CANADIAN JOURNAL OF BUSINESS, ECONOMICS AND HEALTH MANAGEMENT

ORIGINAL ARTICLE

CJBEHM. 2023 December; 6(1): 01-08
ISSN: 2818-0208
Published by www.cjbehm.ca

The Nexus of Sustainability and Industry 5.0: Assessing Canadian Organizations' Readiness for the Next Technological Revolution through British Columbian Manager's Perspective

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Article info
Received: January 11, 2023
Accepted: September 22, 2023
Published: December 18, 2023

Keywords
Industry 5.0, Sustainable business practices, British Columbian Organizations, Qualitative Research.

ABSTRACT

The contemporary business landscape currently witnesses one of the most profound and revolutionary technological transformations -Industry 5.0. This revolution compels organizations with the need to navigate the intricate balance between the adoption of innovation and upholding the principles of sustainable economic growth. This investigation aims to uncover the strategies currently employed by Canadian organizations in anticipation of the challenges and opportunities presented by the synergy between sustainability and technological integration.

This paper presents a qualitative approach to research based on fourteen in-depth interviews conducted with senior managers and executives from various industrial sectors in Canada. Results obtained from a qualitative approach show that although Canadian organizations have adopted sustainable practices with regards to technology usage, they have yet to navigate through the challenges including financial constraints and other strategic priorities before the opportunities of sustainable business practices can be explored.

INTRODUCTION

Organizations face new challenges to balance economic growth with sustainable practices in an era of rapid technological advancements, adaptive environments, and changing global settings as part of a world becoming more inclusive, respectful, and emphatic towards human-centric values (Prasanna et al., 2019; Gupta, 2022).

Canadian organizations are no exception in the face of unprecedented global environmental challenges, and they are also realizing the relevance and importance of implementing sustainable practices and incorporating cutting-edge technologies in their organizational goals and regular operations to foster a more ethically responsible business landscape (Dodds & Holmes, 2011; Delannon et al., 2016; Matson et al., 2016).

This paper explores how Canadian organizations are navigating the encounter between sustainable practices and technological advancements to embrace Industry 5.0. As Industry 4.0 set the foundations for a more digitally connected and efficient manufacturing landscape in the last decades.

Industry 5.0 presents the new phase of the industrial revolution by providing an opportunity for organizations to find a balance between the latest technologies and the opportunity to reach financial objectives through sustainable, more human-centered practices (Ben Youssef & Mejri, 2023). Industry 5.0 represents the convergence of technology and human-centered, sustainable practices within organizational settings (Aslam et al., 2020). To better comprehend the relationship between sustainable organizational practices and Industry 5.0, it is necessary to systematically explore the embrace of new technological trends within Canadian organizations.

LITERATURE REVIEW

Industry 5.0

The urgency for environmental concerns in organizations from the beginning of twenty-first century has compelled organizations to reevaluate their operations' quality and adopt sustainable practices (Matson et al., 2016; Gupta, 2012). The analysis and studies of the industrial revolutions have aimed to understand the economic impact of diverse technological advancements on societies and economies (Xu et al., 2018). Where previous revolutions especially Industry 3.0 and Industry 4.0 are responsible for the creation of a more digitally connected world and mechanized business practices (Jiao et al, 2021; Khang et al, 2023), they are often blamed for creating issues such as human job loss (Dregger et al., 2016; Morrar et al., 2017) and environmental concerns (Ghobakhloo, 2020). The concept of Industry 5.0 was firstly introduced by The European Commission in two virtual workshops that focused on the topic "Industry 5.0 - Towards a Sustainable, Human-centric and Resilient European Industry" (European Commission, 2021; Xu et al., 2021). Industry 5.0 envisions a more harmonious coexistence between humans and machines (He & Chand, 2023) emphasizing value creation, sustainability, and social problem-solving (Prasanna, 2019; Xu et al., 2021; Turner, 2022; Yitmen et al., 2023).

According to Demir et al. (2019), Industry 5.0 emphasizes two main aspects; one is related to the "human-technology co-working" atmosphere that organizations will foster, the second vision is related to using resources for industrial purposes, in balance with ecological practices and economic gains for organizations. From Demir's work, while vision number 1 accentuates an outlook on human-technology collaboration. In contrast, Vision Number 2 focuses on sustainability as its primary focus of interest and motivation, including the smart use of renewable resources through a dual perspective (Demir et al., 2019). As the world transitions into Industry 5.0, the significance of sustainability becomes more relevant when the advancements of new technologies like the Internet of Things (IoT), artificial intelligence, and innovations allow a parallel evolution within sustainable practices in organizations (Shaikh et al., 2015).

Defining Sustainability

The term sustainability originates from the Brundtland Report of 1987, which addressed, for the first time, concerns regarding the aspiration of society to develop better levels of life and commodity while facing limitations imposed by nature (Kuhlman & Farrington, 2010). Dyllick and Hockert define corporate sustainability as the ability to meet the needs of the direct and indirect stakeholders while protecting, sustaining, and enhancing the human and natural resources currently in the present and the future (Engert, 2016).

There are four well-known pillars of sustainability: Environmental sustainability – the responsible use of natural resources and respecting the planet (Hickel, 2019). Human sustainability – investing in the humans and their basic needs, such as education, justice, and healthcare (Sajjad & Shahbaz, 2020). Social sustainability – the responsibility that organizations have towards the communities, and the respect for human rights (Abdel-Raheem & Ramsbottom, 2016). Economic sustainability – creating long-term value and

financial viability for business (Duić et al., 2015).

Sustainability and Industry 5.0

In the context of Industry 5.0, sustainability becomes eminent, as sustainable practices involve the responsible use of technologies while reducing environmental harm, improving societal equity and inclusivity, and fostering resilient, flexible, and socially responsible organizations (Zhanbayev et al., 2023). An "interesting benefit of Industry 5.0 is the provision of greener solutions compared to the existing industrial transformations, neither focusing on protecting the natural environment", as Maddikunta et al. (2021, p. 2) affirmed. The new technological revolution brings new technological advancements in both manufacturing and production, while it will also require organizations to reevaluate how they responsibly respond through ethical, sustainable practices.

The emphasis Industry 5.0 puts on bringing back the value of human beings by empowering the workforce through proper, equitable, and inclusive training and development programs. At the same time, the fast evolution of technology exponentially speeds up its growth and can help organizations realize the potential to meet their sustainability goals in the upcoming years. Industry 5.0, in this sense, can provide, besides technological advancements and innovations for organizations, potential solutions, and strategies to address the sustainability challenges they face, as immediate innovative actions are needed to act on responsible, respectful practices that may provide immediate benefits to internal stakeholders, as well as the community and society organizations operate in (Maddikunta, 2021).

The principles of sustainability -environmental, social, and economic, align with the overall objectives of Industry 5.0, which are based on reducing ecological footprints through advanced technologies, the potential to create equitable workforce opportunities, and offering organizations long-term economic viability through efficiency gains and cost reductions in operations (Demir et al., 2019; Voulgaridis et al., 2022; Rajumesh, 2023).

Ghobakhloo et al. (2022) have recently presented sixteen functions in which Industry 5.0 can generate sustainable development value for organizations. These essential functions, like employee technical assistance, intelligent automatization, open, sustainable innovation, and supply chain adaptability, among many others, present a sample of the interconnected scenarios that will provide insight into how Industry 5.0 will play a crucial role in promoting sustainable practices within organizations in the upcoming years (Ghobakhloo et al., 2022).

RESEARCH METHODOLOGY

Using qualitative research methodologies is considered appropriate when exploring a novel study area to establish a precedent for developing theories about relevant issues. According to Cruz & Tantia (2017), qualitative research methods are used to describe experience processes, to "make meaning of experiences or phenomena by following data as they emerge" (Cruz & Tantia, 2017, p. 81). This study's objective has been to assess and discover the status of sustainability and technology initiatives adopted by organizations based on the opinions and perceptions of collaborators involved in decision-making processes within their organizations.

The Abductive Approach

Abductive analysis encourages researchers to approach qualitative research with a solid theoretical foundation, incorporating existing theories in the research process and using them as a base and framework for developing new insights while offering flexibility and adaptable logic for discovering new phenomena (Timmermans & Tavory, 2012; Janiszewski & Van Osselaer, 2022). Using the abductive approach, researchers can pay

attention to unique aspects that may differ from the usual pattern when studying and analyzing a phenomenon. (Van Burg et al., 2022) The researcher using abductive analysis may then suggest new propositions and hypotheses based on the data analyzed (Timmermans & Tavory, 2012).

Data Analyses

Qualitative Thematic analysis is a qualitative method of analysis to identify, analyze, and decode patterns or themes (Clark & Vealé, 2018). Thematic analysis involves observing and recording patterns while offering flexibility, allowing it to be used within most theoretical frameworks and distinguished from other qualitative analysis methodologies (Terry et al., 2017).

The authors used Nvivo to code, classify and analyze the data. Using Nvivo Patterns related to sustainable practices and technological advancements were identified, providing valuable insights into the current state of Canadian organizations.

Data Collection

The authors conducted fourteen semi-structured in-depth interviews between August and September 2023 with mid to senior-level managers and directors from British Columbian companies in Canada. All fourteen interviews were conducted in different organizations with interviewees who were involved to a certain degree in decision–making processes within their organizations. One consultant, three directors, eight managers, and two supervisors/coordinators were interviewed. The interviewees worked in varying industries including mining, oil and gas, manufacturing, construction, transportation and warehousing, electricity, water, culture, and information. Of the fourteen organizations analyzed, four belong to the public sector, and ten belong to the private sector. Even though all organizations operate in British Columbia (Canada), two of the private enterprises being studied have been recently acquired by multinationals outside Canada in the past year.

DISCUSSION

1) Sustainability as part of Organizational Strategies

79% of the participants affirmed that sustainability is part of their organizational objectives, placing more emphasis on the relevance and importance of this concept mostly in public organizations or in organizations in which, albeit being private, they receive benefits, sponsorships, or financial support from public organizations. 21% of the organizations in which sustainability needs to be started as part of their strategic planning or organizational objectives are private corporations, considered big/medium companies.

2) Sustainability part of Decision-making initiatives and practices

Most of the participants affirmed that sustainability is part of the decision-making process in most areas of their organization; however, four out of ten participants added that the incorporation of these practices was at the surface level only due to the legal compliance requirements established by the government or regulatory organizations in their industry.

3) Sustainability Measures and Targets

Half of the participants expressed that their organization had clear sustainability targets to be met each year. Although sustainability goals for the public sector were well defined such targets were missing in the private sector. The transparency in communication of sustainability targets (and the action steps taken to achieve them) with internal and external stakeholders was also evident in public organizations. Public organizations shared the pre-set targets, measures, and indicators with their stakeholders quarterly and

annually. Contrarily, private corporations were more secretive about their sustainability measures and targets being met, even within their internal stakeholders.

4) Sustainability and Technology Training and Development Programs

All participants affirmed that their organizations provide training programs and offer various courses to their employees to work with sustainable technologies for optimal results. Most interviewees also discussed the role of collaborative partnerships between organizations, universities, and open-access educational platforms such as Coursera and LinkedIn to create awareness of sustainable business practices and technologies via training and development. However, despite having external support and well-structured training and development programs in place, participants expressed the need for more free time to fully participate and learn from these training programs. In public organizations, or those receiving public sponsorship or funding, training programs about sustainable practices were more formal, offered during the employees' working hours, and constituted a significant part of their career plans. These participants confirmed receiving mandatory ongoing training as part of the organizational targets and objectives.

5) Integration and Embracement of New Technologies

All participants confirmed that their organizations had a positive and open attitude to the embracement of new technologies. However, the extent to which these new technologies were adopted was contingent upon the type of industry and the area or department in which some participants work. For example, those working in the manufacturing industry shared examples about automating processes in the production line and using software that could make results more efficient. However, participants from private organizations shared that due to limited financial resources organizations were reluctant to invest in sustainability initiatives and hardware and software technologies. The telecommunication and information technology industries were the ones where more technological advancements were expected and therefore these organizations were willing to adopt sustainable practices to support their operations.

6) The role of sustainability and environmental considerations in shaping organizational future strategies and technological choices

All participants affirmed that they believed sustainability would continue to guide and shape many of the decisions made as part of their organizational objectives and philosophy, permeating from all areas and functions, from strategic planning to everyday operations. All the participants believed there are several opportunities for their organizations to start paying more attention to these relevant topics. From formally incorporating sustainable targets into their organizational objectives and corporate strategies to starting to plan for the incorporation of new technological innovations into all areas of their operations. Participants were of the view that organizations in Canada have a new window of opportunities opened by the incorporation of new technologies to promote more responsible and sustainable practices.

7) Need of Change Mindset to Adapt to Trends in Sustainability and Technology

A topic that was not originally part of the initial questionnaire but that constantly kept appearing in most of the interviews was that of a change mindset in their organizations. Eleven out of the fourteen participants added that they believed organizations had to show resilience, flexibility, and adaptation to face the new advancements and technology and to incorporate all new practices being developed to be socially, ecologically, and financially sustainable.

LIMITATIONS

Limitations of this study are based on the relatively small sample of interviews, which may only partially represent the diverse range of perspectives and practices across all Canadian organizations in British Columbia.

Another limitation is the rapidly evolving nature of technological and sustainable practices. The findings of this study will need timely reflections and revisions to keep pace with rapid technological advancements.

CONCLUSION AND FUTURE RESEARCH

Although in its infancy, Industry 5.0 promises to align more effectively with sustainability goals and highlights the importance of human well-being and environmental health. This qualitative research attempted to reveal initial relevant insights and add to the emerging body of knowledge on the conjunction of Sustainability and Industry 5.0. The implications of this research are relevant for academics, industry experts, and policymakers since these results can shed light on the challenges Canadian organizations will face in pursuing sustainable practices and technology integration in the upcoming years. The findings reveal both opportunities and threats facing Canadian organizations in incorporating new technological innovations to respond to the growing necessity of sustainable policies and practices in all industries.

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