal theme describes how this technology is helpful to the farmer and their animals. Farmers stated that stated that it was better for their health the animals and it was helpful farmer-to farmer:

> It's very helpful because it makes the **cows so much happier** (Farmer).

> I think some of the small farmers who are working together we did deliveries for some of our neighbors, neighboring farms as well, we've added them on to our onto our online store, and coordinates using technology. Here I've got an order for two dozen centers. I'll send you a text to come fix a month. You know, trying to find ways where we can leverage some of these tools to help each other out. I do feel like it makes it a little bit easier to get in contact with people. We've run short of chicken this week and got extra orders are that's an extra Okay, good. **I do feel like a lot of us are using the tools and the technology to better help one another** (Farmer).

**Need Partner Encouragement**

The need for partner engagement theme was apparent among the government and industry participants. Participants stated that there is a need to support farmers, with examples including treat farmers with more respect and de-risking the technology. Government and industry workers shared this discourse:

> Why equipment dealers, equipment manufacturers are virtually, for lack of a better term stealing data that has economic significance to that operation is beyond me, like I just there are issues there, for sure. But it's clear to me, **if we treated farmers like knowledgeable business people, that those should go away**, but it's just going to take some probably class action suits that are already happening globally, to put this to rest (Government worker).

> Then when it gets to the farm community, that's **where government and industry could step into town and de-risk that technology** so that the farmer can the guys who are the early adopters who will step across the line and try something different, or try it out. And demonstrate to the rest of their farm community that there is a process that will go through when you're trying to get people to adopt a new technology, that is the development. And it's the trial. And then the implementations as the broader implementation. And where an organization like mine comes in and collaboration comes in, is where you can work with work with an organization to help to help the industry recognize the value of that technology, and then help them make the necessary just to the other piece of where we're important is that in a lot of cases, industry will develop a technology. But they will give no thought on how they communicate the value of that technology to the general public, the consumer their product (Industry worker).

### Values and Big Ethical Questions

The values and big ethical questions theme described the need to ask ethical questions regarding technology in agriculture. Farmers questioned the implications of technology error, government workers stated the need to ask the ethical questions:

> To account for human error. And even I think if we go to let's say, they're talking about computer, robotic Apple pickers, right? So there's gonna be a robot out there picking apples someday. It makes a mistake. Whose fault was it? … Right? When we are out picking apples pruning trees. It doesn't matter if we make the mistake. **Whose mistake was it?** Was it the managers or was it the workers? (Farmer)

> As far as the field that makes me really uncomfortable. Yeah, very nerve wracking. getting over that kind of power, and data, to amorphous places really bothers me. Also, just yes, if it goes down, and you become so reliant on it. That also frightens me, particularly. And I'll explain why shortly. As far as usefulness, and I think it was, or both ways, frankly, like, I really do think I see so many benefits. And I use some of them. Everything from like reading RFID tags, to scanning things. Like there's so many ways it's saved so much time. **I think where what I have a real challenge with is seeing it use in really vacuous and insidious ways**. Like that, you need more milk, it's like, okay, but you can also open the door and find if you need more milk, because, of course, all the Internet of Things (Farmer).

> We can use, you know, as I was saying, technologies, there is just one technology and how do we employ it ethically? And how do we govern it? Those are the big questions. And they depend on relationships and people and business requirements and business objectives, even at the farm. **And we don't spend enough time on that we just look at the shiny new tool and run over here** (Government worker).

## Discussion

The objective of this study was to conduct a stakeholder thematic analysis of IoT in farming in the Canadian context and provide a descriptive view of the governance of sociotechnical change. The results provide an overview of Canadian agricultural stakeholders' IoT-discourses. The results suggest that the diverging and overlapping views of IoT reflect rational/cultural as well as individual/structural opportunity structures and legitimization of the technology. These 12 themes can be organized into two continuums, or four main themes (Individual versus structural opportunity and rational versus cultural elements).

### Individual versus structural opportunity

The first continuum is individual versus structural opportunity (Figure 4). This is reflected by the first pillar, opportunity, focuses on the "who" and "what" elements directing the change. This pillar defines and conceptualizes interactions in the processes between capital agents and opportunity structures. Individual opportunity themes discuss the needs of the human (the "who" element). These themes (need simplicity and training, understanding and learning are essential/lacking) display the challenges and opportunities regarding IoT and the actor. For example, the "need simplicity" theme describes the complications regarding multiple options. Actors require the resources and communication to be straightforward.

Structural opportunity themes reflect the struggle against the changes technology brings (the "what" and how elements). These themes (the move from manual labor, changing daily routine, tech is changing the structure of the industry –pushback, reliant on tech) display opportunity structures for IoT-enabled farming and issues toward how IoT is being diffused and changing farming practices. For example, the "changing daily routine" theme describes how IoT alters the daily life of farmers. The structure of their jobs is changing due to the technology, and they must adapt.

***Figure 4. Individual/structural opportunity continuum***




**Rational versus cultural elements**

The second continuum is rational versus cultural elements (Figure 5). This is reflected by the themes that legitimize change from a rational and cultural continuum. This complements the second pillar, instrumentation, which focuses on the specific ways and mechanisms by which agents induce change. The rational element describes the theories in use of the farmers. These themes (smart phones make dumb farmers, farming is still farming, not a risk to me – I am just a farmer) describe the actors' struggle with their thoughts regarding the impact of IoT. For example, the "farming is still farming" theme illustrates the personal belief that the essence of farming does not change.

The cultural element leans on a general assumption that the public desires and demands IoT adoption. These themes (beneficial to human and animal, need partner encouragement, values, and big ethical questions) describe the actors' perceptions of the status quo and of the greater meaning behind their role in society. For example, the theme "values and big ethical questions" reflects the general belief in the need to ask ethical questions regarding technology in agriculture.

***Figure 5: Rational/cultural element continuum***




In addition, the results provide evidence of a loosely coupled system. Loose coupling suggests that each multiple level in a system contains interdependent elements that vary in number and strength of their interdependences (Orton & Weick, 1990). The "loose" reflects the spontaneous changes and independence,

where the "coupling" suggests the state of being linked (Orton & Weick, 1990). In contrast, a tight system would be fixed (Papadonikolaki, 2018). Our results suggest that socio-technical transition resulting from diffusion of IoT in agriculture is being structured by a loosely coupled system.

An organization that is loosely coupled is better at understanding the environment, allows for localized adaptation, presents creative novel solutions, and characterized is by high professional autonomy (Elken & Vukasovic, 2019). However, a loosely coupled organization can become caught up in responding to fashionable trends, with changes spreading slowly and weakly through the organization (Elken & Vukasovic, 2019). This form of coupling can cause disconnections between organizational levels (Giacomantonio & Litmanovitz, 2017).

The theory of loose coupling states that the coupled actors are responsive, but preserve their own separate identity (Weick, 1976). Our results indicate the overlap between themes and provide evidence for diffusion of IoT under a "richly connected network, in which influence is slow spread and/or weak while spreading" (Weick, 1976, p. 5). Overlap of themes reflect a type of loose coupling. previous studies have categorized loose coupling of individuals, subunits, organizations, hierarchical levels, organizations and environments, activities, intentions and actions, and ideas (Orton & Weick, 1990). The loose coupling of ideas has appeared in information system literature, where King & Lyytinen (2006) describe information systems as a loosely coupled system operating through weak social ties of communities. Swanson (2017) suggests that information systems are an emerging, embedded, and dynamic system of technologies. Our results highlight the coupling between themes. Discourses are the process of communicating these ideas, with the ideas being the content behind the dialogue (Schmidt, 2008). Indeed, the loose coupling of ideas comprised in ideologies, goals, accounts (Orton & Weick, 1990) and discourses.

Meyerson & Martin (1987) suggest that a group's main ideology can be loosely coupled to subunits that reflect nonconformity. By localizing subunit behaviors, beliefs, and interpretations, and permitting inconsistencies to continue loose coupling provides a space for deviation to induce change (Meyerson & Martin, 1987). Our work provides description for Paradigm 2 Differentiation of Meyerson and Martin (1987) In the context of agriculture in Ontario, which undergoes a change that is impacted by IoT as an external catalysts. Paradigm 2 Differentiation has been used to assess organizations that develop amidst uncertainty (Kumar et al., 2021). These changes, such as those brought by the integration of IoT, may be loosely coupled to each other and not controlled or planned by central powers. There is a lack of consistency, little consensus, and non-leader centered sources (Meyerson & Martin, 1987). This open-system perspective emphasizes the importance of various subgroups and individuals. Due to the predominance of sub-culture differentiation, the shifts are localized as opposed to organization-wide, and incremental rather than revolutionary (Meyerson & Martin, 1987). In differentiated organizations subunits are more closely linked to their environment and more loosely coupled to each other. Individual farmers can experiment with IoT knowing they will be buffered from the consequences of their actions. In our results this buffer can be seen as the partner encouragement and protection from both the government and the industry. Subunits, such as individual pockets of farmers, that reflect the overarching ideology, in this case to adopt digital technology, may be loosely coupled to other subunits of farmers that reflect deviance. The system allowing these inconsistencies provides a discursive safety net for change (Meyerson & Martin, 1987). This Paradigm 2 view allows the change to be incremental, instead of a complete collapse of worldview that Paradigm 1 brings. However, due to this approach, change is difficult to control and hard to predict (Meyerson & Martin, 1987). These inconsistencies can become a burden or asset in the process of a change (Dorval & Jobin, 2021). These reflect our results, in the way that the government and industry aim to lead the narrative of change, but ultimately it is the farmers decisions that dictate the success of the adoption of IoT.

Facets of our research restrict the transferability of our findings. The majority of these participants operated in Ontario, which is recognized for its agriculture and related technologies. More research should focus on

participants from locations where agriculture is less developed. Future research could expand deeper into the farmers relationships with specific policies and government practices.

## Conclusion

This thematic analysis exposed 12 themes between farmers, industry members, and government participants. These themes are organized into the two continuums of rational/cultural elements and individual/structural opportunity. This study contributes to the growing interest in the social implications of farming with technology, intending to satisfy the shortage of empirical studies on the developing theme (Ruder, 2019). We suggest these themes be used to help understand the gap in perceptions between farmers and industry/government. Our work contributes to the theory of loose coupling by adding the theme as a type of loose coupling.

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## Supplementary Material

***Table 2: Coding Hierarchy***

| **Discourses (Selective Codes)** | **Axial Codes** |
|---|---|
| 1. Training, Understanding, and Learning are Essential/Lacking | • Always learning something new<br>• Finding what works for us and learning has been slow<br>• IoT isn't understood and it needs to be<br>• It could be a simple fix, but we don't know<br>• Its crazy but we are going to try<br>• Need a better understanding before I use IoT as the farmer in me doesn't trust it<br>• Need talent to use the tech<br>• Need to be trained how to use it<br>• Tech is to make your life east - you have to adjust and learn<br>• The owner has to know enough to bring it in<br>• Training farmers has a long way to go<br>• Used to one tech - but then you have to learn something new<br>• We will learn how to use information |

| | |
|---|---|
| | • More and more talents around tech<br>• More tech talent needed<br>• You can't know how you do it without knowing how you do it (data) |
| 2. Changing Daily Routine | • As long as it doesn't give more work to do I'd use IoT<br>• First thing is sit at a computer - not check on the pigs<br>• We know what is going on without having to drive around the farm - can't imagine business without it<br>• We are not using it to its fullest<br>• Stupid not to use tech<br>• Bringing in people from outside of agriculture |
| 3. The Move from Manual Labor | • Automation would be displacing talent, but hopefully instead we shift talent<br>• Cant carry on with no labour need IoT<br>• Finding labour is difficult and IoT can make their lives easier<br>• Labor savings as we used to milk the cows but now we look at the computer<br>• Manual work is against our religion<br>• Massive physical labor – we are looking for tech<br>• Its hard work and a lot of labor, you have to love it<br>• Tech is another employee – helps manage fewer people working on farm<br>• Tech minimizes work<br>• We have to use tech as we don't have a workforce anymore |
| 4. Need Partner Encouragement | • Need to communicate the value to public<br>• Need to push the efficiency for entry<br>• Need to treat farmers like knowledgeable business people<br>• Want their own data - but don't want to share for competitive advantage |
| 5. Tech is Changing the Structure of the Industry – We push back | • Farming is now morphing into the generation of everything<br>• I don't trust it but I am educated enough to understand it<br>• Industries are Expropriating<br>• IoT makes us disconnected from our environment<br>• Its getting worse – equipment is controlling the practice<br>• Its inevitable and we will try<br>• Run just like a factory |

| | |
|---|---|
| | • Small farms days are numbered<br>• Taking over every industry<br>• Tech in agriculture is moving extremely fast<br>• Tech replaces Culture<br>• They can see it coming regardless<br>• The nature of farming is to not accept<br>• Farming voice is – we have been doing it for a long time, we know what we are doing |
| 6. Values and Big Ethical Questions | • If the computer makes a mistake whose fault is it – the managers the workers or the computer<br>• The power frightens me – Vacuous and insidious ways<br>• We don't spend enough time answering big ethical questions, we just go to what is new and shiny |
| 7. Need for Simplicity | • Need communication with farmers because of so many options<br>• See if it works for you based of your situation<br>• Smart enough to use/not use technology<br>• So many options from so many different providers<br>• Tech is only a tool - has to align with individual farm objectives<br>• They want to but don't have the time<br>• We want to get into it - but we don't have the time |
| 8. Reliant on Tech | • They wouldn't know what to do without tech<br>• Useful - but what happens when you are reliant on it<br>• We don't know how to fix our equipment and we don't have the right to access it<br>• We wouldn't operate without technology<br>• When its not working, and we are not allowed to fix it, that's when we are in trouble<br>• You still need to have essential tools without tech - what if it breaks<br>• Internet is an essential service but it is not available<br>• Need Internet in Rural Ontario |
| 9. Smart phones make Dumb Farmers | • Be a farmer without your phone<br>• Only smart because of phones<br>• People rely on their phones |
| 10. Beneficial to Human and Animal | • If my smartphone could help me be more efficient the risks would not hold me back<br>• IoT is efficient and nice for the animal and for us<br>• IoT is helpful and makes the cows happier |

| | |
|---|---|
| | • The newer the tech the more sustainable we can be<br>• Using tech to better help one another<br>• Availability for tech in small operations is a game changer<br>• Tech further embraces farming<br>• Using tech to make farming easier<br>• Predicting with data not just experience or opinions |
| 11. Farming is still Farming | • Natural talent in farming<br>• Old (innate) skills<br>• Tech can improve but it's up to mother nature |
| 12. Not a risk to me – I am just a Farmer | • Hacking sounds like a problem but I am not a targeted fish |

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# A COMPREHENSIVE FRAMEWORK FOR DIGITAL BANKING TRANSFORMATION

This article explores digital transformation in the banking sector, focusing on the interplay between capabilities, digital technologies, and regulatory environments. Employing an integrated literature review, it develops a framework based on Dynamic Capabilities Theory and Systems of Innovation. The study highlights the crucial role of capabilities, technologies, and regulatory adjustments in enhancing bank performance amid digital disruptions. It underscores the transformative impact of digital technologies and the importance of regulatory frameworks in fostering innovation. The findings offer practical insights for industry professionals, policymakers, and regulators, contributing to academic discussions on navigating the digital banking landscape.

*Key words: Digital banking, Capabilities, Regulatory, Performance, Digital technologies, Integrated literature review.*

## 1. Introduction

Digital transformation (DT) represents a pivotal shift in modern business paradigms, integrating digital technologies to enhance operations and deliver heightened value to customers (Basrowi & Utami, 2020). With the rapid proliferation of novel technologies and the ubiquitous nature of digital networks, DT has become imperative across diverse sectors (Busca & Bertrandias, 2019). Embracing DT empowers organizations to elevate customer service, streamline business processes, and foster innovation (Westerman et al., 2014).

In the banking sector, DT has emerged as a critical imperative, as banks strive to compete with innovative startups and meet evolving customer expectations (Cuesta et al., 2015; Kitsios et al., 2021). The transition to digital banking, characterized by a shift from physical to digital frameworks, aims to enrich customer experiences and bolster market positions (Akhter, 2018). To navigate this transformative journey successfully, banks must understand their organizational processes, identify technological strengths, and optimize business operations (Konopik et al., 2022; Ulas, 2019). Additionally, integrating customer, organizational, and operational dimensions in digital strategies becomes imperative for achieving DT (Moradi et al., 2020).

Regulators play a crucial role in overseeing the banking industry, ensuring its secure and efficient functioning. Recognizing the role of regulators in the realm of DT is paramount. Existing literature underscores the impact of regulations on innovation, performance, competence development, and competitive advantage in banking (Anning-Dorson et al., 2017; Berry, 1984; Frohwein, 2015). It emphasizes the need for regulators to adapt to digital disruptions and create a supportive regulatory environment fostering innovation while safeguarding customers (Melnychenko et al., 2020; Naimi-Sadigh et al., 2022; Ramanathan et al., 2017). Regulatory flexibility and attentiveness to digital transformations emerge as pivotal considerations for regulators (Ramanathan et al., 2018; Reitz et al., 2018; Shleifer, 2005; Suzuki, 2017).

Scholars have explored the impact of capabilities on firm performance in the context of DT. Marketing capabilities have emerged as significant factors, along with human resources capabilities, relational capabilities, and learning capabilities (e.g., Francesco, 2019; Keskin et al., 2021; Wang & Yin, 2022; Caputo et al., 2019; Jorge Heredia et al., 2022; Tsou & Chen, 2021). Additionally, studies have delved into regulatory environments in digital banking (e.g., Naimi-Sadigh et al., 2022; Melnychenko et al., 2020; Anning-Dorson et al., 2017; Ramanathan et al., 2017) and capabilities' impact on bank performance in digital banking (e.g., Cheng & Feng, 2021; Edu, 2022; Gul et al., 2021; Manser Payne et al., 2021). Despite these studies, there is still a dearth of research providing a comprehensive view and integrating all these elements.

To address this gap, this research seeks to answer the following questions:

- What are the capabilities, resources, and technologies influencing bank performance during DT?
- How do capabilities, resources, and technologies influence bank performance during DT?
- What is the role of regulatory frameworks in shaping the dynamics of DT in the banking sector?
- What emerging trends and promising future research opportunities can be derived from this review?

This study draws upon theoretical frameworks such as Dynamic Capabilities Theory (DCT) and Systems of Innovation (SI) to understand how organizational capabilities evolve, interact with external factors, and drive performance outcomes amidst DT. To address the research questions, we conducted an integrated literature review encompassing a diverse range of scholarly sources, allowing for a nuanced exploration of capabilities, resources, technologies, and regulatory environments in the banking sector's DT journey.

Our study emphasizes the importance of DCT and the SI approach in understanding DT within banking. We highlight the pivotal role of organizational capabilities, institutional factors, and digital technologies in driving outcomes. Additionally, we underscore the need for regulatory adaptation to foster innovation. Our findings offer actionable insights for industry practitioners and policymakers to navigate the digital banking landscape effectively.

The subsequent sections of this paper provide a review of existing literature, present research methodology and findings, and conclude the paper.

## 2. Research background

### 2.1 DT in the Banking Industry

The banking sector has undergone a significant transformation due to the impact of digital technologies, challenging traditional institutions with innovative startups amidst rapid technological advancements. Fintech, blockchain, cryptocurrencies, regulatory mandates, and demographic transitions have propelled profound shifts across various sectors, including banking (Cuesta et al., 2015; Kitsios et al., 2021).

In response to this changing landscape, banks are strategically planning their DT journeys to ensure relevance in the evolving market (Tsindeliani et al., 2021). Evolving customer expectations, driven by the proliferation of the internet and social networks, highlight the importance of personalized, digitally enabled banking services (Boudlaie, 2021; Naimi-Sadigh et al., 2022). An illustrative example of this shift is the transition from physical infrastructure to digital platforms, aimed at enhancing the customer experience (Akhter, 2018). Amidst intensifying competition, leveraging digital technologies such as online services and reducing reliance on physical branches is critical for enhancing customer satisfaction, fostering loyalty, and strengthening a bank's market position (Boudlaie, 2021).

Transitioning to the digital realm is no longer a future opportunity but a necessity for organizational survival in the present. This transformation requires a multifaceted approach for banks to succeed. Success entails not only entering transformative domains but also adopting a gradual, inclusive approach involving various

levels of the bank and its subsidiaries (Borges, 2020). While many global banks have initiated operational model changes, focusing solely on tactical transformation programs risks increasing costs and inefficiencies due to the accumulation of disparate operating models (Khanboubi et al., 2019).

According to Moradi et al. (2020), banks can adopt three digital strategies to drive digital transformation: digital customer strategies, digital organizational strategies, and digital operational strategies. Digital customer strategies aim to provide customers with diverse digital channels for banking interactions, while digital organizational strategies involve adopting new architectural capabilities, digitizing processes, implementing digital collaboration tools, and fostering a cultural shift to become fully digital entities. Lastly, digital operational strategies focus on transforming information technology into an open, flexible platform to enhance efficiency and enable futuristic business models.

## 2.1 Theoretical foundation

At a micro-level, the study employs Teece et al.'s (1997) dynamic capability theory to investigate the internal resources and competencies crucial for successful DTin banks. This theory provides a framework for assessing a company's internal strengths as sources of competitive advantage in dynamic environments, emphasizing the firm's capacity to adapt and evolve its resources over time (Teece et al., 1997). Dynamic capability theory shares similarities with the Resource-Based View (RBV), highlighting the significance of a firm's internal resources and capabilities in attaining sustained competitive advantage (Barney, 1991).

RBV underscores the importance of a company's distinct collection of resources and capabilities in shaping its competitive advantage (Barney, 1991). Resources must meet specific criteria - valuable, rare, inimitable, and non-substitutable (VRIN) - to contribute to sustained competitive advantage (Barney, 1991). While RBV perceives resources as stable entities, dynamic capability theory emphasizes the need for continuous adaptation and evolution of resources to remain relevant in dynamic markets (Teece et al., 1997).

Dynamic capability theory focuses on a firm's capacity to adapt, innovate, and reconfigure its resources and capabilities in response to market dynamics and technological advancements (Teece et al., 1997). Teece (2007) emphasizes the micro-foundations of dynamic capabilities, highlighting the role of managerial and organizational processes in fostering adaptability and innovation. Eisenhardt and Martin (2000) further delve into dynamic capabilities, advocating for strategic flexibility and adaptive strategies to address rapidly changing environments.

In contrast to static theories like RBV, Knowledge-Based View (KBV) by Grant (1996), and Market-Based View (MBV) by Mason and Bain (1950), dynamic capability theory emphasizes the evolution of capabilities over time to remain relevant amidst market disruptions and technological shifts (Madhani, 2010). This theoretical alignment enables the study to scrutinize how capabilities influence bank performance in the context of DT through the lens of dynamic capability theory.

Moreover, at a macro-level analysis, the study adopts the SI framework to comprehensively examine the external factors impacting banks' digital transformation. Originating from the works of Lundvall (1992) and Freeman (1995), the SI approach views innovation as a multifaceted, systemic process involving diverse actors, institutions, and social practices. It underscores the importance of interactions and knowledge exchanges among these elements. Through this lens, the study aims to identify regulatory and institutional factors influencing banks' DTand their interaction with internal resources and capabilities, thereby offering a comprehensive understanding of this phenomenon.

Digital innovations have fundamentally reshaped innovation strategies, enabling the exploration of products, services, business models, and internal processes. This rapid pace of innovation necessitates a different approach from business leaders. Traditional companies, in particular, are compelled to innovate digitally to stay competitive in markets infiltrated by digital-native firms. Consequently, companies face challenges in determining strategic capabilities, leveraging data, and navigating partnerships amidst technological disruptions. The SI framework acknowledges innovation as a collaborative process involving

various stakeholders and institutions, emphasizing the importance of considering these actors and background factors.

Institutions play a vital role in the creation, dissemination, and use of technology, shaping the rules of the game for innovation processes and their delivery to customers. They provide the necessary structure and guidance, defining property rights, standards, and legal frameworks. Additionally, institutions influence resource allocation, funding mechanisms, and incentives for research and development. User involvement and feedback are integral to the innovation process, emphasizing the importance of understanding end-users' needs and experiences.

The SI approach illuminates the complex interplay between institutions, regulations, and diverse actors in the innovation process, emphasizing the alignment of policies and governance mechanisms with technological advancements and societal demands to foster successful innovation and economic development. While the SI framework is apt for exploring the role of regulatory institutions in digital transformation, it doesn't discount the relevance of other theories such as Institutional Theory by Scott (*1987*), Principal-Agent Theory by Jensen and Meckling (1976), and Stakeholder Theory by Donaldson and Preston (1995). Each theory offers unique insights and perspectives, catering to specific research objectives and aspects of exploration. Therefore, the choice of the SI framework in this study aligns with its focus on understanding the multifaceted dynamics of capabilities and bank performance amidst DT and regulatory environments.

## Role of firm's capabilities and resources to enhance bank performance amid digital transformation

***Review of the impact of capabilities on performance in different industries:*** The literature underscores the pivotal role of digital capabilities in augmenting firm performance amid the DT landscape. Table 1 encapsulates a comprehensive summary of these capabilities and their impact on performance across diverse industries.

In investigating the nexus between digital capabilities and firm performance, scholars have leveraged various theoretical frameworks. Notably, the dynamic capabilities perspective has been instrumental, with studies by Caputo et al. (2019), de Vasconcellos et al. (2020), Tsou and Chen (2021), Wang and Yin (2022); Yu et al. (2020), and Yu et al. (2020) showcasing the positive influence of digital technologies on financial and non-financial performance metrics. These works underscore the enhancement of internal processes and customer relationships as key outcomes of digital transformation.

Another prevalent approach is the market-based view, as evidenced by research conducted by Caputo et al. (2019), Nasikhin and Danila (2018), Yu et al. (2020), Wang et al. (2022). These studies underscore the affirmative impact of DT on both financial and non-financial performance indicators.

Moreover, the resource-based view has been prominent in prior studies, highlighting how DT bolsters firm performance by fortifying internal organizational capabilities (de Vasconcellos et al., 2020; Heredia et al., 2022; Hinings et al., 2018; Keskin et al., 2021).

Table 1 illustrates the prevalence of technological and digital capabilities in prior research exploring the effects of DT on firm performance. Noteworthy contributions from Caputo et al. (2019), Müller et al. (2022), Hinings et al. (2018), Khin and Ho (2018), Tsou and Chen (2021), and X. Wang, Fan, S., Kuang, K., Shi, C., Liu, J., & Wang, B. (2020) consistently underscore how DT enhances firm performance by augmenting digital capabilities.

Additionally, marketing capabilities emerge as significant factors in research investigating the impact of DT on firm performance. Studies by Francesco (2019), Keskin et al. (2021), (2019), Khin and Ho (2018),

Tsou and Chen (2021), Wang et al. (2022), and Wang and Yin (2022) elucidate the positive influence of DT on firm performance through the enhancement of marketing capabilities.

Furthermore, human resources capabilities, relational capabilities, and learning capabilities have garnered attention in relevant research. Works by Caputo et al. (2019), Heredia et al. (2022), Keskin et al. (2021), and Tsou and Chen (2021) underscore how the adoption of DT enhances firm performance by improving these critical organizational capabilities.

In summary, the literature underscores the multifaceted relationship between digital capabilities and firm performance, elucidating the diverse pathways through which DT contributes to organizational success.

***Insert Table 1 here***

***Relation between capability, resources and performance:*** The literature consistently underscores the pivotal role of capabilities in shaping both financial and non-financial outcomes for banks amid DT endeavors. Through a comprehensive review of multiple studies, a nuanced understanding emerges regarding the intricate interplay between specific capabilities and performance dimensions in the digital age.

Al-dmour et al. (2021) delve into knowledge management's influence on digital financial innovation, emphasizing bank managers' strategic role in fostering innovation. Al-dmour et al. (2022) extend this investigation to marketing knowledge management, highlighting its functional significance in driving innovation within commercial banks.

Cao et al. (2022) assess the aggregate efficiency of bank holding companies in the digital age, revealing the strategic aspect of capabilities across the banking sector. Setia (2013) explores the interplay of information quality and localized capabilities, showing their direct impact on enhancing customer-centric functions.

Manser Payne et al. (2021) introduce a framework for AI services in financial ecosystems, underscoring the dynamic nature of capabilities in driving digital transformation. Suandi et al. (2022) emphasize the importance of capabilities in shaping Islamic bank performance through ethical and strategic choices.

Lastly, Vijayalakshmi (2019) indirectly highlights the operational facets of capabilities related to digital transaction systems and processes.

Overall, the convergence of findings suggests a high-level hypothesis: Capabilities and resources significantly impact the performance of banks during digital transformation, influencing both financial and non-financial outcomes.

Hooley et al. (1998) distinguish between competencies held by individuals, groups, or organizations, categorizing them into strategic, functional, and operational types. Strategic competencies involve recognizing and interpreting environmental trends, while functional ones relate to specific organizational functions, and operational competencies enable task execution.

In this study, Hooley et al.'s (1998) framework is utilized to comprehensively understand capabilities. This framework, dividing capabilities into strategic, functional, and operational categories held by individuals, groups, or organizations, facilitates a focused analysis of competencies required for competitive advantage. By adopting this framework, the research ensures a thorough examination of capabilities at various organizational levels, enhancing the validity of outcomes (Hooley et al., 1998).

***Capability and resource categorization:*** In scholarly literature, resources are categorized into several groups. Grant (1991) identifies three types: technological, financial, and reputational, while Barney (1991) divides them into physical capital, human capital, and organizational capital. Brumagim (1994) proposes a hierarchical model with four levels: producing/maintaining, administrative, organizational learning, and strategic vision resources. Intangible resources, such as property rights, organizational capital, and knowledge, serve as effective barriers against imitation due to their uniqueness and causal ambiguity (Wójcik, 2015).

***Relation between capability, resource and technology:*** The successful integration of digital technologies in banking institutions relies heavily on resource allocation. Hannan (1984) identifies organizational structure and resource availability as key determinants of technology adoption in banks, with larger, financially robust banks showing a greater inclination toward adopting novel technologies.

McKinsey's report on AI in banking stresses the importance of appropriate resource allocation, particularly in data and talent, to fully leverage AI's potential (Biswas, 2020). This involves strategic investments in data capabilities, hiring skilled data scientists, and fostering an innovative organizational culture.

Likewise, the Canadian Bankers Association (CBA) emphasizes the significance of resource adequacy and an innovation-driven culture for advancing technology in banking (CBA, 2022). Prioritizing talent development and creating an environment conducive to innovation is crucial, as per the CBA report.

In summary, the implementation of digital technologies in banks is influenced by resource availability and organizational capabilities, such as human resources, innovation, and investments in capital and IT infrastructure. Banks must strategically invest in developing these resources and capabilities while fostering a culture that promotes innovation. Thus, the extent and effectiveness of digital technology adoption during a bank's DT are significantly influenced by the availability and strategic allocation of resources and capabilities.

## Technology and performance

The literature reviewed underscores the pivotal role of digital technologies in enhancing bank performance. Cheng and Feng (2021) explore big data's transformative potential in banking, revealing its capacity to drive strategic insights, improve risk management, and enhance customer experiences. Similarly, Edu (2022) advocates for integrating big data analytics to foster financial service agility, leading to improved efficiency and adaptability. Gul and Ellahi (2021) establish a direct link between data analytics and firm performance, showing how it informs decision-making and enhances financial and operational outcomes.

Gul et al. (2021) delve into the complementarities between digitalization and productivity, illustrating how digital technologies streamline operations and optimize resource utilization, thus positively impacting financial performance. Overall, the literature demonstrates that digital technologies serve as powerful catalysts for improving both financial and non-financial aspects of bank performance.

In summary, the empirical findings consistently highlight the transformative potential of digital technologies in banking. These insights underscore the imperative for financial institutions to strategically embrace and leverage digital technologies to enhance their performance across multiple dimensions. Hence, it is hypothesized that digital technologies significantly impact bank performance in their DT journey, encompassing improvements in financial outcomes, operational efficiency, and strategic agility.

## Regulatory role in the literature

The banking industry's evolution, driven by digital technologies, prompts a closer examination of regulators' roles in overseeing this transformative landscape. Regulatory frameworks profoundly influence competence development, innovation, and overall industry dynamics (Anning-Dorson et al., 2017; Frohwein, 2015). Frohwein (2015) and Anning-Dorson et al. (2017) emphasize regulations' dual impact on competence development, competitive advantage, and the relationship between innovativeness and performance in banking. Additionally, Ramanathan et al. (2017) suggest that environmental regulations can foster innovation and enhance firm performance.

Regulations are instrumental in ensuring the security of digital banking, as highlighted by Melnychenko et al. (2020), Naimi-Sadigh et al. (2022), and others. These studies underscore the need for regulatory adaptation to foster innovation while safeguarding customer interests amidst digital disruptions. Flexibility in regulatory approaches, as advocated by Ramanathan et al. (2018) and Reitz et al. (2018), becomes crucial to accommodate digital transformation's pace and complexity.

The ongoing industrial revolution necessitates regulatory evolution, especially in the digital economy's context. Regulatory bodies face challenges in formulating rules that adequately address the transformative effects of new financial technologies (Tsindeliani et al., 2021). The blurring lines between customers and producers further complicate regulatory efforts (Marano, 2021). Consequently, regulatory environments must adapt to the digital age's dynamics, encompassing emerging technologies like cloud computing, IoT, and 5G (ITU, 2020).

Furthermore, countries are crafting specific strategies for digital technologies to harness their potential and mitigate associated risks. Malaysia's National IoT Strategic Roadmap, Germany's focus on artificial intelligence, and initiatives in countries like Singapore, England, and Australia illustrate this trend (ITU, 2020). However, gaps in financial technology regulation persist, necessitating specialized regulations to foster growth (Tsindeliani et al., 2021).

In essence, regulators must navigate the complexities of the digital era to create agile, adaptive regulatory frameworks that balance innovation facilitation with risk mitigation in the banking industry. Then, we can make a hypothesis that effective regulatory frameworks significantly influence the capabilities and performance of the banking industry's DT journey.

# 3. Methodology

We conducted an integrative literature review to synthesize the findings from multiple studies and provide a comprehensive understanding of the interplay between capabilities, technologies, and regulatory environments in the banking sector's DT journey. This approach allows for the inclusion of diverse methodologies and perspectives, providing a holistic view of the topic (Paré et al., 2015).

We conducted a thorough literature search using diverse academic databases and search engines. The search was designed to include a wide range of sources, such as journal articles, conference proceedings, book chapters, and grey literature. We focused on key terms related to "digital", "bank", "capability", and "performance". Inclusion criteria were set to include English/Farsi language publications. The scope included all journal articles, conference proceedings, book chapters, working papers, theses, dissertations, reports, magazines, and trade publications. We excluded documents unrelated to banking, digital transformation, or capabilities and resources. After data collection and importing it into Excel, we conducted a thematic analysis aligned with the research objective. This qualitative method, as outlined by Braun and Clarke (2006), involves identifying patterns and themes within the data. First, we made two categories including all capabilities and resources, Then, following Hooley et al.'s (1998) classification, capabilities were categorized into strategic, functional, and operational groups, with digital technologies

forming a separate category. Similarly, performances were thematically categorized into financial and non-financial domains.

We began by categorizing articles based on their performance focus, distinguishing between financial and non-financial aspects. Following this categorization, we grouped the capabilities mentioned in the selected articles into three distinct categories within each performance category. Additionally, we identified and categorized resources and digital technologies. This approach enabled a comprehensive analysis of the interplay between different types of capabilities and their impact on both financial and non-financial performance metrics. We finally integrated the study's findings into three main areas: i) capabilities and performance; ii) digital banking technologies; and iii) the regulatory scope of focus in digital banking.

## 4. Results

### Area 1: Capabilities and Performance Studies

***Performance:*** Performance measures were categorized into two groups: financial and non-financial. Financial performance pertains to a company's ability to generate profits for shareholders over time, as measured by metrics like return on investment, return on equity, return on assets, and earnings per share (Brigham & Houston, 2021). Non-financial performance, on the other hand, focuses on aspects such as customer satisfaction, employee engagement, sustainability, and social responsibility (Johansson, 2010). Some performance measures may overlap between the two groups. See Table 2 for the categorization details.

***Insert Table 2 here***

Anchoring our literature findings with the framework proposed by Hooley et al. (1998) we further organized the role of strategic, functional, and operational capabilities on firm performance. We categorized performance measures into two groups: financial and non-financial. Financial performance pertains to a company's ability to generate profits for shareholders over time, as measured by metrics like return on investment, return on equity, return on assets, and earnings per share (Brigham & Houston, 2021). Non-financial performance, on the other hand, focuses on aspects such as customer satisfaction, employee engagement, sustainability, and social responsibility (Johansson, 2010). Some performance measures may overlap between the two groups. See Table 3 for the categorization details.

**GROUP 1: Capabilities, resources, and digital technologies impacting non-financial performance:**

Various strategic capabilities, operational capabilities, functional capabilities, and technological operations significantly influence the non-financial performance of banks. Strategic capabilities such as customer response capability, customer orientation capability, competitive advantage, and digital servitization orientation have been identified as positively correlated with non-financial performance (Manser Payne et al., 2021; Setia, 2013; Suandi et al., 2022). However, it is noted that convergence marketing and marketing ethics do not directly affect bank performance (Suandi et al., 2022). Additionally, Islamic marketing ethics and convergence marketing are found not to directly impact bank performance, though competitive advantage mediates the relationship between Islamic marketing ethics and bank performance. Similarly, convergence marketing enhances competitive advantage through technology adoption but does not directly influence bank performance.

Operational capabilities such as fintech innovation, internal and external resource fit, organizational culture, and organizational digital literacy also play a crucial role in enhancing non-financial performance (Al-dmour et al., 2021; Al-dmour et al., 2020, 2022; Liu, 2011; Manser Payne et al., 2021; Suandi et al., 2022). Furthermore, functional capabilities, including employee education and position, knowledge management functions, IT capability, built-in and invested-in marketing assets, and internal and external marketing

capabilities, positively impact non-financial performance (Al-dmour et al., 2021; Al-dmour et al., 2020, 2022; Edu, 2022a; Manser Payne et al., 2021).

Finally, digital technological such as big data analytics, customer-centric, platform-based orientation, AI strategy embeddedness in firm goals, system quality, network quality, information quality, and omnichannel approaches have been found to positively influence the financial performance of banks (Cheng & Feng, 2021; Edu, 2022; Gul & Ellahi, 2021; Manser Payne et al., 2021). Table 3 provides a comprehensive summary of the literature's findings on the capabilities, resources, and technological operations impacting the non-financial performance of banks.

***Insert Table 3 here***

**GROUP 2: Capabilities, resources, and digital technologies impacting financial performance**

Strategic capabilities such as digital servitization orientation, innovation capability, diversification, and fintech innovation positively impact financial performance (Al-dmour et al., 2021; Al-dmour et al., 2020, 2022; Cao et al., 2022; Gul & Ellahi, 2021; Manser Payne et al., 2021). Operational capabilities like ATM digital transactions, organizational culture, peer groups, and partnerships also contribute positively to financial performance (Cao et al., 2022; Manser Payne et al., 2021; Vijayalakshmi, 2019). However, NEFT (National Electronic Funds Transfer), RTGS (Real Time Gross Settlement), and Mobile digital transactions have a negative effect on performance (Vijayalakshmi, 2019).

Moreover, resources such as capital, capital adequacy, IT expenses, age of investment in data analytics, and deposits positively impact financial performance (Cao et al., 2022; Gul & Ellahi, 2021). Conversely, non-performing loans negatively affect financial performance (Cao et al., 2022).

While different capabilities are identified for financial and non-financial performance groups, it's evident that banks need a diverse set of capabilities to succeed in digital transformation. Some capabilities, like digital servitization orientation and fintech innovation, are crucial for both financial and non-financial performance (Al-dmour et al., 2021; Al-dmour et al., 2020, 2022).

Furthermore, various technological operations such as data analytics, customer-centric approach, platform-based orientation, AI strategy integration, and ensuring system/network/information quality have a positive impact on financial performance (Cheng & Feng, 2021; Edu, 2022b; Gul et al., 2021; Manser Payne et al., 2021). Table 4 presents a comprehensive overview of the conclusions drawn from existing literature regarding the effects of capabilities, resources, and technological operations on the financial performance of banks.

***Insert Table 4 here***

Overall, the findings from both groups suggest that banks need to have a holistic approach to digital transformation, encompassing both non-financial and financial aspects.

## Area 2: Digital banking technologies

The Gartner Hype Cycle for Digital Banking Transformation delineates the anticipated evolution of digital banking innovations across five stages: the innovation trigger, the peak of inflated expectations, the trough of disillusionment, the slope of enlightenment, and the plateau of productivity. Initially, at the innovation trigger stage, novel technologies emerge, generating excitement and high expectations within the banking industry. Subsequently, the peak of inflated expectations witnesses exaggerated optimism and overinvestment in these technologies. However, as limitations surface, disillusionment sets in during the trough of the disillusionment stage, leading to decreased investment and interest. In the slope of the enlightenment phase, a more realistic understanding of the technology emerges, fostering practical

applications and experimentation. Ultimately, the plateau of productivity signifies the widespread adoption and integration of technology into banking operations (Newton, 2022).

Concurrently, banks are actively developing new digital products, particularly within retail payments, encompassing digital wallets, NFC payment solutions, and P2P services, akin to those offered by FinTech companies (Cuesta et al., 2015). Melnychenko et al. (2020) delineate digital banking's evolutionary stages: the introduction of ATMs and call centers, followed by personalized banking services utilizing cloud technology, social networks, analytics, and mobile access. Currently, digital banking is advancing into its third stage, featuring artificial intelligence, blockchains, programming interfaces, and roboticization of business processes, highlighting an ongoing process of technological innovation (Melnychenko et al., 2020).

Skinner (2018) categorizes digital banking technologies into six domains:

- Infrastructure technologies: Providing the foundation for digital banking operations, including cloud computing.
- Artificial Intelligence and Analytics technologies: Employing machine learning and data analytics for personalized services.
- Digital engagement technologies: Facilitating customer interaction through various channels, such as banking applications and chatbots.
- Payment and transaction technologies: Enabling payments and transactions through technologies like blockchain and real-time payments.
- Security and privacy technologies: Safeguarding customer data and preventing fraud, incorporating banking APIs.
- Automation technologies: Automating back-office processes to enhance efficiencies, such as IoT in banking and Robo-advisors.

This research adopts Skinner's categorization for its comprehensive framework, covering fundamental and emerging technologies crucial for digital banking. The structured approach aids in identifying areas for technology investment, ensuring the delivery of successful digital banking services.

*** Insert Figure 1 here***

## Area 3: Regulatory scope of focus in digital banking

Financial regulators have traditionally ensured banking industry stability by enforcing rules that mitigate risks, protect consumers, and maintain system integrity (Alatovic et al., 2021). With the rise of digital banking, regulators adapt to address new challenges like online onboarding and AI use (McKinsey & Company, 2021). They manage challenges from FinTech firms, ensuring fair competition and consumer protection (OECD, 2020). Cross-border coordination becomes crucial amidst data democratization and cyber threats (OECD, 2020). Regulators encourage agility and innovation while maintaining stability (McKinsey & Company, 2021).

In response to digital transformations, regulators expand their roles to tackle emerging challenges (EY, 2022). They navigate digitalization's risks, balancing innovation and risk management (EY, 2022). Global coordination is vital for sustainable finance and data governance (EY, 2022). Regulators encourage banks to embed compliance into new services and adapt to ongoing control testing (EY, 2022).

As banks undergo digital transformations, regulatory adaptation becomes crucial (Deutsche Bank, 2018). Achieving global regulatory alignment unlocks technological potential while ensuring jurisdiction-specific flexibility (Deutsche Bank, 2018). Initiatives like global sandboxes foster regulatory collaboration (Deutsche Bank, 2018).

Regulatory bodies must keep pace with the digital transformation's speed to ensure effective regulations (Marano, 2021). The distinction between customers and producers in the digital economy challenges regulatory formulation (Marano, 2021). Regulatory boundaries and methodologies require reevaluation to address evolving landscapes (Marano, 2021).

Regulatory principles like legal certainty, technology neutrality, and proportionality are essential for effective regulation (Nielsen, 2018). Collaboration among regulators enhances clarity and promotes investment (Government of Canada, 2017). Access to core infrastructure via APIs fosters innovation (Government Of Canada, 2017).

Digital financial services require specialized regulatory frameworks due to their unique characteristics (CGAP, 2018). Countries adopt diverse regulatory approaches to address FinTech's emergence and changing financial landscapes (OECD, 2020). Initiatives like open banking vary across regions, promoting innovation and competition (Deloitte).

Overall, regulatory adaptation is essential to navigate the complexities of digital banking. Table 5 provides a comprehensive review of different regulatory environments ' scope of focus in digital banking.

***Insert Table 5 here***

## 5. Discussion and proposed conceptual framework

In this comprehensive article, we embarked on a meticulous journey through a rigorous integrative review, delving deep into various scholarly sources to unearth profound insights into our research inquiries. Through thematic analysis, we categorized our findings, providing a structured framework for understanding the multifaceted dynamics of DT in the banking sector. Firstly, we delved into the capabilities and resources identified in our review, meticulously categorizing them based on the model proposed by Hooley et al. (1998). Secondly, we explored the digital technologies highlighted in the literature or suggested by Garnet, organizing them according to Skinner's (2018) model. Also, we incorporated insights regarding the focus of regulators in digital banking, drawing on previous discussions and extracting relevant elements from our literature review.

What makes this model truly holistic and integrated is its ability to establish intricate connections between capabilities, resources, regulators, and financial, and non-financial performance, all in accordance with the high-level hypotheses delineated in section 2. Figure 2 depicts the research conceptual model.

***Insert Figure 2 here***

In essence, while the existing literature (e.g., Anning-Dorson et al. 2017, Ramanathan et al. 2017, Al-dmour et al. 2021) furnishes invaluable insights into the nexus between capabilities and bank performance, the review amplifies this understanding by providing a structured and exhaustive analysis of capabilities, resources, and technological operations. Our structured approach not only enhances comprehension but also sheds light on the nuanced interplay between different types of capabilities, resources, and technologies, thereby enriching our understanding of the digital banking landscape. Through this endeavor, we not only enrich the scholarly dialogue but also chart a course for future research endeavors in the dynamic landscape of digital banking transformation.

Notably, while many capabilities were extensively studied, important aspects like risk and compliance management were overlooked in academic discourse. This research gap suggests a critical oversight, indicating the existence of unexplored capabilities crucial to the success of DT in banking. Addressing this gap is vital as neglecting fundamental capabilities. Additionally, our review unveiled a geographical imbalance in studies, with a focus primarily on emerging economies and a dearth of research in developed

countries. Expanding the scope of investigation to include developed economies would offer a more holistic understanding of capabilities' impact on bank performance during digital transformation. Furthermore, there's a notable gap in the literature concerning the examination of external factors, like regulatory regimes and competition, on identified capabilities. Exploring this aspect could provide valuable insights into the symbiotic relationship between capabilities and regulatory parameters, offering a comprehensive understanding of the banking sector's DT landscape. In essence, addressing these research gaps is crucial for regulators, scholars, and practitioners alike, as it facilitates a nuanced understanding of the complex dynamics shaping the digital evolution of the banking sector.

## Theoretical Contributions

Our study underscores the essence of DCT, as proposed by Teece et al. (1997). DCT emphasizes continuous adaptation and evolution of resources and capabilities over time. In the context of digital transformation, our findings reveal that strategic, operational, and functional capabilities are pivotal in driving both financial and non-financial outcomes. By aligning with DCT's emphasis on firms' capacity to adapt and evolve in dynamic environments, our research contributes to the understanding of organizational resilience and agility.

Moreover, drawing from the SI approach, we recognize the vital role institutions play in shaping the rules of the game for innovation processes. Institutions, as highlighted by Lundvall (1992) and Freeman (1995), significantly impact how banks navigate the digital landscape. Our research framework acknowledges the influence of regulatory frameworks and institutional factors on DT within the banking sector. By exploring the intricate interaction between regulatory environments, organizational capabilities, and technological advancements, our study provides valuable insights into how institutions shape innovation dynamics in banking.

Our research framework, informed by insights gleaned from existing literature, illuminates the pivotal role of capabilities in shaping bank performance amidst the ongoing digital revolution. Esteemed scholars such as Al-dmour et al. (2021) and Manser Payne et al. (2021) underscore the significance of capabilities in driving both financial and non-financial outcomes. Our integrative review further corroborates these discerning findings, emphasizing the need for organizations to cultivate and leverage capabilities strategically.

Converging with the existing literature, our research highlights the transformative potential of digital technologies within the banking realm. Studies by Cheng and Feng (2021) and Gul and Ellahi (2021) accentuate the game-changing effects of technologies like big data analytics and AI on enhancing financial performance. These technological operations, identified through our integrative review, serve as catalysts for positive bank performance outcomes. By shedding light on these transformative elements, our work contributes to the ongoing dialogue on digital innovation in banking.

Our research framework, harmonizing with established literature, accentuates the paramount importance of regulatory adaptation in navigating the ongoing digital metamorphosis within the banking sector. As underscored by esteemed scholars Anning-Dorson et al. (2017) and Ramanathan et al. (2017), regulatory frameworks play an indispensable role in fostering innovation and mitigating risks. Our contribution lies in emphasizing the need for collaborative regulatory approaches that accommodate the dynamic landscape of digital banking. By advocating for adaptive frameworks, we contribute to the resilience and sustainability of the financial ecosystem.

## Practical Implications

The findings of the article offer valuable insights for industry practitioners, particularly in the banking sector, by highlighting the significance of capabilities, resources, and regulatory adaptation in driving successful DT initiatives. Practitioners can leverage these insights to develop strategic approaches to DT and enhance their organizations' performance.

The article underscores the imperative of regulatory adaptation to accommodate the digital metamorphosis in the banking sector. By acknowledging the influence of regulatory frameworks and institutional factors on digital transformation, regulatory bodies can align their policies and governance mechanisms with technological advancements and societal demands, fostering innovation and mitigating risks in the banking sector.

The categorization of capabilities, resources, and digital technologies based on robust data analysis methodology provides industry practitioners and policymakers with a structured framework for understanding the nuanced interplay between different factors influencing bank performance during digital transformation. This structured approach enhances comprehension and sheds light on the complexities of the digital banking landscape.

## 6. Conclusion and research limitation

In conclusion, our comprehensive article delves deeply into the multifaceted dynamics of digital transformation (DT) in the banking sector. Through a meticulous integrative literature review, we provide a structured framework for understanding the interplay between capabilities, resources, regulators, and financial and non-financial performance. Our study not only enriches scholarly dialogue but also charts a course for future research endeavors in the dynamic landscape of digital banking transformation.

While the research employed an integrative review methodology to provide a comprehensive summary of evidence on DT in banking, it may have certain limitations. Methodological rigidity could introduce biases in study selection and data extraction, while the industry scope of the study might limit the generalizability of findings. Additionally, reliance on data availability and quality could influence the reliability of conclusions, and the theoretical framework might not fully capture the complexity of DT in banking.

To address these limitations and advance the field, future research could adopt longitudinal studies to track the evolution of DT in banks over time and conduct cross-cultural studies to understand the influence of cultural contexts on the process. Combining quantitative analysis with qualitative research methods could provide deeper insights, and assessing the broader impact of DT beyond financial performance could offer a more holistic understanding. These approaches will contribute to a nuanced understanding of the digital transformation landscape in banking and benefit regulators, scholars, and practitioners alike.


## Disclosure statement

*The authors report there are no competing interests to declare.*

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**Appendix 1 - Tables**

**Table 1- Review of DT capabilities and their impact on performance across different industries**

| **Authors** | **Country of study** | **Theory employed in the study** | **Capabilities** | **Performance** | **Industry** | **Methodology** |
|---|---|---|---|---|---|---|
| Wang et al. (2022) | China | Dynamic capabilities, Market-based view | Technological capabilities, marketing capabilities | Internal process, financial, and marketing performance | Manufacturing sector | Quantitative analysis using panel data |
| Heredia et al. (2022) | 27 different countries | Resource-based view | Technological capabilities, digital capabilities, human resource capabilities | Financial performance | Manufacturing sector | Quantitative analysis with mediation model |
| Keskin et al. (2021) | Turkey | Resource-based view (RBV), Structure–conduct–performance (SCP) paradigm | Technological capabilities, marketing capabilities, relational capabilities | Financial performance, export performance | Manufacturing sector | Quantitative analysis using survey data |
| de Vasconcellos et al. (2020) | Not specified | Human resource management, Dynamic capabilities, Resource-based view | Technological capabilities | Financial performance | Manufacturing sector | Literature review |
| F. Wang (2020) | 167 international firms | Market-based view, Dynamic capabilities | Digital capabilities, marketing capabilities | Sales growth, cash flow, gross profit margin, net profit from operations, profit-to-sales ratio, return on investment | Various manufacturing industries | Quantitative analysis using survey data |
| Tsou and Chen (2021) | Taiwan | Dynamic capabilities | Digital capabilities, marketing capabilities, learning capabilities, innovation capabilities | Financial performance | Financial industries | Quantitative analysis using survey data and mediation model. |

| | | | | | | |
|---|---|---|---|---|---|---|
| Caputo et al. (2019) | European countries | Dynamic capabilities, Human resource management Market-based view | Digital capabilities, marketing capabilities, human resource capabilities | Economic performance | High-tech firms | Quantitative analysis using survey data |
| Khin and Ho (2018) | Malaysia | Market-based view | Digital capabilities, marketing capabilities, | Financial and non-financial performance | IT firms | Quantitative analysis using survey data |

**Table 2- Categorization of the founded performance**

| Category | Performance | Reference |
|---|---|---|
| Non-financial performance | Bank performance | Suandi et al. (2022) |
| | Firm performance outcomes | Manser Payne et al. (2021) |
| | Consumer service performance | Setia (2013) |
| | Financial service agility | Edu (2022a) |
| | Successful e-banking project implementation | Liu et al. (2011) |
| | Digital financial innovation | Al-dmour et al. (2021); Al-dmour et al. (2022) |
| | Bank performance (non-financial) | Al-dmour et al. (2020) |
| Financial performance | Operating profitability | Vijayalakshmi (2019) |
| | Firm Performance Outcomes | Manser Payne et al. (2021) |
| | Aggregate efficiency scores | Cao et al. (2022) |
| | Productivity of banks | Gul et al. (2021) |
| | Performance (financial) | Gul and Ellahi (2021) |
| | Bank performance (financial) | Al-dmour et al. (2020) |

**Table 3- Capabilities and technological operations with impact on bank's non-financial performance**

| Group | Capability/resource | Reference |
|---|---|---|
| Strategic capabilities | Customer response capability | Setia (2013) |
| | Marketing ethics | Suandi et al. (2022) |
| | Convergence marketing | Suandi et al. (2022) |
| | Customer orientation capability | Setia (2013) |
| | Digital servitization orientation | Manser Payne et al. (2021) |
| | Competitive advantage | Suandi et al. (2022) |
| Operational capabilities | External resource fit | Liu et al. (2011) |
| | Internal resource fit | Liu et al. (2011) |
| | External capability fit | Liu et al. (2011) |
| | Internal capability fit | Liu et al. (2011) |
| | Fintech innovation | Al-dmour et al. (2020) |
| | Organization culture | Manser Payne et al. (2021) |
| | Organizational digital literacy | Suandi et al. (2022) |
| Functional capabilities | Built-in marketing assets | Al-dmour et al. (2020, 2022) |
| | Invested-in marketing assets | Al-dmour et al. (2020, 2022) |
| | Internal marketing capabilities | Al-dmour et al. (2020, 2022) |
| | External marketing capabilities | Al-dmour et al. (2020, 2022) |
| | Managers demographic characteristics (age, sex, education, experience, and position) | Al-dmour et al. (2021) |
| | Employee education and position | Al-dmour et al. (2022) |
| | Knowledge management functions (acquisition, integration, utilization) | Al-dmour et al. (2021) |
| | IT capability | Edu (2022b) |
| Digital technologies | Application of big data | Cheng and Feng (2021) |
| | Big data analytics capabilities | Edu (2022b) |
| | Customer-centric, platform-based orientation | Manser Payne et al. (2021) |
| | AI strategy embeddedness in firm goals | Manser Payne et al. (2021) |
| | System quality/Network quality/Information quality | Manser Payne et al. (2021) |
| | Omni-channel | Manser Payne et al. (2021) |
| | Level of AI technology infrastructure | Manser Payne et al. (2021) |

**Table 4- Capabilities and technological operations with impact on bank's financial performance**

| Group | Capability/resource | Reference |
|---|---|---|
| Strategic capabilities | Income diversification | Cao et al. (2022) |

| | | |
|---|---|---|
| | Digital servitization orientation | Manser Payne et al. (2021) |
| | Dynamic capabilities | Gul et al. (2021) |
| | Innovation capability | Cao et al. (2022) |
| | Fintech innovation | Al-dmour et al. (2020) |
| Operational capabilities | Digital transactions-ATM transaction | Vijayalakshmi (2019) |
| | Digital transactions-NEFT | Vijayalakshmi |
| | Digital transactions-RTGS (Real Time Gross Settlement) | Vijayalakshmi |
| | Partnerships with technology companies | Cao et al. (2022) |
| | Digital Transactions-Mobile transaction | Vijayalakshmi |
| Functional capabilities | Built-in marketing assets | Al-dmour et al. (2020, 2022) |
| | Invested-in marketing assets | Al-dmour et al. (2020, 2022) |
| | External marketing capabilities | Al-dmour et al. (2020, 2022) |
| | Internal marketing capabilities | Al-dmour et al. (2020, 2022) |
| | Organization culture | Manser Payne et al. (2021) |
| Resources | Capital (K) | Cao et al. (2022); Gul and Ellahi (2021) |
| | Information Technology expense (ITE) | Gul et al. (2021) |
| | Age of investment in data analytics (DA-Age) | Gul et al. (2021) |
| | Deposits (Deposits) | Gul et al. (2021) |
| | Non-performing loans (NPL) | Cao et al. (2022),Gul et al. (2021) |
| | Investment in data analytics | Gul and Ellahi (2021) |
| Technological operations | Data Analytics | Gul et al. (2021) |
| | Customer-centric, platform-based orientation | Manser Payne et al. (2021) |
| | AI strategy embeddedness in firm goals | Manser Payne et al. (2021) |
| | System quality/Network quality/Information quality | Manser Payne et al. (2021) |
| | Omni-channel | Manser Payne et al. (2021) |
| | Level of AI technology infrastructure | Manser Payne et al. (2021) |

**Table 5- Scope of focus of different regulatory environments in digital banking**

| **Groups** | **Subgroups** |
|---|---|
| Risk management and compliance | • AML (Anti-Money Laundering) (Buckley et al., 2015)<br>• Risk management (investments, portfolios, etc.) (Izraylevych, 2021)<br>• Risk-Based Customer Due Diligence (CDD) (CGAP, 2018)<br>• Consumer and investor protection (AML and combating the financing of terrorism) (Forgione, 2023)<br>• Security and risk management (CBI, 2013, 2023; Nasir, 2023) |
| Cybersecurity | • New cyber threats (Nielsen, 2018)<br>• Digital ID (Forgione, 2023)<br>• Cybersecurity (Forgione, 2023; Kurniati & Suryanto, 2022)<br>• E-signature(CBI, 2013, 2023) |
| Data protection | • Data leakage (Kurniati & Suryanto, 2022)<br>• Data usage (Nielsen, 2018)<br>• Data Protection and Privacy (CGAP, 2018; Forgione, 2023; Nasir, 2023; Natarajan, 2023)<br>• General Data Protection Regulation (GDPR) |

| | |
|---|---|
| | • How customer information is processed (Izraylevych, 2021)<br>• Data reliability (Izraylevych, 2021)<br>• Ethics and conduct (Izraylevych, 2021) |
| Consumer protection | • Consumer protection (Buckley et al., 2015; CBI, 2013, 2023; Nasir, 2023)<br>• Protecting consumers from product push (Retail Banker International, 2020)<br>• Protecting consumers from hidden fees and punitive charges (Retail Banker International, 2020)<br>• Credit scoring (CBI, 2013, 2023) |
| Market dynamics and new players | • New market players and business models (Kurniati & Suryanto, 2022; Nielsen, 2018)<br>• Competition and Innovation (Natarajan, 2023)<br>• Nonbank E-Money Issuance (CGAP, 2018)<br>• Use of Agents (CGAP, 2018)<br>• Regulating third parties (Buckley et al., 2015; Kurniati & Suryanto, 2022; Natarajan, 2023)<br>• Licensing (CBI, 2013, 2023; Forgione, 2023)<br>• Digital inclusion (Retail Banker International, 2020) |

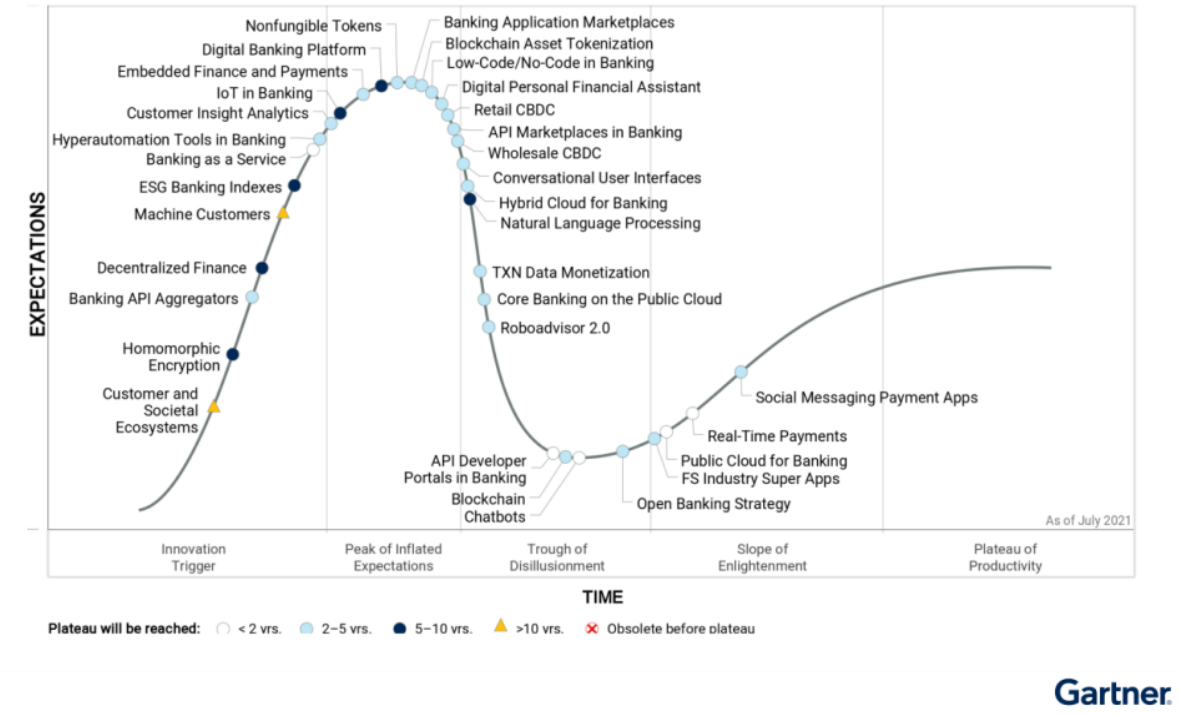



**Figure 1- Hype Cycle for Digital Banking Transformation -Source: Newton (2022)**

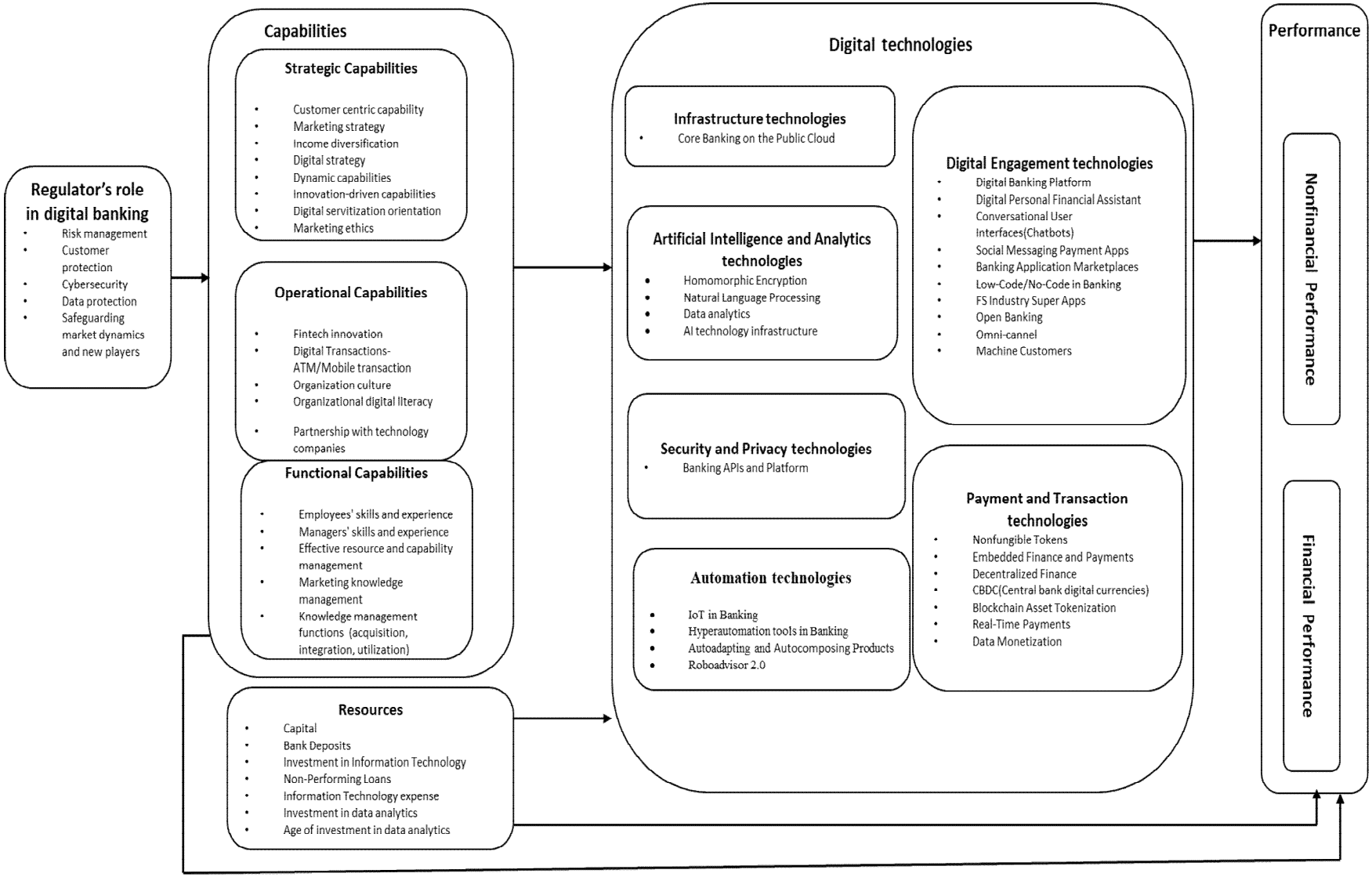



**Figure2 - Research conceptual model**

# MARKETING

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# AN INVESTIGATION OF THE ROLE OF ACCULTURATION ON BILINGUAL RESPONSES TO THE FACTORS OF ETHNIC CHANGE

This essay looked into the role of acculturation (the adoption of traits and values of another culture) on the response from bilinguals in their second languages. Ethnic change of the English Canadian (EC) and the French Canadian (FC) bilinguals in Quebec, Canada were measures in this regard. Language acculturation (adoption of a second language) and ethnic identification (adherence to the culture of origin) are the two measures of ethnic change used in this study. A correlated three factor common structure involving media use, social interaction, and cultural attachment emerged in this study. A multivariate analysis of variance showed the effects of ethnicity and language of questionnaire on the factors. Also, comparison between the first and the second language responses explained the role acculturation plays.

## Introduction

The largest ethnic groups in Canada are the English Canadians and the French Canadians. English and French are the two official languages in the country. In Canada, the term 'bilingual' refers to people who can hold a conversation in both English and French. A lot of French Canadians (most of them living in the province of Quebec) and many English Canadians have embraced language and culture of the other group and form the bilingual core in Canada that includes Quebec and the neighboring provinces Ontario and New Brunswick. In North America, it is not so common to find English speaking population learning a different language and living within another dominant culture than English as seen in Quebec. Here, a lot of people with English heritage (specifically in Quebec) speak fluent French and socially interact with French speaking people. French Quebecers are the majority in this province and roughly half of them are bilinguals. One interesting aspect of this bilingualism in Quebec is the blurred presence of the dominant culture. French is the only official language and the dominant culture in the province of Quebec which made English Canadians to acculturate to French culture. However, English is the indirect dominant culture given that the province is surrounded by the very strong English culture present in the USA and the rest of Canada. French Quebecers are said to have a very American lifestyle (Leger, Nantel, Duhamel, 2016). Previous studies have reported that French bilinguals show acculturation to English language and culture (Laroche et al. 1996, 2009). Some studies have found that English Quebecers' response to some behavioral questionnaires fall between the English people living in the rest of Canada and the French Quebecers, and they are a distinct identity (Laroche, Pons, Turmel, 2002; Leger, Nantel, Duhamel, 2016). This phenomenon is attributed to the effects of acculturation or adoption of the cultural traits of the host or dominant culture. Learning and using the second language is also considered acculturation as language is a major part of any culture. This study wanted to capture language acculturation of both the English Canadian and the French Canadian bilinguals to both the cultures in this blurred presence of a dominant culture. It is observed that studies to understand the differences between the English and French Canadians are abundant, yet there are

not many studies that include bilinguals or explain the effects of bilingualism that may be present in the responses from bilinguals. This study will be one of the few attempts to fill this void and build a knowledge base to refer to in future studies involving bilingual respondents. This will be very important for organizations and businesses operating in a bilingual capacity and trying to capture consumer preferences or behavior. Quebec language regulations often make companies communicate only in French, fluent bilinguals from the English communities may choose to respond in French. Strong English institutions like hospitals and universities serve many French bilinguals who may prefer use their second languages. Bilinguals can set their personal devices to either language which prompts most communication in the preferred language. Knowing the probable differences in such scenarios would be important.

There are a lot of studies to understand bilingual language acculturation and ethnic identification. This stream of research normally collects data from bilinguals in the language of the dominant culture and in their native language. In a Canadian context, Laroche et al. (1996) reported on the multidimensional structure of ethnic change of French Canadians. They reported that ethnic affiliation and acculturative tendency are the key dimensions of ethnic change. Kim, Laroche, and Tomiuk (2001) studied the language acculturation and ethnic identification of Italian Canadians and reported on a four factor structure for language acculturation and ethnic identification and attachment. Three factors are related to language acculturation and the other factor measures ethnic identification and attachment. Also, Laroche, Pons, and Richard (2009) reported a similar structure while investigating role of language on measurement of ethnic identity of English Canadians. This study adds to this stream by analyzing both English and French Canadians living in the province of Quebec and their responses in both the languages. Getting responses from two ethnic groups in two languages are not very common in cross-cultural or social science literature. This study would make a significant contribution from that perspective. Also, a comparison of mutual ethnic change showed by two ethnic groups living in a particular geographic area is a significant contribution.

The study of language acculturation and ethnic identification among the English and French Canadians is an interesting one. English bilinguals living in this French-language province in Canada are the minority people living within the dominant French culture. But, often they have the choice and a right (supported by language laws) to attend English institutions for education, receive services from the strong English institutions or the bilingual service providers in the province, and live in English majority neighborhoods mostly located on the west part of the Island of Montreal and in a few other notable towns or neighborhoods in the province. On the other hand, French Quebecers live in a province surrounded by English provinces/states in Canada and the USA and are under the influence of the strong English/American culture of the USA. The Quebec border with the only officially bilingual province in Canada, New Brunswick, is not in a populated area, and the largest cities in these two provinces are not close compared to their distance from major US cities where English is predominantly used. Many French Quebecers are bilingual and they consume English media produced mostly in the USA or in the rest of Canada. Bilinguals often prefer to consume entertainment in the original languages. So, French bilinguals' consumption of a lot of English media makes the presence of the dominant culture blurred at times.

## Conceptual Framework

### Ethnic Change

Ethnic change is the process showed by immigrants adapting to the new culture. Bilingualism requires a person to go through ethnic change while acquiring the second language. Literature on ethnic change fall under two dominant streams (Kim, Laroche, and Tomiuk, 2001). The assimilationist view argues that immigrants gradually lose their original identity as they pick up dominant culture of the land. This is often called the melting pot theory where traits from different cultures come together to make a distinct culture (Park, 1950). There have been numerous studies to support this view as it very well explained the ethnic

change of people coming into the USA from different European countries. The influence of culture under this view is considered unidirectional that flowed from 'Anglo-American' to different ethnic groups. English-Canadian culture as described under this view also shows very similar tendencies (Kim, Laroche, and Tomiuk, 2001). The underlying tenet is that ethnic change is a unidirectional process that shows a loss of the original identity and a gain in the new (dominant) identity. 'Americanization' and 'Anglo-conformity' are some of the other terms used in this regard (Keefe and Padilla 1987). Later, it was argued that only white Protestant people from Western and Northern Europe showed true assimilation as explained under this view. The acculturation view proposed that people may retain their original identity and at the same time live in the host society. People need not lose original identity to adapt to the dominant culture. Ethnic change showed by Hispanics and Asian people in the USA is better explained by this stream of thought (Keefe and Padilla 1987; Wooden, Leon, & Toshima, 1988). In the context of the present study, we will focus only on the later stream. The main reason is that both English and French are the dominant cultures in Canada and the linguistic rights of each group are respected at the federal government level. Also, bilinguals from these two groups do not show complete loss of one identity or assimilation tendencies to merge into the other one. French Canadians preserved their language and culture for centuries despite being under the British rule. Also, English Canadians living in the province of Quebec as a minority are not assimilating into the French culture despite their numbers decreased dramatically over the last few decades. Both the groups significantly retained their original identity and captured traits of the second culture. 'A very American lifestyle' as used to describe French Canadians (Leger et al, 2016), and the differences showed by English Quebecers from the 'rest of Canada' support this view.

**Ethnic Identification and Language Acculturation**

Ethnic identity was explained as the retention of the culture of origin of a person (Keefe and Padilla, 1987, Laroche, Kim, and Tomiuk, 1998). Ethnic identity can be observed through values, attitudes and behaviors and is multi-dimensional in nature (Lee and Yoo, 2004). Phinney (1990) proposed that ethnic involvement includes language, network of friends, food, religion, etc. Acculturation, on the other hand, is learning the language and culture of the host society or the dominant culture by the minority group (Keefe 1980). Laroche, Kim, Hui, and Joy (1996) reported on the multidimensional structure of ethnic change for French Canadians in Quebec. Kim, Laroche, and Tomiuk (2001) proposed a four dimensional scale to measure ethnic change that includes factors for language acculturation and ethnic identification. The three factors for language acculturation are language use, media use, and social interaction. The other factor is ethnic identification and attachment. Though language acculturation and ethnic identification are only two facets of ethnic identity, they explain much of the variance of the concept (Kim, Laroche, and Tomiuk 2001) and can be considered an appropriate measure for ethnic change.

**Role of Acculturation on Second Language Responses**

Bond and Yang (1982) analyzed response of Chinese bilinguals in Hong Kong and found that participants responded to match cultural norms associated with the language of questionnaire (Cantonese vs. English). This was referred to as cultural accommodation. This stream of thought inspired many studies and documented response of bilinguals to show cultural accommodation. Hong et al. (2000) reported that bilinguals develop two cultural frames based on their cultural experiences and knowledge. These frames can be activated by cultural elements like language and bilinguals can switch between the frames under language priming (Dixon, 2007; Kemmelmeier and Cheng, 2004). This confirms that bilinguals responding to a questionnaire in a particular language would be primed to that language and follow cultural norms of that culture while responding to a questionnaire. This is also supported by the Whorfian hypothesis of linguistic relativity arguing that language can influence thoughts (Hunt and Agnoli, 1991). Later, Hull (1996) showed that coordinate bilinguals show different thought patterns and differences in responses while responding in the two languages. Coordinate bilinguals are people who learn the two languages in two different contexts, like learning one at home and the other at school (D'Acierno, 1990). It is expected that

responses from Canadian bilinguals in the second language would show acculturation of bilinguals to the second culture.

## Hypotheses

There are four groups/conditions for data collection in this study. They are English Canadian (EC) bilinguals' response in English, EC bilinguals' response in French, French Canadian (FC) bilinguals' response in French, and FC bilinguals' response in English. These are termed as EC-English, EC-French, FC-French, and FC-English. English Canadians are expected to show more English language use, English media use, English social interaction, and English ethnic identification compared to the French Canadians. For the French Canadians, similar results are expected for the factors related to French acculturation and ethnic identification. The following hypothesis argues that first language responses by these two groups would show expected differences between the two groups as showed by monolinguals.

> $H_1$: First language response by EC and FC bilinguals on the factors of ethnic change for each of the cultures will be significantly different.

Also, following literature relating to acculturation and second language responses, the groups are expected to show acculturation while responding to the questions in their second languages. Hypothesis 2 and 3 are proposed to explain acculturation showed by the English and French bilinguals respectively.

> $H_2$: Second language response of English bilinguals (EC-French response) will be significantly different than their first language responses (EC-English response); and the mean values for second language response will shift towards the response by the French bilinguals.

> $H_3$: Second language response of French bilinguals (FC-English response) will be significantly different than their first language responses (FC-French response); and the mean values will move towards the response by the English bilinguals.

As a cross-cultural study, we decided to look into the differences between the bilinguals from the English and French communities. It shows us a possible role of acculturation. However, another important question emerged from the study. What is the cause of the differential responses? The data collection strategy helped us look into the role of ethnicity and the language of the questionnaire on these differences. The distinction is an important attribute of a cross-cultural study. No significant effect of ethnicity means that the differential response from the concerned groups is not linked to the ethnicity of the people, it is simply because of the language people are choosing to respond in.

## Methodology

The study used a survey to collect data from bilinguals from both the French and the English communities in Quebec, Canada. Both groups had responses in their first and second languages. The survey used measurement scales for language acculturation and ethnic identity and attachment. The responses are analyzed with and exploratory factor analysis (EFA) and a confirmatory factor analysis (CFA). A multivariate analysis of variance (MANOVA) was run to know the effects of ethnicity and language of questionnaire on the purified measures. Independent T-tests were run to check the hypotheses about the differences between the two groups and their responses in the first versus second languages.

**Measurement Scales**

This study used the work of Kim, Laroche, and Tomiuk (2001) as the basis for the measurement scales regarding language acculturation and ethnic identification. They integrated and purified various measurements while developing a scale to measure acculturation and ethnic identification of Italian Canadians. They reported on the three dimensions of language acculturation (English language use, English Canadian mass media exposure, and English Canadian social interaction), and one dimension for ethnic identification and attachment to the English culture. From that study, 16 items for the language acculturation dimensions and 9 items for the factor identification and attachment to the English culture are adopted for this study. Modifications were made to measure attachment to English culture than Italian. Table 1.1 provides with the items used in this study to measure English language acculturation and ethnic identification. A similar scale was developed and used to measure French language acculturation and ethnic identification and attachment to French culture.

**Survey Development**

The survey questionnaire was uploaded in the Qualtrics online platform. The first page contained the qualifying and demographic questions. The qualifying questions were that participants must identify to speak English or French as a mother tongue, have good second language proficiency, be resident of the province of Quebec, and be between the ages of 18-40. The qualifying question regarding mother tongue helped to exclude multilingual people who may speak both English and French but grew up speaking another language at home. Also, bilingual people who consider both English and French as their native languages were excluded. The age groups selected are important because people in these two groups of adults are the people who were born after the Bill 101 or Charter of the French language came in effect in 1977 (Behiels and Hudon, 2023). So, they grew up in a French dominant atmosphere. Also, the two groups closely match the age brackets for the generations Y and the generations Z. Though the study wanted to understand Canadian bilinguals in general, this section limited the scope to bilinguals living in the province of Quebec. This is mostly due to the fact that English Quebecers have shown differences from the rest-of-Canada English speakers in different studies (Laroche, Pons, Turmel, 2002). Also, the majority of the bilinguals in Canada live in Quebec. This choice helped to understand the effects in an apparently-blurred presence of a dominant French culture within an overarching presence of English.

Following the first page, questions for English and French language acculturation and attachment were presented in separate pages after this section. Language learning questions (language proficiency, medium of school etc.) were at the end of the survey. Participants needed to answer each question in order to proceed to the next page. Scrolling up and down a page allowed viewing that particular section and related questions.

The survey was translated into French by two co-authors who are bilinguals and have years of experience in cross-cultural research involving English and French Canadians. As all participants are from the province of Quebec, the French version was carefully reviewed for its relevance to the language and culture in Quebec. Also, a few items were updated to reflect present technology use by participants. For example, use of the word ‘video cassette’ was replaced with ‘DVD’.

**Data Collection and Demographics**

Qualtrics Experience Management was appointed to help with data collection. They formed panels and sent the questionnaire to prospective participants. The target was to get data from 600 participants and around 150 people in each of the four conditions. Participants responded to both the measurement scales-Acculturation to English Language and identification with the English culture; and acculturation to French language and identification with the French culture.

Participants could access only one language version of the questionnaire. People not comfortable with the second language questionnaire had the option of not completing the survey. One reason for this was to collect second language response from bilinguals who are at ease with responding in their second languages. Also, language proficiency was asked to screen out candidates with weak first/second language skills.

A total of 619 participants completed the data. Among them 300 participants identified English as their first language and 319 participants identified French as their first language. All participants completed either the English version or the French version of the survey. So, the responses include both first language and second language responses. 145 EC Bilinguals completed the survey in English and 155 EC Bilinguals completed the survey in French. 164 FC bilinguals completed the survey in French and 155 FC bilinguals completed the English version. Sample size was decided on a reasonable estimate to build structural equation models and availability of resources to collect data. Around 150 responses were expected in each group.

189 participants were between the age of 18-25, and 430 participants were in the group between the ages of 26-40. 217 participants were male and 402 participants were female. 9 participants (2% of the total) mentioned their highest level of education as primary, and the other options for education were reasonably represented. Annual household income of '$80,000 and up' was the biggest contributor (26%) while the other four options varied between 14% and 21% of the participants. Table 1.2 shows demographic composition of the participants across the four groups. The English Canadian groups have a few more people aged between 18-25 years, and there are a few more female participants among the French Canadians. Also, the English Canadian groups include a few more people with college degrees. The demographic composition across the four groups is very similar and considered suitable for the use of between group comparisons for this study.

## Measure Purification

### Exploratory Factor Analysis (EFA)

As a translated version of the questionnaire was developed and two different ethnic groups were used in the study, the factorial structures of the measurement scales were looked into in the first analysis. A series of exploratory factor analyses were run separately on the 4 groups. The questionnaire includes measurements scales for both English language acculturation and identification and French language acculturation and identification. Principal axis factoring and direct oblimin rotation were used in IBM SPSS software for the EFA. An iterative purification process was used in each of the four groups to get rid of the cross-loaded items and the items with low factor loadings (Churchill, 1979). A cutoff value of 0.65 was used in this regard. It was difficult to find a comparable structure across all the groups for both English and French language acculturation and identification. A correlated three factor structure emerged across all conditions. The factors 'English/French Language Use' and 'English/French Social Interaction' merged at one point during the EFA and most items of the first factor (language use) moved out of the factor. The items in factors in the EFA are presented in table 1.3 and 1.4.

During the EFA analysis, it appeared that the factor 'Ethnic identification and attachment' gets rid of the core identity questions (22-24) in almost all the groups. Also, the factors 'language use' and 'social interaction' merged to form one factor. An interesting finding from the EFA was that only the FC-French responses for French acculturation hold all the original items (French language use, French media use, French social interaction, and French ethnic identification and attachment). This is in line with the previous reports regarding ethnic change of French Canadians (Laroche et al., 1996). But their response regarding English acculturation has the new 3 factor structure. Omission of the 'language use' factor in the other

conditions and for the English language acculturation may be more of a phenomenon related to inclusion of English bilinguals and second language response of French Canadians.

***A Common Item Structure Based on EFA.*** A common item factorial structure across all the conditions is proposed in this study. The common item model is needed to derive meaningful comparisons of means across conditions. Table 1.5 presents the proposed common item 3 factor structure with explanations why some additions or omissions were made to each of the factors. In brief, the factor 'media use' retained 3 items, 'social interaction' retained 4 items, and 'cultural attachment' retained 4 items.

**Confirmatory Factor Analysis (CFA)**

Different models on the four conditions were tested with the confirmatory factor analysis. High multivariate Kurtosis values related to non-normal data suggested the use of a robust maximum likelihood estimator and have Satorra-Bentler correction for $\chi 2$ test to tackle this issue. Figure 1.1 shows the initial maximum likelihood estimator results that was later improved with the robust estimator. All fit indices for the common item 3 factor model with a robust maximum likelihood estimator are presented in table 1.6. Standardized factor loadings of the items for all conditions are presented in table 1.7 and 1.8 for English and French acculturation respectively. Only FC response (both English and French version) to the item relating to 'always listen to English/French radio programs' had moderate factor loadings for the media use factor. Factor loadings for all other items were very good. Factor correlations for all the conditions are presented in table 1.9 and 1.10 for the English and French acculturation responses respectively. Correlations among the three factors for all conditions were moderate to strong. EC-French responses showed particularly stronger correlations between factors. The presence of moderate to strong correlations between factors led to a discriminant validity analysis. The CFA models for all the conditions for both English and French acculturation were constrained by placing the correlation value between two factors to unity. Then the $\chi 2$ difference tests found the original CFA models to show better statistical fits. This confirmed discriminant validity of the factors (Anderson and Gerbing, 1988).

As the study includes two ethnic groups and translated version of a questionnaire, measurement invariance across the four conditions were looked into. The guidelines compiled by Steencamp and Baumgartner (1998) were consulted in this regard. It is realized that configural invariance and scalar invariance are already achieved across the four conditions. The proposal of the common item factorial structure across the four conditions with the same observed variables for each latent variable largely helped to achieve invariance. The criterions for the configural invariance are that the factorial structures across the conditions are the same, the factor loadings are substantial and significantly different than zero, the factor correlations are significantly under unity, and the factors show discriminant validity. These are all supported in the proposed structure across the conditions. This measurement also has scalar invariance as the factor loadings for each item across the conditions are very similar with only a couple of items showing slightly low factor loadings for certain conditions. The requirement is to have at least two items in each factor that have very similar loadings. Also, the fit indices for the measurement models in the four conditions are very similar. The other forms of measurement invariances were not checked as these two forms of invariance are considered sufficient to compare means across the conditions.

## CFA Results Discussion

The results suggest that English and French Canadian bilinguals living in the province in Quebec show a different factorial structure for language acculturation and ethnic identification than was observed among bilingual French Canadians or other bilinguals in Canada in previous studies. The factors 'language use' and 'social interaction' became highly correlated and formed a single factor once an exploratory factor analysis was run. In the CFA, it was possible to find two similar 3 factor common item structures to explain

English acculturation and cultural attachment and French acculturation and cultural attachment. Both the concepts have three factors namely 'media use', 'social interaction,' and 'cultural attachment'. There were multivariate Kurtosis in the data and robust maximum likelihood estimate provided with better model fit indices for the models.

## Multivariate Analysis of Variance

This section used the purified factors for language acculturation and cultural attachment and looked into the differences across the groups. English acculturation and French acculturation are the two distinct (and correlated) cultural frames that the bilinguals exhibit in this regard. The dependent variables in this analysis are the factors of ethnic change- English/French media use, English/French Social interaction, and English/French cultural attachment. Ethnicity (EC vs. FC) and language of questionnaire (English vs. French) are the two independent variables used in the analysis.

The choice of a multivariate analysis of variance starts with the findings that the dependent variables are moderately to strongly correlated as found during measure purification. Also, the analysis of the demographic variables in each of the groups did not find any major differences in composition in terms of age, gender, education, and income. So, consideration of the data from the four conditions as data from a continuous group seemed appropriate. Using ethnicity and language of questionnaire as categorical independent variables and the factors of ethnic change as dependent variables allowed us to run between-group analysis. The analysis and details for both the English and French acculturation are presented in the following sections.

### English Language Acculturation and Ethnic Identification

From the common item factorial structure proposed in the earlier section, mean values for the factors English media use, English social interaction, and English cultural attachment for each participant were calculated for this analysis. As MANOVA was selected as the method of analysis, the different assumptions for MANOVA were looked into. The data was collected from Likert type scales and it was considered suitable to be used in parametric procedures (Norman, 2010). The independent variables were categorical and dependent variables explained a meaningful concept and were correlated from moderately to strongly as we had found in the first section. The observations were independent of each other and no participant was present in more than one group. Sample size was adequate with about 150 cases in each cell where having more cases than number of DVs is considered a sufficient condition. As Likert type scale data was used in this study, outliers were not deemed a major concern. Looking in to the data, it was found that the assumption of normality was violated as normality tests were significant in most conditions. Only FC-English responses adhered to normality assumptions (Kolmogorov-Smirnov test P=0.2, df= 155, Shapiro-Wilk test p=0.1, df=155). Q-Q plots showed that the deviations from the normal curves were rather modest. So, a multivariate analysis of variance (MANOVA) was deemed appropriate as an analysis tool as it is considered robust to modest violations of normality when sample sizes are equal and degrees of freedom is at least 20 in the univariate analyses (Tabachnick and Fidell, 2007). Also, equality of covariance matrix was violated as Box's M test was significant (p=.00). It is reported that for groups with more than 30 cases, MANOVA is robust against the violation of this assumption. Assumption of equality of error variance was also violated as Levene's test came significant for all the Dependent variables. A stricter p value (p=0.01) was used in the univariate tests as a measure against this violation of equality of error variance. Descriptive statistics for the MANOVA for English acculturation are presented in table 1.11.

A multivariate analysis with ethnicity and language of questionnaire as independent variables (IVs) and the three factors of English language acculturation and cultural attachment as dependent variables (DVs) showed a significant effect of ethnicity ($F(3,613) = 88.28$, $p<0.005$; Wilk's $\Lambda = 0.698$) and language of

questionnaire (F (3,613) = 4.171, p = 0.006; Wilk's Λ = 0.980), and no significant effect of the interaction term ethnicity*questionnaire language (F (3,613) = 0.511, p=0.68; Wilk's Λ= 0.998). Table 1.12 shows the between subject effects for this test. All the effects for ethnicity and language of questionnaire are statistically significant except for effect of questionnaire language on 'English cultural attachment'. Univariate effects of ethnicity and questionnaire language for the significant main effects are showed in table 1.13 and 1.14.

Figure 1.2, 1.3 and 1.4 show that the marginal mean values for English language acculturation and cultural attachment for EC bilinguals are always higher than that of FC bilinguals. This supports hypothesis $H_1$. Also, it confirms that second language responses tend to be different from first language response and it shifts towards the responses the other ethnic group. This appears to be the result of acculturation; that EC bilingual's response in French moves closer to FC bilingual response to the questions, and vice versa. These findings indicate that hypotheses $H_2$ and $H_3$ have the right direction of mean differences. An important finding from the marginal means is that the second language responses always stayed close to the first language response and did not cross the grand mean. This suggests that the magnitude of acculturation during second language response is not too strong (or statistically significant) to be compared with the response from the other ethnic group. So, both the groups are strongly rooted to their ethnic identity and show moderate acculturation. As there is no significant effect of questionnaire language on English cultural attachment, the marginal means plot does not show a significant deviation in the plot. Yet, the mean differences show they are in the right direction.

***Hypothesis Testing: English Language Acculturation and Cultural Attachment.*** The MANOVA was followed up with a series of T-tests to confirm the between group differences and the hypotheses. The results are presented in table 1.15. Hypothesis $H_1$ (EC-English vs FC-French response for English Acculturation and cultural attachment) was statistically significant for all the dependent variables. $H_2$ (EC acculturation to French) was not statistically significant for any of the variables, though the direction of mean differences was correct for all the factors. $H_3$ was statistically significant for only 'English Media Use', and had a noteworthy p value (.07) for 'English Social Interaction'. This suggests that though native language responses by the two ethnic groups are significantly separate for the factors of English acculturation, second language response of EC bilinguals does not show statistically significant effects of acculturation. Second language response of FC bilinguals shows acculturation in only one factor. Having a closer look at the p values suggests that the factor 'cultural attachment' does not show any signs of acculturation for second language responses, while 'media use' and 'social interaction' show signs of acculturation despite not having statistical significance for all variables for both the ethnic groups.

***Effects of Demographic Variables.*** A series of MANOVAs were conducted to understand the effects of demographic variables age, gender, income, and education. A statistically significant effect of age (F (3, 615) = 2.947, p = 0.032; Wilk's Λ = 0.986) was found. There were no significant effects for gender (F (3,615) = 0.113, p = 0.95; Wilk's Λ = 0.999), income (F (12, 1619.491) = 0.870, p = 0.577; Wilk's Λ = 0.983), and education level (F (15, 1687.103) = 1.347, p = 0.166; Wilk's Λ= 0.968). Test of between-subjects effects showed that age has an effect on English social interaction (F (1, 21.565) = 6.856, p=0.009). Table 1.16 shows descriptive statistics for the two age groups and gives an idea of the direction of the mean values.

**French Language Acculturation and Cultural Attachment**

All participants responded to both the English and French language acculturation and cultural attachment factors. A similar common item factorial structure was obtained for responses to both the scales. So, the data is expected to have similar characteristics regarding suitability for parametric tests and a MANOVA. The independent variables were the same and the dependent variables explained a meaningful concept and were correlated as we had found in the CFA in the previous section. The observations were independent of

each other as usual. Sample size was adequate with about 150 cases in each cell. Outliers, again, were not considered a major concern for this study. Looking into the data, it was found that the assumption of normality was violated as normality tests were significant in all conditions (p=.00). Q-Q plot for the dependent variables though did not show major deviations from normality. Equality of covariance matrix was violated as Box's M test was significant (Box's M= 67.293, F=3.705, df1=18, p=.00). Equality of error variance was also violated as Levene's test came significant for all the Dependent variables.

Though some of the assumptions are violated, a robust MANOVA was run for the analysis as a significant number of cases were available in each cell (more than 30 in each) and there are almost equal numbers of cases across all the conditions (Tabachnick and Fidell, 2007). Having adequate cases in each cell is a sufficient condition for a robust MANOVA with modest violations with normality and equality of the covariance matrix. A stricter p value (p=0.01) for the univariate tests was proposed as a measure against the violation of equality of error variance following the Levene's test. Descriptive statistics for the test are presented in table 1.17.

A multivariate analysis with ethnicity and language of questionnaire as independent variables (IVs) and the three factors of French language acculturation and cultural attachment as dependent variables (DVs) showed a significant effect of ethnicity (F (3,613) = 125.516, p<0.001; Wilk's $\Lambda$ = 0.619) and language of questionnaire (F (3,613) = 4.747, p = 0.003; Wilk's $\Lambda$ = 0.977), and no significant effect of the interaction term ethnicity*questionnaire language (F (3, 613) =.740, p = .529; Wilk's $\Lambda$ = 0.996). Table 1.18 shows between subject effects for this test. All the effects for ethnicity and questionnaire language were statistically significant at p = 0.05 level. If a stricter value for p = 0.01 are applied following violation of homogeneity of variance, all effects of ethnicity on all the DVs come statistically significant (p<0.001) and only effects of questionnaire language on French media use is statistically significant (p<0.001). This is consistent with the results for English acculturation. The univariate tests for the effects of ethnicity and questionnaire language on the dependent variable are presented in table 1.19 and table 1.20.

Plots for the estimated marginal means for 'French media use', 'French social interaction', and 'French cultural attachment' are showed in figure 1.5, 1.6, and 1.7. The plots show similar trends as were found with English acculturation. First language responses have significantly different mean values which supports hypothesis $H_1$. Second language responses also show mean differences from first language responses in the right direction for 'French media use' and 'French social interaction'. Mean values for second language did not cross the grand mean or get too close to responses by the other ethnic group. FC response to French cultural attachment also showed differences between the first and second language responses.

***Hypothesis Testing: English Language Acculturation and Cultural Attachment.*** Based on the results from the graphical marginal means, the MANOVA was followed up with a series of T-tests to confirm the statistical significance of between group differences related to the hypotheses. The results are presented in table 1.21. The results suggest that hypothesis $H_1$ (EC-English vs FC-French response for French Acculturation and cultural attachment) was statistically significant for all the dependent variables. $H_2$ (EC acculturation to French) was not statistically significant for any of the variables, but had a notable p value of 0.1 for 'French Media Use'. Though not statistically significant, direction of the mean differences was always correct for $H_2$. This means that EC response in French moved closer to FC responses to the factors. $H_3$ (FC acculturation to English) was statistically significant for all the dependent variables. So, acculturation of FC bilinguals while responding in English was supported.

***Effects of demographic factors.*** A series of one-way MANOVAs were conducted to find the effects of demographic variables on French language acculturation. A significant multivariate main effect of age on the French language acculturation factors was observed (Wilk's $\Lambda$= 0.981, F (3, 615) = 3.953, p= 0.008). Tests of between subjects effects showed significant main effect of age on French social interaction (p =

0.005), and French cultural attachment (p = 0.001). Effect on French media use (p = 0.052) was not statistically significant as more stringent p = .01 was used. Results of univariate tests are presented in table 1.22. It is evident that participants in the 26-40 year age group showed significantly more French media use, French social interaction, and French cultural attachment than participants in the 18-25 year age group. The findings make sense as the public education system in Quebec normally does not allow younger people to get high proficiency in the second language or give the opportunity to interact with people from the other group in the academic context. People working in the industry often have more exposure in the second language and have more chances to meet people from the other group.

No significant main effects were observed in the other one-way MANOVA tests for gender (F (3,615) = 2.796, p = 0.04; Wilk's $\Lambda$ = 0.987), income (F (12, 1619.491) = 1.097, p = 0.358; Wilk's $\Lambda$ = 0.979), and education (F (15, 1687.103 = 0.898, p = 0.0.566; Wilk's $\Lambda$ = 0.978). use of a stricter p value for gender showed a significant main effect in the between subjects test, but no statistically significant effect was observed in the univariate test.

## General Discussion

This study looked into ethnic change of both English and French Canadian bilinguals in the province of Quebec and collected responses in both languages from each group. This helped looking into the role of ethnicity and language of questionnaire on responses on ethnic change in the two languages. The factors that emerged in the analysis are 'English/French media use', 'English/French social interaction', and 'English/French cultural attachment'. The proposed structure is different than previous reports as the factor 'language use' could not be obtained in the analysis. This common structure helped running a MANOVA to see the effects of ethnicity and language of questionnaire. Also, acculturation to second language was observed from the responses in the two languages. The role of acculturation on the responses in the second language was more prominent for the factors on language acculturation, but subtle or non-existent on the cultural attachment factor.

The missing factor 'language use' and 'ethnic identity' can be a source of future research. It appeared that the items in 'language use' and 'social interaction' had very subtle differences. This study was challenging as it looked to find a common measure across four conditions regarding ethnicity and language of questionnaire. Also, acculturation to two different cultures were measured at the same time which added to this issue. Most other studies, in comparison, normally consider two conditions only. Some adjustments had to be made in the measures in this regard. For example, the item 'listening to radio programs' was retained based on the judgement of the authors. Another adjustment in the factorial structure was the use of a very strongly correlated alternate measure for 'French social interaction' for the EC-French condition, and the exclusion of the items for the same factor for the FC-French condition. The fit indices for the proposed model showed that these practices did not have any visible impact on the following analysis. The biggest reveal from this analysis is that French Canadians show significant acculturation while responding in second language.

One limitation in this study was the choice of data collection through an external agency and location data of participants could not be obtained. Another issue was that this study considered linguistic ethnicity and ignored the 'race' factor of participants. Bilingual people who did not learn any other language than English and French at home were eligible to take part in this study. This was expected to provide with a relatively homogeneous sample of bilingual participants from both the groups. However, English Canadians usually provide a larger diversity simply because of the larger population size. Many immigrants from Asia or Africa lose original identity within a couple of generations and become part of the unilingual (English speaking) 'Canadian' identity. Future studies can avoid this limitation and provide with a discussion in this regard.

The three-factor structure of ethnic change, as emerged in this study, is thought provoking. Disappearance of the factor 'language use' and 'ethnic identity' could not be explained. A recent study emerging from this analysis revealed that Language use and Ethnic identification forms a separate construct (Language identity) while the three factors proposed in this study (Language acculturation) stays as is (Aurup, Laroche, and Richard, 2024). Similar analysis of variance on this new construct would be a logical extension of this research.

The importance of this study goes way beyond the measurement of ethnic change of the two groups. Cross cultural studies look into the differences between two cultures/ethnic groups. However, the distinction between the effects of ethnicity of the groups and the language of the questionnaire is not made. This study shows that the differences can be because of the distinct identities of the groups, or it can be simply because of the language of the questionnaire. The use of a translated questionnaire is very common for studies involving non English-speaking groups. Often back translation is considered a valid means of having reliable responses. This study suggests that similar structures of studies should be introduced to rule out/isolate the effect of the language of the questionnaire. The support for the role of acculturation on second language responses is another important finding. Bilinguals with high proficiency often take surveys in their second languages or receive communication in their second languages. The study suggests that the careful choice of the languages of the questionnaire by organizations/ businesses may help them receive more meaningful responses.

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## Appendices

**Figure 1.1** FC-English Common Structure CFA Model: English Acculturation; $\chi 2=48.45$, df=41, P=0.20, CFI=0.99, RMSEA=0.03, SRMR=0.046 (ML estimator)

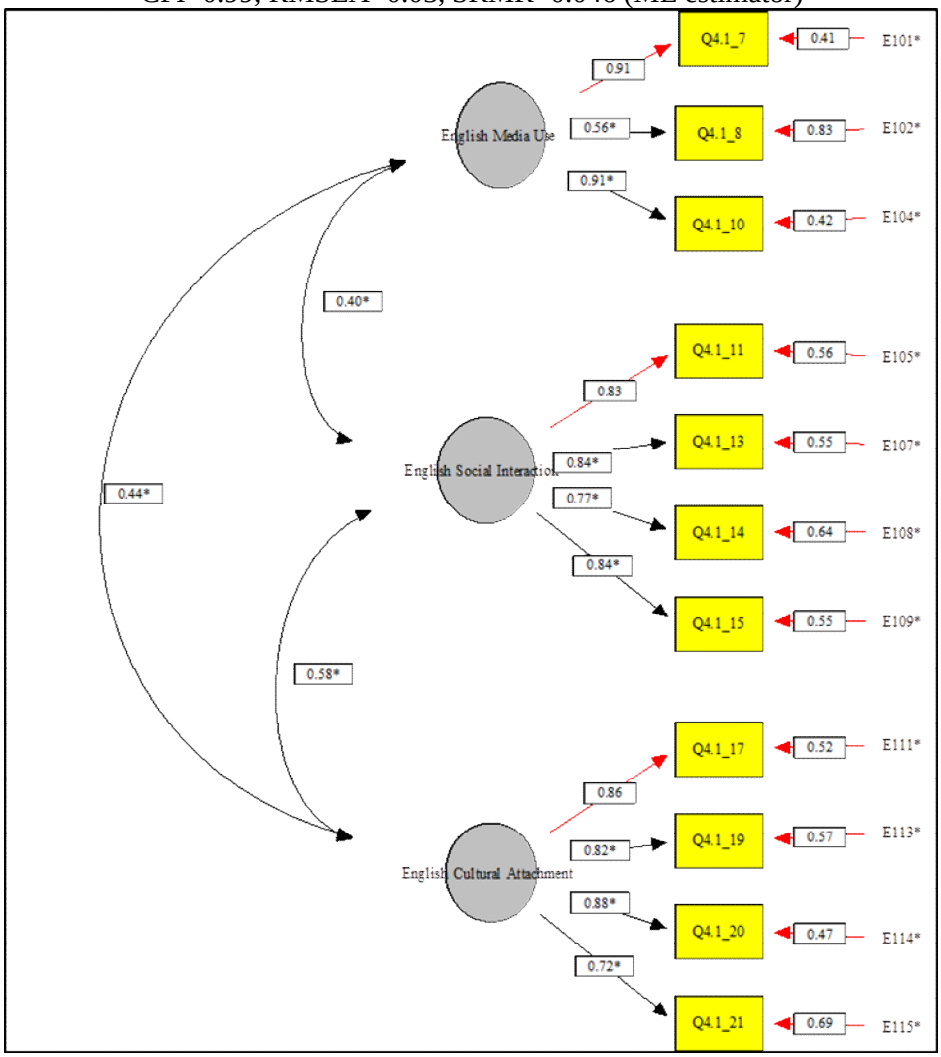


**Figure 1.2** Estimated Marginal Means for English Media Use

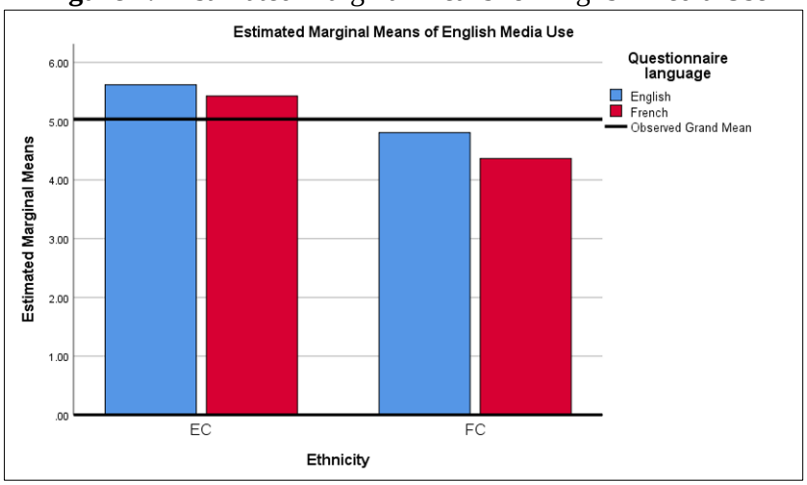



**Figure 1.3** Estimated Marginal Means for English Social Interaction

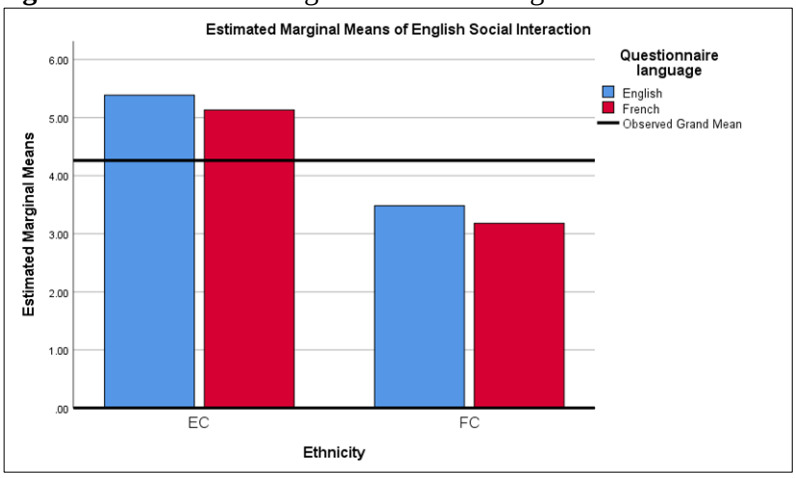



**Figure 1.4** Estimated Marginal Means for English Cultural Attachment

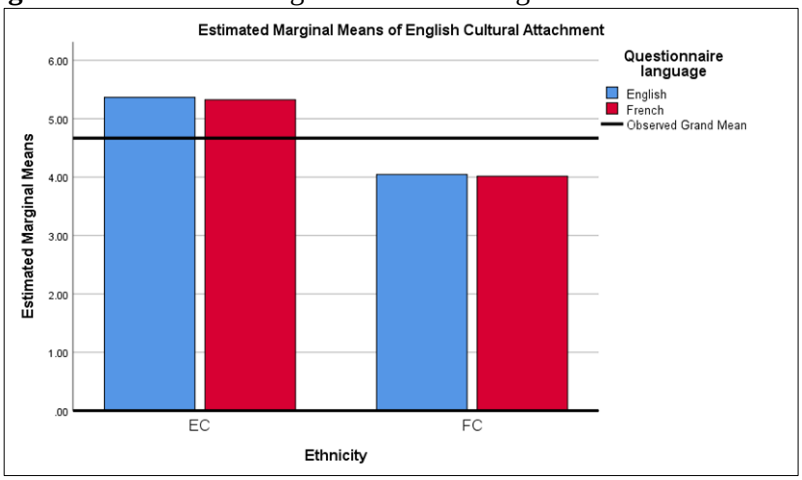


**Figure 1.5** Estimated Marginal Means for French Media Use

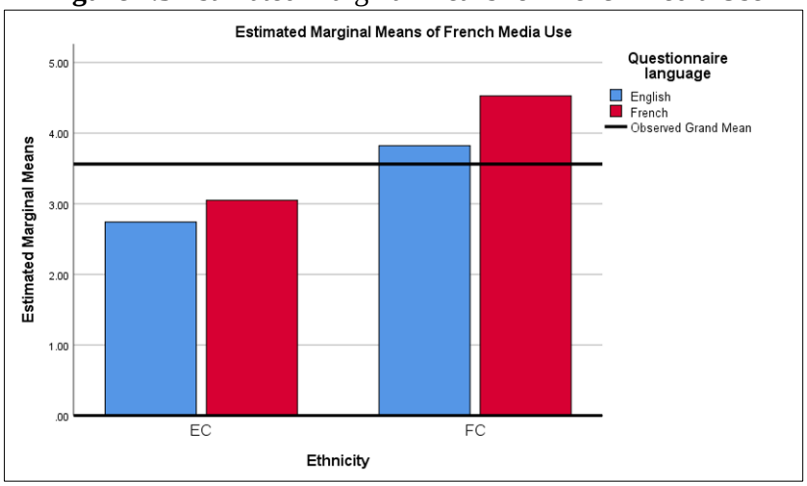



**Figure 1.6** Estimated Marginal Means for French Social Interaction

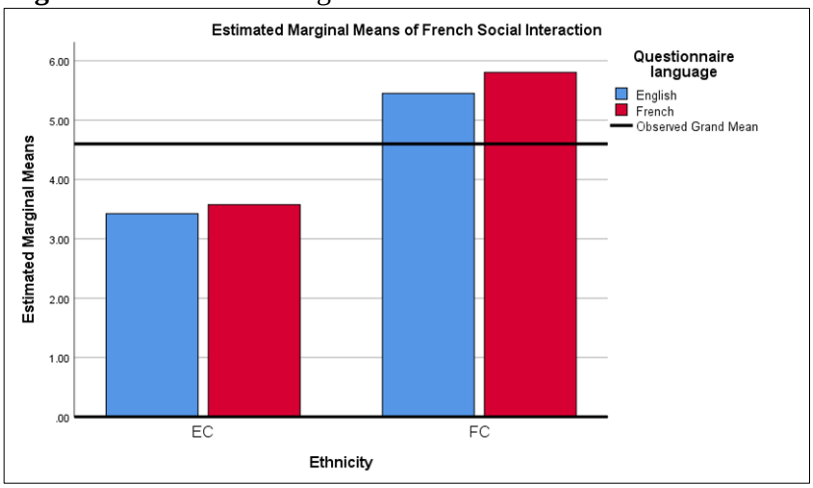



**Figure 1.7** Estimated Marginal Means for French Cultural Attachment

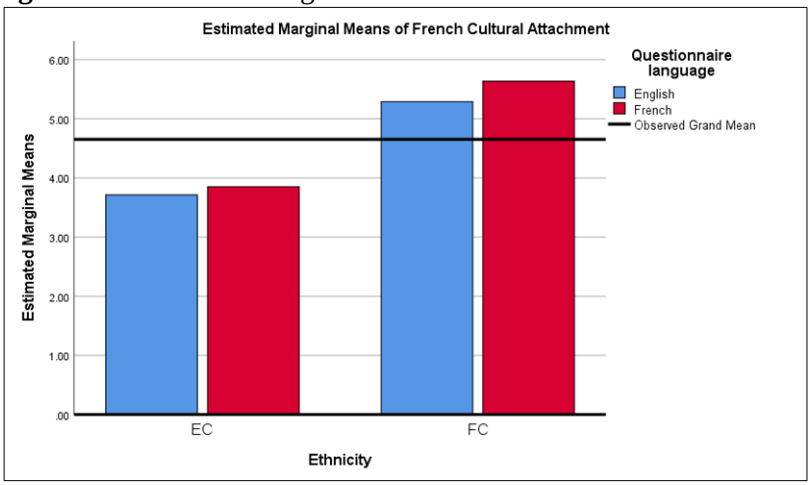


**Table 1.1** English Language Acculturation and Ethnic Identification Scale Items

| Factor | Item No | Item description |
|---|---|---|
| English Language Use | Q4.1_1 | I always speak English to my spouse |
| | Q4.1_2 | I always use English with my friends |
| | Q4.1_3 | I mostly think in English |
| | Q4.1_4 | In general, I speak in English |
| | Q4.1_5 | I mostly speak in English at family gatherings |
| | Q4.1_6 | I mostly carry on conversations in English every day |
| English Media Use | Q4.1_7 | The TV programs that I watch are always in the English language |
| | Q4.1_8 | The radio programs that I listen to are always in the English language |
| | Q4.1_9 | The newspapers and magazines that I read are always in the English language |
| | Q4.1_10 | The movies and DVDs that I watch are always in the English language |
| English Social Interaction | Q4.1_11 | Most of my friends are English speaking |
| | Q4.1_12 | Most of the people at the places I go to have fun and relax are English speaking |
| | Q4.1_13 | Most of the people I go to parties with are English speaking |
| | Q4.1_14 | I get together with English speaking people very often |
| | Q4.1_15 | I have many English speaking friends with whom I am very close |
| English Ethnic Identification and Attachment | Q4.1_16 | The English culture has the most positive impact on my life. |
| | Q4.1_17 | I feel very proud of the English culture. |
| | Q4.1_18 | I feel most comfortable in the English culture. |
| | Q4.1_19 | I feel a strong attachment to the English culture. |
| | Q4.1_20 | I feel very proud to identify with the English. |
| | Q4.1_21 | I consider the English culture rich and precious. |
| | Q4.1_22 | I have the sentiment of being ‘‘English speaking’’. |
| | Q4.1_23 | I consider myself to be "English speaking" |
| | Q4.1_24 | I would like to be known as ‘‘English speaking’’ by people of English descent. |

**Table 1.2** Demographic Compositions across Groups

| | | EC-English | | EC-French | | FC-English | | FC-French | |
|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % of Total | Freq. | % of Total | Freq. | % of Total | Freq. | % of Total |
| Age | 18-25 | 54 | 37.20 % | 57 | 36.80 % | 43 | 27.70 % | 35 | 21.30 % |
| | 26-40 | 91 | 62.80 % | 98 | 63.20 % | 112 | 72.30 % | 129 | 78.70 % |
| Gender | Female | 90 | 62.10 % | 96 | 61.90 % | 102 | 65.80 % | 114 | 69.50 % |
| | Male | 55 | 37.90 % | 59 | 38.10 % | 53 | 34.20 % | 50 | 30.50 % |
| Income | Less than $20,000 | 25 | 17.20 % | 34 | 21.90 % | 28 | 18.10 % | 23 | 14% |
| | $20,000-$39,999 | 26 | 17.90 % | 31 | 20% | 32 | 20.60 % | 40 | 24.40 % |
| | $40,000-$59,999 | 30 | 20.70 % | 30 | 19.40 % | 32 | 20.60 % | 37 | 22.60 % |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | $60,000-$79,999 | 21 | 14.50% | 24 | 15.50% | 22 | 14.20% | 23 | 14% |
| | $80,000 and up | 43 | 29.70% | 36 | 23.20% | 41 | 26.50% | 41 | 25% |
| Education | Primary School | 1 | 0.70% | 2 | 1.30% | 5 | 3.20% | 1 | 0.60% |
| | High School | 24 | 16.60% | 39 | 25.20% | 39 | 25.20% | 45 | 27.40% |
| | College (2 years) | 43 | 29.70% | 39 | 25.20% | 49 | 31.60% | 50 | 30.50% |
| | Bachelor's | 43 | 29.70% | 43 | 27.70% | 36 | 23.20% | 41 | 25% |
| | Professional Deg. | 13 | 9% | 18 | 11.60% | 9 | 5.80% | 22 | 13.40% |
| | Master's or PhD | 21 | 14.50% | 14 | 9% | 17 | 11% | 5 | 3% |

**Table 1.3** EFA on **English** Language Acculturation, Ethnic Identification and Attachment

| Group | Items retained in EFA | | |
|---|---|---|---|
| | Factor 1 **English** Social Interaction | Factor 2 **English** Media Exposure | Factor 3 **English** Cultural Attachment |
| EC-English | Q4. (2, 11, 13, 14, 15) | Q4. (7, 8, 9, 10) | Q4. (17, 19, 20, 21, 24) |
| EC-French | Same as above | Same as above | Same as above |
| FC- French | Q4. (11, 12, 13, 14, 15) | Q4. (7,10) | Q4. (17, 19, 20, 21) |
| FC-English | Same as above | Same as above | Same as above |

**Table 1.4** EFA on **French** Language Acculturation, Ethnic Identification and Attachment

| Group | Items Retained in EFA | | |
|---|---|---|---|
| | Factor 1 **French** Social Interaction | Factor 2 **French** Media Exposure | Factor 3 **French** Cultural Attachment |
| EC-English | Q5. (11, 12, 13, 14, 15) | Q5. (7, 8, 9, 10) | Q5. (17, 18, 19, 20, 21) |
| EC-French | Q5. (1, 2, 4, 5, 6) | Q5. (7, 8, 10) | Q5. (16, 17, 18, 19, 20, 21) |
| FC- French | Q5. (2, 3, 4, 5, 6) + (11, 13, 14, 15) | Q5. (7, 8, 9, 10) | Q5. (17, 19, 20, 21) |
| FC-English | Q5. (11, 12, 13, 14, 15) | Q5. (7, 8, 10) | Q5. (17, 18, 19, 20, 21) |

**Table 1.5** Proposed Common-Item Factorial Structure across Groups

| Factor No. | Factor Name | Item Numbers | Explanatory note |
|---|---|---|---|
| Factor F1 | English/French Media Use | Q (7,8,10) Note: Q9 is not included | Item Q8 was not present in EFA for English acculturation for FC-French and FC-English responses (present in 6 other groups). It is added to have a minimum 3 items in the factor. This item (listening to radio programs) is very similar to the included item 'watching TV programs'. |
| F2 | English/French Social Interaction | Q (11, 13, 14, 15) Note: Q12 is removed | These items from 'Social Interaction' factor are common in all conditions except for EC-French response for French acculturation. There, the items for the factor |

| | | | |
|---|---|---|---|
| | | | 'French language use' survived in the EFA. These two factors 'language use' and 'social interaction' are highly correlated (>0.85) in all conditions. So, items from 'social interaction' can be an alternate measure for French acculturation responses for EC-French condition. |
| F3 | English/French Cultural Attachment | Q (17, 19, 20, 21) Note: Q16 and Q18 removed | Items Q16 and Q18 were present in the conditions inconsistently. The other items appeared in all conditions consistently. |

**Table 1.6** Common Item Model Fit Indices All Groups, **Robust** ML Estimate

| Robust ML | Satorra- Bentler Scaled $\chi 2$ | df | p | $\chi 2$/ df | CFI | RMSEA | 90% CI |
|---|---|---|---|---|---|---|---|
| *English Acculturation* | | | | | | | |
| EC-English ) | 37.23 | 38 | .51 | .98 | 1 | .00 | .00, .057 |
| EC-French | 45.35 | 38 | .19 | 1.19 | .991 | .035 | .00, .069 |
| FC-French | 85.53 | 38 | .00 | 2.25 | .956 | .088 | .063, .11 |
| FC-English | 31.76 | 38 | .75 | .83 | 1 | .00 | .00, .041 |
| *French Acculturation* | | | | | | | |
| EC-English | 51.96 | 38 | .07 | 1.37 | .989 | .051 | .00, .082 |
| EC-French | 69.19 | 38 | .00 | 1.82 | .978 | .073 | .045, .1 |
| FC-French | 56.33 | 38 | .03 | 1.48 | .985 | .054 | .018, .08 |
| FC-English | 43.88 | 38 | .23 | 1.15 | .995 | .032 | .00, .067 |

**Table 1.7** Standardized Parameter Estimates **English Acculturation** (All Groups)

| | Latent Factors & Items | Standardized coefficients | | | |
|---|---|---|---|---|---|
| | | EC-English | EC-French | FC-French | FC-English |
| *F1* | *English Media Use* | | | | |
| | Q4.1_7 The TV programs that I watch are always in the English language | 0.89 | 0.84 | 0.87 | 0.91 |
| | Q4.1_8 The radio programs that I listen to are always in the English language | 0.78 | 0.84 | 0.47 | 0.56 |
| | Q4.1_10 The movies and DVDs that I watch are always in the English language | 0.79 | 0.83 | 0.91 | 0.91 |
| *F2* | *English Social Interaction* | | | | |
| | Q4.1_11 Most of my friends are English speaking | 0.87 | 0.81 | 0.90 | 0.83 |
| | Q4.1_13 Most of the people I go to parties with are English speaking | 0.94 | 0.89 | 0.86 | 0.84 |
| | Q4.1_14 I get together with English speaking people very often | 0.89 | 0.80 | 0.73 | 0.77 |
| | Q4.1_15 I have many English speaking friends with whom I am very close | 0.80 | 0.85 | 0.86 | 0.84 |
| *F3* | *English Ethnic Identification and Attachment* | | | | |
| | Q4.1_17 I feel very proud of the English culture. | 0.82 | 0.87 | 0.88 | 0.86 |
| | Q4.1_19 I feel a strong attachment to the English culture. | 0.87 | 0.87 | 0.90 | 0.82 |
| | Q4.1_20 I feel very proud to identify with the English. | 0.96 | 0.88 | 0.88 | 0.88 |
| | Q4.1_21 I consider the English culture rich and precious. | 0.88 | 0.75 | 0.74 | 0.72 |

**Table 1.8** Standardized Parameter Estimates for **French Acculturation** (All Groups)

| | Latent Factors & Items | Standardized Coefficients | | | |
|---|---|---|---|---|---|
| | | EC-English | EC-French | FC-French | FC-English |
| *F1* | *French Media Use* | | | | |
| | Q5.1_7 The TV programs that I watch are always in the French language | 0.96 | 0.90 | 0.93 | 0.94 |
| | Q5.1_8 The radio programs that I listen to are always in the French language | 0.89 | 0.92 | 0.60 | 0.68 |
| | Q5.1_10 The movies and DVDs that I watch are always in the French language | 0.88 | 0.87 | 0.81 | 0.92 |
| *F2* | *French Social Interaction* | | | | |
| | Q5.1_11 Most of my friends are French speaking | 0.85 | 0.83 | 0.84 | 0.83 |
| | Q5.1_13 Most of the people I go to parties with are French speaking | 0.89 | 0.86 | 0.78 | 0.88 |
| | Q5.1_14 I get together with French speaking people very often | 0.91 | 0.66 | 0.90 | 0.84 |
| | Q5.1_15 I have many French speaking friends with whom I am very close | 0.83 | 0.80 | 0.93 | 0.76 |
| *F3* | *French Ethnic Identification and Attachment* | | | | |
| | Q5.1_17 I feel very proud of the French culture | 0.88 | 0.81 | 0.86 | 0.90 |
| | Q5.1_19 I feel a strong attachment to the French culture. | 0.90 | 0.96 | 0.90 | 0.91 |
| | Q5.1_20 I feel very proud to identify with the French. | 0.86 | 0.92 | 0.94 | 0.94 |
| | Q5.1_21 I consider the French culture rich and precious. | 0.80 | 0.80 | 0.85 | 0.80 |

**Table 1.9** Factor Correlations for **English** Acculturation (All Groups)

| English Acculturation | Eng. Media Use * Eng. Social Int. | Eng. Social Int. * Eng. Cultural Attachment | Eng. Media Use * Eng. Cultural Att |
|---|---|---|---|
| EC-English | .61 | .65 | .55 |
| EC-French | .8 | .78 | .72 |
| FC-French | .41 | .64 | .44 |
| FC-English | .4 | .58 | .44 |

**Table 1.10** Factor Correlations for **French** Acculturation (All Groups)

| French Acculturation | French Media Use * French. Social Int. | French Social Int. * French Cultural Attach. | French Media Use * French Cultural Attach. |
|---|---|---|---|
| EC-English | .59 | .61 | .55 |
| EC-French | .76 | .71 | .57 |
| FC-French | .25 | .59 | .34 |
| FC-English | .39 | .5 | .47 |

**Table 1.11** Descriptive Statistics for MANOVA: English Acculturation

| | Ethnicity | Questionnaire language | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| English Media Use | EC | English | 5.6184 | 1.34485 | 145 |
| | | French | 5.4280 | 1.54805 | 155 |
| | FC | English | 4.8043 | 1.59987 | 155 |

| | | | | | |
|---|---|---|---|---|---|
| | | French | 4.3659 | 1.54471 | 164 |
| English Social Interaction | EC | English | 5.3879 | 1.50662 | 145 |
| | | French | 5.1323 | 1.46255 | 155 |
| | FC | English | 3.4823 | 1.52125 | 155 |
| | | French | 3.1814 | 1.49188 | 164 |
| English Cultural Attachment | EC | English | 5.3644 | 1.29904 | 145 |
| | | French | 5.3258 | 1.30687 | 155 |
| | FC | English | 4.0452 | 1.40735 | 155 |
| | | French | 4.0152 | 1.34654 | 164 |

**Table: 1.12** Tests of Between-Subjects Effects: English Acculturation

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Ethnicity | English Media Use | 135.925 | 1 | 135.925 | 59.177 | .000 |
| | English Social Interaction | 574.299 | 1 | 574.299 | 256.782 | .000 |
| | English Cultural Attachment | 267.042 | 1 | 267.042 | 148.413 | .000 |
| Questionnaire language | English Media Use | 15.272 | 1 | 15.272 | 6.649 | .010 |
| | English Social Interaction | 11.960 | 1 | 11.960 | 5.347 | .021 |
| | English Cultural Attachment | .181 | 1 | .181 | .101 | .751 |
| Ethnicity * Questionnaire language | English Media Use | 2.375 | 1 | 2.375 | 1.034 | .310 |
| | English Social Interaction | .079 | 1 | .079 | .035 | .851 |
| | English Cultural Attachment | .003 | 1 | .003 | .002 | .968 |

**Table 1.13** Univariate Effects of Ethnicity**:** English Acculturation

| | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|
| Dependent Variable | Ethnicity | Mean | Std. Error | Lower Bound | Upper Bound |
| English Media Use | EC | 5.523 | .088 | 5.351 | 5.695 |
| | FC | 4.585 | .085 | 4.418 | 4.752 |
| English Social Interaction | EC | 5.260 | .086 | 5.090 | 5.430 |
| | FC | 3.332 | .084 | 3.167 | 3.496 |
| English Cultural Attachment | EC | 5.345 | .077 | 5.193 | 5.497 |
| | FC | 4.030 | .075 | 3.883 | 4.178 |

**Table 1.14** Univariate Effects of Questionnaire Language: English Acculturation

| | Questionnaire | | | 95% Confidence Interval | |
|---|---|---|---|---|---|
| Dependent Variable | language | Mean | Std. Error | Lower Bound | Upper Bound |
| English Media Use | English | 5.211 | .088 | 5.039 | 5.383 |
| | French | 4.897 | .085 | 4.730 | 5.064 |
| English Social Interaction | English | 4.435 | .086 | 4.265 | 4.605 |
| | French | 4.157 | .084 | 3.992 | 4.321 |
| English Cultural Attachment[N.S.] | English [N.S] | 4.705 | .077 | 4.553 | 4.857 |
| | French [N.S] | 4.671 | .075 | 4.523 | 4.818 |

**Table 1.15** Hypothesis Testing: English Language Acculturation

| Dependent Variable | Comparison | Hypothesis | P value | Hypothesis Supported? | Direction of Mean Diff. |
|---|---|---|---|---|---|
| English Media Use | EC-English vs FC-French | $H_1$ | <.0001 | **Yes** | **Correct** |
| | EC-English vs. EC-French | $H_2$ | 0.23 | No | Correct |

| | | | | | |
|---|---|---|---|---|---|
| | FC-French vs. FC-English | $H_3$ | .01 | **Yes** | **Correct** |
| English Social Interaction | EC-English vs FC-French | $H_1$ | <.0001 | **Yes** | **Correct** |
| | EC-English vs. EC-French | $H_2$ | .13 | No | Correct |
| | FC-French vs. FC-English | $H_3$ | .07 | No | Correct |
| English Cultural Attachment | EC-English vs FC-French | $H_1$ | <.0001 | **Yes** | **Correct** |
| | EC-English vs. EC-French | $H_2$ | .76 | No | Correct |
| | FC-French vs. FC-English | $H_3$ | .84 | No | Correct |

**Table 1.16** Descriptive Statistics for Age as an Independent Variable: English Acculturation

| | Age | Mean | Std. Deviation | N |
|---|---|---|---|---|
| English Media Use | 18-25 | 5.0829 | 1.58138 | 189 |
| | 26-40 | 5.0140 | 1.59895 | 430 |
| English Social Interaction | 18-25 | 4.5437 | 1.72563 | 189 |
| | 26-40 | 4.1384 | 1.79420 | 430 |
| English Cultural Attachment | 18-25 | 4.7751 | 1.41625 | 189 |
| | 26-40 | 4.6194 | 1.52195 | 430 |

**Table 1.17** Descriptive Statistics for MANOVA: French Acculturation

| | Ethnicity | Questionnaire language | Mean | Std. Deviation | N |
|---|---|---|---|---|---|
| French Media Use | EC | English | 2.7402 | 1.52523 | 145 |
| | | French | 3.0495 | 1.74276 | 155 |
| | FC | English | 3.8215 | 1.87151 | 155 |
| | | French | 4.5285 | 1.59451 | 164 |
| French Social Interaction | EC | English | 3.4241 | 1.60520 | 145 |
| | | French | 3.5742 | 1.52633 | 155 |
| | FC | English | 5.4516 | 1.30063 | 155 |
| | | French | 5.8049 | 1.12999 | 164 |
| French Cultural Attachment | EC | English | 3.7138 | 1.52695 | 145 |
| | | French | 3.8516 | 1.64768 | 155 |
| | FC | English | 5.2903 | 1.31008 | 155 |
| | | French | 5.6357 | 1.24319 | 164 |

**Table 1.18** Tests of Between-Subjects Effects: French Acculturation

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Ethnicity | French Media Use | 253.114 | 1 | 253.114 | 88.620 | .000 |
| | French Social Interaction | 700.146 | 1 | 700.146 | 359.287 | .000 |
| | French Cultural Attachment | 436.089 | 1 | 436.089 | 211.166 | .000 |
| Questionnaire language | French Media Use | 39.874 | 1 | 39.874 | 13.961 | .000 |
| | French Social Interaction | 9.782 | 1 | 9.782 | 5.020 | .025 |
| | French Cultural Attachment | 9.014 | 1 | 9.014 | 4.365 | .037 |
| Ethnicity * Questionnaire language | French Media Use | 6.108 | 1 | 6.108 | 2.139 | .144 |
| | French Social Interaction | 1.595 | 1 | 1.595 | .818 | .366 |
| | French Cultural Attachment | 1.663 | 1 | 1.663 | .805 | .370 |

**Table 1.19** Univariate Effects of Ethnicity: French Acculturation

| Dependent Variable | Ethnicity | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|
| French Media Use | EC | 2.895 | .098 | 2.703 | 3.087 |
| | FC | 4.175 | .095 | 3.989 | 4.361 |
| French Social Interaction | EC | 3.499 | .081 | 3.341 | 3.658 |
| | FC | 5.628 | .078 | 5.475 | 5.782 |
| French Cultural Attachment | EC | 3.783 | .083 | 3.620 | 3.946 |
| | FC | 5.463 | .080 | 5.305 | 5.621 |

**Table 1.20** Univariate Effects of Questionnaire Language: French Acculturation

| Dependent Variable | Questionnaire language | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|
| French Media Use | English | 3.281 | .098 | 3.089 | 3.473 |
| | French | 3.789 | .095 | 3.603 | 3.975 |
| French Social Interaction [N.S.] | English | 4.438 | .081 | 4.280 | 4.596 |
| | French | 4.690 | .078 | 4.536 | 4.843 |
| French Cultural Attachment [N.S.] | English | 4.502 | .083 | 4.339 | 4.665 |
| | French | 4.744 | .080 | 4.586 | 4.902 |

**Table 1.21** Hypothesis Testing: French Language Acculturation

| Dependent Variable | Comparison | Hypothesis | P value | Hypothesis Supported? | Direction of Mean Diff. |
|---|---|---|---|---|---|
| French Media Use | EC-English vs FC-French | $H_1$ | <.001 | **Yes** | **Correct** |
| | EC-English vs. EC-French | $H_2$ | .1 | No | Correct |
| | FC-French vs. FC-English | $H_3$ | .0003 | **Yes** | **Correct** |
| French Social Interaction | EC-English vs FC-French | $H_1$ | <.0001 | **Yes** | **Correct** |
| | EC-English vs. EC-French | $H_2$ | .4 | No | Correct |
| | FC-French vs. FC-English | $H_3$ | <.001 | **Yes** | **Correct** |
| French Cultural Attachment | EC-English vs FC-French | $H_1$ | <.0001 | **Yes** | **Correct** |
| | EC-English vs. EC-French | $H_2$ | .45 | No | Correct |
| | FC-French vs. FC-English | $H_3$ | .01 | **Yes** | **Correct** |

**Table 1.22** Effect of Age on French Language Acculturation Factors

| Dependent Variable | Age | Mean | Std. Error | 95% Confidence Interval Lower Bound | 95% Confidence Interval Upper Bound |
|---|---|---|---|---|---|
| French Media Use | 18-25 | 3.347 | .132 | 3.087 | 3.608 |
| | 26-40 | 3.657 | .088 | 3.484 | 3.829 |
| French Social Interaction | 18-25 | 4.304 | .127 | 4.054 | 4.554 |
| | 26-40 | 4.730 | .084 | 4.565 | 4.896 |
| French Cultural Attachment | 18-25 | 4.311 | .120 | 4.075 | 4.547 |
| | 26-40 | 4.802 | .080 | 4.646 | 4.959 |

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# DRIVERS AND BARRIERS TO THE PURCHASE OF EVS PRE AND DURING COVID-19: INSIGHTS FROM NEW BRUNSWICK (NB) CONSUMERS

In this industry study, barriers to the adoption of EVs are investigated. Considering adoption barriers connected to socio-demographic behaviours and environmental and infrastructural concerns within an underrepresented population (i.e., one of the Atlantic Provinces) is one of the main research contributions of this project. In addition, utilizing new data collected pre-COVID-19 (2020) and during COVID-19 (2021) offers another unique feature of this study. A few important points were gleaned from our findings, which include, concern for the environment and offering a purchase incentive were still significant predictors of EV purchase intentions. The future perceived dominance of this type of technology also impacted purchase decisions in both years. Unlike earlier literature, we do not find that barriers such as battery capacity, increased capital cost, infrastructure, range anxiety, and cold climate represent barriers to the adoption of EVs for both years. And finally, in both samples, males within the 31+ age category were more likely to buy an EV.

## 1. Introduction

There has been a rise in awareness of the negative social and environmental consequences of gasoline and diesel auto-dominated transportation systems. The adverse outcomes include increased greenhouse gas emissions, a decline in air quality and instability in the supply and price of oil (Kotter, 2013). The transportation sector is responsible for 25% of GHG emissions in Canada, the second-largest emitting sector (ECCC, 2020). This has placed more attention on alternatives to internal combustion engines. Electric vehicles (EVs) are being presented as a solution. EVs are attributed to being environmentally friendly, operating without emission, and having low maintenance costs. However, attempts to change the existing transportation system have been difficult (White & Sintov, 2017). There are barriers connected to the population's reaction to environmental problems (a discrepancy between self-reported environmental stances and objective and observed behaviour), a lack of knowledge about EVs and established infrastructure considerations (refuelling stations, price of alternatives and dealer inventory). Although significant growth in the sale of EVs has been recorded in Canada, about 97% of the sales are in three provinces, namely British Columbia, Ontario, and Quebec. In contrast, the total sales of EVs in Atlantic Canada are significantly lower (Abotalebi et al., 2019). Unfortunately, studies completed in other provinces (e.g., Ontario, BC or Quebec) are not directly relatable to the Atlantic Canadian context because of its rural settlement, harsher climates, a higher proportion of low-income households and ties to regional inventory allocation. Thus, it is time to develop better theoretical frameworks for understanding and removing EV adoption barriers in these underrepresented provinces.

Based on a review of the existing literature, beyond a handful of studies that explored only limited factors and populations such as Ontario, British Columbia, and Quebec, much of the EV peer-reviewed research has largely ignored Atlantic Canada. However, according to Abotalebi et al. (2019) this region, which consists of four Canadian provinces, has fallen behind in EV sales. "As of mid-2018, a cumulative total of only 385 electric vehicles (or 0.4 EVs per 1000 households) have been sold in Atlantic Canada (Nova Scotia – 169; New Brunswick – 156; Prince Edward Island – 25; Newfoundland and Labrador – 35)" (2019, p. 289). Additionally, data collected does not reflect more recent changes in this region's buying patterns, business practices, technology, and global shifts (e.g., the COVID-19 pandemic) that would be impactful. As a result of this deficiency, it is valuable to review survey data collected from one of the four Atlantic Provinces. Thus, this study uses survey data collected in New Brunswick (NB) pre-COVID-19 (in 2020) and during the pandemic (in 2021) to draw some preliminary conclusions. If Canada wants to meet its target of 100% of new light-duty cars and passenger truck sales to be EVs by 2035, an examination of drivers and removal of barriers to adoption in these under-researched regions are essential.

Therefore, the purpose of this industry report is to explore: *1) why consumers in New Brunswick (a province in Atlantic Canada) are reluctant to purchase EVs, 2) what barriers to adoption they experience, 3) differences in consumers' perceptions, and 4) intention to purchase an EVs before and after the start of the COVID 19 pandemic.*

**In line with our research purpose, our main research questions are:**

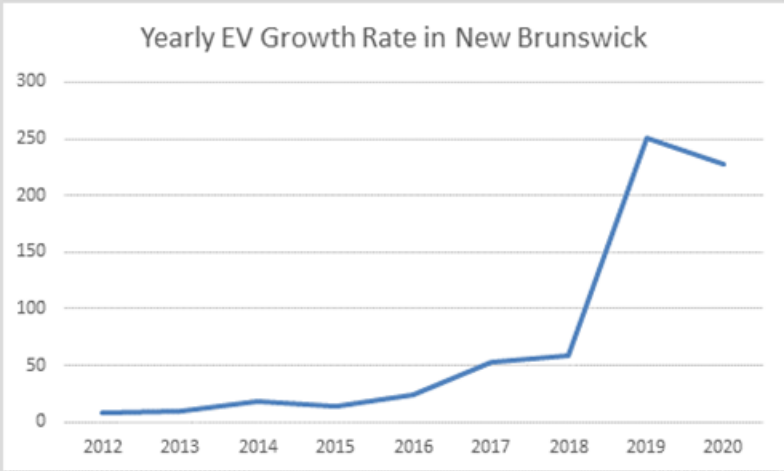
1. Do concerns about the environment play a role in the adoption of EVs?
2. Do socio-demographic aspects such as household size, number of children, number of family vehicles, income, age, gender, etc. play a role in the adoption of EVs?
3. Does the higher price of EVs or financial motives such as subsidies for EVs play a role in consumers' purchase intentions?
4. Do concerns about infrastructure like charging stations act as a barrier to the adoption of EVs?
5. Does a lack of familiarity with EVs (test drive, EV owners within a peer group, etc.) hinder adoption?
6. Has there been a difference in consumers' intention to purchase EVs before and during the COVID-19 pandemic?

## 2. Research On EVs

### 2.1 Drivers to the Adoption of EVs

Current drivers of EV adoption are environmental factors such as reduction in CO2 emission (Biresselioglu et al., 2018), economic measures i.e., purchasing cost, fuel prices or rebates (Sierzchula et al., 2014; Hahnel et al., 2014; O'Neill et al., 2019) and infrastructural features like vehicle-to-grid (V2G) systems, which offer the power capacity in parked vehicles to be used to return electricity to the grid or a home.

**Figure 1: Yearly EV Growth Rates in NB**



Obtained from P. Giasson, 2021, NB Natural Resources and Energy Development Department

Economic drivers of EV adoption may include purchase price and maintenance costs, fuel prices or rebates. There was also a spike in EV sales in NB after the 2019 announcement of purchase incentives from the federal government (Figure 1). However, using these factors to supplement the overall environmental benefits is best. O'Neill et al. (2019) found that EV adoption can be limited by a lack of ongoing promotion and awareness about EVs, an over-reliance on fiscal instruments and weak incentive policies. They also suggested that EV policy has been weakened by the avoidance of clear signals about the future of internal combustion engine vehicles, even as their use has been called into question internationally. Their findings offer insights into the need to maintain responsiveness when developing national EV policies as the development of plug-in technologies progresses. Targeting consumers can be advantageous when attempting to increase adoption. White & Sintov (2017) quantified the influence of separate aspects of symbolism on EV adoption intentions alongside instrumental, psychological, and demographic factors. They found there were differences in what boosted EV adoption intentions. Environmentalist symbolism was the strongest predictor of adoption. Second in strength was innovator symbolism (i.e., projecting an image of technological innovativeness), which predicted a willingness to lease/buy an EV. Instrumental attributes, as well as psychological and demographic factors, were a distant third. These results were noteworthy as they suggest that drawing attention to specific self-identities (environmental or technical influences) may be more effective in increasing adoption rates over emphasizing instrumental attributes (e.g., purchase cost, maintenance cost, fuel costs, access to charging outlets, etc.).

### 2.2 Barriers to the Adoption of EVs

She et al. (2017) explored EV adoption intentions using a sample of 476 urban respondents in Tianjin, China. They found that consumers had a "wait and see" attitude as they were concerned about EV safety, reliability, and range per charge. Respondents focusing on vehicle performance over environmental benefits express significantly lower EV acceptance. Poor public charging infrastructure ranked as the largest impediment. These are similar to other findings as outlined below.

• ***Purchase price disparity:*** The higher upfront cost of EVs vs. ICE (internal combustion engine) vehicles is a barrier. When products are compelling and priced right, there is high demand, but when the right balance is not achieved, the price can be a barrier to adoption. However, the existing literature concerning the impact of purchasing price on EV adoption has not reached a consensus. For instance, Münzel et al., (2019) analyzed data on EV sales from 32 European countries from 2010 to 2017. Their findings indicated that financial incentives positively impact EV adoption in the range of a 5-7% sales share

increase. In contrast, Dong et al., (2020) used subsidy levels to explore whether cost factors influence Chinese urban households' purchase intentions for electric vehicles in eight economic regions (or 30 provinces). They found that compared to subsidies, cruising power and charging facility availability were significantly more important for participants. This level of importance placed on the charging facilities could be connected to consumer perceptions about charging range and times and a lack of first-hand experience.

• ***Home Charging Access:*** Charging at home can be a challenge for those living in multi-unit residential buildings (MURBs) without dedicated garages or driveways. In large urban centers, the prevalence of MURBs can create additional technical and non-technical barriers that make it harder to install car park charging equipment (Ecology & Centre, 2020). The cost can also become a barrier. As of July 2021, the last Atlantic province (New Brunswick) came on board with provincial incentives for EV purchases meant to enhance the federal government's Canada-wide $5,000 EV rebate (Daniel-Rufiange, 2021). However, only PEI and New Brunswick offer incentives for a home charging station out of the four Atlantic provinces.

• ***Range anxiety and public charging access:*** "Gaps in geographic coverage of public infrastructure can limit the ability to undertake long-distance travel. In contrast, insufficient capacity of charging infrastructure can lead to concerns about the availability of the infrastructure and potential lineups. Both real and perceived lack of public charging stations results in barriers to EV adoption" (Ecology & Centre, 2020, p. 5).

• ***Lack of awareness and conflicting results increase confusion:*** A lack of familiarity (education and information) and social networks (friends who own EVs would expand the knowledge base) are barriers to adoption. "Limited information - or misinformation - about EVs, their availability, charging options, and total cost of ownership (TCO) can lead consumers to give outsized weight to the cost and risk of EVs relative to their benefits" (Ecology & Centre, 2020, p. 5). Thus, the key to success is to educate the public concerning the characteristics and benefits of an EV. Additionally, there are conflicting views about the energy performance of EVs and a divergence of opinions about the life-cycle assessment of EVs' environmental impact from raw-material extraction to the end-of-life. A lack of a standardized charging design and architecture has caused variability of EV performance attributes between the different charging design solutions (Arribas-Ibar et al., 2021).

• ***COVID-19:*** Finally, Arribas-Ibar et al. (2021) explored how COVID-19 could serve as an opportunity for innovations such as EVs by capitalizing on the disruption generated by the pandemic to break prior behavioural patterns. However, the authors are cautiously optimistic. The COVID-19 outbreak, as we now know, was a barrier as it created uncertainty within the automotive industry on the supply side through quarantined workforces, business shutdowns, and disrupted global supply chains (production plants have had to cease operations). According to economist Andrew Foran's (May 2024) TD Canadian automotive report, inventory levels fell for three straight years after the pandemic. And by 2023 North American light vehicle production was still 3.9% below 2019 levels. The increased production in 2023 had 2024 inventory levels the highest they had been in the last three years. Thus, it is still hard to anticipate what the 'new normal' will look like after the pandemic as it significantly accelerated and reconfigured existing economic trends. More insights into consumers' views are needed before definitive statements can be made.

### 2.1. Gap in EV Research in Atlantic Canada

***Canadian Studies:*** Concerning Canada, most of the studies (e.g., Ewing and Sarigöllü, 1998; Mohamed et al., 2016; Axsen et al., 2017; Potoglou and Kanaroglou, 2007; Abotalebi et al. 2020) primarily investigated factors associated with EVs purchase for Ontario, British Columbia or other regions. Except

for Abotalebi et al. 2019, little research empirically investigates factors that affect EV adoption rates in Atlantic Canada. We found only three main studies that explored this geographic area. Most noteworthy, Abotalebi et al. (2019) used the 2015 Survey for Preferences and Attitudes of Canadians towards Electric Vehicles dataset and examined the socio-economic, financial, and environmental aspects. The study found that cash incentives and the quality of the battery warranty encourage the purchase. In contrast, the price of EVs and public charging infrastructure significantly discourage the purchase of EVs in the Atlantic sample. The study also observed that driving range, maintenance cost, free parking, and access to high occupancy vehicle lanes do not significantly contribute to Atlantic Canadian EV consumers.

In another study conducted by Natural Resources Canada (2018), in addition to the lack of public charging infrastructure, incentives, and availability of dealerships, the study found that educating people about ZEVs and their benefits and providing test drives or awareness concerning ease of operation may enhance the sales of EVs in Atlantic Canada. The study also identifies systematic barriers[1] across the four provinces and people's concerns regarding the complexities of charging EVs. Natural Resources Canada (2018) also observed that the lack of public awareness and education about EVs is one of the main barriers to purchasing EVs in Atlantic Canada. For instance, several individuals believed that they would be left 'stranded' once they ran out of battery power. The study asserts that three leading provinces, Quebec, Ontario, and British Columbia, have implemented policies and programs to guide people and overcome these barriers. As a result, there has been significant growth in the sales of EVs in these areas from 2013 to 2017.

Though the Natural Resources Canada's 2018 report pointed out the role of some of the barriers, such as the lack of infrastructure buyers' perception concerning complexities in charging or financial incentives; nonetheless, the role of these factors has not been empirically tested in Canada.

Based on our review of the current literature and our knowledge, we observed that much of the peer-reviewed research on EVs does not include Atlantic Canada beyond the three studies that explored only limited factors and populations. Data collected does not reflect more recent changes in this region's buying patterns, business practices, technology, COVID-19 responses and global shifts that would be impactful. Therefore, designing and distributing new surveys and analyzing the related information is valuable. If Canada wants to meet its targets, it needs to examine barriers to adoption in these under-researched regions.

## 3. Theoretical Framework: Lewin's Change Theory

As with most disruptive technologies, EV adoption can be slow to materialize within the general population, but a lot can be learned from early adopters of the technology. Thus, those intending to purchase EVs during these early stages of market conversions can point to ways to decrease barriers and increase motivators of change. Why is this information important? Changing established patterns is difficult. Lewin's (1947) often cited three-step change model introduced the concept of a dynamic balance of forces that caused the behaviour to move in one of two directions. Driving forces initiate the need for thawing and reshaping behaviours. Barriers to change pushed back and restricted this movement. Resultantly, change drivers must apply more pressure than the barriers to change to reshape behaviours and recast them into a new form. This thaw, move and refreeze sequence is the basis of Lewin's change theory (Burnes, 2020). Taking change theory and overlaying it on EV adoption patterns can offer a helpful framing of the problems faced with technology acceptance.

## 4. Data Collection

This project uses secondary data collected by the New Brunswick Lung Association. Since 2016, the association has been collecting yearly data on EVs. Each year the survey participation levels have grown and in 2020 and 2021, there were enough responses to attempt a more in-depth form of analysis. The survey

was categorized into five sections: demographics, social, knowledge about vehicle's attributes, environmental and financial. As a result, we could examine the impacts of these interconnected factors in the adoption of electric vehicles. Close-ended questions were used in both surveys, though some questions were open-ended. Except for some variables where the data was provided on a Likert scale (1 to 5), dichotomous variables were mainly adopted in most of the questions.

As a result, this study adopted descriptive analysis to analyze the above-mentioned research questions. Following earlier studies (Chu et al., 2019; She et al., 2017; Wang et al., 2017), a non-parametric test was used to compare differences between two nominal groups. For the test of independence, when the number of observations was greater than 20 (per cell), Pearson's chi-square test statistic was employed to capture heterogeneity between the causes and consumer willingness to buy EVs. In cases where the number of samples was less than 20 (per cell), Fisher's exact test statistic was used. A standard 5% or 0.05 cut-off point was used to determine the significance level. We may conclude a significant difference between the two groups (intended to buy EV this year or not) when the associated p-value was found to be less than 0.05. All results are produced through Stata 16.

This study aims to investigate the willingness and the main barriers to the adoption of EVs in New Brunswick, Canada. We also explored if the pandemic (COVID-19) affected the willingness to buy EVs. We know that this event was impactful and worthy of a closer examination e.g., supply chain uncertainty, vehicle chip shortage, layoffs/reduced income, increase in work from home, and increased relevance of personal actions impacting public health, which is analogous to a driver of EV adoption (less polluting, less GHG, -> better planetary health for all). After cleaning the data and dropping observations where most answers were not specified, we have 383 and 573 observations for the 2020 and 2021 surveys, respectively.

To determine if knowledge about EVs impacts the willingness to purchase EVs, we have examined several variables, such as if the respondent has spoken with the owner of an EV, researched, heard, or experienced driving an EV. We also analyzed if the respondent considers their public image as the biggest advantage of EVs. Another related factor was if the consumer forecasted that EVs would be the dominant vehicle in the future. Air pollution, environmental concerns, and climate change are three questions that focus on environmental concerns to determine if they matter to consumers intending to purchase an EV. To assess the financial importance of the adoption of EVs, charging financial incentives and purchasing financial incentives are also discussed. The main barriers are investigated, such as battery capacity, increased capital cost, infrastructure (charging stations), travel range, and cold climate. To ascertain demographic factors, the role of gender, age, the highest level of education, household gross annual income, the number of vehicles in the household, fuel economy satisfaction, or the number of children with age under 18 are discussed.

## 5. Findings and Discussions

**Table 1: Summary of Hypotheses and Findings**

| Hypothesis: | Research Findings |
|---|---|
| **H1: Environmental concerns are likely to have a relationship with EV purchase intentions.** | support this relationship. |
| **H2: Knowledge about an EV is likely to have a relationship with EV purchase intention.** | support this relationship |

| | |
|---|---|
| **H3: Financial incentives and EV adoption are likely to have a relationship with EV purchase intention.** | support this relationship |
| **H4: Demographic factors are likely to have a relationship with EV purchase intention.** | partly support this relationship |
| **H5: There will be a difference in consumers' intention to purchase EVs pre and during the COVID-19 pandemic.** | partly support this relationship |

A few points came forward during the analysis. We have attempted to structure the results into tables based on our research questions and Lewin's assumption of competing forces (drivers vs. barriers).

**Table 2: Descriptive Statistics in the adoption of EV in New Brunswick (2020 data)**

| Variable | | Is anyone in the household intended to buy EV this year? | | | p-value |
|---|---|---|---|---|---|
| | | Yes | No | Total | |
| Have you spoken with the owner of an EV (any of the four brands*)? [1] | Yes | 132 (43%) | 23 (31%) | 155 (40%) | 0.0670 [2] |
| | No | 177 (57%) | 51 (69%) | 228 (60%) | |
| Have you researched about any of the EV (any of the four brands)? [1] | Yes | 203 (66%) | 26 (35%) | 229 (60%) | < 0.0001 [2] |
| | No | 106 (34%) | 48 (65%) | 154 (40%) | |
| Have you heard about any of the EV (any of the four brands)? [1] | Yes | 284 (92%) | 65 (88%) | 349 (91%) | 0.2687 [2] |
| | No | 25 (8%) | 9 (12%) | 34 (9%) | |
| Do you have experience of driving an EV (any of the four brands)? [1] | Yes | 88 (28%) | 10 (14%) | 98 (26%) | 0.0080 [2] |
| | No | 221 (72%) | 64 (86%) | 285 (74%) | |
| Do you consider public image the best advantage of EV? [1] | Yes | 4 (1%) | 6 (8%) | 10 (3%) | 0.0040 [3] |
| | No | 304 (99%) | 65 (92%) | 369 (97%) | |
| EV dominance in future [1] | Yes | 205 (66%) | 12 (16%) | 217 (57%) | < 0.0001 [2] |
| | No | 104 (34%) | 62 (84%) | 166 (43%) | |
| Do you consider environment the best advantage of EV? [1] | Yes | 167 (54%) | 15 (21%) | 182 (48%) | < 0.0001 [2] |
| | No | 141 (46%) | 56 (79%) | 197 (52%) | |
| How serious air pollution is a problem? [1] | I do not know enough about this issue | 5 (2%) | 2 (3%) | 7 (2%) | < 0.0001 [3] |
| | It could be a serious problem and we should take some action now | 90 (29%) | 26 (36%) | 116 (30%) | |
| | It is a serious problem and immediate action is necessary | 191 (62%) | 21 (29%) | 212 (56%) | |
| | It is not a problem and does not require any action | 4 (1%) | 5 (7%) | 9 (2%) | |
| | More research is needed before deciding if action should be taken | 18 (6%) | 19 (26%) | 37 (10%) | |
| How vital environmental activities are? [1] | Not a priority | 11 (4%) | 12 (16%) | 23 (6%) | < 0.0001 [2] |
| | Sometimes a priority | 60 (19%) | 31 (42%) | 91 (24%) | |
| | Generally a priority | 151 (49%) | 24 (32%) | 175 (46%) | |
| | Main lifestyle priority | 87 (28%) | 7 (9%) | 94 (25%) | |
| How serious climate change is a problem? [1] | I do not know enough about this issue | 6 (2%) | 2 (3%) | 8 (2%) | < 0.0001 [3] |
| | It could be a serious problem and we should take some action now | 43 (14%) | 15 (21%) | 58 (15%) | |
| | It is a serious problem and immediate action is necessary | 229 (74%) | 19 (26%) | 248 (65%) | |
| | It is not a problem and does not require any action | 5 (2%) | 13 (18%) | 18 (5%) | |
| | More research is needed before deciding if action should be taken | 26 (8%) | 24 (33%) | 50 (13%) | |
| Home charging financial incentive in category [1] | home charging cost< $500 | 49 (16%) | 19 (26%) | 68 (18%) | < 0.0001 [2] |
| | home charging cost>=$500 but <$1000 | 91 (29%) | 8 (11%) | 99 (26%) | |
| | home charging cost>=$1000 but <$5000 | 126 (41%) | 17 (23%) | 143 (37%) | |
| | home charging cost>=$5000 | 43 (14%) | 30 (41%) | 73 (19%) | |
| Purchasing financial incentive in category [1] | purchase incentive <$5000 | 60 (19%) | 18 (24%) | 78 (20%) | < 0.0001 [2] |
| | purchase incentive >=$5000 but<$10000 | 146 (47%) | 11 (15%) | 157 (41%) | |
| | purchase incentive >=$10000 | 103 (33%) | 45 (61%) | 148 (39%) | |
| Do you consider battery capacity the main concern of buying EV? [1] | Yes | 9 (3%) | 3 (4%) | 12 (3%) | 0.7083 [3] |
| | No | 300 (97%) | 71 (96%) | 371 (97%) | |
| Do you consider increased capital cost the main concern of buying EV? [1] | Yes | 110 (36%) | 11 (15%) | 121 (32%) | 0.0006 [2] |
| | No | 199 (64%) | 63 (85%) | 262 (68%) | |
| Do you consider infrastructure (charging stations) the main concern of buying EV [1] | Yes | 34 (11%) | 6 (8%) | 40 (10%) | 0.4645 [2] |
| | No | 275 (89%) | 68 (92%) | 343 (90%) | |
| Do you consider range anxiety the main concern of buying EV? [1] | Yes | 68 (22%) | 12 (16%) | 80 (21%) | 0.2711 [2] |
| | No | 241 (78%) | 62 (84%) | 303 (79%) | |
| Do you consider cold climate the main concern of buying EV? [1] | Yes | 53 (17%) | 20 (27%) | 73 (19%) | 0.0521 [2] |
| | No | 256 (83%) | 54 (73%) | 310 (81%) | |
| Gender [1] | Male | 201 (65%) | 57 (77%) | 258 (67%) | 0.0484 [2] |
| | Female | 108 (35%) | 17 (23%) | 125 (33%) | |
| Age [1] | 16-21 | 11 (4%) | 4 (5%) | 15 (4%) | 0.0298 [2] |
| | 22-30 | 39 (13%) | 5 (7%) | 44 (12%) | |
| | 31-45 | 107 (35%) | 15 (20%) | 122 (32%) | |
| | 46-64 | 106 (35%) | 33 (45%) | 139 (36%) | |
| | 65 and over | 44 (14%) | 17 (23%) | 61 (16%) | |
| Highest level of education [1] | Some high school | 1 (0%) | 0 (0%) | 1 (0%) | 0.3302 [2] |
| | High school diploma | 20 (7%) | 6 (8%) | 26 (7%) | |
| | Some Post-Secondary education | 59 (19%) | 14 (19%) | 73 (19%) | |
| | Post-Secondary Degree/Diploma | 157 (51%) | 45 (61%) | 202 (53%) | |
| | Post-Graduate Degree | 69 (23%) | 9 (12%) | 78 (21%) | |
| Gross annual household income [1] | Less than $50,000 | 75 (25%) | 18 (27%) | 93 (25%) | 0.8410 [2] |
| | $50,001-$75,000 | 70 (23%) | 17 (25%) | 87 (23%) | |
| | $75,001-$100,000 | 64 (21%) | 15 (22%) | 79 (21%) | |
| | $100,001-$150,000 | 65 (21%) | 10 (15%) | 75 (20%) | |
| | Over $150,000 | 31 (10%) | 7 (10%) | 38 (10%) | |
| Number of vehicles in hh [1] | 1 | 131 (43%) | 29 (39%) | 160 (42%) | 0.3654 [2] |
| | 2 | 153 (50%) | 36 (49%) | 189 (50%) | |
| | 3 or more | 22 (7%) | 9 (12%) | 31 (8%) | |
| Fuel economy satisfaction [1] | Very dissatisfied | 20 (7%) | 1 (1%) | 21 (6%) | 0.0012 [2] |
| | Dissatisfied | 67 (22%) | 6 (8%) | 73 (19%) | |
| | Neutral | 82 (27%) | 16 (22%) | 98 (26%) | |
| | Satisfied | 104 (34%) | 34 (46%) | 138 (36%) | |
| | Very satisfied | 34 (11%) | 17 (23%) | 51 (13%) | |
| How soon will your household buy its next vehicle? [1] | Within the next 6 months | 18 (6%) | 7 (9%) | 25 (7%) | 0.4629 [2] |
| | 6 months to a year from now | 36 (12%) | 7 (9%) | 43 (11%) | |
| | 1 to 2 years from now | 70 (23%) | 16 (22%) | 86 (22%) | |
| | 2 to 5 years from now | 127 (41%) | 24 (32%) | 151 (39%) | |
| | More than 5 years from now | 32 (10%) | 11 (15%) | 43 (11%) | |
| | I do not know | 26 (8%) | 9 (12%) | 35 (9%) | |
| Number of children under the age of 18 residing with you [1] | 0 | 198 (65%) | 63 (85%) | 261 (69%) | 0.0048 [3] |
| | 1 | 41 (13%) | 4 (5%) | 45 (12%) | |
| | 2 | 53 (17%) | 4 (5%) | 57 (15%) | |
| | 3 | 8 (3%) | 3 (4%) | 11 (3%) | |
| | 4 or more | 4 (1%) | 0 (0%) | 4 (1%) | |

* Four brands mean Hyundai Kona, Kia Niro, Nissan Leaf and Tesla models

1: n (column percentage)
2: Chi-squared test
3: Fisher's exact test

**Table 3: Descriptive Statistics in the adoption of EV in New Brunswick (2021 data)**

| Variable | | Is anyone in the household intended to buy EV this year? | | | p-value |
|---|---|---|---|---|---|
| | | Yes | No | Total | |
| Have you spoken with the owner of an EV (any of the four brands*)? [1] | Yes | 268 (62%) | 11 (8%) | 279 (49%) | < 0.0001 [2] |
| | No | 162 (38%) | 127 (92%) | 289 (51%) | |
| Have you researched about any of the EV (any of the four brands)? [1] | Yes | 342 (80%) | 22 (16%) | 364 (64%) | < 0.0001 [2] |
| | No | 88 (20%) | 116 (84%) | 204 (36%) | |
| Have you heard about any of the EV (any of the four brands)? [1] | Yes | 400 (93%) | 66 (48%) | 466 (82%) | < 0.0001 [2] |
| | No | 30 (7%) | 72 (52%) | 102 (18%) | |
| Do you have experience of driving an EV (any of the four brands)? [1] | Yes | 268 (62%) | 5 (4%) | 273 (48%) | < 0.0001 [2] |
| | No | 162 (38%) | 133 (96%) | 295 (52%) | |
| Do you consider public image the best advantage of EV? [1] | Yes | 14 (3%) | 6 (8%) | 20 (4%) | 0.1116 [3] |
| | No | 405 (97%) | 74 (93%) | 479 (96%) | |
| EV dominance in future [1] | Yes | 338 (81%) | 15 (18%) | 353 (70%) | < 0.0001 [2] |
| | No | 80 (19%) | 70 (82%) | 150 (30%) | |
| Do you consider environment the best advantage of EV? [1] | Yes | 236 (56%) | 13 (16%) | 249 (50%) | < 0.0001 [2] |
| | No | 183 (44%) | 67 (84%) | 250 (50%) | |
| How serious air pollution is a problem? [1] | I do not know enough about this issue | 2 (0%) | 1 (1%) | 3 (1%) | < 0.0001 [3] |
| | It could be a serious problem and we should take some action now | 190 (46%) | 25 (31%) | 215 (44%) | |
| | It is a serious problem and immediate action is necessary | 146 (36%) | 17 (21%) | 163 (33%) | |
| | It is not a problem and does not require any action | 6 (1%) | 11 (14%) | 17 (3%) | |
| | More research is needed before deciding if action should be taken | 65 (16%) | 27 (33%) | 92 (19%) | |
| How vital environmental activities are? [1] | Not a priority | 56 (14%) | 8 (10%) | 64 (13%) | < 0.0001 [2] |
| | Sometimes a priority | 135 (33%) | 24 (30%) | 159 (33%) | |
| | Generally a priority | 21 (5%) | 19 (23%) | 40 (8%) | |
| | Main lifestyle priority | 196 (48%) | 30 (37%) | 226 (46%) | |
| How serious climate change is a problem? [1] | I do not know enough about this issue | 2 (0%) | 3 (4%) | 5 (1%) | < 0.0001 [3] |
| | It could be a serious problem and we should take some action now | 191 (46%) | 21 (26%) | 212 (43%) | |
| | It is a serious problem and immediate action is necessary | 171 (42%) | 17 (21%) | 188 (38%) | |
| | It is not a problem and does not require any action | 2 (0%) | 16 (20%) | 18 (4%) | |
| | More research is needed before deciding if action should be taken | 46 (11%) | 24 (30%) | 70 (14%) | |
| Home charging financial incentive in category [1] | home charging cost< $500 | 153 (36%) | 26 (19%) | 179 (32%) | < 0.0001 [2] |
| | home charging cost>=$500 but <$1000 | 82 (19%) | 4 (3%) | 86 (15%) | |
| | home charging cost>=$1000 but <$5000 | 122 (28%) | 15 (11%) | 137 (24%) | |
| | home charging cost>=$5000 | 73 (17%) | 93 (67%) | 166 (29%) | |
| Purchasing financial incentive in category [1] | purchase incentive <$5000 | 91 (21%) | 25 (18%) | 116 (20%) | < 0.0001 [2] |
| | purchase incentive >=$5000 but<$10000 | 116 (27%) | 9 (7%) | 125 (22%) | |
| | purchase incentive >=$10000 | 223 (52%) | 104 (75%) | 327 (58%) | |
| Do you consider battery capacity the main concern of buying EV? [1] | Yes | 26 (6%) | 10 (12%) | 36 (7%) | 0.0685 [2] |
| | No | 389 (94%) | 74 (88%) | 463 (93%) | |
| Do you consider increased capital cost the main concern of buying EV? [1] | Yes | 106 (26%) | 15 (18%) | 121 (24%) | 0.1339 [2] |
| | No | 309 (74%) | 69 (82%) | 378 (76%) | |
| Do you consider infrastructure (charging stations) the main concern of buying EV [1] | Yes | 74 (18%) | 5 (6%) | 79 (16%) | 0.0065 [2] |
| | No | 341 (82%) | 79 (94%) | 420 (84%) | |
| Do you consider range anxiety the main concern of buying EV? [1] | Yes | 119 (29%) | 12 (14%) | 131 (26%) | 0.0063 [2] |
| | No | 296 (71%) | 72 (86%) | 368 (74%) | |
| Do you consider cold climate the main concern of buying EV? [1] | Yes | 65 (16%) | 14 (17%) | 79 (16%) | 0.8182 [2] |
| | No | 350 (84%) | 70 (83%) | 420 (84%) | |
| Gender [1] | Male | 311 (76%) | 68 (85%) | 379 (78%) | 0.0910 [2] |
| | Female | 96 (24%) | 12 (15%) | 108 (22%) | |
| Age [1] | 16-21 | 3 (1%) | 0 (0%) | 3 (1%) | < 0.0001 [2] |
| | 22-30 | 102 (25%) | 3 (4%) | 105 (21%) | |
| | 31-45 | 161 (39%) | 15 (19%) | 176 (36%) | |
| | 46-64 | 108 (26%) | 36 (45%) | 144 (29%) | |
| | 65 and over | 38 (9%) | 26 (33%) | 64 (13%) | |
| Highest level of education [1] | Some high school | 6 (1%) | 2 (3%) | 8 (2%) | 0.1734 [2] |
| | High school diploma | 42 (10%) | 13 (16%) | 55 (11%) | |
| | Some Post-Secondary education | 115 (28%) | 14 (18%) | 129 (26%) | |
| | Post-Secondary Degree/Diploma | 195 (47%) | 36 (46%) | 231 (47%) | |
| | Post-Graduate Degree | 55 (13%) | 14 (18%) | 69 (14%) | |
| Gross annual household income [1] | Less than $50,000 | 43 (11%) | 18 (26%) | 61 (13%) | 0.0012 [2] |
| | $50,001-$75,000 | 70 (17%) | 15 (22%) | 85 (18%) | |
| | $75,001-$100,000 | 157 (39%) | 14 (21%) | 171 (36%) | |
| | $100,001-$150,000 | 101 (25%) | 14 (21%) | 115 (24%) | |
| | Over $150,000 | 34 (8%) | 7 (10%) | 41 (9%) | |
| Number of vehicles in hh [1] | 1 | 259 (61%) | 46 (34%) | 305 (54%) | < 0.0001 [2] |
| | 2 | 156 (36%) | 71 (52%) | 227 (40%) | |
| | 3 or more | 13 (3%) | 19 (14%) | 32 (6%) | |
| Fuel economy satisfaction [1] | Very dissatisfied | 6 (1%) | 2 (1%) | 8 (1%) | 0.0002 [2] |
| | Dissatisfied | 54 (13%) | 10 (7%) | 64 (11%) | |
| | Neutral | 91 (21%) | 27 (20%) | 118 (21%) | |
| | Satisfied | 213 (50%) | 54 (40%) | 267 (48%) | |
| | Very satisfied | 61 (14%) | 43 (32%) | 104 (19%) | |
| How soon will your household buy its next vehicle? [1] | Within the next 6 months | 38 (9%) | 9 (10%) | 47 (9%) | < 0.0001 [2] |
| | 6 months to a year from now | 106 (25%) | 8 (9%) | 114 (22%) | |
| | 1 to 2 years from now | 111 (26%) | 16 (18%) | 127 (25%) | |
| | 2 to 5 years from now | 124 (29%) | 22 (24%) | 146 (28%) | |
| | More than 5 years from now | 31 (7%) | 18 (20%) | 49 (10%) | |
| | I do not know | 15 (4%) | 17 (19%) | 32 (6%) | |
| Number of children under the age of 18 residing with you [1] | 0 | 159 (39%) | 63 (79%) | 222 (45%) | < 0.0001 [3] |
| | 1 | 176 (43%) | 8 (10%) | 184 (37%) | |
| | 2 | 66 (16%) | 7 (9%) | 73 (15%) | |
| | 3 | 9 (2%) | 2 (3%) | 11 (2%) | |
| | 4 or more | 1 (0%) | 0 (0%) | 1 (0%) | |

* Four brands mean Hyundai Kona, Kia Niro, Nissan Leaf and Tesla models

1: n (column percentage)

2: Chi-squared test

3: Fisher's exact test

### 5. 1. Drivers

***Do concerns about the environment play a role in the adoption of EVs?***

Similar to the findings of (Biresselioglu et al., 2018), O'Neill et al. (2019) and White & Sintov (2017), environmental-related factors were statistically significant for intention to buy an EV in both years (p-values less than .05). For instance, 54% in 2020 and 56% in 2021 of the respondents who intended to buy an EV within the year considered the environment to be the best advantage of an EV.

In our study, participants' environmental concerns appear connected to tangible evidence. In the 2020 sample, 56 % of the respondents believed air pollution is a serious problem, and 30% felt it could be a serious problem. Interestingly, this concern appears to diminish in 2021 (i.e., 33% and 44%). It is not clear why concerns about the environment have diminished. It could be linked to reduced air pollution connected to decreased travel created by COVID lockdowns or something else entirely. This decrease is one to watch as these measures are important. They help to signal buying behaviours because, when combined, 91% in 2020 and 82% in 2021 of those who consider air pollution to be or could be a serious problem are significantly more likely to buy an EV. Intriguingly, a small portion of respondents who did not consider environmental activities a priority (4% in 2020 and 14% in 2021) were still willing to buy an EV in the same year.

Nevertheless, most respondents consider environmental activities from "sometimes" to a "main lifestyle" priority for both samples. In addition, most respondents intend to buy EVs based on the ecological benefits. Similarly, a significant number of respondents imagine that climate change is a serious issue; therefore, they were willing to buy an EV in both samples (2020 and 2021). For instance, 88% of the respondents in 2020 and 2021 who believe climate change is or could be a serious problem are likely to buy an EV. Biresselioglu et al., (2018) discussed how overall energy consumption could be significantly reduced by EV market penetration as a driver for attempting to increase EV adoption within the European Union (EU). Our findings explored environmental activism from the consumer point of view and found it to be a significant motivator for EV purchase intentions in our Canadian sample. This is good news as targeted consumer marketing messages can be structured around the environmental benefits of EVs; however, they need to follow a specific format.

White & Sintov (2017) found that environmentalist symbolism (projecting an image of environmentalism) was the strongest predictor of adoption. However, this aspect of symbolism did not appear to boost participants' intentions to adopt EVs for either year. Although purchases of EVs seem to have a relationship with personally held views about the environment, they do not appear to be connected to pressure from society or peers. Only 3% in 2020 and 4% in 2021 of the participants considered public image to be the major factor in buying an EV, and among these, merely 1% and 3%, respectively are willing to buy EVs in the same year. Nevertheless, the association is insignificant for the 2021 dataset (p-value is 0.1116). However, similar to O'Neill et al., (2019), views about the dominance of EV use in the future were impactful and statistically significant in both years (p-value=.000). For example, of the respondents who believe that EVs will dominate in the future, 66% (2020) and 81% (2021) are intending to buy an EV within a year. Thus, marketing messages should be structured to include environmental benefits and the future dominance of this type of technology.

***Do socio-demographic aspects such as household size, number of children, number of family vehicles, income, age, gender, etc., play a role in the adoption of EVs?***

It would appear there were some inconsistencies between the datasets regarding different demographic factors and their impact on the adoption of EVs. Concerning demographic characteristics, the highest level of education is not significantly associated with the intention to buy an EV for both years. The same insignificant nexus is found in the 2020 dataset for the gross household income, number of vehicles in the

household, or how soon the household is expected to buy the next vehicle. However, there was a significant relationship between the intention to buy an EV and some of these soci-demographic aspects in the 2021 dataset. For example, gross annual household income (p-value=.001), number of vehicles in the household (p-value=.000), how soon they will buy their next vehicle (p-value= .000) and number of children (p-value=.000) all demonstrated a significant relationship with intention to buy in 2021.

The gender of the respondents (p-value=.048) for the 2020 survey participants shows a statistically significant difference. Males represent 67% of survey respondents in 2020 and 78% in 2021. Like earlier literature (e.g., He et al., 2018; Prakash et al., 2014), we found that males (65% in 2020) were more statistically likely to buy an EV that year. The following year, 76% of males in 2021 stated they intended to purchase an EV within the year, which is greater than the female respondents. Still, there was no statistical relationship in the 2021 dataset (p-value=.091). These findings suggest more attention needs to be directed towards female drivers. This underrepresented group could be a good growth area in future years.

Age showed a statistically significant relationship to buying intentions for both years (p-value=.029 in 2020 and p-value=.000 in 2021). Those over 31 years old attracted the most attention in the 2020 dataset (70% in 2020). Still, the distribution became more refined the following year (2021), with the 31 to 45-year-old category representing the largest proportion (39% of those planning to purchase an EV that year).

Households with children under 18 years of age residing with them were significantly (p-values below .05) related to purchasing attention both years. However, there were differences between years, with the largest proportion of respondents in 2020 (65%) not reporting any children and 13% having one child, while in 2021 the largest portion (43%) had one child.

There were a few interesting points when examining gross annual household income. First, in 2020, the category with the largest percentage of those planning to buy an EV that year was earning less than $50,000 (25%), with those making $75,000 per year following close behind at 23%. However, the percentages shifted slightly in 2021 to the largest percentage (39%) falling in the $75,000 to $100,000 range. Additionally, households earning less than $50,000[2] annually who are willing to buy an EV decrease to 11% in 2021. The final point of interest was that families earning $100,000 or less per year were statistically more likely to buy an EV that year (p-value=.00 in 2021) with similar percentages across the two years (69% and 67% for 2020 and 2021). This result means that households with incomes between $100,000 and $150,000 only had 21% in 2020 and 25% in 2021, respectively, and were planning on buying an EV that year. The figure drops lower for those earning over $150,000 as those in this income range intending to buy an EV that year accounted for only 10% in 2020 and 8% in 2021. This finding goes against the widely held belief that environmental expression can be based on symbolic public perceptions (White & Sintov, 2017). These higher income groups may not view EVs as luxury vehicles, so they are not as interested in their purchase.

### 5.2. Barriers

***Do concerns about infrastructure like charging stations act as a barrier to the adoption of EVs?***

Statically significant differences in responses were found in both years (2020 and 2021) for home charging financial incentives and purchase incentives. Statistical differences were also found for the increased capital costs (2020 and 2021). The importance of these economic drivers was not surprising as this falls in line with extensive prior research ( Hahnel et al., 2014; Sierzchula et al., 2014; O'Neill et al., 2019; Dong et al., 2020). However, what was noteworthy was the decrease in worry about battery capacity. This had been a

[2] The GDP per capita income for the year 2020 was observed $ 49,218 in New Brunswick (Statistics Canada, 2021)

contentious point in prior findings within Canada (Abotalebi et al., 2019; Natural Resources Canada, 2018). This fear appears to be changing. Despite travel distances in Canada, which can be greater than in other countries, most responders do not consider battery capacity a major concern of EVs. For instance, only 3% of the 2020 and 7% of the 2021 responders believe that battery capacity is a major barrier to buying an EV. Moreover, 97% of the 2020 and 94% of the 2021 responders who do not consider battery capacity a major concern intend to buy an EV. This change in views could be connected to increased charging stations within the Atlantic provinces in the last few years. This shift in viewpoint would fit Dong et al. (2020), as they found that throughout 30 provinces in China, cruising power and charging facility availability, which are directly connected to battery capacity limitations, held significantly more importance than subsidies.

What was also interesting was the participants' views on the increased capital costs of buying an EV. This question was significant (p-value= .00) for both 2020 and 2021. Those who will not buy an EV in the coming year are not concerned about the increased capital costs over conventional automobiles. This finding makes sense as they were not intending to buy an EV anyway. Notably, only 36% (2020) and 26% (2021) of those planning to buy an EV reported finding that higher capital costs are the main concern for purchasing an EV. This means that 64% of participants in 2020 and 74% in 2021 who report wanting to buy an EV that year do not find the capital cost their primary concern. It would be interesting to find out why these participants do not fit with prior research findings (Sierzchula et al., 2014; Hahnel et al., 2014; O'Neill et al., 2019). It could be connected to the responses surrounding incentives. With many provinces starting to offer purchase incentives for EVs, these participants may view the purchase cost as less of a concern based on the introduction of these types of rebates. This would be logical as financial incentives were statistically significant (p-values below .05) in both years.

Contrasting the existing literature (Ecology & Centre, 2020; She et al., 2017), our samples for the years 2020 and 2021, respectively, showed that 90% and 84% do not consider infrastructure (charging stations) as a major concern in buying EVs. Among those who do not consider infrastructure (charging stations) a major barrier, 89% and 82% were likely to buy an EV for each of these two years. Similarly, 79% and 81% do not consider range anxiety and cold climate, respectively, to be the major barriers to purchasing EVs for the sample of 2020. Similar findings were reported in the 2021 sample regarding range anxiety and cold climate (74% and 84%, respectively).

***Does the higher price of EVs or financial motives such as subsidies for EVs play a role in consumers' purchase intentions?***

Financial incentive measures, which were taken as two categorical variables, such as the home charging financial incentives and purchasing financial incentives, are significantly associated with intentions to buy an EV for both year's samples. Of those intending to purchase an EV in 2020, over 50% (more precisely, 29% and 41%) of the respondents wanted home charging incentives between $500-$1000 and $1000-$5000. This changed slightly in 2021, as 36% of those who intended to purchase an EV that year would be satisfied with home charging incentives as low as less than $500, or the other large grouping (28%) was for those who wanted between $1,000-$5,000. Most of the respondents who wanted to purchase an EV that year and wanted a hefty home charging incentive of over $5,000 were a smaller portion, 14% in 2020 and 21% in 2021. This seems to point to more knowledge among this group. Home charging stations usually do not cost over $5,000, so it would be unlikely that incentives would be this large. This lack of knowledge about the actual cost of home charging infrastructure was confirmed by those not intending to purchase an EV in the year. Most of this group wanted home charging incentives of over $5,000 (41% in 2020 and 67% in 2021). This lack of knowledge identifies the need for more education and information offered through a targeted marketing effort. It could be viewed as a significant barrier to change if those on the fence about buying an EV believe the infrastructure costs are this high.

Considering purchasing incentives, 80% of the responders who intend to buy an EV that year expect over $5000 in government support (47% and 33% expect that purchase incentive to be $5,000-$10,000 and over $10,000, respectively, for 2020). Similar results were identified in 2021, with 79% (27% and 52% expecting purchase incentives to be $5,000-$10,000 and over $10,000, respectively). Those who did not intend to

purchase an EV that year were looking for higher purchase incentives of over $10,000 (61% in 2020 and 75% in 2021). Thus, both groups (those who were going to buy and those who were not going to buy that year) wanted purchase incentives of over $5,000 for both years. Our results are in line with earlier findings (Habich-Sobiegalla et al., 2018; Sierzchula et al., 2012; X. Zhang et al., 2018b) that government incentives such as purchase incentives given at the time of EV purchase, exemption from toll and parking charges, reduction in acquisition tax and charging infrastructure incentives have a significant impact on consumers' buying intentions.

### 5.3. Removing Barriers Through Education and Access:

***Does a lack of familiarity with EVs (test drive, EV owners within peer groups, etc.) hinder adoption?***

Most measures that demonstrated familiarity with EVs offered statistically significant differences between those who wanted to buy an EV that year and those who did not intend to buy one. This speaks to the importance of information and education when attempting to change consumers' purchase intentions. Forty-three % in 2020 and 62% in 2021 of those who had spoken with the owner of an EV are willing to buy an EV in the same year. It would appear that a lack of familiarity was a barrier for many respondents based on the statistical differences for both years. In the 2021 dataset, speaking to an owner of an EV, research on EVs, hearing about the EV brands and experience driving an EV were statistically significant (p-values below .05). Similar findings were found in the 2020 dataset for a few of these categories. However, the association between buying an EV and speaking to an owner was insignificant for 2020 (p-value is 0.0670), and so was hearing about four of the EV brands (p-value=.269).

The samples show that 66% in 2020 and 80% of consumers in 2021 who have conducted research are significantly associated with the intention to buy EVs for both surveys. About 92% and 93% of respondents had heard about the specifications of an EV for the 2020 and 2021 datasets, respectively. Among those, 92% and 93% are likely to buy an EV in the same year for 2020 and 2021, respectively. Interestingly, 26% and 48% of all respondents had experienced driving an EV for the 2020 and 2021 datasets, respectively. We also see some interesting points when examining those who intended to buy an EV that year. In 2020, only 28% of those who intend to buy an EV that year had experience driving any brand of EV. This figure rose to 62% in 2021, representing increased familiarity with the EV brands in just one year. It is also noteworthy that there is a significant increase in the willingness to buy an EV if the respondent has practical experience and linked knowledge (Matthews et al., 2016; Sovacool & Hirsh, 2009; Thøgersen & Ebsen, 2019).

***Has there been a difference in consumers' intention to purchase EVs pre and during the COVID-19 pandemic?***

Government support is a noteworthy driver for the purchase of EVs, and the pandemic appears to be increasing the need for government intervention. In 2021, 80% of the respondents expected over $5000 in government support (22% and 58% expect that purchase incentive to be $5000-$10000 and over $10000, respectively, for the year 2021). Due to COVID, a greater percentage of respondents are expecting higher government support. For instance, 58% of all respondents in 2021 wanted government purchase incentives for over $10,000, up from 39% in 2020.

There is also a slight shift in views about how many vehicles are needed within a household. Fifty % of all respondents had two vehicles in 2020, with this figure falling to 40% in 2021. This change in the number of vehicles within households was also seen among those who intended to buy an EV that year. Fifty % in 2020 had two vehicles in the household, but this fell to only 36% in 2021. Over 60% of those who intended to buy an EV that year stated they only had one vehicle in the household in 2021. This was a noteworthy increase from the 43% reported in 2020. This could mean responders could be travelling less for work

because of COVID-19, as Chokshi and Katz (2020) suggested, so there is less need for multiple vehicles, or it could mean more consumer trust in EVs as primary vehicles.

Interestingly, the gross household annual income was not significantly associated with the adoption of an EV in 2020, but it was significantly related in 2021. Household income measures were broken down in detail in a prior section, so they will not be repeated here. But it is important to point out that in 2020, the category with the largest percentage of those who were planning to buy an EV that year was for those earning less than $50,000 (25%), but in 2021 the largest percentage (39%) was in the $75,000 to $100,000 range. Additionally, households earning less than $50,000 annually who are willing to buy an EV decreased to 11% in 2021 from 25% in 2020.

Fuel economy satisfaction was statistically different between the two groups in both samples (pre and during COVID-19). This is interesting as for all participants, 61% were either satisfied (48%) or very satisfied (13%) with their fuel economy in 2021, which is higher than the 49% who were either satisfied (36%) or very satisfied (13%) in 2020. This could be connected to the lower gas prices reported during the pandemic. However, it is interesting to note that the financial pressures caused by COVID-19 do not appear to have adversely affected the adoption of EVs in NB. In other words, we may conclude that our results contradict earlier findings (Achille & Zipser, 2020; Peng & Chen, 2021) that observed that the ongoing pandemic has decreased consumers' desire for luxury items and that they are more inclined to purchase basic items or save their assets. The possible reason for our result is associated with the Canadian federal and provincial governments' support since the pandemic could have lowered the financial impact of the pandemic on household's lifestyles.

## 6. Conclusions

The purpose of this research was to gain more insight into why consumers in Atlantic Canada may be reluctant to purchase an EV, what barriers they experienced, what differences there were with consumers' perceptions of EVs, and to track intention to buy an EV before and after the start of the COVID-19 pandemic. To answer these questions, this study took EV data sets for the years 2020 and 2021 and used them to explore financial, socioeconomics, demographic and environmental factors associated with the adoption of electric vehicles in a relatively small Canadian province, New Brunswick. We also examined the main obstacles and impact of the contemporary pandemic on the purchase of EVs in NB by comparing datasets from 2020 and 2021. Our results show a statistically significant relationship between environmental concerns and intention to purchase an EV within a year. Additionally, some social factors, such as whether the respondents had spoken with the owner of an EV or even heard about EVs, had a significant association with the adoption of EVs in 2020. In contrast, survey participants did not express concern about their public image while purchasing EVs. Thus, other social factors such as EV driving experience or having completed research about EVs were more likely to shape the procuring of EVs than worry about societal or peer group pressures.

Unfortunately, beyond press releases that outline the very recent EV incentive program (which came after data for this article was collected), the NB government has not actively participated in creating public awareness for EV alternatives. The government has relied on NB Power and the NB Lung Association's EV awareness campaign programs to provide information about environmental concerns in the region. It is interesting that in our study, participants considered environmental concerns as an issue, and they were significantly more likely to purchase EVs due to environmental reasons. This suggests government support would fit with taxpayer's wishes. Now that NB's incentive program has come online (July 2021), results in future data collection periods may demonstrate even more consumer acceptance. Earlier studies (Biresselioglu et al., 2018; Kim & Heo, 2019; Zarazua De Rubens, 2019) had suggested that when the

government supported setting up home battery charging stations or offering purchase rebates, shoppers were more likely to acquire EVs in the same year.

Unlike earlier literature, we do not find that barriers such as battery capacity, increased capital cost, infrastructure, range anxiety, and cold climate represent barriers to the adoption of EVs for both years. The possible reasons could be that consumers have become more informed about driving patterns and the availability of charging stations. We also found that gender is weakly related to buying EVs in NB. Additionally, our results indicate that fuel economy satisfaction and the number of kids under 18 likely influence EV buyers. The rest of the factors are either significant for one year and not the other year or insignificantly associated with the adoption of EVs.

The survey findings benefit fellow researchers and offer policymakers, entrepreneurs and organizations (e.g., Lung Association, etc.) who want to promote EVs insights into motivations, barriers, and social factors influencing EV purchases. Among the findings, most notably for policymakers, was that in NB, males over 31 years of age were most likely to express a desire to purchase an EV. This means that younger people and women were population segments that would benefit from further outreach. Additionally, based on the above results, experience driving an EV was a significant factor in the intention to procure an EV. Based on the prior literature, we know that government interventions increase EV adoption rates. Thus, we recommend more targeted marketing efforts (e.g., advertisement of government incentive programs) that should be done in tandem with test-driving events to provide hands-on EV experience to more Atlantic Canadians. Further data collected from other Atlantic provinces would be beneficial as it could provide important insight into target populations and signal areas for future education about the benefit of EV events to provide hands-on EV experience to more Atlantic Canadians. Further data collected from other Atlantic provinces would be beneficial as it could provide important insight into target populations and signal areas for future education about the benefit of EVs.

In conclusion, the transition to electric vehicles in Atlantic Canada is an environmental imperative and an economic opportunity. By leveraging insights from this research and implementing the recommended strategies, the region can enhance EV adoption, contribute to global climate goals and improve the quality of life for its residents. Continued research and data collection will be essential to monitor progress, refine strategies and ensure that the benefits of electric vehicles are realized across all communities in Atlantic Canada.

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# TOWARDS AGENTIC YOUTH ENGAGEMENT: A YOUTH PARTICIPATORY ACTION RESEARCH STUDY

The aim of this study is to explore the social phenomenon of youth engagement and contribute to its theorization and conceptualization. This study asks: "how can youth help us understand agentic youth engagement? The study applies youth participatory action research (YPAR) and interpretative phenomenological analysis. The study involves youth ages 15-18, engaged in peer research. This study extends our understanding and conceptualization of the phenomenon of youth engagement (as informed by youth perspectives). This study has two key findings which inform our understand of agentic youth engagement: (1) a convergence of motivations may be necessary to foster engagement, and (2) this convergency may assist in helping to shape an internal locus of control and thus lead to youth engagement. Environment is one example where such convergences may occur and thus it acts as both a motivation but also an enabler (or barrier). The novelty of this study stems from the dual role that youth play as both youth researchers and participants. Their emic insights, through model of youth participatory action research, contribute to new theorizing regarding youth engagement.

## 1. Introduction

The aim of this study is to explore the social phenomenon of youth engagement and contribute to its theorizing and conceptualization. First, this study reveals motivations for engagement as defined and described by youth. Secondly, the study exposes youth perceptions regarding inhibiting or facilitating factors affecting their engagement and perseverance in activities. Third, this study examines the role of an internal locus of control orientation and a disposition towards engagement. This study asks: "how can youth help us understand agentic youth engagement?" The research study applies a model of youth participatory action research (YPAR) (author, 2024) and interpretative phenomenological analysis (IPA) (Smith and Osborn, 2004). The novelty of the study stems from the dual role youth play; serving as both youth researchers and participants. Their collective insights expand our understanding of youth engagement as a prosocial behaviour. We hope to inform future research on youth engagement. Additionally, we believe there are practical implications relevant to youth serving organizations, educators, caregivers and advocates.

Youth engagement is variously described and defined in the literature. In an institutional context it often considers youth involvement in decision making and policy to ensure such practices are responsive and relevant to youth (Augsberger *et al.*, 2023). In an educational environment, youth engagement considers positive social connection, academic success, motivational drivers and other factors which may further characterize a thriving context where youth can develop (Debnam *et al.*, 2014; Bowles, Scull and Jimerson, 2022). Further, educators see a relationship between school engagement and academic success, including decreased dropout rates and increased graduation rates (Debnam *et al.*, 2014). Engagement in a research context is also seen as a way to promote intergenerational dialogue, reduce power imbalances and empower

youth (Nesrallah *et al.*, 2023). Generally, youth engagement is seen as positive and central to understanding how to support positive development. However, youth engagement is complex and is not well understood (Simmons *et al.*, 2021).

This paper is organized in the following way. We first review the literature on youth engagement which highlights our theoretical entry points. We then review our methodological approach, combining a model of youth participatory action research (author, 2024) and interpretive phenomenological analysis (Smith and Osborn, 2004). In our findings and analysis section, we share data which highlights motivations for youth engagement, perceptions of barriers and enablers, and evidence of both internal and external locus of control orientation. Our discussion unpacks our findings and links back to theory and literature to illustrate implications. We have two key findings and contributions which inform our understand of agentic youth engagement: (1) a convergence of motivations may be necessary to foster engagement. (2) This convergency may assist in helping to shape an internal locus of control and thus lead to youth engagement. Environment is one example where such convergences may occur and thus it acts as both a motivation but also an enabler (or barrier). We conclude by returning to the aim of our study.

## 2. Literature Review and Theoretical Engagement

### 2.1 Youth Engagement

Youth that participate in meaningful activities benefit from personal growth, developmental skills. They also think more proactively about their futures (Simmons *et al.*, 2021). Additionally, research suggests that youth who are engaged in meaningful activities develop important social and cognitive skills and a better connection with their community (Simmons *et al.*, 2021). A succinct definition of youth engagement is a bit challenging. For instance, Farthing (2012) defines youth participation (engagement) as “a process where young people, as active citizens, take part in, express views on and have decision-making power about issues that affect them” (Farthing, 2012, as cited in Simmons *et al.*, 2021, p. 1003). Another definition characterizes youth engagement as “meaningful and sustained involvement in an activity outside of the self” (Pancer, Rose, Krasnor & Loiselle, 2002, as cited in Ramey *et al.*, 2015). Therefore, it is useful to think of youth engagement as both the propensity to engage, but also stay engaged. However understanding youth engagement and potential models remains underexplored (Kellett, 2011; Monson & Thurley, 2011, as cited in Simmons *et al.*, 2021). For advocates, educators, youth supporting organizations and stakeholders, this leaves the prospect of youth engagement a tricky process, which relies on potentially unreliable strategies and has inconsistent results.

Measuring engagement is also difficult, and comprised of several dimensions of subjective experience (Ramey *et al.*, 2015). This has led to some interest in measuring engagement in terms of psychological metrics. That research confirms several components featuring in why youth engage and stay engaged, spanning, affective and relational considerations (Ramey *et al.*, 2015). The literature also suggests that key attributes to models of engagement include flexibility, authenticity and diversity of opportunities as critical factors (Simmons *et al.*, 2021). Research also suggests that enjoyment, concentration and sense of a challenge are important factors (Ramey *et al.*, 2015). For example, Bowles, Scull and Jimerson (2022) suggest that youth engagement can be studied using a four-factor model, which measures future and task focus, planning and motivation, positive roles and models, and positive social engagement (Bowles, Scull and Jimerson, 2022). Some models also consider levels of engagement and shared power (Shier, 2001). Shier (2001) builds on Hart, 1992’s Ladder of Participation, a foundational study which outlined a typology for increased agency control and power, using the metaphor of a ladder.

There is increasing interest in identifying conditions which promote engagement behaviour because of the potential benefits to positive youth development (Debnam *et al.*, 2014). This study does not promote a particular model of youth engagement, nor is it a psychological study. However, our insights may inform future models and/or further study. Additionally, we are responding to the call for an increased understanding of conditions which promote youth engagement. Youth wellbeing is a critical consideration in education, health, community, and family environments. Their wellbeing is greatly influenced by their access and opportunities, but also the extent by which their involvement in various activities contributes to their positive development. Their engagement also hinges on their agency in engagement opportunities, their opportunity to exercise choice and voice.

**Problem Statement:** Youth engagement needs further study; implications are clear for formal settings and those that support youth, and models of youth engagement are still developing. It is here that the study hopes to contribute to the scholarly discourse on youth engagement, inform effective strategies and provide emic insights from youth as to their motivations, their perceptions of barriers and enablers and how their engagement orientation might be influenced.

### 2.2 Motivations in Youth Engagement

As previously stated, motivation can feature significantly in youth engagement. Motivation stems from a variety of factors, including future goals, beliefs, time, and cognitive engagement (Bowles, Scull and Jimerson, 2022). Understanding that motivation is either intrinsic or extrinsic, cognitive theory points to the potential efficacy of combining motivational drivers (Bowles, Scull and Jimerson, 2022). Cognitive theories also emphasize that activities that are planned, tend to contribute to more sustained motivation (Bowles, Scull and Jimerson, 2022) and this has implications for models of engagement as well as how activities may be organized. Agentic engagement may also be a strong motivational consideration, in that youth able to express agency (voice and choice) may be more psychologically engaged. For example agentic engagement in learning is considered fundamental to academic success (Bowles, Scull and Jimerson, 2022). Thus, agency in engagement activities may be a way to amplify engagement or sustain it. Relatedly, meaningfulness and kinship to others are integral parts of youth psychological engagement (Ramey *et al.*, 2015).

It would appear that motivation can be ignited or re-ignited when activities are well aligned with a young person's interests or perception of relevance and this means that pathways may be charted in which motivations are configured towards goal achievement (Bowles, Scull and Jimerson, 2022). Motivation to participate may also depend on age and stage of development and thus perceived relevance is critical as motivation may change over time (Ramey *et al.*, 2015). It may also be affected by resilience and adaptive processes (Dion *et al.*, 2013). For example, motivation may need to correspond with an individual's sense of self-sufficiency and that may be informed by the extent to which they have considered the relationship between personal goals and their engagement in a particular activity (Dion *et al.*, 2013). With that said, motivations, such as enjoyment, feeling fulfilled and empowered can also sustain motivation (Pickering *et al.*, 2022). Additionally, research has pointed to socio-political awareness as increasing motivation in youth (Sprague Martinez, Pufall Jones and Connolly BA, 2020). Ultimately, motivation is fostered when activities are meaningful, foster competence, involve agency and kinship (Hart, 1992).

Therefore, we believe that the theoretical entry points relate to how youth describe their own motivations in their own terms, how such motivations may be clustered or configured in various ways and how motivations may shift in relation to a developmental process.

### 2.3 Facilitating and Inhibiting Factors in Youth Engagement

In a recent study by Kontak et al, (2022), barriers and enablers were defined as including (1) safe and supportive spaces (environment), passion and interest (intrinsic motivation), (3) an opportunity to exercise voice (agency), (4) power dynamics (i.e., shared power), (5) accessibility and (6) awareness (Kontak *et al.*, 2022). Additionally, some research points to the importance of adults in providing caring, understanding and an opportunity for youth voice in engagement opportunities (Martínez, Loyola and Cumsille, 2017).

Today's youth (15-24 years old) make up almost 20% of the world's population and they are better educated than any previous generation (United Nations, 2020). However, youth also suffer from poverty, discrimination and inequality. Empowerment models in youth are still developing (Angulo-Ruiz and Pergelova, 2015; Williams, 2024). Organizational barriers to engagement also exist and are not well understood (Augsberger *et al.*, 2023). Organizational barriers include adult readiness (preparedness and openness) and organizational readiness (safe and meaningful engagement) (Augsberger *et al.*, 2023).

We see our data contributing to a greater understanding of how to achieve readiness in organizing activities with some practical insights directly from youth.

### 2.4 Internal Locus of Control Orientation in Youth

For the purposes of this study, it is useful to think of youth engagement as shaped from an internally oriented locus of control, and therefore it can vary individually (Ahlin and Lobo Antunes, 2015). A sense of having control over outcomes, being responsible for consequences stemming from one's own behaviour and actions, leads to prosocial and proactive personality traits and behaviours (Ahlin and Lobo Antunes, 2015) and thus fosters the potential for engagement and participation in youth. Therefore, it is important to consider that proactive self-driven engagement begins with an internal locus of control, therefore, strategies, however well designed and intentioned, may not be successful with youth without an internal locus of control orientation.

Locus of control is linked to wellbeing (Di Pentima *et al.*, 2019). An external orientated locus of control can lead to negative outcomes (Nazareth *et al.*, 2016). Several factors can shape an internal locus of control orientation including environmental factors (Ahlin and Lobo Antunes, 2015). Additionally, several strategies can influence a young person's locus of control, either towards an internal or external orientation. For example an internal locus of control can be fostered by more independence, while an external locus of control can be fostered by overprotective strategies (Ahlin and Lobo Antunes, 2015). Such orientations are also influenced by various reinforcements and expectations. These reinforcements can be facilitated by peer interactions, family management or even place (context), but they can also be influenced by individual characteristics (Ahlin and Lobo Antunes, 2015). How to shape a locus of control orientation has not been fully explored (Ahlin and Lobo Antunes, 2015) even though it is considered beneficial to youth, leading to the ability to cope, adjust, protect themselves and shape autonomy and independence positively (Ahlin and Lobo Antunes, 2015). In their study, Ahlin and Lobo Antunes (2015) found that family management most significantly shapes an internal locus of control orientation.

Locus of control is considered pliable within youth (Di Pentima *et al.*, 2019). Therefore, we believe that the theoretical entry point for our study is the opportunity to provide data which enriches our understanding of youth's internal or external orientation.

### 2.5 Youth Engagement and Management and Organizational Studies

Youth Engagement figures more prominently in health promotion studies and psychology studies however, in this literature there are clues as to its importance and relevance to management and organizational studies.

The first obvious entry point is educational environments, where engagement supports student outcomes, academically and otherwise (Kontak *et al.*, 2022). Engagement in a variety of organizational environments has been studied to some degree and the benefits are apparent. For example Paceley, Thomas and Turner, (2019), look at risks for youth with stigmatized identities and how limited involvement with supportive organizations can further isolate them and negatively impact their identity development. Crocetti, Erentaitė and Žukauskienė, (2014) investigating the social-cognitive benefits of youth engagement in civic organizations (e.g. volunteering, government, non-political organizations and more) found that low rates of civic engagement affects youth competence, confidence, character, connection and caring abilities. Martínez, Loyola and Cumsille, (2017) while investigating active participation in youth organizations long term, found that significant interaction can lead to powerful effects on the youth identity development and even other forms of social political efficacy, including longer term engagement contributing to leadership outcomes.

We therefore see the theoretical entry points for our study in the opportunity to enlighten current discourse with emic insights from youth as to their perceptions of motivational drivers and perceived benefits.

## 3. Methodological Framework

### 3.1 Research Structure

This study expands on an earlier study by the first author. That study used the same methodological framework to investigate youth empowerment adopted here (author, 2024). In that study, youth empowerment was explored using a model of youth participatory action research (YPAR) established inside a research lab, hosted by community organization and partnered with a Canadian university. The Lab (which houses this model of YPAR) is both a formal developmental program for youth (aged 15-18) and a scholarly research lab. Through a partnership with the government's department of education, the Lab is an approved community host, whereby youth in the Lab earn a full high school credit for their involvement as part of a co-operative education program. These youth researchers spend 14 weeks (80 hours) in the Lab learning about qualitative research and collecting data using a peer-to-peer approach. Under supervision, they learn about the ethical considerations of research, how to identify knowledge gaps and opportunities, how to interview, manage voluntary consent and confidentiality, to code and analyze data and they contribute to sensemaking, using their own emic perspectives as youth.

### 3.2 Data Collection

This study features 34 qualitative interviews, conducted by a team of 14 youth researchers, ages 15-18 (See Appendix # Participant List). The youth interviewed their peer networks, namely other youth, aged 15 to 18. Due to restrictions set by the ethics board, we did not collect demographic information, only ascertained if youth met the basic qualifications for participation: (1) they confirmed they were between 15 to 18 years of age, and (2) they provided their written voluntary consent. Youth voluntarily assented to their participation in addition to parents and caregivers giving their written permission. Youth in the Lab managed the voluntary consent process under the first author's close supervision.

The questions in the study were established with support of youth in the Lab, in that youth helped us to frame the questions so that they would be better understood by other youth. Additionally, youth were permitted to adjust questions to ensure that their participants understood what was being asked of them (see Appendix #2 Interview Questions). We provided prompts to help the youth researchers navigate the interview process. Interviews generally lasted between 15 and 20 minutes but some were much shorter. The

length of the interview was considered both for the benefit of the youth researcher and the youth participant and to ensure that the task was not too onerous, but still produced rich data. Since we were working with youth, we tried to find a balance between making the interview accessible and our quest for deep data.

Data was collected for this study in the Fall of 2023 and the Winter of 2024. There were two teams of youth researchers. The first team (Fall 2023) had eight members and collected 22 interviews. The second team (Winter 2024) had five members and collected 13 interviews. Youth in this study (both researchers and participants) are in Atlantic Canada. Data has been anonymized to protect participant identity, and each participant is represented with a pseudonym. Data for which we did not receive consent has not included. Interviews were recorded and then transcribed verbatim, using Otter.AI. Youth then compared their recordings with the transcriptions to correct errors and remove identifying information. The second author conducted a second round checking the transcriptions against recordings, and cleaning and anonymizing the data.

In the next section (3.3), we will unpack our model of Youth Participatory Action Research and the way that youth were engaged. In the section on Interpretive Phenomenological Analysis (3.4), we will explain the ways that youth were engaged in the analysis.

### 3.3 Youth Participatory Action Research

Youth Participatory Action Research (YPAR) involves youth in all aspects of the research process (Funk *et al.*, 2012). Youth involvement at each stage can depend on their motivation and interest (Funk *et al.*, 2012). In YPAR, youth are engaged as co-researchers and empowered by their curiosity, insights and leadership (Michaelson and Steeves, 2020). Similar to other studies using YPAR, this study trained youth to interview their peers, including managing the consent process, administering the interviews and engaging in the decision-making process surrounding the research project and approach (Kontak *et al.*, 2022).

YPAR is an equity-based approach in which youth conduct research important to them (Abraczinskas and Zarrett, 2020; Ozer *et al.*, 2020). As such it is viewed as both a research method and an intervention, whereby youth engaged in the process of research are affected by the experience, increasing their sense of empowerment through power-sharing and getting directly involved in actions for change (Abraczinskas and Zarrett, 2020). Additionally, data resulting from YPAR studies are used to help influence the existential condition of youth (Malorni *et al.*, 2022). In this study, it is important to note that we set out to study youth engagement, but we were simultaneously engaging youth in a program of research. Therefore, we will discuss some of our insights from our own youth engagement experience in the Discussion (5.0).

Facilitating YPAR is not easy. A scoping review conducted by Malorni et al (2022) found that YPAR is a black box – meaning that how to enact YPAR is not well understood. Though powerful and designed to advance both research and action, it is also difficult to achieve authentic engagement with youth, and there is a lack of transparency in how the research is conducted (Malorni *et al.*, 2022). The first author of this study published a recent article that shared the model of YPAR herein used. In that study, the process of involving youth in research, the steps taken, and the meaningful engagement with youth, including how to share power, was explored. To summarize (author, 2024), the steps involved in this YPAR model endeavour to engage youth as co-leaders with empowering and emancipatory intentions (Keddie, 2021). Youth in the Lab trained by first learning about the sociology of knowledge process, they then learned the difference between qualitative and quantitative approaches. They unpacked research philosophy. Understandably, their

experience (and training) reflecting the first author's expertise[1]. Additionally, the youth in the Lab understood the study would be exploratory (not confirmatory) and that as such we would be starting without pre-conceived ideas about youth engagement. They therefore understood the merits of a qualitative approach.

Youth in the Lab practiced interviews, rehearsed the consent-based conversations, and then managed their own interviews. As you will note in the next section, they were central to the analysis in that they brought their own interpretations and ideas to our understanding of the data. Youth were also engaged in disseminating findings through social media, which allowed them to distill what they had investigated. They converted these insights into a medium that would be open to youth and those that are in youth-serving roles (via social media). Their knowledge mobilization efforts spanned not just insights from their data, but insights from the experience of becoming researchers (See Figures 2 a-c Insights from YPAR Model and Figures 3 a-c Insights from Data).

INSERT FIGURES 2 A-C HERE

INSERT FIGURES 3 A-C HERE

### 3.4 Interpretive Phenomenological Analysis

Interpretive Phenomenological Analysis (IPA) helps to explore lived experiences and considers how participants "make sense of their personal and social world" (Smith and Osborn, 2004, p. 54). It assumes a connection between what people say, their thinking and their emotional state (Smith and Osborn, 2004). We adopted Smith and Osborn's approach to IPA (Smith and Osborn, 2004, 2008, 2015). IPA's theoretical underpinnings are linked to a commitment to discovering meaning as a way to understand cognition, namely how participants perceive and make sense of their individual experiences (Smith and Osborn, 2004).

We selected IPA as our form of analysis because it actively considers that both researchers and participants are sense-making when participating in research. We understood from the onset that our participants may not have considered our topic of research very much before we spoke to them. We also took for granted that as young persons their thinking about certain social phenomena would still be developing. Thus, we understood that our data would represent a state of developing thought for each participant. Simultaneously, we as a research team were also developing our thinking about youth engagement and this thinking evolved as youth conducted their interviews and through discussions we had as a research team. This commitment to an unfolding understanding in analysis is considered a central analytical concern in IPA (Smith and Osborn, 2004).

Additionally, IPA made sense because it typically draws on small sample sizes to understand a deeper level of detail and is not concerned with generalizations (Smith and Osborn, 2004). It is therefore important to consider that the data in this study has been analyzed at the individual level. IPA typically starts with a homogeneous sample for whom the inquiry is significant vs. finding a random or representative sample. In our case, the sample is drawn from youth of a certain age, living in a similar region in Canada. In this way IPA functions analogous to social anthropology and ethnographic research where findings may speak to a particular group vs. a larger population (Smith and Osborn, 2004).

In terms of sample size, this is generally guided by trying to find a balance between two factors: (1) the commitment to deep analysis and interpretation and (2) the constraints set by the capacity of the research

[1] The first author is a deeply critical, qualitative researcher, engaged with emancipatory research, novel forms of inquiry and ways of writing in management and organizational studies. This philosophy towards research was the basis for learning in the Lab.

team. In our case, we were simultaneously teaching youth to be researchers, supervising the study and helping make sense of the interviews[2]. This set a limit whereby youth peer researchers were restricted to no more than 5-8 per team, and no more than three interviews per youth researcher.

Our analysis followed steps outlined by Smith and Osborn (2004). Specifically, we first transcribed our interviews and then began looking for key themes. These themes very quickly took the tenor of motivations for why youth tended to engage and stay engaged. We started by looking at a single interview, then a second and a third and so on. We did this together. This generated an initial code list with both definitions and descriptions. To facilitate our group engagement as we completed the original codebook, we used a software called Padlet, which is a cloud based, bulletin board. We used this first stage of analysis to not only describe the code or theme, but to also indicate where it was showing up (what kinds of activities). This inductive approach was followed by a deductive approach in which we looked for the themes and codes we had identified in other transcripts. As a result, by the end of our first stage of analysis we felt we had a comprehensive list of codes, their definitions and a description, as well as a comprehensive list of activities (or what constituted where engagement was happening).

Our next stage of analysis involved connecting themes (Smith and Osborn, 2004). After we had our themes and codes established, we then looked for relationships between the themes. This is when it became evident that our themes were either (1) motivations or (2) enablers or barriers. This is what Smith and Osborn refer to as analytical or theoretical ordering. The result is a clustering of codes or themes by virtue of our sense-making and close reading. Our themes/codes were either descriptive or in vivo. This means that our codes either described our impression of the participants' own words or we used the very words provided by the participants. For example, "altruism" was a descriptive code, whereas "enjoyment" was an in vivo code.

The final stage of analysis involved organizing the data in a coherent manner. We elected to use tables to do so, but to share our preliminary findings, we produced a Fact Sheet (See Figure 1 Fact Sheet) which summarizes the classifications of motivations and enablers and barriers.

## 4. Findings and Analysis

### 4.1 Youth Engagement Activities

As a start to our inquiry, we tried to capture the breadth and scope of activities which constituted settings for youth engagement. This list is not likely exhaustive, but we have organized the information so that our readers might understand where and how this data might be used. It also confirms one of our introductory statements, in that we believe our study does not just advance scholarly discourse, but also has practical implications for those that work with, or support youth, in a variety of settings.

According to the youth in our study, youth engagement encompasses a range of activities from formal to informal, skilled to unskilled, individual to collective, obligatory to pleasure-seeking, physical to body-fixed, and educational to nescient (see Table #1 Example of Engagement Activities). The youth in our study talked about exciting forms of activities through to the mundane.

For example, formal opportunities involved things like clubs, work and personal projects:

[2] The first author leads the Lab, whereas the second author served as a research assistance while completing a co-operative term with her university program. She worked with both youth research teams and the data and assisted with the literature review.

> I have been trying to volunteer […] I have volunteered my time to help teach the young kids at the gym. Inside of school, I have volunteered my time to be a part of the school production and an acting club" [Olivia]
>
> "I'm only really involved in my own artistic projects as well as a couple of like student council committees. In the, our high school's GSA, I run the tech and video committee, as well as I do the music for like our school dances and stuff [Blake].
>
> Being involved in 4-H helps take up some of my spare time, and working gives me money to put towards things I'd like. 4-H teaches me many different social skills that I can use for a very long time, but both give me many different skills I've never had before. [Leigh].
>
> "Drawing, writing. Walking after school; going on runs during the summer. Sometimes writing music strips for no reason at all. Taking--like walking my friend's dog around. Playing basketball sometimes after school" [Zuri].

When participants started to make the connection with some of the barriers and enablers we were surfacing, they also began cited more mundane activities, such as hygiene and even self-care – essentially anything that took up time. To provide additional insight into the kinds of activities our participants cited, please see Table #1 for Examples of Engagement Activities.

INSERT TABLE #1 HERE

**4.2 Motivations**

As described in our section about our IPA steps, motivations quickly became the way we made sense of the data and clustered it. We identified nine key motivations; however, we think that there may be many more and future research could investigate and identify those. The motivations we speak to in this study were defined by youth, in that we used their emic understanding of the theme to define it and describe it. As cited in the earlier study by the first author, youth acted as critical knowledge translators as a result (author, 2024).

In the previously referenced Figure #1, we have detailed the motivations, their definitions and we have provided an example from our participants. In Table #2, we provide additional examples from our data set.

INSERT TABLE #2 HERE

What is interesting about the motivations is that where there is a convergence of motivations, the inclination to engage seems to be higher. We believe that this means that there is the potential to  to perhaps influence engagement by combining motivational factors.

**4.3 Barriers and Enablers**

A secondary data cluster focused on what our participants viewed as either facilitating factors or inhibiting factors and we described these as either enablers or barriers. However, we also quickly learned that such factors may be one in the same, either acting as an enabler or a barrier. In other words, they could be seen as positively or negatively by our participants, depending on context.

In Table #3, we describe various enablers and barriers and provide examples from the data set.

INSERT TABLE #3 HERE

We note that the theme environment functions a bit differently than the others. We see it as perhaps both a motivation and an enabler or barrier. As a result, it could be where motivations converge most prominently and thus be a particularly important factor in youth engagement.

### 4.4 Internal and External Locus of Control

If locus of control is a primary consideration in youth engagement, our data points to the relatively diverse impression of both internal and external orientations in our participant group. Locus of control was not something we directly probed, but rather the orientation was revealed upon deeper analysis by the second author. Our observation is that there was evidence of clear internal and external orientation, but for some, there was also a developing internal orientation. We believe that this points to a related developmental process happening in the young person we were interviewing.

For example, on the one hand, Oliva cites schoolwork as an external block to engagement:

> "Schoolwork definitely gets in the way of being involved in activities as I am constantly over-run by assessments".

However, she also states that she is motivated to engage and appears empowered to do so:

> "I am involved in these activities as they make me feel good and helpful. They are good exercise; I constantly learn new things and always have a lot of fun".

Similarly, Oscar cites time and mental readiness as a barrier:

> "I have options, I just don't tend to go for them. Because I – once again – don't have the time, or I genuinely don't have the mental state".

However, in another instance, Oscar's interests and apparent choice is a strong driver:

> "I like [in art], it's like, you kind of get to pick what you do. It's like a free choice."

Ashley also shows that too many activities can be a perceived barrier:

> "There are clubs and sports, but my other activities make me too busy to even consider doing them [even though] I live pretty close to everything".

Whereas she also shows agency (choice and voice) here:

> "I stopped Girl Guides when I was 10 because it wasn't something I wanted to do. And I would rather, like, spend more time doing my other activities".

Again, we interpret these variations as an indication of development, intrinsic to youth maturation and changing world views. More typically, our participants seemed so show either a propensity towards an external or internal orientation. See Table #1 Locus of Control, for additional examples from our data set.

INSERT TABLE #4 HERE

## 5.0 Discussion

Here, we return to our theoretical entry points to discuss the implications of our data. As noted in the data from this study, a confluence of motivations seems to foster and sustain engagement. Many of our participants talked of more than one motivation in the context of a particularly important or sustained

activity. For example, Eve cited a combination of learning opportunities with social connections. Oliva cited social connection along side sense of accomplishment. David cited an educational imperative along with proficiency. We believe that this clustering is insightful. It not only tells us why youth are engaged but it potentially reveals ways in which we can configure activities to either engage youth for the first time or re-engage them.

Our participants were similarly insightful with respect to what they revealed about enablers and barriers. If organizations and adults are to enhance their readiness (Augsberger *et al.*, 2023), our participants suggest that there are key conditions for success. For example, adults need to allow for agency [Lucas], they need to be positively, and constructive helpful [Evan] and they need to help youth find time and keep time by not overburdening them [Oscar; Brittany]. Organizations need to provide sufficient access and be easy to get to [Mila; Evan] but they also need to address limitations in space and opportunities [Louis; Aria]. Organizations also need to think about physical access, and the onerousness or excessive stress of activities [Amy; Mila; Annie; Kaylee].

In terms of locus of control orientation, our participants typically fell into a more external or internal orientation. However, some of our participants were less clear and we took this to mean that their locus of control was indeed pliable (Di Pentima *et al.*, 2019). We find this encouraging. If family management is indeed a significant factor in the development of an internal locus of control (Ahlin and Lobo Antunes, 2015), than an internal locus of control can be fostered and this may enhance a young person's proactivity towards engagement. Both an internal locus of control and youth engagement are positive contributors to youth development.

Our final theoretical entry point related to what youth could tell us about motivational drivers overall as informed by youth perspectives and ideas. In this respect, our youth provided a wealth of information about why they chose to get involved and why they stayed involved. We believe that a confluence of motivational factors is critical. We also believe that environment is critical. Environmental considerations seemed to transcend other factors. Environmental considerations include youth feeling safe, feeling comfortable, feeling supported by adults, having agency (voice and choice).

In our Lab, while studying youth engagement, we were simultaneously engaging youth in a research project. The Lab, as a scholarly research lab and a developmental program for youth has had to address these same parameters to get youth engaged and keep them engaged as other formal activities might. The Lab has now completed two studies with a third starting in Fall of 2024. Four youth teams have now gone through the Lab program[3]. We have learned a great deal not only about youth issues, but also about working with and engaging with youth. The findings from our study resonate with our experience in the Lab. For example, youth enjoy working on a project that has a higher purpose (altruism), they like the responsibility of doing something important and the feeling that comes from making an important contribution to the study (responsibility, accomplishment). They enjoy learning to become researchers, becoming better and better at interviewing and contributing to the analysis in fundamental ways (education imperative, proficiency). They have even spoken about how much they like the Lab as something separate from home, school and the usual pressures of their life (escapism). I believe we also achieved something that was more nascent in our data, in that our youth had voice and choice. They volunteered to come to the Lab, they were put in a position of power and were given the opportunity to share what they learned and be valued for it. In the previous study (author, 2024) the first author reviews aspects of the YPAR model that make it successful and many of those features correspond to conditions for youth engagement, including (1) creating a safe

[3] We involve the youth in the Lab in formal program evaluation and as a result, we continue to make improvements to the Lab both as a research space and a development program.

place, (2) building in value (3) not underestimating youth and (4) reminding youth of their value. We believe that the Lab is transcending environment with a convergence of motivational drivers.

To bring together the data with the extant literature and our own observations we offer the following developing conceptualization of agentic youth engagement (see Figure #4 Conceptualizing Agentic Youth Engagement).

INSERT FIGURE #4 HERE

As evidence by Figure #4, we believe that a convergence of motivations, plus an internal locus of control orientation, plus environment may lead to sustained youth engagement.

## 6.0 Conclusion

In this study, we set out to explore youth engagement, and therefore, the data stemming from this study was developed out of an exploratory frame. We contribute to the extant literature with an insiders' view, whereby youth were empowered to conduct research involving other youth and explore an issue that matters to them. The findings in this study may contribute to furthering our understanding of youth engagement as a phenomenon and offer entry points for future areas of inquiry. This study also includes insights about how to shape and promote an internal locus of control in youth, and how to adopt strategies in various organizational contexts (environment) which may promote engagement in youth. Specifically, we offer two contributions which inform our understand of agentic youth engagement: (1) a convergence of motivations may be necessary to foster engagement. (2) This convergency may assist in helping to shape an internal locus of control and thus lead to youth engagement. We also believe environment holds a tremendous amount of potential, especially because we see that it operating as both a motivator and an enabler (especially if associated activities also promote personal agency). As such, a positive and supportive environment also seems to be a place for potential motivational convergence.

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**Dedication:** This study is dedicated to the youth in the Student Research Lab. You continue to inspire us with your brilliance.

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**Appendix #1 Participant List (anonymized with assigned pseudonyms)**

| | | |
|---|---|---|
| EMMMP2M | 1 | Mateo |
| EMBLP1M | 2 | Brian |
| EMLJP4F | 3 | Leslie |
| SDADP1F | 4 | Kaylee |
| SDRWP2F | 5 | Leigh |
| SDKEP3F | 6 | Amy |
| RLKYP1F | 7 | Kelsey |
| RLESP2F | 8 | Liz |
| RMBNP2X | 9 | Luna |
| MDNCP1M | 10 | Tim |
| MDATP2M | 11 | James |
| MDSRP3X | 35 | Jules |
| MDSTP5F | 12 | Amber |
| VMBAP1F | 13 | Ava |
| VMOHP2X | 14 | Oscar |
| VMMCP3F | 15 | Eve |
| ZHKDP1F | 16 | Olivia |
| ZHIHP2F | 17 | Aria |
| ZHAWP3F | 18 | Annie |
| LSRRP1F | 19 | Brittany |
| LSCAP2M | 20 | Rowan |
| LSDFP3M | 21 | Blake |
| SMRWP1M | 22 | Lucas |
| SMCCP2F | 23 | Charlotte |
| SMOMP3M | 24 | Asher |
| MDEPP1M | 25 | Noah |
| MDSBP3M | 26 | Ezra |
| STNGP1M | 27 | Louis |
| STCTP2M | 28 | George |
| EKAKP1M | 29 | David |
| EKDTP2F | 30 | Zuri |
| EKAVP3F | 31 | Maya |
| HMACP1F | 32 | Ashley |
| HMPCP2F | 33 | Mila |
| HMETP3M | 34 | Evan |

**Appendix #2 Interview Questions**

Engagement Questions

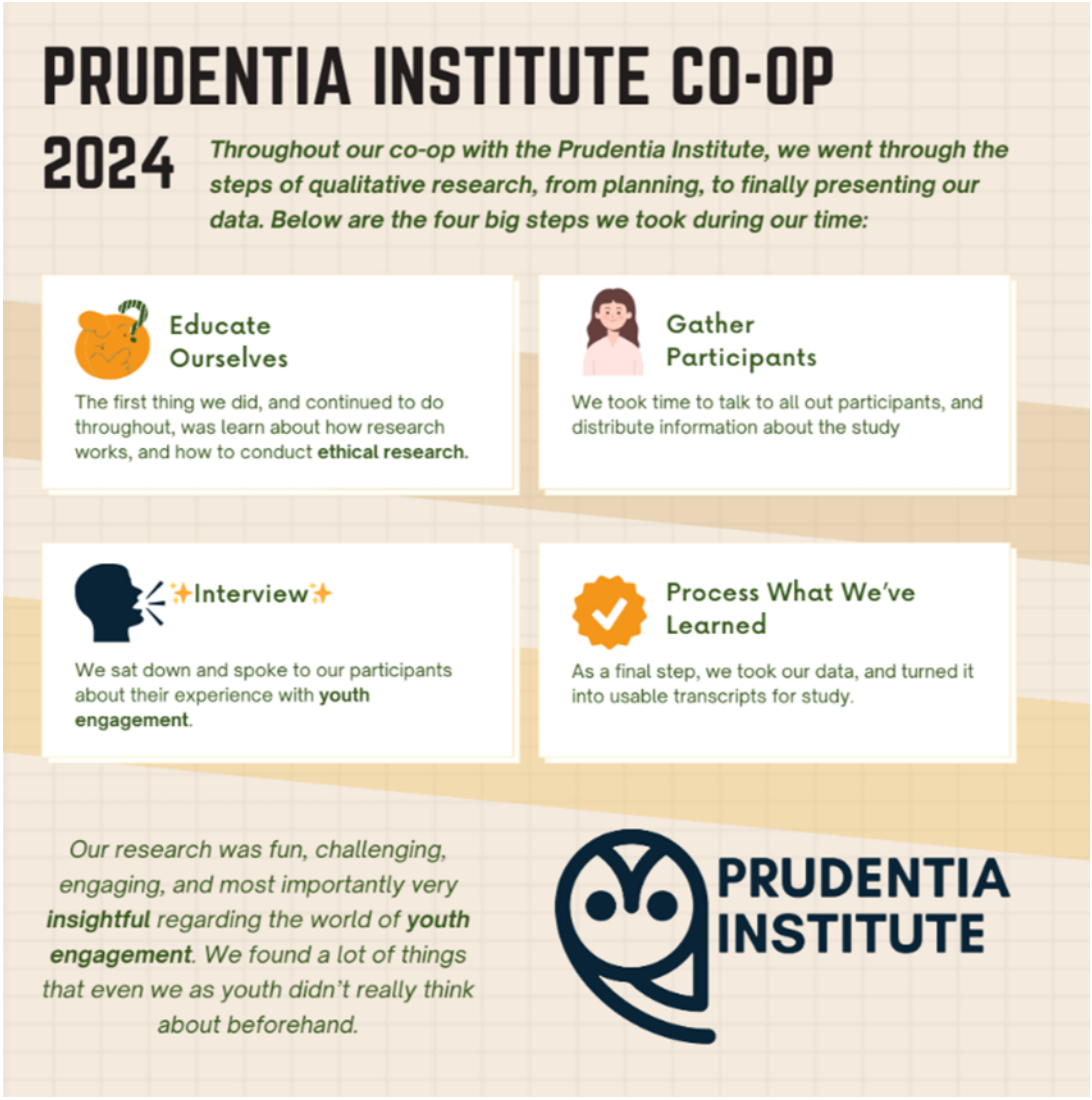
1. What are you involved in?
    a. Prompt: sports, arts, community, school
2. Why are you involved in these activities?
    a. Internal drivers like, fit, learning something new, getting good at something, mastery
    b. External drivers like, social, feedback, coaching, rewards
3. What do you like about being involved in these activities?
    a. Prompt: relevant, interesting, something you are passionate about
4. What do you get out of these activities?
    a. Prompt: meaningful, belonging
5. If you stopped an activity, why did you stop?
6. What gets in the way of you being involved?
    a. Prompt: barriers like money, distance, supports, pandemic, school
7. Because school occupies a lot of your time, does school also provide an outlet for you to explore your passions?
    a. Prompt: clubs, sports, activities
8. Are there many options for you? Are options limited? Why?
9. Tell me about the adults that support the activities you are involved in? What good characteristics do they have?
    a. Prompt: supportive, committed, fun, understanding
10. How do we get you involved, what motivates you to try something new?
11. Do you play games, what do you like about games?
    a. Prompt: mastery, rewards, social, fun
12. Does learning something new and getting good at something help you stay involved?

**Figure #1 Fact Sheet**




*Author(s)' Work, 2024*

**Figure 2 a) Insights from YPAR Model**



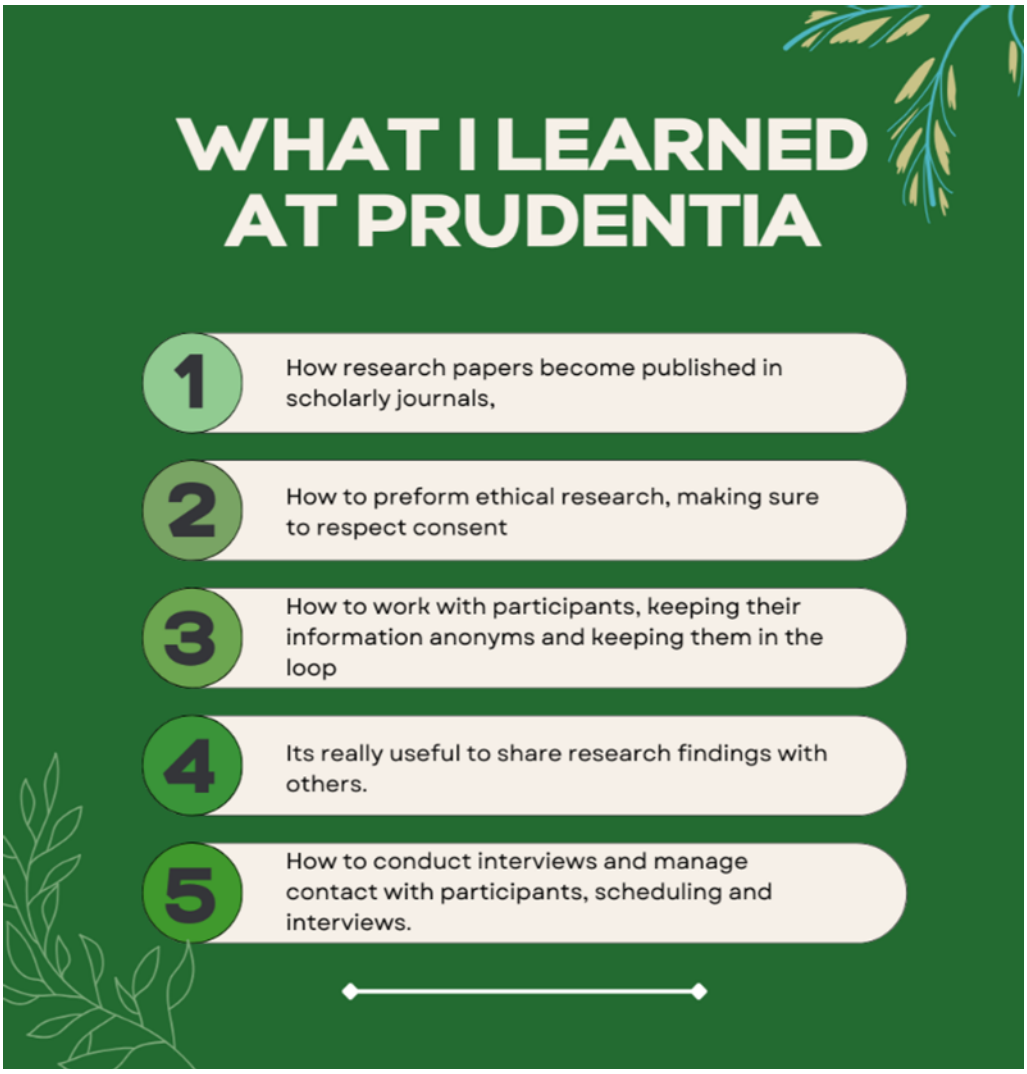

*Youth Researcher's Work, 2024*

**Figure 2 b) Insights from YPAR Model**




*Youth Researcher's Work, 2024*

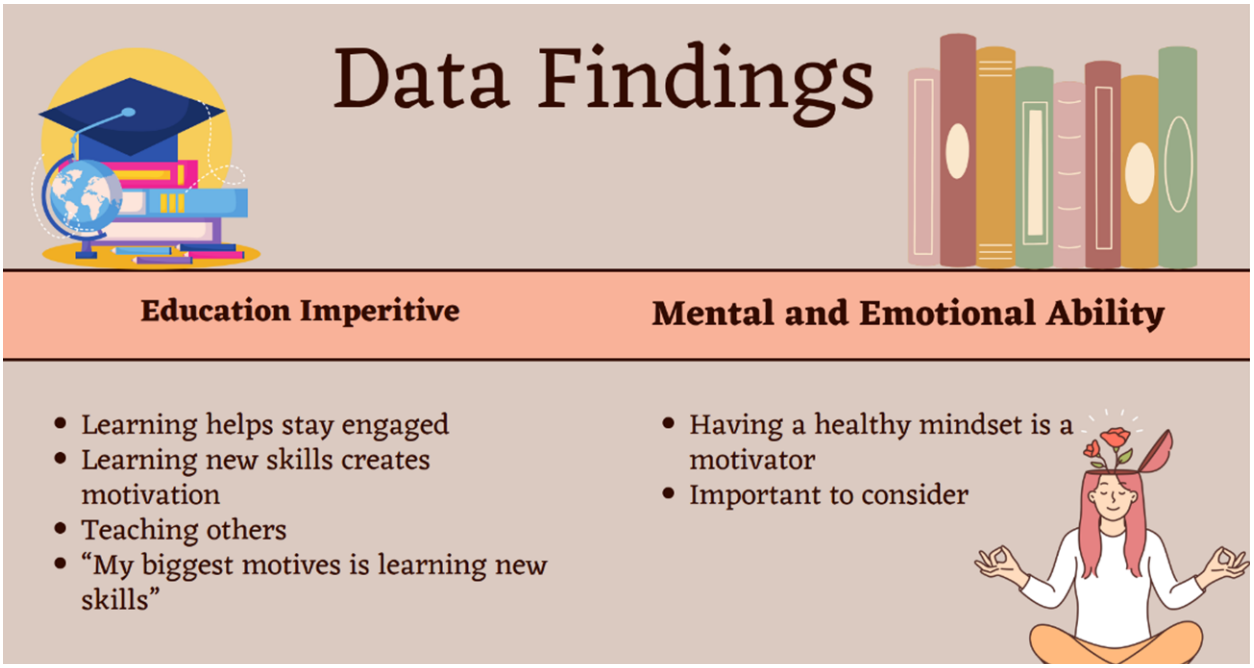
**Figure 2 c) Insights from YPAR Model**




*Youth Researcher's Work, 2024*

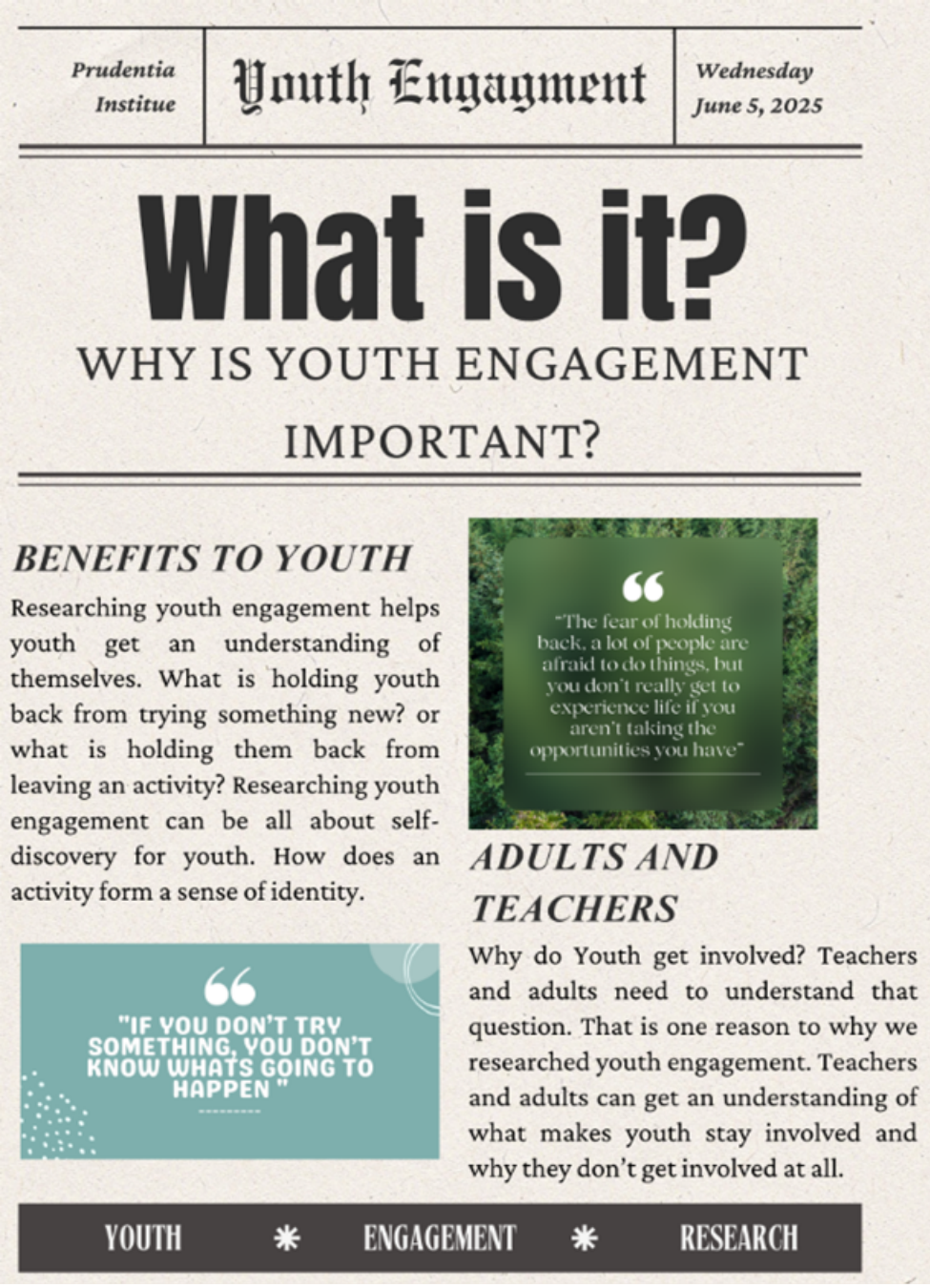
**Figure 3 a) Insights from Data**




*Youth Researcher's Work, 2024*

**Figure 3 b) Insights from Data**



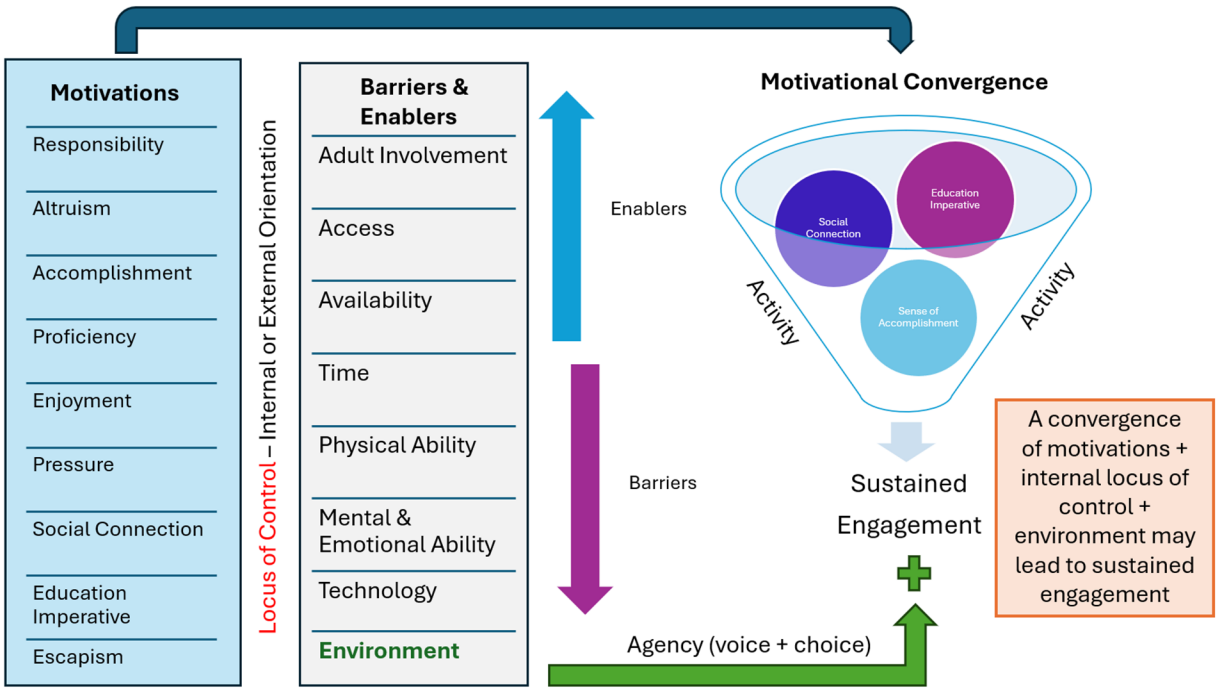

*Youth Researcher's Work, 2024*

**Figure 3 c) Insights from Data**




*Youth Researcher's Work, 2024*

**Figure #4 Conceptualizing Agentic Youth Engagement**




*Author(s)' Work, 2024*

**Table #1 Examples of Engagement Activities**

| Form of Engagement | Example | Form of Engagement | Example |
|---|---|---|---|
| Formal | Volunteering | Informal | Crafts |
| Skilled | Work | Unskilled | Tasks or Chores |
| Individual | Hobbies | Collective | Events or Holidays |
| Obligatory | Homework | Pleasure-Seeking | Rest |
| Physical | Sports | Body-Fixed | Games |
| Educational | Academics | Nescient | Social Media |

**Table #2 Motivations**

**Motivations**

| Motivation | Definition | Examples |
|---|---|---|
| Responsibility | A desire to please or satisfy others, care for others. A duty or formal obligation. | "Well, I'm involved in work to get paid, because I need to pay my bills […] But yeah, work because like, that's something everyone has to do" [David].<br><br>"I'm working at [place of work]; um, I need the money to pay my bills. It's good, because it's a good learning experience. Socialization is good. Um, [I like] being able to meet new people, being able to socialize, being able to help the customers, my coworkers. [I get] a sense of belonging maybe, being there" [Eve]. |
| Altruism | Demonstrating selflessness, prioritizing others and their needs; authentic and sincere | "I mean, mostly, some of the stuff I do is to help my nan and other stuff; just because" [Louis].<br><br>"I have been trying to volunteer- sometimes many people have volunteered and only so many are needed- around the community a bit, [for example at] used book sales. I have also made a commitment to help make and sell items in a booth on some holidays as a fundraiser. I have volunteered my time to help teach the young kids at the gym" [Olivia].<br><br>"[Being involved] makes me feel more like I'm doing something with my life […]I like to do things, because it makes me feel like I'm putting more into my life" [Aria]. |
| Accomplishment | A feeling of satisfaction, pride, completion and external validation. A desire for praise. | "I like feeling the, the improvement and feeling success of all the hard work I've put into the activities. It's mostly just seeing myself improved. That keeps me going" [Evan].<br><br>"My brain thinks that if I do more things throughout the day, and I like, try and volunteer, or do more things just in general that's not just sitting in my room rotting; I feel like a better person. I feel like I can grow more" [Oscar].<br><br>I got a better perspective on life, a way to channel emotions of what I'm feeling into something, a sense of belonging and being a part of something. I also get lots of dopamine from being a part of these activities, which I believe is an amazing benefit as it makes me feel happy" [Olivia]. |
| Proficiency | Fluent and knowledgeable, confident and deeply skilled. | "Learning something new would definitely help me get involved. Because like if I'm already doing something that I like, but like you know when you're |

| | | |
|---|---|---|
| | | stuck at like a standstill? Because you, you know what you're doing. But like it almost like, you get more in-depth to the situation already because you learn something new about it? That's why I like it, because you already are kind of good at it… and then you keep learning something new and then you get to do like, expanding further. That's fun, because then you get to like, switch it up. You know?" [David].<br><br>"For art, well, that's... the one thing that I get, like, the sense- a sense of belonging in. And like I've always felt like, that's where I need to be, and what I need to do. And that's where I know everything. Or not everything, but I mean, that's just where I, I know how to do this. And I can tell people how to do it without feeling confused or anything; like, I just know" [Kaylee] |
| Enjoyment | Feelings of joy, passion, euphoria, fun, promoting positive emotions. | "Baking. Yean, I enjoy that" [David].<br><br>"Decorating stuff. Like doing crafts, making bracelets. I love doing that because that's just awesome" [Zuri].<br><br>"When it comes to games and stuff like that, I'm usually doing them because it's competitive and it's fun" [Asher]. |
| Pressure | Pressures to represent, to participate, to compete, or even to disrupt or challenge. | "Well, I think, like, what motivates me is wanting to become somebody someday. I want to be a little bit famous with it" [Charlotte].<br><br>"To just show people that I can do it. Not really anything else" [Louis].<br><br>"Well, I'm involved in GSA because I am queer, and I would like to spread awareness. And just kind of, um, it's kind of my mojo; so, I'm a part of that to…explain who I am and who I'm becoming and how it's okay to be who you are 'n stuff" [Lucas]. |
| Social Connection | To interact with others. To be with friends and/or family or to make new connections. | "I think something that motivates me to try something new is, um, my friends doing it. I feel like, it's kind of like the extra reassurance that I'm not going into something by myself, and I have people with me for it" [Asher].<br>"Um, I like the feeling of, when I play soccer, staying as a team and working together with people" [Evan].<br><br>"I feel like the people who most impact me and my choices and the things that I want to branch out and do, even if I don't wanna do them, but trying new things - definitely my friends" [Lucas]. |

| | | |
|---|---|---|
| Education Imperative | A desire to learn, to become better, gain knowledge and grow. | “I would say the thing that motivates me the most to try something new is just for that new experience. You know, I think to myself, ‘What would my life be like if I hadn't done this? What am I missing out on?” [Evan].<br><br>“Well, I'm involved in the environment club, because I'm interested in it. And I also feel like, it would help me, you know, pursue the education I want to pursue after high school” [Brittany].<br><br>“I find I get like, better [over time] with like, certain skills. They’re transferable” [Charlotte] |
| Escapism | To retreat, to distract from other things, including obligations or pressures. | Like for me, I find that I lose... like I lose myself in things sometimes [Noah].<br><br>“I do play video games. Not as much as I used to, but I do play them. And it's just like a way to like, not think about everything in like… like future stuff, or like, my life. I just kind of unwind and just play the game” [Mateo].<br><br>“[When] I get to play with my friends, it sometimes can take me out of the real world and I just get to like... chillax” [Ezra]. |

**Table #3 Barriers and Enablers**

| Enabler or Barrier | Examples |
|---|---|
| Adult Involvement | "Um, for school-wise, absolutely not. Um, it is very, like- you do kind of the same things every day, and there's not a lot of teachers out there who will kind of form their own like criteria and stuff like around the students" [Lucas].<br><br>"Well, my coach on the swim team has really pushed me to keep getting better, and I really thank her for that. All of my coaches actually have been really helpful. And my parents being there for me; driving me everywhere. Yep. Super supportive." [Evan]<br><br>"Well, I think it's very good for adults to facilitate different activities and stuff to motivate, like, youth leadership and stuff. Because when kids are doing activities, they're not usually doing it to be told what to do. It's the opposite. So, it's very nice when the person facilitating that makes a point of kind of putting you in charge of how to... how you want to handle stuff" [Blake]. |
| Access | "Previously, like without having a license, I couldn't get drives" [Mila].<br><br>"Um, when I was younger, I used to do gymnastics. And I'm in a military family, so I had to move away. And there were no gymnastic places within like an hour" [Evan].<br><br>"I mean, I never really have the opportunity to like to get into stuff because usually other people are already there first. First come first serve" [Louis]. |
| Availability | "There's quite a lot of options […] Well, there's lots of stuff you can do" [Ezra].<br><br>"I think they are very limited, because the school with its extracurriculars tries to, I don't know, give a wide variety of different things. But a lot of them are not things that I would ever be interested in. Yeah, just my personal point of view" [Aria] |
| Time | "Genuinely just time [gets in the way of involvement]; my schedule is usually either very busy or empty. It's all or nothing. Honestly, I- lately; it's been everything. I'm very busy currently, and it's not fun" [Oscar].<br><br>Because I don't have a lot of time. I mean, that's probably the main reason I don't [get involved with more]. I go to school most of the day; I work mostly- like, four or five nights out of the week. So, I don't have a lot of time" [Brittany]. |
| Physical Ability | "My options are limited because I'm [disabled]. And semi-poor (laughs)" [Annie].<br><br>"When you get good at something it, like, pushes you to keep going. If you're not good at it, then you would not want to keep going" [Mila].<br><br>"I had to stop playing hockey because it was hurting my back too much" [Amy]. |
| Mental & Emotional Ability | "So, I did end up recently stopping volleyball; I was not exactly halfway through the year- well, the club season. But I had to stop it just because I [was] deal[ing] with a lot of stress. And stress can really make me not feel motivated to do a whole lot of stuff. And I really needed to take that motivation and use it for my art because I, that's where I want to be in the future" [Kaylee]. |
| Technology | "Writing, like, I really enjoy it. But like, I don't even have like a computer anymore. So when am I ever gonna go write? Am I gonna hand-write stuff?" [David].<br><br>I used to but it's not something I'm super interested in now, mainly because the Wi-Fi is so slow that nothing is able to work" [Asher]. |

| | |
|---|---|
| Environment | “I feel like it's definitely important just to make sure that like you're creating a space where everyone feels comfortable to be involved in an activity of some sort” [Brittany].<br><br>“I stopped theatre as the school year is over, and the production only lasted so long. I stopped dance as I had to change dance teachers and was tired of constantly being criticised and told I'm not doing things/movements properly when I don’t have enough joint mobility to do so and had made that clear. Mixed martial arts got too competitive, and everything was about the next competition and the next chance to win and was no longer fun, as well as being there were only adult males that I had the opportunity to fight with” [Olivia].<br><br>“I really like the fact that I can be surrounded by people who understand me as a person and I can understand them as people, um, and that it’s just there’s a wide variety of people” [Lucas].<br><br>“Because I've been doing them for years, so it's like family, the people. And it's good for me” [Ashley].<br><br>“Like I, I like having that little family that we go to. Even, even if like, we don't play on the same team” [Kaylee]. |

**Table #4 Locus of Control**

| External Locus of Control | Internal Locus of Control |
|---|---|
| “Usually, if I’m not very good at something, I won’t continue doing it” [Brittany]. | “I play video games. You can play with your friends. You can talk to them. And you can try to win; it’s fun” [George]. |
| “Okay, I’d say… at the moment not really, just because I don’t have my driver’s license. Not my fulls [full driver’s licence], anyway; um, so it’s kind of hard living in a certain area” [Lucas]. | “Definitely go out and learn new stuff. Because if you don’t then you’re going to be really bored […] it doesn’t matter if you don’t like it or not, at least try” [Zuri]. |
| “That gets in the way of almost everything; my lack of time due to being [disabled]” [Annie]. | “I have a passion for them. I get to meet new people. And overall, I just enjoy spending time doing these things” [Ezra]. |
| “[Options are] sort of limited? Because of like, location. Yeah, I can't always go like from where I live on the [area name redacted] to like, say [town name redacted] every day. Like mainly it's gas [price] wise, and just travel” [Noah]. | A lot of people are afraid to try new things because they're afraid they're aren't going to be good at it. That's also another thing. But um, that's kind of the whole point. Once you try it, get used to it, get good at it, then it's just something that becomes part of you” [Amy]. |

# ABSTRACTS

Alfred V. Aaron Ph.D.
University of Guyana
Arron M. Fraser Ph.D.
Mount Saint Vincent University

**Using A Multi-Stakeholder Future Imagining Approach To Develop Work Ready Accounting Graduates In An Emerging Economy**

Using a multi-method imagined future study approach this research engages multiple stakeholders to ascertain the salient elements of a value-added accounting internship program at a university in an emerging economy and the resultant impact on students. We found that a program is perceived to be value-adding when there is (1) an emphasis on real world application (2) increased employability of students post internship, (3) a discernable utility from partnerships and networks and 4) effectively administered by the companies' offering internships. We also found that students and practitioners expected a positive impact on interns because of the opportunity to complete their circle of learning and solidify their career choices. Practically, the university can use our findings as a basis for implementing an internship program. Since internships are critical, the limitations of our research can be used as avenues for future research.

Jennifer Alex
Jane Fraser
Ken MacAulay
Mary Oxner
St. Francis Xavier University

**BRIDGING THEORY AND PRACTICE: AN EXPERIENTIAL LEARNING EXERCISE IN ACCOUNTING**

This work-in-progress paper describes and evaluates the effectiveness of an experiential learning project implemented in an introductory managerial accounting classroom at a small Canadian university. The project involved students visiting a local business to assess internal controls and develop a balanced scorecard. Data was collected from students who completed the project through surveys, which included scale-type and open-ended questions. Results indicate that the project enhanced students' understanding of internal controls and performance measurement and was an effective instructional strategy. This study underscores the value of experiential learning in accounting education, with a specific usable example, and suggests how similar activities could be refined and expanded in future iterations to enrich student engagement and experience in the classroom.

Ashley Doyle
Ryan Stack
Acadia University

## RECRUITMENT Of ACCOUNTING STUDENTS IN ATLANTIC CANADA

This study aims to understand the recruitment process for undergraduate accounting students at Atlantic Post-Secondary Institutions (PSIs). Information regarding the demographics of students who attend accounting and finance career fairs will be gathered and analyzed. While there have been studies covering those early in their career, more information on potential recruits in the accounting area must be covered. This study will include demographic-related survey questions for students attending career fairs and data collection of recruitment materials offered to students in person and online. Observational data will be collected on recruiters and recruits by attending career fairs.

Rhonda McIver
Jennifer Alex
St. Francis Xavier University

## EMPOWERING YOUNG ADULTS TO PRACTICE POSITIVE FINANCIAL BEHAVIOUR THROUGH TAX EDUCATION

This study reviews the literature on the financial behaviour and financial literacy of young adults with a focus on taxation awareness and knowledge. The literature review will be used to explore emerging themes and gaps in an effort to inform the creation of an intervention tool. The purpose of this study is to develop an experiential learning tool that will be delivered to high school students to empower these young adults to take control of their financial position and practice positive financial behaviour, through a basic understanding of Canadian taxation, as they move on from high school. This is the preliminary stage of further research on the financial literacy of young adults and interventions that may reduce barriers to positive financial behaviour and reduce the stigma surrounding tax compliance.

Ryan Stack
Terrence Weatherbee
Acadia University

**PUBLIC ACCOUNTABILITY AUDITS: MAPPING THE FIELD**

This study examines a relatively new phenomenon related to accountability and transparency of public officials: Public Accountability Audits (PAAs). Those engaging in PAA activities mobilize modern technology and the public gaze to impose accountability on those in positions of power. In branding themselves as 'auditors' they attempt to benefit from the legitimacy traditionally attributed to that activity. However, many aspects of their activities are incongruous with more traditional forms of audit. At this stage of our research, we discuss data collected using Google YouTube API v3, including data points from dozens of YouTube channels and tens of thousands of videos. The work shown here represents the beginning of a project to better understand this new phenomenon, its participants, and its impacts on public discourse.

Abigail Steen [Student]
Mark MacIsaac
Rhonda McIver
St. Francis Xavier University

**THE EXPLORATION OF DETERMINANTS OF PLAYER VALUATION AND SALARIES IN WOMEN'S PROFESSIONAL SOCCER**

Women's professional soccer players face pay inequity compared to men. While their salaries should be a result of their performance, other factors can lead to variations in salary amounts paid to each player. The purpose of this research is to examine the key determinants used in the valuation process of women's soccer players by clubs and how these results inform player salary. An extensive literature review was conducted, and the findings will be used throughout the collection of data from sources such as financial statements and social media posts. The data will be analyzed using mixed methods. The expected results are to provide insight to better evaluate players to help women's professional soccer players be paid more equitably.

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The University of the West Indies, St Augustine, Trinidad and Tobago
Amrika Baboolal,
CTS College of Business and Computer Science, Trinidad and Tobago
Abede Jawara Mack,
St Francis Xavier University, Antigonish, NS
Katelynn Carter-Rogers,
St Francis Xavier University, Antigonish, NS

## TOWARDS BUSINESS CREATION: ATTITUDES AND INTENTIONS OF UNEMPLOYED YOUTHS

Cultivating positive attitudes towards business creation through entrepreneurship education and training is a significant challenge for agencies addressing youth unemployment and underemployment. This study assessed the effectiveness of entrepreneurship training on unemployed youths' entrepreneurial intentions using the theory of planned behavior. Surveying 128 youths from a vocational education institute, results showed training significantly improved attitudes towards business creation, social norms, and entrepreneurial intentions, though perceived behavior control had the smallest improvement. The authors reviewed best practices and offered recommendations to enhance training delivery. Implementing these could improve vocational training, boost youth self-employment and aid national poverty reduction efforts.

Md. Jahangir Alam Zahid [Student]
MSc in Management, Memorial University of Newfoundland and Labrador

## EXPLORING EQUITY CROWDFUNDING POTENTIAL IN NEWFOUNDLAND AND LABRADOR

The study adopted a place-based approach to evaluate the readiness of Newfoundland and Labrador (NL) tech companies in terms of human and social capital, innovation, and active knowledge sharing to attract investors through Equity Crowdfunding (ECF). A systematic literature review was conducted to understand the relevant factors for ECF success. Primary data was gathered through a survey of small tech-based enterprises. Additionally, observations of founders' and companies' social media and websites provided further data. The findings highlight both strengths and areas for improvement among the founders, offering insights into their readiness for ECF success. Given the emerging role of ECF in Canada as an alternative fundraising method, the study's findings may hold significant implications for policymakers and other relevant stakeholders.

David Foord
UNB Fredericton
Maha Tantay
University of Windsor

**THE SOCIAL CONSTRUCTION OF SMART GRIDS: POLICY MIXES IN THE MARITIME CANADIAN TECHNOLOGY INNOVATION SYSTEM, 2009 TO 2022**

In technology innovation system (TIS) literature, development cycles address structural tensions, such as the interlinking of hydroelectricity and intermittent renewable electricity systems to decarbonize electric power grids. What is not yet well understood in this literature is how systemic change occurs in the context of technology innovations systems with multiple pathways in development. To understand this process of change, we examine a regional TIS case study on smart grids. We address our question through use of a social construction of technology and society model to identify stakeholder problems and solutions within a transitioning TIS.

Kaitlyn Garrison
Cory Ochs
Kristen Romme
Priyam Saxena
Atanu Sarkar
Memorial University

**PUBLIC PERCEPTIONS OF MUNICIPAL SOLID WASTE AMONG IMPACTED COMMUNITIES IN CANADA AND THE UNITED STATES: A SYSTEMATIC REVIEW AND QUALITATIVE SYNTHESIS**

Waste generation and landfill use are escalating globally. These sites pose significant health risks to nearby communities, with a disproportionate impact on marginalized groups. This review examines public perceptions in impacted Canadian and American communities. A comprehensive search yielded 30 articles, revealing prevalent themes: ‘Pollution,’ ‘Health,’ ‘Community,’ and ‘Injustice.’ Concerns included water contamination, mental health impacts, and increased illnesses attributed to landfills. Additionally, communities suffer from conflicts, stigma, and economic decline, leading to feelings of dread and hopelessness among residents. Future policies must prioritize community consultation and ongoing input. Socio-economic mapping should guide future sites away from already disadvantaged communities. Initiatives should incorporate measures to mitigate environmental racism, empower affected communities, and promote sustainable waste management practices to foster environmental.

Maria Matthews
Mount Saint Vincent University
Annamarie Sisson
Edinburgh Napier University

## ACADEMIC HAZING: THE EFFECTS OF SYSTEMS OF OPPRESSION ON HIGHER EDUCATION FACULTY

The higher education business landscape is witnessing heightened levels of systems of oppression that have surfaced amongst early career academics. The effects of systems of oppression on higher education faculty are investigated in this study. Data was collected from 168 higher education educators worldwide. Oppression has an impact on faculty promotion and tenure, emotional well-being, and workload capacities. Manipulation and racial and gender biases are presented in open-ended responses from faculty. This study benefits higher education administrators to act in a supportive and non-biased role towards early career professionals. This study could also benefit researchers and practitioners interested in furthering the dialogue between junior and senior-level faculty in higher education.

Courtney McKay
Steven Smith
Vurain Tabvuma
Katelynn Carter-Rogers
Hao Lu
Saint Mary's University

## WHO IS MAKING MINING MORE SUSTAINABLE? HOW BOARD CHARACTERISTICS CAN ADVANCE THE SDGS THROUGH ECSR INITIATIVES

This work in progress paper aims to better understand the relationship between board characteristics and achieving the Sustainable Development Goals (SDGs) through environmental corporate social responsibility (ECSR) initiatives in mining organizations operating in the Canadian North. Specifically looking at gender, insider/outsider status, age, and cultural background this study investigates whether increasing board diversity can advance sustainability efforts within the industry. Proposing a two-study mixed methods approach, it will provide an overview of current ECSR initiatives, the extent SDG targets and indicators are considered in ECSR efforts, and how board characteristics support or derail such efforts.

Joe Abekah
Afua Asante
Dinesh Gajurel
University of New Brunswick

**Impact of Foreign Direct Investment and Foreign Direct Assistance on Economic Growth in Africa. A Half Century Analysis**

This paper reports on the impact of FDI and FDA on economic growth of forty-three (43) African countries over a half century period from 1970 to 1921. Preliminary results indicate that both FDI and FDA have positive effects over time. However, they also make it abundantly clear that domestic productive efforts, captured by gross domestic capital formation, are by far the strongest determinants of national growth and development. The research fills some of the dearth in long-term evaluations of FDI and FDA in Africa and overcome the limited number of countries covered in prior studies. As FDA's share of available development assistance capital dwindles globally, African countries may do well to enhance enabling conditions that attract FDI as a continuing source of capital for economic development.

Akoko Agossou (Student)
Tania M. Morris
Vicky Therrien
Lamine Kamano
Université de Moncton

**Understanding the Financial Challenges Immigrants Encounter in Canada Regarding Better Financial Integration: A Work in Progress**

This project explores the financial challenges immigrants face in Canada, with the aim of promoting better financial integration. Canada is renowned for its open immigration policy, which has led to a significant increase in immigration. However, immigrants face challenges such as under banking, wealth accumulation deficits, language barriers, and a lack of financial knowledge. These challenges are exacerbated by the current economic situation, which is marked by high interest rates and inflation, both of which have increased the cost of living. This study aims to highlight the financial challenges immigrants face and to provide insights into how these challenges impact their financial integration.

Azadeh Babaghaderi
Assistant Professor of Finance, University of Windsor
Sam Kolahgar
Assistant Professor of Finance, University of Prince Edward Island

**Board Gender Diversity and Corporate Spinoff Incompletion**

This study investigates the impact of female board members on the likelihood of corporate spinoff incompletion and examines the relationship between the proportion of female board members and the performance disparity between completed and incomplete spinoffs. Utilizing a sample of 1,526 U.S. corporate spinoffs announced between 1980 and 2016, we find that board gender diversity is positively correlated with both the probability of spinoff incompletion and the performance difference between completed and incomplete spinoffs. Our findings indicate that a higher presence of female directors is associated with an increased rate of spinoff cancellations, while the spinoffs that are completed tend to exhibit superior long-term performance compared to their incomplete counterparts.

Reihaneh Kolivandi
Ashraf Al Zaman
Saint Mary's University

**Influence of AI on Corporate Social Responsibility: Some Initial Evidence**

In this paper, we investigate the relationship between Artificial intelligence (AI) and corporate social responsibility (CSR). Using data for firms from the US, we find a positive relationship between AI use and overall CSR performance. The dual benefit of AI in enhancing corporate performance and CSR is significant. This finding is robust to the inclusion of fixed effects and various control variables. In investigating the mechanism driving this outcome, we find that the key driver is the "employee relation" category of our CSR measures. To effectively operationalize AI, firms recruit and retain employees endowed with high levels of human capital requiring significant expenses from the firm. Continuous investment in these employees' professional and personal well-being leads to improved CSR performance.

Tania M. Morris
Vicky Therrien
Akoko Agossou (Student)
Université de Moncton

**Improving the Financial Well-Being of Canadians: The Role of Stakeholders**

This research explores how diverse stakeholders, beyond individuals, can improve the financial well-being of Canadians. A qualitative study was carried out, showing that the education system, financial institutions, and regulatory bodies play a crucial role in this quest.

Alexandre Savoie-Comeau
Tania M. Morris
Université de Moncton

**Economic Conditions, Bank Profile, and Balance Sheet Management**

This article explores the impact of rising interest rates on federally chartered Canadian banks' balance sheet management, amid high inflation and substantial household debt. Leveraging recent economic data and a Keynesian framework, the study assesses how increasing interest rates influence bank deposits. Although higher rates might boost deposits, the previous era of low rates may have led to increased household debt, potentially negating the benefits of higher deposit returns and negatively affecting aggregate bank deposits. Additionally, the research evaluates how these dynamics affect bank loan allocation practices. The findings offer crucial insights for policymakers, regulators, banks, and investors, informing macroprudential policy development, regulatory risk management, stress testing, and financial evaluations.

Tayyaba Yousaf
Assistant Professor, Hailey College of Commerce, University of the Punjab
Kiran Shafi
Hailey College of Commerce, University of the Punjab

**Unleashing the Importance of Intellectual Capital through Companies' Life Cycle Stages**

Intellectual capital is a valuable but often intangible asset for organizations; hence, its impact is not fully reflected in financial accounts. Current study attempts to investigate the impact of intellectual capital on financial performance of Pakistan's Pharmaceutical Industry, which has undergone significant modernization and adheres to Good Manufacturing Practices. Data spans ten years from 2012 to 2022, and were analyzed using Modified Value-Added Intellectual Coefficient (MVAIC) model to quantify intellectual capital alongside multiple regression for hypothesis testing. The way intellectual capital affects Pakistani pharmaceutical companies' financial performance in different life cycle stages makes this research unique. The findings will benefit external investors in making investment decisions and companies' management in optimizing intellectual capital to obtain a competitive edge and enhance financial performance.

Dr. Zainab Almukhtar
Radhika Ramachandran Nair
Gadha Jyothi Prasad
Cape Breton University

**THE IMPACT OF DIVERSITY AND INCLUSION ON INNOVATION IN SMALL BUSINESS IN CAPE BRETON**

The paper investigates the impact of Equity, Diversity and Inclusion (EDI) on innovation in small business in Cape Breton. By conducting a survey to a number of small businesses in Cape Breton we explore how those business manage and utilize diversity. We further explore the challenges they faces when incorporating diversity; what conflicts they faced and how they dealt with them. Based on that and on a theoretical model that links diversity to innovation we construct a framework with focus on small business on how diversity can be best utilized to foster innovation. Within that we investigate obstacles that are faced in implementing diversity and ways business owners and managers face those obstacles. The importance of this work stems from the vitality of small business to the growth of economy in the island. As well as the rich and diverse culture of the island and the growth in the diversity of its population.

Chiedza Chigumba [Graduate Student]
Saint Mary’s University
Katelynn Carter-Rogers
St. Francis Xavier University & Saint Mary’s University

**AN ALTERNATIVE PERSPECTIVE ON THE UTILITY OF THE MODEL OF STEREOTYPING THROUGH ASSOCIATED AND INTERSECTIONAL CATEGORIES (MOSAIC)**

Intersectionality continues to be a topic of interest to researchers looking to operationalize the framework. MOSAIC has attempted to do so and has been cited frequently in intersectional research. Since the model bases its approach to intersectionality on the White race being the base comparison group, the utility of the MOSAIC comes into question when explored outside this lens. A closer look at how the model has been used in research since 2019 shows that the MOSAIC has reinforced stereotypes in intersectional research but is yet to be tested empirically. We argue that MOSAIC's utility is limited as it is focused on social categorization by the observer, not lived intersectional experiences.

Susan Graham
Amy McFarlane
University of Prince Edward Island

## THE CATHERINE CALLBECK FUND TO SUPPORT WOMEN IN BUSINESS

Women are and have been under-represented in business education. The creation of the Catherine Callbeck Fund to Support Women in Business was founded to create inspiration and connection for tomorrow's women business leaders through enrichment and mentoring opportunities. This endowment will be used to find programming and initiatives to support these broad objectives. Part of the funding agreement requires that programming impacts be tracked and reported on. To fulfil this requirement, a data collection process will need to be established along with programming. The pillars of the proposed program will span skills development, building community, and strategizing ways to tackle systemic gender biases in business education and beyond. The research program is under development.

Claire Robb
Master of Arts in Women and Gender Studies
Saint Mary's University
Gender & Diversity: Work-in-progress

## QUALITY CHECK: NOURISHING FEMINIST SPACES IN THE RESTAURANT INDUSTRY THROUGH EMPLOYEE RELATIONSHIPS

An academic investigation into the intersection of precarious work and feminist literature within the context of the restaurant industry. This work in progress is informed by personal experience and the utilization of four key literature areas (precarious work, feminist organizing, feminist spaces, and intersectionality). Using semi-structured interviews focused on the experience of restaurant workers (servers) as a form of genuine knowledge production. An intersectional lens will be applied to interpret the findings and work to fulfill an identified literature gap. This research seeks to contribute to both feminist literature and practice by highlighting the importance of participant experience, community organizing, and accessible content.

Kristin S. Williams
Acadia University & University of Eastern Finland

**ROSE FORTUNE: A THORNY HISTORY**

The aim of this paper is to foreground the story of an overlooked groundbreaking entrepreneur in Canada, Rose Fortune. The study asks: Who is Rose Fortune and why is she an important figure in Canada's business history? Rose Fortune was a Black Loyalist immigrant who came to Canada in the late 1700s. She became not only Canada's first self-appointed female police officer, but she started a business that thrived for well over a century. This study applies a novel, embodied methodology, called ficto-feminism. Ficto-feminism draws together fictocriticism, autoethnography and collective biography as a political project to re-imagine a taken for granted history. This strategy can be used to bring light to overlooked women in management and organizational history. The contribution of this study is two-fold: (1) to create a sense of resonance with Rose Fortune, (2) to foreground her key contributions and the conditions that allowed her to be overlooked in the first place. The novelty of this study stems from the approach which involves crafting a fictitious conversation with the late Rose Fortune, using historical traces, family accounts, and archival records.

Badr-un-nisa (Nisa) Chand
Reena Alias,
Kiran Thakur
University Canada West, Vancouver, Canada

**DARK SIDE OF INNOVATION: TECHNOLOGY EXPLOITATION AND THE ROLE OF GOVERNANCE STRUCTURES IN DEVELOPING COUNTRIES.**

Modern technologies play a pivotal part in promoting innovation, however, in the developing countries context, due to inefficient governance structures, sometimes these technologies become mere tools for organizations to pursue their profit agendas. This paper explores how weaker governance causes the exploitation of Information Systems (IS) technology in developing countries. Critical Realism (CR) Methodology has been used to uncover the mechanisms that cause ineffective governance and allow the misuse of technology by organizations operating in developing countries. We combine our CR methodology with the affordances of technology theory to understand the role of context in the technology actualization and effect. This paper concludes that organizations operating in contexts where weak governance structures exist find it easier to exploit the affordances offered by technologies.

Geethu Susan Ebby (Student)
Cape Breton University
Enayat Rajabi
Cape Breton University
Somayeh Kafaie
Saint Mary's University

**TRANSFORMING HEALTHCARE WITH KNOWLEDGE GRAPHS: APPLICATIONS, CHALLENGES, AND FUTURE DIRECTIONS**

Knowledge graphs (KGs) have emerged as transformative tools in healthcare, offering structured and semantically enriched representations of complex medical data. By integrating diverse data sources, knowledge graphs enable a holistic view of medical knowledge. As healthcare systems increasingly rely on data-driven insights, the ability of knowledge graphs to provide explainability to the generated information becomes invaluable. This work-in-progress paper explores various medical knowledge graphs, their application, challenges, and future direction. The paper emphasizes the need for advancements in explainable AI (XAI) systems and the importance of rigorous evaluation frameworks, and user-friendly interfaces for clinical users. By addressing these opportunities, knowledge graphs have the potential to significantly advance innovation, improve clinical decision-making, and support personalized medicine.

Aravind Krishnan [Student]
Manipal Institute of Technology, Bengaluru
Yusuff Kazeem [Student]
Saint Mary’s University
Somayeh Kafaie
Saint Mary’s University
Enayat Rajabi
Cape Breton University

## ANTIBIOTIC RESISTANCE GENES PREDICTION USING KNOWLEDGE GRAPHS

Antimicrobial Resistance (AMR) poses a significant threat to public health causing 1.27 million deaths globally in 2019. Traditional methods for identifying antibiotic resistance genes (ARGs) are resource-consuming and limited in detecting new resistance patterns. This study aims to enhance ARGs detection using knowledge graphs, integrating AMR gene neighborhoods and protein-protein interaction networks to study horizontal gene transfer (HGT) cases in Klebsiella pneumoniae and Staphylococcus aureus. By constructing a comprehensive knowledge graph and applying iterative link prediction methods, this work-in-progress paper seeks to identify potential HGT cases. This approach addresses the limitations of existing frameworks and aims to contribute to better strategies to combat AMR.

Naeem Shirmohammady [Student]
Department of Mathematics and Computing Science, Saint Mary's University
Somayeh Kafaie
Department of Mathematics and Computing Science, Saint Mary's University

## UNCOVERING HIGH-ORDER DRUG-DRUG INTERACTIONS WITH MACHINE LEARNING

High-order drug-drug interactions (DDIs) present a significant challenge in pharmacology due to their potential to cause unforeseen and harmful effects. Traditional approaches have often focused on pairwise interactions, neglecting the complex interplay between multiple drugs. This study introduces a novel method for detecting patterns in higher-order DDIs utilizing advanced machine learning techniques. By leveraging extensive pharmacological databases and employing the state-of-the-art algorithms, our approach is able to identify significant interaction patterns. This work-in-progress paper describes our methodology, and future research directions.

Golam M. M. Aurup
Cape Breton University
Michel Laroche
Concordia University
Marie-Odile Richard
State University of New York Polytechnic Institute, U.S.A.

## THE ROLE OF ETHNICITY AND LANGUAGE ON MATERIALISM, COSMOPOLITANISM, AND CONSUMER ETHNOCENTRISM SCALES: A STUDY ON CANADIAN BILINGUALS IN QUEBEC

The study analyzed responses on materialism, cosmopolitanism, and consumer ethnocentrism from bilingual Quebecers in Canada. Both French and English bilinguals responded in the two languages. The results suggest that different ethnic groups living in the same country may show differential responses to these consumer attitudinal perceptions. The differences may be due to their ethnicity or the language used to respond to the questionnaire.

Thi Linh Giang Chu
Krishnakumari Jayakumar
Xiaoshan Zhang
Mizanur Rahman
Dr. Trang Mai-McManus
Cape Breton University

## THE IMPACTS OF COVID-19 ON STUDENTS' ATTITUDE TOWARDS DEGREE VALUE, JOB PROSPECTS AND FINANCIAL CONCERNS: A STUDY AMONG POST-SECONDARY STUDENTS ACROSS ATLANTIC PROVINCES

This study explores the impact of the COVID-19 pandemic on students pursuing post-secondary education across Atlantic provinces and how they addressed their concerns about degree value, job prospects, and financial issues. The outcome of this study will be used to provide recommendations to the policy makers, post-secondary institutions, and educators on how to support graduates in the area during future periods of labour market volatility.

Gordon Fullerton, Ph.D
Saint Mary's University

## THE EFFECTS OF COMMITMENT TO THE ENDORSER ON ATTITUDES AND PURCHASE INTENTIONS FOR PERFORMING AND SUPPORTING BRANDS

There is a vast body of research on the nature of celebrity endorsement processes (Schimmelpfennig and Hunt, 2000) and it is a fairly mature field. Endorsers have multiple sources of influence, but two of the well-studied ones are expertise and likeability (Cialdini, 2001). At the same time, endorsers often work with multiple endorsed brands that allow the endorser to apply different sources of influence depending on the nature of the brand (Fleck, Korchia and Roy, 2012). For sports celebrities, fans develop relationships with the object of their fandom and this is one route through which brands can make an impact on consumers who are fans of the endorser (Bodkin, Amato and Peters, 2009). This paper will examine the impact of the fan's relationship with the endorser on attitudes and intentions towards endorsed brands.

Dr. Trang Mai-McManus
Cape Breton University
Dr. Olya Bryksina
University of Winnipeg
Dr. Luming Wang
University of Manitoba

## THE SMALLER THE SIZE, THE HIGHER THE PRICE? HOW SIZE-RANGE INFLUENCES BRAND-STATUS INFERENCES AND WILLINGNESS TO PAY

Can the size-range of a clothing brand influence consumer willingness to pay for the brand's clothing? The results of three controlled experiments and an analysis of secondary data suggest that the answer to this question is "yes." We demonstrate that consumers are willing to pay more for brands that carry smaller size-ranges because they infer smaller-size-range brands to be higher in status/luxury value. This happens because smaller-sized brands are worn by thinner consumers, and in Western society thinner people are often attributed higher social status—the extent to which they are respected and admired by others. This research has conceptual implications for the understanding of the meaning of thinness in Western cultures and practical implications for the managers of clothing brands.

Ainsley MacNeil [student]
Bobbi Morrison
Neil Maltby
St. Francis Xavier University

## LEVERAGING SOCIAL MEDIA FOR NON-PROFIT FUNDRAISING: A SYSTEMATIC LITERATURE REVIEW

Non-profit organizations rely on effective fundraising to sustain their vital societal roles. Social media offers a promising platform for fundraising efforts, yet best practices in this area are not well understood. This study conducts a domain-based systematic literature review using the SPAR-4-SLR protocol to identify these best practices. A search of multiple databases yielded 1,483 records. Following screening of abstracts and full-text articles for inclusion criteria, 40 studies were included in the final analysis using the ADO and 5W+1H frameworks. Preliminary findings revealed a body of knowledge originating mainly from the United States, a predominant focus on Facebook, and a dominance of empirical methodological approaches. A content analysis is ongoing, with final results to be presented at the conference.

Suzanne Rath
University of Prince Edward Island

## CHRISTMAS DECORATIONS IN OCTOBER? HOW TIME STYLE AFFECTS CONSUMERS' REACTIONS TO HOLIDAY SALIENCE

Consumers have recently noticed holiday promotions and store décor creep outside the expected time bounds of the holiday in question, such as Christmas décor in October. While some consumers enjoy the early display of stores' holiday décor, others criticize this practice. The present work presents one experiment investigating whether consumers perceive early holiday salience less positively than typical holiday salience. It also tests the prediction that a monochronic (time is linear and separable) vs. polychronic (time is fluid and flexible) time style will affect perceptions of consumers' persuasion knowledge of holiday salience or whether they will give the company the benefit of the doubt. This work cautions marketers as to whether they should display their holiday decorations too early.

Prashantkumar Jani (student)
Tasquia Mizan
Dr. Samiul Islam
Shannon School of Business, Cape Breton University

## ADVANCING AI AND ML APPLICATIONS IN CLOSED-LOOP SUPPLY CHAINS: A COMPREHENSIVE LITERATURE REVIEW

This paper presents a comprehensive literature review of artificial intelligence (AI) and machine learning (ML) applications in closed-loop supply chains (CLSC). Through an exhaustive and objective search of peer-reviewed articles, we identify the most influential authors, impactful studies, and leading journals, as well as prevailing publication trends in the field. Our analysis reveals a significant increase in relevant publications over the past decade, underscoring the growing interest in AI/ML research in CLSC. We also identify Genetic Algorithms (GA) as the most popular AI method, with additional techniques like Reinforcement Learning, Artificial Neural Networks (ANN), and Convolutional Neural Networks (CNN) showing promise in this domain. Furthermore, our findings highlight a predominant focus on single-objective functions, suggesting a need for multi-objective optimization approaches that can address the complex, multidimensional challenges in CLSC. This review provides valuable insights into the current landscape and future potential of AI/ML applications, emphasizing the need for innovative methods to enhance predictive capabilities, optimization efficiency, and decision-making in closed-loop supply chains.

Warren Marchant (student)
Mount Saint Vincent University

## A LITERARY REVIEW OF THE POLICY EFFECTS OF LARGE DEMOGRAPHIC CHANGE ON THE VIABILITY OF NEW BUSINESSES IN NOVA SCOTIA

For more than seventy years, the Canadian Government has closely tied its immigration policy to economic policy. In the post-Covid economy, debates are ongoing if the current demographic changes, specifically the rapid population change resulting from immigration, are providing the greatest benefit to the Canadian economy and population. By conducting a systematic review of relevant government and economic reports, this research paper aims to understand how immigration policy influences business development in Nova Scotia, highlighting both opportunities and challenges for new business in the context of rising living costs and economic pressures.

Matthew McKenna (student)
Michael Zhang
Saint Mary’s University

## A LITERATURE REVIEW OF LEGAL INSTRUMENTS TO COMBAT ONLINE HATE CONTENT

The submission is work-in-progress study. Our aim is to review legal measures aimed at regulating and combating online hate content.

Md Fahad Reza (student)
Samiul Islam
Tasquia Mizan
Shannon School of Business, Cape Breton University

**IMPACT OF VERTICAL INTEGRATION ON COST EFFICIENCY AND SALES GROWTH – A CASE STUDY IN POULTRY INDUSTRY**

Vertical integration refers to how much a company owns its suppliers and buyers. Moving towards full integration can bring challenges like higher costs and a shift in focus from the main business. This study explores vertical integration in the poultry industry, examining its extent over time and its impact on performance, including capital, profit, sales growth, and costs. Compared to a non-integrated setup, a fully integrated poultry operation saw an 8% decrease in feed costs, a 91% drop in veterinary costs, a 3% reduction in labor costs, and a 44% cut in transportation costs. Additionally, sales significantly increased when the poultry industry fully integrated its supply chain.

Amritpal Singh (student)
Tasquia Mizan
Samiul Islam
Shannon School of Business, Cape Breton University

**MACHINE LEARNING APPLICATIONS IN SUSTAINABLE SUPPLIER SELECTION AND ORDER ALLOCATION PROCESS: A COMPREHENSIVE LITERATURE REVIEW**

Supplier selection is a frequent multicriteria decision-making (MCDM) challenge that is further complicated by the need for sustainable supplier selection. This advanced form of supplier selection necessitates consideration of economic, environmental, and social factors, which complicates the decision-making process. To address these complexities, various methodologies have been developed. Some of these approaches are grounded in MCDM/A methods, either independently or integrated with other MCDM/A methods, along with various alternative techniques. We searched and found that very little work had been done on Supplier selection and order allocation with Sustainability, which includes machine learning or AI gave us only 56 research papers. This paper intends to give a literature review of the machine learning methodologies used in the last 5 years (2019-2024) in selecting suppliers and allocating orders by considering sustainability.

Mohammad Siddiquee, Ph.D.
Mount Saint Vincent University

# INDEPENDENT DIRECTORS: WHAT CAN WE LEARN FROM WARREN BUFFETT?

NYSE and NASDAQ mandate that company boards have a majority of "independent" directors, with few exceptions, and require that audit and compensation committees consist entirely of independent directors. However, these directors can still encounter conflicts of interest that compromise their independence. The article explores one such conflict highlighted by Warren Buffett in his letters: if an independent director relies solely on their board compensation for income, their independence is questionable. Buffett's experience on 21 public company boards and interactions with around 250 directors provides significant insights into the role of independent directors. The article compares Berkshire's governance practices, including director compensation, share ownership, and board membership requirements, with those of DOW 30 companies.

# CONFERENCE PROGRAM

# ASB 2024 | Program

Friday 20 September | 3.00pm – 5.00pm

**All Conference Workshop**
Location: Sobey 260
Friday 20 September | 3.00pm – 5.00pm

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|---|---|
| **Title:** Navigating Academic Careers in the 21st Century: Challenges, Opportunities, and Innovations | **Organizer:** Nicholous Deal, MSVU<br><br>**Panelists:**<br>Peter McInnis, StFX: Labour Relations<br>Kristene Coller, SAIT: Academic Programs<br>Ellen Shaffner, MSVU: Social Media<br>Shelley Price, Acadia: Knowledge Mobilization<br>Ashley Doyle, Acadia: Industry Spanning<br>Justin McMannus, Dalhousie: Open Science |

**Workshop Description**: The landscape in higher education is rapidly evolving and business academia in Atlantic Canada is at the forefront of these changes. Our workshop explores the terrain of 'doing' academic careers in the 21st century, focusing on the unique challenges and opportunities that define academic life in business schools. From the unbundling of academic programs to the disruption of new media and open science innovations, we will hear from panelists about navigating these challenges and equipping us with insights, tools and knowledge needed to excel in an ever-changing context.

Saturday 21 September | 9.00am – 10.30am

**Track: Accounting**
Location: Loyola 271
Chair: Mary Oxner, StFX
Saturday 21 September | 9.00am – 10.30am

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|---|---|
| Using A Multi-Stakeholder Future Imagining Approach to Develop Work Ready Accounting Graduates in An Emerging Economy | Alfred V. Aaron, University of Guyana<br>Arron M. Fraser, MSVU |
| Recruitment of Accounting Students in Atlantic Canada | Ashley Doyle, Acadia<br>Ryan Stack, Acadia |
| Public Accountability Audits: Mapping the Field | Ryan Stack, Acadia<br>Terrance Weatherbee, Acadia |

**Track: Cases & Cases in Progress**
Location: Loyola 273
Chair: Conor Vibert, Acadia
Saturday 21 September | 9.00am – 10.30am

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|---|---|
| Environmental Benefits of Hydrogen-Fueled Public Buses: A Life Cycle Assessment Case Study in Halifax, Nova Scotia | Ali Mahmoudi, Dalhousie<br>Hamid Afshari, Dalhousie<br>Armin Jabbardazeh, Université de Quebec<br>Hassan Sarhadi, Acadia |

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|---|---|
| Lactalis: Is It Time to Shift the Strategic Priority from Financial Growth to Environmental Sustainability? | Joanne McNeish, Toronto Metropolitan<br>Jillian Newfeldt, University of Cambridge |
| The ethics and sustainability of the seafood industry: a critical examination of clearwater seafoods | Courtney Cockerill, Mount Allison |

| Track: Human Resources, Industrial Relations, Organizational Behaviour & Organizational Theory<br>Location: Loyola 274<br>Chair: Scott Cassidy, UPEI<br>Saturday 21 September \| 9.00am – 10.30am | |
|---|---|
| Working through a Collage of Pain: A Systematic Literature Review on Sudden Death Survivors, Their Grieving Processes and Work Experiences | Stefanie Ruel, CBU |
| Cultural Intelligence and Knowledge Sharing: Unravelling the Mediating Influence of Emotional Intelligence and Moderating Effects of Social Capital in Multicultural Organizations | Noushin Kazeminezhad, Dalhousie<br>Binod Sundararajan, Dalhousie |
| Application of Technology Affordance in Understanding the Use of AI in Recruiting | Badr-un-nisa (Nisa) Chand, University Canada West<br>Min Bum Kay, University Canada West |

| Track: Communication & Marketing (joint session)<br>Location: Loyola 275<br>Chair: Amy Thurlow, MSVU<br>Saturday 21 September \| 9.00am – 10.30am | |
|---|---|
| The Effects of Commitment to the Endorser on Attitudes and Purchase Intentions for Performing and Supporting Brands | Gordon Fullerton, SMU |
| Exploring the Development of the Communication Process Model | Boluwatife Andrew Omojuwa, MSVU |
| A Year in the Interview Life of Google CEO Sundar Pichai | Karen Grandy, SMU |

| Track: Gender & Diversity & Finance (joint session)<br>Location: Loyola 277<br>Chair: J. Scott Grant, SMU<br>Saturday 21 September \| 9.00am – 10.30am | |
|---|---|
| Board gender diversity and corporate spinoff incompletion | Azadeh Babaghaderi, University of Windsor<br>Sam Kolahgar, UPEI |
| Quality check: nourishing feminist spaces in the restaurant industry through employee relationships | Claire Robb, SMU |
| Diversity policy in Chilean companies: an intersectional approach | Mariana I. Paludi, Universidad Técnica Federico Santa Maria<br>Juan Felipe Espinosa, Universidad Técnica Federico Santa Maria |

| Track: Indigenous Business, Economics & Reconciliation<br>Location: Loyola 280<br>Chair: Mary Beth Doucette, CBU<br>Saturday 21 September \| 9.00am – 10.30am | |
|---|---|
| Membertou's Journey to Financial Systems Certification | Dan Christmas, CBU |
| The Story Not Told: Corporate Social Responsibility and Environmental Conflicts in Indigenous Communities | Emily Head, StFX<br>Brad Long, StFX<br>Katelynn Carter-Rogers, StFX & SMU |
| Indigenous and Non-Indigenous Partnerships: Lessons on Allyship Through Storytelling from a Non-Indigenous Perspective | Courtney McKay, SMU |

| Track: Management Education<br>Location: Loyola 281<br>Workshop<br>Saturday 21 September \| 9.00am – 10.30am | |
|---|---|
| **Title:** Telling Tales Out of Business School: Exploring Identity Work in Early Academic Careers | **Organizers:**<br>Nicholous M Deal, MSVU<br>Kristin Williams, Acadia & University of Eastern Finland<br><br>**Panelists:**<br>Gabrielle Durepos, MSVU<br>Ellen Shaffner, MSVU<br>Shelley Price, Acadia<br>Blake Kanewischer, SMU & SAIT<br>Keshav Krishnamurty, University of Toronto<br>Maria Matthews, MSVU<br>Rhonda Dever, Thompson Rivers University<br>Kristene Coller, SAIT |
| **Workshop Description:** Early career trajectories face increasing inquiry in management studies due to heightened precarity and external shocks to the business school. Existing literature often lacks problematization of what constitutes early careerism and qualitative insights into the unique challenges of early career academics. This symposium aims to explore narratives from within and beyond those starting academic careers in business schools. We are holding space to share stories of identity work, including pursuing academia alongside parenthood, fulltime professional careers, work practice, and conditions of oppression and marginalization. Presenters share first-voice perspectives in hopes of addressing these systemic issues faced by those starting careers in management education. Attendees will surface challenges and solutions to starting academia differently. | |

Saturday 21 September | 11.00am – 12.30pm

| Track: Accounting<br>Location: Loyola 271<br>Chair: Mary Oxner, StFX<br>Saturday 21 September \| 11.00am – 12.30pm |
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|---|---|
| Empowering Young Adults to Practice Positive Financial Behaviour through Tax Education | Rhonda McIver, StFX<br>Jennifer Alex, StFX |
| The Exploration of Determinants of Player Valuation and Salaries in Female Professional Soccer | Abigail Steen, StFX<br>Rhonda McIver, StFX<br>Mark MacIsaac, StFX |
| Bridging Theory and Practice: An Experiential Learning Exercise in Accounting | Jennifer Alex StFX<br>Jane Fraser, StFX<br>Ken MacAulay StFX |

| Track: Business & Organizational History<br>Location: Loyola 273<br>Chair: Nicholous Deal, MSVU<br>Saturday 21 September \| 11.00am – 12.30pm | | |
|---|---|---|
| Edward Elgar Encyclopedia of Historical Organization Studies: Constuctivism | David Foord, UNB Fredericton | |
| Storying Business Histories: A Canadian Alouette Woman's Spiral Through Space and Time | Stefanie Ruel, CBU | Best paper nominee |
| The Methodological Legacy of the "Historic Turn": Advancing History-As-Method in Historical Organization Studies | Nicholous Deal, MSVU<br>Gabrielle Durepos, MSVU | |

| Track: Human Resources, Industrial Relations, Organizational Behaviour & Organizational Theory<br>Location: Loyola 274<br>Chair: Scott Cassidy, UPEI<br>Saturday 21 September \| 11.00am – 12.30pm | |
|---|---|
| We Don't Need Another Hero (Leadership Construct) | J. Scott Grant, SMU |
| Technology and the Work of Musicians: A Sociomaterial Exploration | Bui K. Petersen, SMU<br>Gordon B. Cooke, Memorial |
| Innovative and Creative Organizational Climate: The Impact of Innovative HR Practices on Performance | Rene Arseneault, Université Laval<br>Grant Wilson, University of Regina<br>Felix Bellesteros-Leiva, Université Laval |

| Track: Communication<br>Location: Loyola 275<br>Chair: Amy Thurlow, MSVU<br>Saturday 21 September \| 11.00am – 12.30pm | |
|---|---|
| Fostering Civil Discourse: how to create supportive learning and workplace environments by incorporating invitational Rhetoric into communications courses | Valerie Creelman, SMU |
| Reformation: uncovering the sustainability messaging of a fashion brand on Instagram | Taryn Martin, MSVU |

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|---|---|
| Reversing Student-Teacher Roles and Astute use of AI Tools to address Neurodivergent Needs in the Classroom | Binod Sundararajan, Dalhousie<br>Malavika Sundararajan, Ramapo College of New Jersey |

| Track: Tourism & Hospitality<br>Location: Loyola 277<br>Chair: Maria Matthews, MSVU<br>Saturday 21 September \| 11.00am – 12.30pm | | |
|---|---|---|
| The Entanglements of Colonialism, Settler Nations, Politics, and Tourism Demands: A Comprehensive Literature Review | Helle C. Haven Petersen, University of Waterloo & MSVU | Best student paper nominee |
| Reconceptualizing disruptive innovation: the case of airbnb and an introduction to the egraces model | Maria Matthews, MSVU<br>Ioannis S. Pantelidis, Ulster University<br>Rodrigo Lucena, University of Brighton | Best paper nominee |
| Wine Tourism the World Over: If It Ain't Broke How Do We Fix It? | Terrance Weatherbee, Acadia<br>Donna Sears, Acadia | |

| Track: Management & Information Systems<br>Location: Loyola 280<br>Chair: Claudia De Fuentes, SMU<br>Saturday 21 September \| 11.00am – 12.30pm | |
|---|---|
| Dark side of innovation: technology exploitation and the role of governance structures in developing countries | Badr-un-nisa (Nisa) Chand, University Canada West<br>Reena Alias, University Canada West<br>Kiran Thakur, University Canada West |
| A Comprehensive Framework for Digital Banking Transformation | Fariba Seyedjafarrangraz, SMU<br>Claudia De Fuentes, SMU |
| Antibiotic resistance genes prediction using knowledge graphs | Aravind Krishnan A, Manipal Institute of Technology<br>Yusuff Kazeem, SMU<br>Somayeh Kafaie, SMU<br>Enayat Rajabi, CBU |

| Track: Open<br>Location: Loyola 281<br>Chair: Suzanne Rath, UPEI<br>Saturday 21 September \| 11.00am – 12.30pm | |
|---|---|
| Impact of Vertical Integration on Cost Efficiency and Sales Growth – A case study in Poultry Industry | Md Fahad Reza, CBU<br>Samiul Islam, CBU<br>Tasquia Mizan, CBU |
| Machine Learning Applications in Sustainable Supplier Selection and Order Allocation Process: A comprehensive literature review | Amritpal Singh, CBU<br>Tasquia Mizan, CBU<br>Samiul Islam, CBU |
| Literature Review of Policy Effects on Demographics | Warren Marchant, MSVU |

Saturday 21 September | 2.00pm – 3.30pm

| Track: Ethics & Social Issues<br>Location: Loyola 271<br>Chair: Brad Long, StFX<br>Saturday 21 September \|2.00pm – 3.30pm | |
|---|---|
| Public Perceptions of Municipal Solid Waste Among Impacted Communities in Canada and the United States: A Systematic Review and Qualitative Synthesis | Kaitlyn Garrison, Memorial<br>Cory Ochs, Memorial<br>Kristen Romme, Memorial<br>Priyam Saxena, Memorial<br>Atanu Sarkar, Memorial |
| Academic Hazing: The Effects of Systems of Oppression on Higher Education Faculty | Maria Matthews, MSVU<br>Annamarie D. Sisson, Edinburgh Napier University |
| Who Is Making Mining More Sustainable? How Board Characteristics Can Advance the SDGs Through ECSR Initiatives | Aravind, SMU<br>Steven Smith, SMU<br>Vurain Tabvuma, SMU<br>Katelynn Carter-Rogers, StFX & SMU<br>Hao Lu, SMU |

| Track: Cases & Cases in Progress<br>Location: Loyola 273<br>Chair: Conor Vibert, Acadia<br>Saturday 21 September \| 2.00pm – 3.30pm | |
|---|---|
| Acceleron: Value Creation in the Biopharmaceutical Industry | David Foord, UNB Fredericton |
| Atlantica Cinemas Ltd. | Ryan Stack, Acadia<br>Ashley Doyle, Acadia |
| The Crowdstrike Conundrum | Neal Wilcott, Memorial<br>Ryan Stack, Acadia |

| Track: Human Resources, Industrial Relations, Organizational Behaviour & Organizational Theory<br>Location: Loyola 274<br>Chair: Scott Cassidy, UPEI<br>Saturday 21 September \| 2.00pm – 3.30pm | | |
|---|---|---|
| Perceptions of Leadership Emoji Use in Virtual Teams: A Cross-Cultural Study | Rene Arseneault, Université Laval<br>Thomas K.B. Koo, Dalhousie<br>Jialiang Yang, Hefei University of Technology | Best paper nominee |
| Diversite Culturelle Milieux de Travail: Une Revue de Litterature | Hafsa El Kira, Université de Moncton<br>Gilles Marcoux, Université de Moncton | |
| Nonstandard Work After Retirement: A Conception Model to Identify the Determinants of Job Quality | Bishakha Mazumdar, CBU | |

| Track: Communication<br>Location: Loyola 275<br>Chair: Amy Thurlow, MSVU |
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| Saturday 21 September \| 2.00pm – 3.30pm | | |
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| Government health communication and the pandemic of 2020 | Patricia Green, MSVU | |
| Framing strategies, eWOM, and audience engagement: Analyzing tweets from nonprofit organizations | Alla Kushniryk, MSVU | Best paper nominee |
| Exploring trust between parent influencers and parent audiences on social media | Janice Osei-Essah, MSVU | Best student paper nominee |

| Track: Marketing<br>Location: Loyola 277<br>Chair: Suzanne Rath, UPEI<br>Saturday 21 September \| 2.00pm – 3.30pm | |
|---|---|
| The Smaller the Size, the Higher the Price? How Size-range Influences Brand-status Inferences and Willingness to Pay | Trang Mai-McManus, CBU<br>Olya Bryksina, University of Winnipeg<br>Luming Wang, University of Manitoba |
| Christmas Decorations in October? How Time Style Affects Consumers' Reactions to Holiday Salience | Suzanne Rath, UPEI |
| The Impacts of Covid-19 On Students' Attitude Towards Degree ariue, Job Prospects And Financial Concerns: A Study Among Post-secondary Students Across Atlantic | Thi Linh Giang Chu, CBU<br>Krishnakumari Jayakumar, CBU<br>Xiaoshan Zhang, CBU<br>Mizanur Rahman, CBU<br>Trang Mai-McManus, CBU |

| Track: Open<br>Location: Loyola 280<br>Chair: Keshav Krishnamurty, University of Toronto<br>Saturday 21 September \| 2.00pm – 3.30pm | |
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| Drivers and Barriers to the Purchase of EVS Pre and During COVID-19: Insights from New Brunswick (NB) Consumers | Leslie J. Wardley, CBU<br>Amar Anwar, CBU<br>Melanie Langille, NB Lung Association |
| Independent directors: what can we learn from Warren Buffett? | Mohammad Siddiquee, MSVU |

| Track: Management Education<br>Location: Loyola 281<br>Workshop<br>Saturday 21 September \| 2.00pm – 3.30pm | |
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| **Title:** Exploring Management Education in the Atlantic Canadian Region: Challenges and Opportunities for the Future | Organizer:<br>Nicholous Deal, MSVU<br><br>Panelists:<br>Susan Graham, UPEI<br>Ellen Shaffner, MSVU<br>Kristin Williams, Acadia & University of Eastern Finland |

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| | Mary Beth Doucette, CBU<br>Wendy Carroll, SMU<br>Shamsud Chowdhury, Dalhousie |

**Workshop Description:** The place and role of business education has long been the subject of much debate. Following the numerous external shocks to our environment - global pandemic, civil unrest, and political instability – issues involving 'doing' management learning have exposed questions about the sustainability of business education as currently practiced. While a small yet blossoming area in historical organization studies has begun to etch out a Canadian history of management learning and education, the potential of an Atlantic Canadian context remains unexplored. Challenges in, and opportunities for, management education in Atlantic Canada might be different from the rest of the country. Our symposium brings together these issues in dialogue with those curious about the future in the region.

Saturday 21 September | 4.00pm – 5.30pm

| **Track: Business & Organizational History**<br>Location: Loyola 271<br>Chair: Terrance Weatherbee, Acadia<br>Saturday 21 September \| 4.00pm – 5.30pm | |
|---|---|
| Henley versus Harvard: Neocolonialism or national development? | Keshav Krishnamurty, University of Toronto<br>Terrance Weatherbee, Acadia |
| Pass the Elton Mayo Please: Writing in Business Schools and Writing Out Training Within Industry as a Site of Human Relations Training | Keshav Krishnamurty, University of Toronto<br>Terrance Weatherbee, Acadia<br>Ryan MacNeil, Acadia |
| Missing in Action: The Second World War and the History of Management Thought | Terrance Weatherbee, Acadia<br>Keshav Krishnamurty, University of Toronto |

| **Track: Cases & Cases in Progress**<br>Location: Loyola 273<br>Chair: Conor Vibert, Acadia<br>Saturday 21 September \| 4.00pm – 5.30pm | |
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| Valens Company Ltd. | Ryan Stack, Acadia |
| From the ashes: preparing financial statements from ground zero | Afua Asante, UNB Fredericton |
| Beadwork designs Inc. | Jane Fraser, StFX<br>Ken MacAulay, StFX<br>Mary Oxner, StFX |

| **Track: Finance**<br>Location: Loyola 274<br>Chair: Mohammad Siddiquee, MSVU<br>Saturday 21 September \| 4.00pm – 5.30pm | |
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| Unleashing the Importance of Intellectual Capital through Companies' Life Cycle Stages | Tayyaba Yousaf, Hailey College of Commerce<br>Kiran Shafi, Hailey College of Commerce |
| Economic conditions, bank profile, and balance sheet management | Alexandre Savoie-Comeau, Université de Moncton<br>Tania M. Morris, Université de Moncton |

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| Insurance perspectives on climate change-induced public health emergencies: a rapid scoping review | Kaitlyn Garrison, Memorial<br>Atanu Sarkar, Memorial<br>Tom Cooper, Memorial |

| Track: Gender & Diversity<br>Location: Loyola 275<br>Chair: J. Scott Grant, SMU<br>Saturday 21 September \| 4.00pm – 5.30pm | |
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| Underrepresentation of women in business-to-business sales: a scoping review and future research directions | Jonathan F. Stevens, SMU<br>Wendy Carroll, SMU |
| Donor's name fund to support women in business | Susan Graham, UPEI<br>Amy MacFarlane, UPEI |
| The Impact of Diversity and Inclusion on Innovation in Small Businesses of Cape Breton | Zainab Almukhtar, CBU<br>Radhika Ramachandran Nair, CBU<br>Gadha Jyothi Prasad, CBU |

| Track: Marketing<br>Location: Loyola 277<br>Chair: Suzanne Rath, UPEI<br>Saturday 21 September \| 4.00pm – 5.30pm | |
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| An Investigation of the Role of Acculturation on Bilingual Responses to the Factors of Ethnic Change | anwar Aurup, CBU<br>Michel Laroche, Concordia<br>Marie-Odile Richard, State University of New York Polytechnic |
| Leveraging social media for Non-Profit Fundraising: A Systematic Literature Review | Ainsley MacNeil, StFX<br>Bobbi Morrison, StFX<br>Neil Maltby, StFX |
| The Role of Ethnicity and Language on Materialism, Cosmopolitanism, and Consumer Ethnocentrism Scales: A Study on Canadian Bilinguals in Quebec | Golam Aurup, CBU<br>Michel Laroche, Concordia<br>Marie-Odile Richard, State University of New York Polytechnic |

| Track: Open<br>Location: Loyola 280<br>Chair: Nicholous Deal, MSVU<br>Saturday 21 September \| 4.00pm – 5.30pm | |
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| Towards agentic youth engagement: a youth participatory action research study | Kristin Williams, Acadia & University of Eastern Finland Rebecca Mian, Acadia |
| A Literature Review of Legal Instruments to Combat Online Hate Content | Matthew McKenna, SMU<br>Michael Zhang, SMU |
| Advancing AI and ML Applications in Closed-Loop Supply Chains: A Comprehensive Literature Review | Prashantkumar Jani, CBU<br>Tasquia Mizan, CBU<br>Samiul Islam, CBU |

| Track: Management Education<br>Location: Loyola 281<br>Workshop |
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| Saturday 21 September \| 4.00pm – 5.30pm | |
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| **Title:** Using an Andragogical Praxis of Trauma-Informed Intersectional Love within Management Education | **Organizers:**<br>Shelley Price, Acadia<br>Katelynn Carter-Rogers, StFX & SMU<br>Mary-Beth Doucette, CBU<br>Courtney McKay, SMU |
| **Workshop Description:** This professional development workshop will support the business education community to discuss rematriating kincentric spirituality in management education. We will be using an andragogical praxis of trauma-informed intersectional love as a pragmatic guide for attendees to begin centering Critical Collective Curiosity, Knowledge Gardening / Collective Storytelling, Compassionate Self Inquiry, and Relational Accountability in workplaces. | |

Sunday 22 September | 9.00am – 10.30am

| **Track: Gender & Diversity**<br>Location: Loyola 271<br>Chair: J. Scott Grant, SMU<br>Sunday 22 September \|9.00am – 10.30am | |
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| An alternative perspective on the utility of the model of stereotyping through associated and intersectional categories (MOSAIC) | Chiedza Chigumba, SMU<br>Katelynn Carter-Rogers, StFX & SMU |
| Rose fortune: a thorny history | Kristin Williams, Acadia & University of Eastern Finland |
| Beyond intersectionality: a Bourdieusian approach to equity, diversity, and inclusion | Blake Kanewischer, SMU |

| **Track: Human Resources, Industrial Relations, Organizational Behaviour & Organizational Theory**<br>Location: Loyola 273<br>Chair: Scott Cassidy, UPEI<br>Sunday 22 September \| 9.00am – 10.30am | | |
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| Does Abusive Supervision Lead to Employee Silence?: A Proposal for a Systematic Review and Meta-Analysis | Wendy R. Carroll, SMU<br>Camilla M. Holmvall, SMU | |
| Remote Work and Employee Withdrawal Cognitions During the Late Days of the COVID-19 Pandemic: Exploring the Dual Roles of Job Satisfaction and Psychological Strain | Scott A. Cassidy, UPEI<br>Hannah E. Bertrand, UPEI | Best paper nominee |
| LMX Ambivalence and its Impact on Affective Organizational Commitment and Job Satisfaction | Raqib Mahmud, Carleton University | |

| **Track: Finance**<br>Location: Loyola 274<br>Chair: Mohammad Siddiquee, MSVU & Arron Fraser, MSVU<br>Sunday 22 September \| 9.00am – 10.30am |
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| Impact of Foreign Direct Investment and Foreign Direct Assistance on Economic Growth in Africa. A Half Century Analysis | Joe Abekah, UNB Fredericton<br>Afua Asante, UNB Fredericton<br>Dinesh Gajurel, UNB Fredericton |
| Balancing Risk, Fairness, and Costs: A Framework for Hydrogen Refueling Station Location in Urban Areas | Mina Valaei, Dalhousie<br>Hamid Afshari, Dalhousie<br>Hassan Sarhadi, Dalhousie<br>Muhammad Ahsanul Habib, Dalhousie |
| Influence of AI on Corporate Social Responsibility: Some Initial Evidence | Reihaneh Kolivandi, SMU<br>Ashraf Al Zaman, SMU |

| Entrepreneurship<br>Location: Loyola 275<br>Chair: Claudia De Fuentes, SMU<br>Sunday 22 September \| 9.00am – 10.30am | | |
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| Towards business creation: attitudes and intentions of unemployed youths | Priscilla Bahaw, University of the West Indies, St. Augustine Campus<br>Amrika Baboolal, CTS College of Business and Computer Science<br>Abede Jawara Mack, StFX<br>Katelynn Carter-Rogers, StFX & SMU | Best paper nominee |
| Development of a pan-university entrepreneurship centre at UPEI | Reuben Domike, UPEI<br>Amy Andrews, UPEI<br>Jeremy Heartz, UPEI<br>Megan MacLean, UPEI<br>Tarek Mady, UPEI<br>Greg Naterer, UPEI | |
| High tides make good wines. Collaboration in the craft wine industry for rural revitalization | Claudia De Fuentes, SMU<br>Steve Quilley, University of Waterloo<br>Janan Ara Peerally, HEC Montreal<br>Favid Doloreux, HEC Montreal | Best paper nominee |

| Track: Management & Information Systems<br>Location: Loyola 277<br>Chair: Karen Grandy, SMU<br>Sunday 22 September \| 9.00am – 10.30am | |
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| Online Grocery Delivery Services Usage Intention in Canada: An Assessment with an Extended Theory of Planned Behaviorample | Princely Ifinedos, Brock University<br>Anteneh Ayanso, Brock University<br>Md Tanaz Abir (S), Brock University |
| Supplier selection and order allocation in nova scotia meat industry using fuzzy TFN and linear programming model | Premkumar Kumarasamy, CBU<br>Samuil Islam, CBU<br>Tasquia Mizan, CBU |
| "Farming is now morphing": Exploring the Agricultural Revolution with the Internet of Things in Canada - A Thematic analysis of Canadian Farmers, Industry Members, and Government Partners | Melanie McCaig, StFX<br>Davar Rezania, University of Guelph<br>Rozita Dara, University of Guelph |

| Track: Management Education<br>Location: Loyola 281<br>Chair: Susan Graham, UPEI<br>Sunday 22 September \| 9.00am – 10.30am | | |
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| Preliminary Categories of Reactions to Personality Feedback Interventions | R. Blake Jelley, UPEI<br>Henriette Lundgren, University of Georgia | Best paper nominee |
| More than meets the eye: the case of the misfired missive | Shripad G. Pendse, SMU | |
| I Stumbled Upon Stemble: Using AI to Provide Real-Time Feedback in a Marketing Cases Class | Susan C. Graham, UPEI<br>Jason Pearson, UPEI | |

Sunday 22 September | 11.00am – 12.30pm

| Track: Management & Information Systems & Ethics & Social Issues (joint session)<br>Location: Loyola 271<br>Chair: David Foord, UNB Fredericton<br>Sunday 22 September \|11.00am – 12.30pm | |
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| The Social Construction of Smart Grids: Policy Mixes in the Maritime Canadian Technology Innovation System, 2009 to 2022 | David math, UNB Fredericton<br>Maha Tantay, University of Windsor |
| Transforming healthcare with knowledge graphs: applications, challenges, and future directions | Geethu Susan Ebby, CBU<br>Enayat Rajabi, CBU<br>Somayeh Kafaie, SMU |
| Uncovering high-order drug-drug interactions with machine learning | Naeem Shirmohammady, SMU<br>Somayeh Kafaie, SMU |

| Track: Finance<br>Location: Loyola 274<br>Chair: Mohammad Siddiquee, MSVU & Arron Fraser, MSVU<br>Sunday 22 September \|11.00am – 12.30pm | |
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| Understanding the financial challenges immigrants encounter in Canada regarding better financial integration: a work in progress | Akoko Agossou, Université de Moncton<br>Tania M. Morris, Université de Moncton<br>Vicky Therrien, Université de Moncton<br>Lamine Kamano, Université de Moncton |
| Improving the Financial Well-Being of Canadians: The Role of Stakeholders | Tania M. Morris, Université de Moncton<br>Vicky Therrien, Université de Moncton<br>Akoko Agossou, Université de Moncton |
| Fintech and economic performance: a meta-analytical perspective | Amar wardley, CBU<br>Arshia Khalid, CBU |

| Track: Entrepreneurship<br>Location: Loyola 275<br>Chair: Karen Grandy, SMU<br>Sunday 22 September \|11.00am – 12.30pm |
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| Effect of dysfunctional career beliefs and university's environment and support system on university students' entrepreneurial intention | Jay Vyas, Memorial<br>Carlos Bazan, Memorial | |
| Exploring equity crowdfunding potential in Newfoundland and Labrador | Md Zahid, Memorial | Best student paper nominee |
| Opportunity recognition as a precursor to the antecedents of entrepreneurial intention | Jacobson Okoro, Memorial | |

| Track: Book Launch<br>Location: Loyola 277<br>Chair: Gabrielle Durepos, MSVU<br>Sunday 22 September \| 11.00am – 12.30pm | |
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| ANTi-History: theorization, application, critique and dispersion | Nicholous Deal, MSVU<br>Christopher Hartt, Dalhousie<br>Albert Mills, SMU |
| Observing dark innovation (in Atlantic Canada) | Ryan MacNeil, Acadia |
| Businesses´ Contributions to Sustainable Development Goal 5 | Mariana Ines Paludi, Universidad Técnica Federico Santa Maria Maria Eugenia Funes, Universidad Torcuato Di Tella |

| Track: Marketing<br>Location: Loyola 281<br>Workshop<br>Sunday 22 September \|11.00am – 12.30pm | |
|---|---|
| Title: Biometrics | Organizers:<br>Nicole Michaud-Kuszelewski, SMU<br>Katelynn Carter-Rogers, StFX & SMU<br>Ramesh Venkat, SMU |
| Workshop Description: This biometric workshop will illustrate the mechanisms for gaining insight into consumers' subconscious cognitive processes and will demonstrate methods for capturing emotional responses and predicting decision-making. This workshop will cover how to access, measure and interpret consumer's physiological response through techniques such as electroencephalography (EEG), galvanic skin response (GSR) and eye tracking. This comprehensive approach will enable the business community to delve into consumer behavior and related metrics, enhancing their understanding of the consumer journey and improving their ability to target marketing strategies effectively. | |