INTEGRAL UNIVERSITY
LUCKNOW (INDIA)

P-ISSN: 0974-8032
e- ISSN: 2278-6120

# INTEGRAL REVIEW

## A Journal of Management

*A Bi-Annual Refereed Journal*

(Indexed at J-Gate and EBSCO)

**Volume 14 | Issue 2** **July-December, 2024**

**Integral Business School**
**Integral University, Lucknow**

# Integral Review – A Journal of Management

## (INDEXED AT J GATE & EBSCO)

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The Integral Review: A Journal of Management is a peer-reviewed academic publication focused on contemporary issues and emerging trends in business management and its broader societal implications. Its goal is to offer readers valuable insights and explore new frontiers of knowledge, benefiting both academics and industry professionals. Designed to be easily accessible and engaging, the journal ensures a reader-friendly format, making it a valuable resource for scholars,
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**ISSN listed:** The Journal has been listed as P-ISSN: 0974-8032, e-ISSN: 2278-6120.

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# Editorial Board

# Editorial

Welcome to Volume 14, Issue 2 of the Integral Review: A Journal of Management. In this edition, we present a rich tapestry of research that explores the intersections of technology, diversity, innovation, and resilience—key pillars that shape the future of management. As global markets evolve amid unprecedented challenges and opportunities, this issue offers actionable insights for scholars, practitioners, and policymakers.

The edition opens with a bibliometric exploration of "Technology and Sustainable Supply Chain," laying the groundwork for understanding how digital advancements can foster environmentally conscious logistics. Complementing this, "Creativity and Innovation for Sustainability: A Conceptual Framework" delves into the human element, proposing a model in which ingenuity drives sustainable progress. Together, these studies highlight the dual role of technology and creativity in shaping a greener future through redefined supply chains.

Diversity takes center stage in "Managing Generational Diversity: Leadership and Organizational Culture as Driving Forces." This study highlights how adaptive leadership and inclusive cultures can harness the strengths of multigenerational workforces, a critical consideration as organizations navigate shifting demographics. Similarly, "How Being Different Drives Success: Using Artificial Intelligence to Create a Blue Ocean in Retail" showcases how AI can carve unique competitive spaces, proving that differentiation is a timeless strategy in management.

We then turn to grassroots perspectives with "A Study on Factors Influencing the Promotion of Online Business Among Women Respondents in Tiruchirappalli District." This study sheds light on the socioeconomic drivers empowering women entrepreneurs in the digital economy, offering lessons for inclusive growth. In contrast, "Mattala Rajapaksa International Airport (MRIA): A White Elephant" provides a cautionary tale of mismanagement and analyzes how poor strategic decisions can undermine infrastructure investments.

Health and safety, often overlooked in management discourse, find a voice in "Occupational Health, Safety, and Productivity in the Fragrance Industry in Kannauj, India" by Dr. Aisha Badruddin. This study bridges employee well-being with organizational efficiency, reminding us of the human core of management. Finally, "Navigating Challenges in the Indian Market – A Case Study of Nestle's Response to the Israel Boycott" dissects corporate agility and explores how global firms adapt to local sentiments and geopolitical pressures.

Collectively, these articles reflect the multifaceted nature of modern management, where technology, innovation, diversity, and resilience converge to address both opportunities and obstacles. As we move deeper into 2025, this issue invites readers to rethink traditional paradigms and embrace adaptive strategies for a sustainable and equitable future.

We thank our contributors, reviewers, and readers for their continued support in advancing the management scholarship. Happy reading!

**Dr. Rajiv Ranjan**
Editor-in-Chief

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# Technology and Sustainable Supply Chain: A Bibliometric Approach

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Abstract

Contemporary supply chains are complex, involving multiple tiers and global companies, with challenges in risk management due to diverse regulatory frameworks, cultural differences, and globalisation. Modern supply chains rely heavily on centralized, often fragmented information management systems such as enterprise resource planning. Furthermore, sustainability, defined by the triple-bottom-line approach, is becoming increasingly vital in supply chain strategy. Verifying compliance with sustainability certifications is a competitive issue in supply chains, and the integration of technology is crucial for meeting sustainability goals. This study explores the role of technology in achieving sustainability within supply chains through a bibliometric analysis of 130 journal articles sourced from Scopus. The study employed citation, co-citation, and co-occurrence analyses using VOSViewer and MS Excel to examine trends, country rankings, and influential authors. The findings show a growing academic interest, with China leading in publications, while the USA leads in citation impact. The study offers valuable insights for enhancing research on technology's role in global supply chains' sustainability practices.

**Keywords:** Sustainable Supply Chain Management, Sustainability, Technology, Bibliometric Analysis, Trend Analysis

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ARTICLE INFO
Received:12/08/2024 | Revised: 20/09/2024 | Accepted: 23/11/2024 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15212327
CITATION
Bilgrami, T. F., Khan, S., & Ahmed, S. (2024). Technology and Sustainable Supply Chain: A Bibliometric Approach. Integral Review–A Journal of Management, 14(2), 1-16. https://doi.org/10.5281/zenodo.15212327

**Introduction**

Sustainable Supply Chain Management (SSCM) has become a critical focus for businesses aiming to reduce their environmental impact while maintaining operational efficiency and social responsibility. As global supply chains grow increasingly complex, companies are facing mounting pressure from governments, consumers, and stakeholders to integrate sustainability practices into every aspect of their operations. This includes not only minimizing carbon emissions and waste but also ensuring ethical labour practices and transparent sourcing throughout the supply chain. The integration of technology into SSCM is playing a pivotal role in transforming how businesses manage these challenges, enabling them to improve transparency, enhance operational effectiveness, and reduce environmental footprints, all while driving profitability and competitiveness. According to Zhang et al. (2021) China and the U.S. are leading contributors, with European countries displaying strong academic collaboration. They revealed that big data technologies, such as IoT, cloud computing, and blockchain, are increasingly applied in supply chains to enhance transparency, efficiency, and sustainability. Key research themes included data-driven decision-making, predictive analytics, and Industry 4.0 applications. The study concluded that big data-driven supply chains can improve decision-making, market responsiveness, and sustainability. However, more collaboration between academia and industry is needed to bridge the gap between theoretical research and practical implementation in SSCM.

Key technologies such as the Internet of Things (IoT), blockchain, artificial intelligence (AI), machine learning (ML), additive manufacturing (3D printing), radio-frequency identification (RFID), and digital twins are reshaping the landscape of sustainable supply chains. These technologies not only support real-time tracking and data transparency but also optimize resource use and minimize waste across supply chain operations. For instance, IoT devices allow for continuous monitoring of inventory and environmental conditions, ensuring that products are transported and stored efficiently, reducing spoilage and loss (www.sap.com; McGrath, A., & Jonker, A., 2024). Blockchain, with its secure, immutable records, ensures transparency and traceability, making it easier for businesses to comply with sustainability standards and verify ethical practices across their supply chains (McGrath, A., & Jonker, A., 2024). AI and ML further enhance supply chain efficiency by predicting demand patterns, optimizing delivery routes, and reducing waste (Alp, E., 2024; www.planisware.com). Similarly, additive manufacturing allows for localized production, which not only reduces transportation costs and emissions but also improves material efficiency (Alp, E., 2024).

These technologies are not only improving the operational effectiveness of businesses but also contributing to broader sustainability goals. By leveraging advanced technologies, companies can reduce their carbon footprint, minimize waste, and enhance accountability throughout the supply chain. In doing so, they can align their operations with the growing demand for environmental, social, and governance (ESG) considerations, which are integral to achieving a sustainable supply chain (www.sap.com; McGrath, A., & Jonker, A., 2024). Moreover, embracing these innovations offers companies a competitive advantage in an increasingly sustainability-conscious market, allowing them to meet regulatory requirements and cater to the expectations of consumers who demand more sustainable practices from the companies they support.

According to Karmaker et al. (2023), Industry 4.0 technologies significantly enhance sustainability performance. Furthermore, Green Supply Chain Management and Circular Economy practices mediate the relationship between Industry 4.0 and Sustainable Supply Chain Performance, reinforcing their importance in environmental and socio-economic performance.

Blockchain technology (BT) can improve supply chain management (SCM) and sustainability, particularly in mineral supply chains (MSCs). While BT offers benefits such as responsible sourcing, compliance with environmental standards, transparency, and traceability, its adoption remains limited due to managerial conservatism and lack of familiarity with its intrinsic characteristics. The findings highlight that BT significantly enhances MSC performance by facilitating smart contracts, transparency, traceability, and environmental sustainability. This study provides valuable insights for decision-makers to overcome adoption barriers and leverage BT for more efficient and ethical supply chains (Yousefi, S., & Tosarkani, B. M., 2022).

Khan et al. (2022) explored the role of blockchain technology (BT) in supply chain (SC) mapping, integration, and sustainability within Malaysian Electrical and Electronics firms. The findings include blockchain technologies (BT) do not have a direct impact on SC sustainability, BT indirectly influences sustainability through SC mapping and integration, mapping upstream, midstream, and downstream SCs enhances SC sustainability, SC integration and mapping serve as crucial mediators in the relationship between BT and sustainability.

This paper explores the trends of pattern with which technology is connected with supply chains sustainability. Through this exploration, we aim to provide a comprehensive overview of the key technological advancements in SSCM, the benefits they offer, and the challenges organizations may face in integrating these solutions into their operations.

Despite advancements in SSCM technologies, several research gaps remain. Integration challenges, including interoperability and standardization, require further investigation. The scalability and cost-effectiveness of these technologies, particularly for SMEs, remain underexplored. Limited studies assess long-term impacts on sustainability and performance. Regulatory, ethical, and cybersecurity concerns need deeper analysis. Human and organizational factors, such as employee adaptability and resistance, are often overlooked. Research on technology-enabled circular economy practices is

insufficient.Comparative studies across regions and emerging economies are lacking, and the role of technology in enhancing supply chain resilience against disruptions requires further exploration to ensure sustainable and adaptive SSCM practices.

## 2. Literature Review

### 2.1 Sustainable Supply Chain Management (SSCM)

Sustainable Supply Chain Management (SSCM) has emerged as a crucial area of study and practice, focusing on reducing environmental and social impacts while ensuring economic viability. In this section, we explore the definition, theoretical perspectives, recent findings, and trends in SSCM, highlighting key technologies and their role in enhancing sustainability across supply chains.

#### 2.1.1 Definition and Importance of SSCM

SSCM refers to the management of supply chain activities with a focus on sustainability, aiming to minimize negative environmental impacts, improve social equity, and maintain economic viability. As businesses face increasing pressure from stakeholders, governments, and consumers, there is a growing recognition of the need for corporate responsibility. This has driven companies to adopt sustainable practices that align with stakeholder expectations and regulatory requirements. By focusing on sustainability, companies are not only addressing ecological concerns but are also enhancing their reputation and ensuring long-term profitability (Panigrahi, S. S et al., 2018; Sahu, M. P. K. et al., 2021).

Recent literature on SSCM has identified three main dimensions that define the successful implementation of sustainable practices in supply chains: economic performance, environmental impact, and social values. These dimensions are rooted in the "triple bottom line" approach, which emphasizes the importance of balancing profit, planet, and people. Theories in SSCM underscore the necessity of integrating sustainability into the core operations of supply chains across these three areas:

Economic Performance: Integrating sustainability can lead to cost savings through enhanced resource efficiency and waste reduction. Companies adopting sustainable practices often experience lower operational costs, which improve their bottom line (Panigrahi, S. S et al., 2018; Sánchez-Flores, R. B. et al., 2020).

Environmental Impact: Companies are increasingly held accountable for their environmental footprint, leading to greater adoption of greener practices. These practices include reducing emissions, minimizing waste, and promoting responsible sourcing of materials (Sahu, M. P. K. et al., 2021; Sánchez-Flores, R. B. et al., 2020).

Social Values: Ethical considerations in sourcing, labour practices, and community involvement are becoming crucial for maintaining brand reputation and consumer trust. Sustainable supply chains are expected to uphold high standards of social responsibility, particularly in areas like fair labour and human rights (Sahu, M. P. K. et al., 2021; Sánchez-Flores, R. B. et al., 2020).

- **2.2 Key Findings from Recent Studies**

#### 2.2.1 Collaboration and Relationships

Effective collaboration among supply chain partners is a key determinant for the successful implementation of SSCM. Studies consistently highlight that strong relationships with suppliers foster better information sharing, enhanced innovation, and the adoption of more sustainable practices. This collaborative approach is essential for aligning sustainability objectives across the supply chain, which ultimately leads to improved environmental, social, and economic outcomes (Panigrahi, S. S et al., 2018; Sánchez-Flores, R. B. et al., 2020).

#### 2.2.2 Technological Integration

The role of technology in supporting sustainable practices has received growing attention in recent studies. Key technologies such as blockchain and the Internet of Things (IoT) are critical in enhancing transparency and traceability across supply chains. These technologies enable better monitoring of resources, reduce waste, and improve the efficiency of operations. By enhancing supply chain visibility, they also facilitate compliance with sustainability standards and foster trust among stakeholders. (Cerqueira-Streit, J. et al., 2021; Mugoni, E. et al., 2024).

### 2.3 Key Technologies in Sustainable Supply Chains (SSCM)

The integration of advanced technologies into SSCM has become critical for achieving long-term sustainability goals. These technologies not only enhance operational efficiency but also support the overarching objectives of minimizing environmental impacts, promoting social equity, and ensuring economic viability. In this section, we explore key technologies contributing to sustainable practices within supply chains, their role in enhancing sustainability dimensions, and current research trends and gaps.

#### 2.3.1 Blockchain Technology

Blockchain technology is identified as one of the most significant enablers of sustainability within supply chains. Its decentralized and immutable nature enhances transparency and traceability, making it easier to track the origin and journey of products. This visibility is essential for ensuring compliance with sustainability standards, improving trust among stakeholders, and preventing unethical practices. Blockchain allows companies to monitor product lifecycles, ensuring that resources are sourced responsibly and waste is minimized. As a result, blockchain fosters sustainable sourcing, reduces fraud, and enhances accountability across supply chains (Winkelmann, S. et al., 2024b; Al-Talib et al., 2024).

#### 2.3.2 Internet of Things (IoT)

The Internet of Things (IoT) technologies enable real-time tracking and monitoring of supply chain activities. By deploying IoT devices throughout the supply chain, companies can optimize resource use,

reduce waste, and enhance operational efficiency. For instance, IoT sensors can monitor environmental conditions such as temperature and humidity, helping businesses manage perishable goods more effectively and reduce spoilage. These capabilities support environmental sustainability by minimizing waste and improving resource allocation (Al-Talib et al., 2024; Sánchez-Flores, R. B. et al., 2020b).

**2.3.3 Artificial Intelligence (AI)**

Artificial Intelligence (AI) is increasingly being applied within supply chains for predictive analytics, demand forecasting, and risk management. AI can analyse vast amounts of data to uncover patterns, predict demand fluctuations, and optimize decision-making processes. This leads to more efficient production planning, reduced overproduction, and minimized waste. AI-powered systems can also enhance supply chain resilience by responding quickly to disruptions and ensuring smoother operations during crises (Al-Talib et al., 2024; Sánchez-Flores, R. B. et al., 2020b).

**2.3.4 Big Data Analytics**

Big data analytics plays a pivotal role in optimizing supply chain operations, helping businesses analyse large volumes of information to identify trends, inefficiencies, and opportunities for improvement. This technology supports both economic and environmental sustainability by enabling better resource management, waste reduction, and optimization of logistics. By leveraging big data, companies can make informed decisions that improve sustainability performance, from sourcing raw materials to managing end-of-life products (Al-Talib et al., 2024; Sánchez-Flores, R. B. et al., 2020b).

**2.3.5 Information and Communication Technologies (ICT)**

Information and Communication Technologies (ICT) facilitate communication and coordination between supply chain partners, which is critical for collaborative sustainability efforts. Effective ICT infrastructure enhances supply chain transparency and fosters collaboration, enabling partners to share information about sustainability practices, challenges, and innovations. These technologies help reduce inefficiencies, align sustainability goals, and improve responsiveness, making them an essential component of sustainable supply chain management. (Al-Talib et al., 2024; Sánchez-Flores, R. B. et al., 2020b).

**2.4 Relevance of Technology in Sustainable Supply Chain Management**

The relevance of technology in SSCM has garnered significant attention in recent years. This literature review synthesizes key findings from various studies that explore how technological advancements contribute to sustainability goals within supply chains, focusing on their applications, benefits, and challenges.

**2.4.1 Enhancing Efficiency**

Technologies such as Internet of Things (IoT), Artificial Intelligence (AI), and Machine Learning (ML) have been instrumental in optimizing supply chain operations. For instance, IoT devices can monitor environmental conditions and track inventory in real-time, leading to reduced waste and improved resource utilization (Guest., 2023; www.inboundlogistics.com). AI and ML algorithms help companies analyse large datasets to identify trends and optimize logistics, which can lower operational costs while enhancing sustainability efforts (Alp, E., 2024b).

**2.4.2 Improving Transparency and Traceability**

Blockchain technology has emerged as a pivotal tool for enhancing transparency in supply chains. By providing a decentralized ledger that records every transaction, blockchain enables stakeholders to trace the origin and journey of products throughout the supply chain. This capability not only fosters consumer trust but also helps companies comply with environmental regulations and ethical standards (https://edis.ifas.ufl.edu; Winkelmann, S. et al., 2024c).

**2.4.3 Facilitating Sustainable Practices**

Technologies like 3D printing and cloud-based enterprise resource planning (ERP) systems are reshaping how companies approach sustainability. 3D printing allows for localized production, reducing transportation emissions and costs (Alp, E., 2024b). Cloud ERP systems integrate real-time data across the supply chain, enabling better decision-making regarding resource allocation and sustainability reporting (www.inboundlogistics.com).

**2.4.4 Benefits of Technological Integration**

Cost Reduction: The implementation of advanced technologies often leads to significant cost savings through improved efficiencies and reduced waste. For example, Walmart's use of IoT sensors to monitor produce temperatures has minimized food waste while enhancing safety (Guest., 2023).

Environmental Impact: By optimizing logistics and production processes, technology can substantially lower greenhouse gas emissions. Studies indicate that improvements in efficiency could reduce emissions by up to 40% without significantly impacting product pricing (www.inboundlogistics.com).

Social Responsibility: Technology enhances social sustainability by ensuring compliance with labour standards and improving working conditions through better management practices. Blockchain's ability to trace supplier practices helps mitigate risks related to human rights violations (Guest., 2023; Alp, E., 2024b)

**2.4.5 Contributions of Technology to Sustainability Dimensions**

Technologies integrated into sustainable supply chains contribute across multiple sustainability dimensions:

Economic Sustainability

Technologies such as AI and big data analytics contribute to economic sustainability by improving efficiency, reducing operational costs, and enhancing resource management. Companies that adopt these technologies often experience increased profitability while achieving their sustainability objectives. AI-driven decision-making, for instance, helps organizations minimize waste and optimize supply chain processes, leading to cost reductions and enhanced performance (Winkelmann, S. et al., 2024b; Yu, Z. et al., 2022).

*Environmental Sustainability*

Green technologies, particularly blockchain, IoT, and AI, contribute significantly to environmental sustainability. Blockchain's traceability features ensure compliance with environmental standards and ethical sourcing, while IoT enables better resource management and waste reduction. By facilitating recycling, sustainable sourcing, and responsible production practices, these technologies help reduce ecological footprints and support circular economy principles (Yu, Z. et al., 2022; Siju, N. M., & Shivdas, A., 2024).

*Social Sustainability*

Digital technologies also play a role in enhancing social sustainability by promoting ethical practices and improving transparency within supply chains. For example, blockchain technology ensures fair labour practices by tracing the origins of goods and materials, while IoT and AI can improve working conditions by streamlining processes and reducing the need for labour-intensive tasks. These technologies foster better community engagement and enhance corporate social responsibility efforts (Winkelmann, S. et al., 2024b; Yu, Z. et al., 2022).

**2.5 Research Gaps and Objectives**

**2.5.1 Research Gaps**

While the integration of technology into SSCM has advanced significantly, several gaps remain in the literature:

Limited Scope of Studies

Many existing studies focus on individual technologies or specific sectors, leaving a gap in comprehensive analyses that examine the use of multiple technologies across diverse industries. There is a need for research that explores how various technologies can be combined to drive sustainability in different contexts and across different sectors. The leading countries as per this bibliometric study were China, India, and the USA, with respect to most contributions made in the field of SSCM technologies.

*Emerging Economies*

There is limited research on the application of SSCM technologies in emerging economies. As these regions face unique challenges such as regulatory constraints and resource limitations, exploring how these technologies can be leveraged in such contexts is an important area for future research. Tailored strategies that consider local conditions and capacities are needed to support sustainable practices in emerging markets (Yu, Z. et al., 2022; Sánchez-Flores, R. B. et al., 2020b)

**2.5.2 Research Objectives**

In this study, our main objective was to identify the leading players in the field of SSCM technologies, and to understand if and how they are related. This objective is further branched into five major research questions:

RQ1: What is the year-wise publication trend in the field?

RQ2: Which are the most contributing countries in this research area?

RQ3: What are the most productive journals and most cited documents in this fields?

RQ4: Which organisations and authors have been most prominent contributors in the area?

RQ5: Who are the major researchers in the field and which keywords are most used in this area?

To achieve these objectives, a bibliometric analysis was conducted to examine collaboration patterns among countries, authors, and publications (Capobianco-Uriarte et al., 2019; Guo et al., 2019) and to generate a co-occurrence map of frequently appearing terms within the literature (van Nunen et al., 2018).

This study makes two key contributions. First, it provides valuable insights for researchers into the topics most extensively explored and identifies gaps that warrant further investigation within SSCM research. Second, it encourages researchers to approach SSCM from a technological perspective, a particularly pertinent focus in the current digital era.

**3. Methodology**

Most studies on SSCM technologies use qualitative or case study methodologies, but there is a call for employing more diverse research methods, such as bibliometric analysis, meta-analysis and quantitative modelling. These approaches could provide a more comprehensive understanding of how technologies can be effectively implemented and measured in the context of sustainable supply chains (Siju, N. M., & Shivdas, A., 2024; Al-Talib et al., 2024).

The goals of our study are pursued in this work using bibliometric analysis, which has gained popularity in business and management studies (Teixeira et al., 2013; Zupic & Čater, 2015).

This study began by analysing the growth trends of the research field by year and by nation. We intended to use a bibliometric study of SSCM technologies in order to respond to the research topic. We used co-country analysis, co-citation analysis, and co-occurrence analysis. Three processes make up the study methodology for this paper: searching scientific digital libraries for data, extracting data, preparing data, and analysing data.

All tables and figures have been prepared by the researchers, unless stated otherwise.

### 3.1 Data Search and Extraction

The data for this study was extracted on September 10th, 2024 from Scopus. Scopus was chosen over WoS because Scopus provides over 20% more coverage of research works than WoS, which is why any paper listed in WoS might also be discovered on Scopus (Falagas et al., 2008; Gavel and Iselid, 2008).

The study sourced its data of 130 journal articles from Scopus, searching for TITLE-ABS-KEY ("technology" AND "sustainable supply chain management" OR "SSCM"). The subject areas selected were "business and accounting" and "social sciences" for years 2007 to 2024. The analysis techniques used were co-country analysis, co-citation analysis, and co-occurrence analysis, using VOSViewer. A year-wise trend analysis and ranking of countries was carried out using MS Excel.

### 3.2 Data Preparation and Analysis

Since several of the keywords in the retrieved files were identical, with the only variations being in the single or plural forms, they were combined into one keyword, like Sustainable Supply Chain/ Sustainable Supply Chains/SSCM, or Digital Technology/ Digital Technologies in the extracted files.

In order to comprehend the patterns of the research field, the findings for each year were analysed and a bar chart was produced to illustrate the proportion of publications annually. The study further made a ranking of countries based on number of publications each year. This was carried out using MS Excel.

The bibliometric analysis was carried out using VOSviewer, a software application created by van Eck and Waltman (2010) for creating and evaluating bibliometric networks. To find out which nations have more researchers working on this subject, co-country analysis was carried out. To find the most cited papers, citation analysis was employed. The most influential works in the field can be determined by looking at the most referenced publications (Ferreira, 2011). To determine the semantic link between those highly cited works, co-citation analysis was applied.

The research flow followed in this study is illustrated in Figure 1.

To determine which keywords are most often used in studies on technology and sustainable supply chain, we conducted a co-occurrence analysis which produced a map based on abstract fields and titles of the selected corpus.

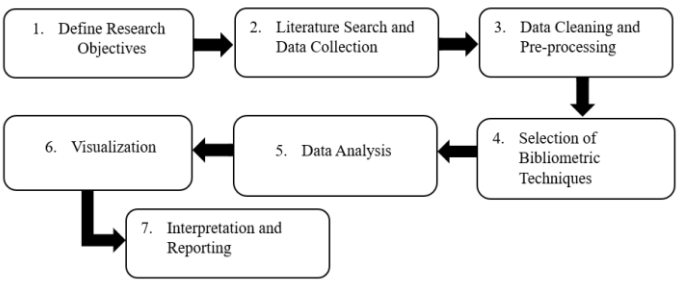


Figure 1. Research Process (Source: Passas, 2024)

The study utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework (Moher et al., 2015; Khin & Rakthin, 2022) to identify and select relevant articles for inclusion (Figure 2).

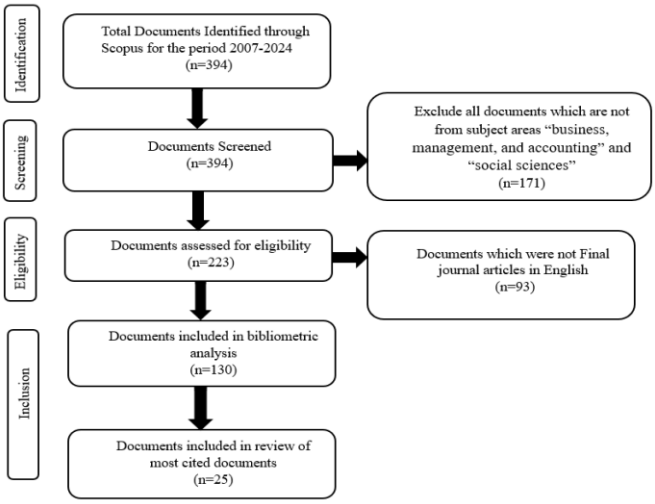


Figure 2. PRISMA Framework

## 4. Results

### 4.1 Yearly Growth Trend of Publications

The extracted files from Scopus were used to analyse the number of publications for each year in order to comprehend the yearly patterns of publications taking into account the adoption of technology into SSCM. The number of publications along with the

cumulative trend of these publications made annually is depicted in Figure 3.

In every year, there was at least one publication, except in the years 2008, 2011, 2013, 2015. Prior to 2016, merely 6 publications were made in this field, with the first publication not appearing until 2007, which makes the field fairly nascent. The year 2016 saw a sudden boost in the publications which slowed in the year 2017, only to catch up in the period 2018-2020, although at a slow pace. However, there was a surge in articles published on SSCM technologies in 2021, peaking at 2022. With a slight decline in the year 2023, the year 2024 saw a rise in publications in this field of research.

As previously mentioned, the data for this study was retrieved on September 10th, 2024, and till date, a total of 130 pieces have been published in the intersectional field ofc SSCM technologies.

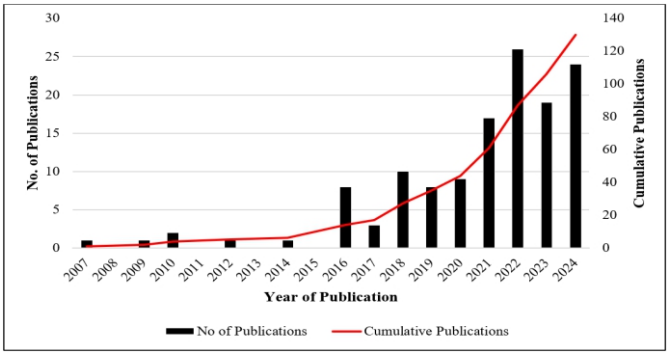


Figure 3. Yearly Distribution of Growth Trend

The year that saw most publications was 2022, with a total of 26 publications, followed by 2024 (24 publications), and then 2023 (19 publications). As a result, the trend of the cumulative publications is clearly upward facing, catching exponential pace in the past 8 years, particularly in these three years. Thus, it can be said that this sum will only increase further by the end of 2024 and carry on in 2025.

**4.2 Country Analysis**

The bibliometric study undertook a co-citation analysis to determine the countries in which these articles are dispersed. The data from co-citation analysis conducted on countries that published at least one document have been depicted in tabular form in Table 2.

The top three countries with highest percentage of publications – as compared to all contributing countries – were China (14.14%), India (10.61%), and the United States of America (10.10%), respectively. However, the average citation derived using VOSviewer told a different story, replacing the top three positions with the USA (174.75), Canada (161.50), and Netherlands (105), in that order. The ranking of India (34.76) and China (29.54) in this category was brought down to 16 and 17 respectively.

The Nominal GDP rank (as per IMF, 2024) of each country was also included in the analysis, to examine if a correlation could be derived between the GDP rank and publication percentage and average citation of the leading and lagging countries. The USA was ranked highest amongst all countries based on its nominal GDP, and also scored the highest position in terms of the average citations received per document. China being the second highest in terms of nominal GDP positioned itself at the top in terms of publication percentage. However, Germany was ranked third in terms of nominal GDP and yet, did not score a seat in the top five positions of publication percentage or average citations per document.

Additionally, Canada and Netherlands had taken the second and third ranks in terms of average citation although their nominal GDP rankings were 10 and 17, which is not even in the top five. Therefore, it can be said that the nominal GDP of a leading country may not have had an effect on its publication frequency and citations in the research field.

On the other hand, most of the countries on the lower ranks of publication percentage and average citations – such as Mexico, Ghana, and Cuba – were also ranked low in terms of nominal GDP. Therefore, there may exist a direct correlation between nominal GDP and publication percentage as well as average citation of lowly ranked countries.

Table 1. Top countries that published at least 1 document

| S. No. | Country | No. of Publications | Publication Percentage (%) | Citation | Average Citation | Nominal GDP Rank* | Total Link Strength | Rank |
|---|---|---|---|---|---|---|---|---|
| 1 | China | 28 | 14.14 | 827 | 29.54 | 2 | 29 | 17 |
| 2 | India | 21 | 10.61 | 730 | 34.76 | 5 | 17 | 16 |
| 3 | United States | 20 | 10.10 | 3495 | 174.75 | 1 | 24 | 1 |
| 4 | United Kingdom | 17 | 8.59 | 1347 | 79.24 | 6 | 16 | 5 |
| 5 | Iran | 10 | 5.05 | 161 | 16.10 | 36 | 5 | 25 |
| 6 | Germany | 8 | 4.04 | 462 | 57.75 | 3 | 3 | 8 |
| 7 | Taiwan | 7 | 3.54 | 478 | 68.29 | 185 | 10 | 7 |
| 8 | Italy | 7 | 3.54 | 87 | 12.43 | 8 | 3 | 29 |
| 9 | France | 7 | 3.54 | 324 | 46.29 | 7 | 8 | 11 |
| 10 | Malaysia | 5 | 2.53 | 137 | 27.40 | 37 | 5 | 19 |
| 11 | Brazil | 5 | 2.53 | 255 | 51.00 | 9 | 3 | 10 |
| 12 | United Arab Emirates | 4 | 2.02 | 36 | 9.00 | 29 | 4 | 31 |
| 13 | Greece | 4 | 2.02 | 181 | 45.25 | 54 | 1 | 12 |
| 14 | Bangladesh | 4 | 2.02 | 103 | 25.75 | 32 | 2 | 21 |
| 15 | Thailand | 3 | 1.52 | 22 | 7.33 | 27 | 1 | 34 |
| 16 | Spain | 3 | 1.52 | 46 | 15.33 | 15 | 1 | 26 |
| 17 | South Korea | 3 | 1.52 | 88 | 29.33 | 14 | 1 | 18 |
| 18 | Saudi Arabia | 3 | 1.52 | 61 | 20.33 | 19 | 4 | 24 |
| 19 | Morocco | 3 | 1.52 | 250 | 83.33 | 60 | 5 | 4 |
| 20 | Australia | 3 | 1.52 | 21 | 7.00 | 13 | 0 | 35 |
| 21 | Turkey | 2 | 1.01 | 75 | 37.50 | 18 | 6 | 14 |
| 22 | Pakistan | 2 | 1.01 | 18 | 9.00 | 44 | 4 | 31 |
| 23 | Netherlands | 2 | 1.01 | 210 | 105.00 | 17 | 8 | 3 |
| 24 | Lithuania | 2 | 1.01 | 27 | 13.50 | 78 | 3 | 27 |
| 25 | Indonesia | 2 | 1.01 | 5 | 2.50 | 16 | 0 | 38 |
| 26 | Egypt | 2 | 1.01 | 147 | 73.50 | 38 | 1 | 6 |
| 27 | Denmark | 2 | 1.01 | 20 | 10.00 | 35 | 1 | 30 |
| 28 | Canada | 2 | 1.01 | 323 | 161.50 | 10 | 1 | 2 |
| 29 | Sweden | 1 | 0.51 | 8 | 8.00 | 24 | 1 | 33 |
| 30 | South Africa | 1 | 0.51 | 52 | 52.00 | 40 | 1 | 9 |
| 31 | Russian Federation | 1 | 0.51 | 13 | 13.00 | 11 | 0 | 28 |
| 32 | Romania | 1 | 0.51 | 36 | 36.00 | 43 | 1 | 15 |
| 33 | Qatar | 1 | 0.51 | 7 | 7.00 | 55 | 1 | 35 |
| 34 | Poland | 1 | 0.51 | 25 | 25.00 | 21 | 0 | 22 |
| 35 | Palestine | 1 | 0.51 | 40 | 40.00 | 125 | 0 | 13 |
| 36 | New Zealand | 1 | 0.51 | 24 | 24.00 | 51 | 3 | 23 |
| 37 | Mexico | 1 | 0.51 | 0 | 0.00 | 12 | 2 | 39 |
| 38 | Macao | 1 | 0.51 | 27 | 27.00 | 93 | 1 | 20 |
| 39 | Jordan | 1 | 0.51 | 0 | 0.00 | 88 | 1 | 39 |
| 40 | Ghana | 1 | 0.51 | 0 | 0.00 | 80 | 3 | 39 |
| 41 | Finland | 1 | 0.51 | 0 | 0.00 | 47 | 3 | 39 |
| 42 | Ecuador | 1 | 0.51 | 0 | 0.00 | 63 | 2 | 39 |
| 43 | Cyprus | 1 | 0.51 | 3 | 3.00 | 102 | 1 | 37 |
| 44 | Cuba | 1 | 0.51 | 0 | 0.00 | 188 | 0 | 39 |
| 45 | Colombia | 1 | 0.51 | 0 | 0.00 | 41 | 2 | 39 |

*Source: IMF.org (2024)

With 28 documents and 827 citations, China has the strongest overall link strength among the 45 nations, according to the data. This could be attributed to China taking the lead in scientific research over the past two decades. China has made investments to expand its capacity for research, send students overseas, and entice companies to produce high-tech goods. In terms of spending on research and technology, China is currently second only to the USA. The majority of engineering doctorates in the world are currently produced by Chinese universities, and these institutions' quality has significantly increased recently. (Freeman, 2023)

The second and third strongest link strengths were found in publications made in the USA (with 20 publications and 3495 citations), and India (with 21 publications and 730 citations), as per the data. The USA has a stronger overall relationship, which indicates that

it cooperates with other nations more than China and India, despite the fact that they have published more publications in this area.

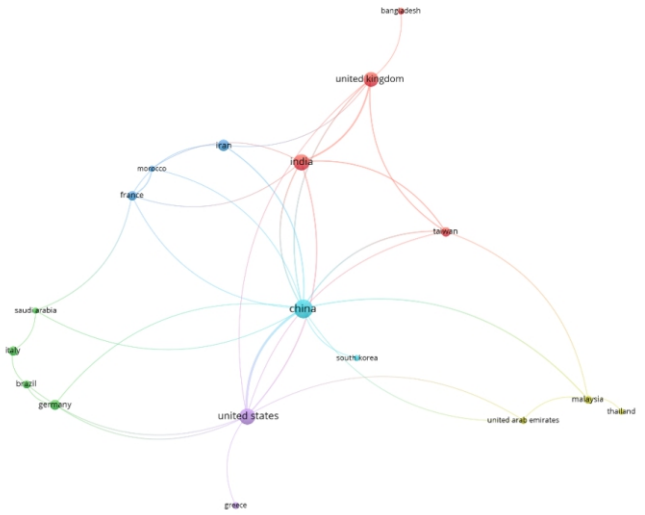


Figure 4. Bibliometric Map of Co-Countries Analysis

Figure 4 shows the bibliometric map of nations which pioneer the field of SSCM technologies, with at least 2 publications in the area. Each object has a distinct colour that indicates which group it belongs to. In terms of collaboration, the nations that share the same colours are closely tied to one another. The red colour in this map, for instance, demonstrates how frequently publications from India, the UK, Bangladesh, and Taiwan mention one another.

### 4.3 Citation Analysis

In order to analyse the most highly cited sources, documents, organisations, and authors, citation analysis was undertaken. The purpose was to find which (or if any) sources (journals), organisations, documents (papers/articles), and authors have made the most essential contributions in the field of SSCM technologies, and to discover any collaboration amongst these.

#### 4.3.1 Prominent Sources

The most prominent sources which had more than one publications were identified for citation analysis. These 21 sources, listed in Table 3, were analysed for having the highest citation per document using VOSviewer. The CiteScore for almost each journal could be retrieved through the Scopus database, since all documents were extracted from Scopus. This was done to find out if a correlation could be drawn between the average citation per document and the CiteScore of the source.

The source grossing the topmost place in terms of most documents published in this field was Journal of Cleaner Production (n=18), followed by Sustainability (n=17) and Business Strategy and the Environment (5). However, the top three positions for highest average citation per document was taken by International Journal of Production Research (563), Journal of Cleaner Production (112.1), and International Journal of Production Economics (102.5), in that order.

Table 2. Citation Analysis of Most Prominent Sources

| S. No | Name of Journal/Source | Documents | Citations | Average Citation | CiteScore* | Total Link Strength |
|---|---|---|---|---|---|---|
| 1 | Journal of Cleaner Production | 18 | 2018 | 112.1 | 20.4 | 0 |
| 2 | Sustainability (Switzerland) | 17 | 404 | 23.8 | 6.8 | 0 |
| 3 | Business Strategy and the Environment | 5 | 125 | 25.0 | 22.5 | 0 |
| 4 | International Journal of Production Research | 4 | 2252 | 563.0 | 19.2 | 0 |
| 5 | International Journal of Supply Chain Management | 4 | 22 | 5.5 | - | 0 |
| 6 | Industrial Management and Data Systems | 3 | 132 | 44.0 | 9.6 | 0 |
| 7 | International Journal of Logistics Management | 3 | 39 | 13.0 | 12.2 | 0 |
| 8 | Operations Management Research | 3 | 24 | 8.0 | 6.2 | 0 |
| 9 | Journal of Enterprise Information Management | 3 | 45 | 15.0 | 14.8 | 0 |
| 10 | Technological Forecasting and Social Change | 3 | 68 | 22.7 | 21.3 | 0 |
| 11 | International Journal of Production Economics | 2 | 205 | 102.5 | 21.4 | 0 |
| 12 | International Journal of Business Performance and Supply Chain Modelling | 2 | 37 | 18.5 | 2 | 0 |
| 13 | IEEE Transactions on Engineering Management | 2 | 58 | 29.0 | 10.3 | 0 |
| 14 | International Journal of Information Systems and Supply Chain Management | 2 | 4 | 2.0 | 1.9 | 0 |
| 15 | Journal of Self-Governance and Management Economics | 2 | 48 | 24.0 | - | 0 |
| 16 | International Journal of Logistics Systems and Management | 2 | 16 | 8.0 | 2 | 0 |
| 17 | Resources Policy | 2 | 4 | 2.0 | 13.4 | 0 |
| 18 | Sinergie | 2 | 10 | 5.0 | 1.7 | 0 |
| 19 | Cleaner Logistics and Supply Chain | 2 | 26 | 13.0 | 8.6 | 0 |
| 20 | International Journal of Services and Operations Management | 2 | 3 | 1.5 | 1.2 | 0 |
| 21 | Transportation Research Part E: Logistics and Transportation Review | 2 | 115 | 57.5 | 16.2 | 0 |

*Source: Scopus (2024)

The CiteScore of all leading sources in average citation was in the top five. The highest CiteScore was taken by Business Strategy and the Environment, which was 22.5, followed by International Journal of Production Economics (21.4), and Technological Forecasting and Social Change (21.3). Although, International Journal of Production Research took the 5th spot in CiteScore rankings (19.2), it garnered the highest citations (n=2252), followed by Journal of Cleaner Production (2018) which also had the highest number of publications and a CiteScore of 20.4, taking the 4th position. Therefore, it can be said that a correlation exists between the CiteScore and average citation per document of sources, and a high CiteScore could be the reason behind higher number of citations.

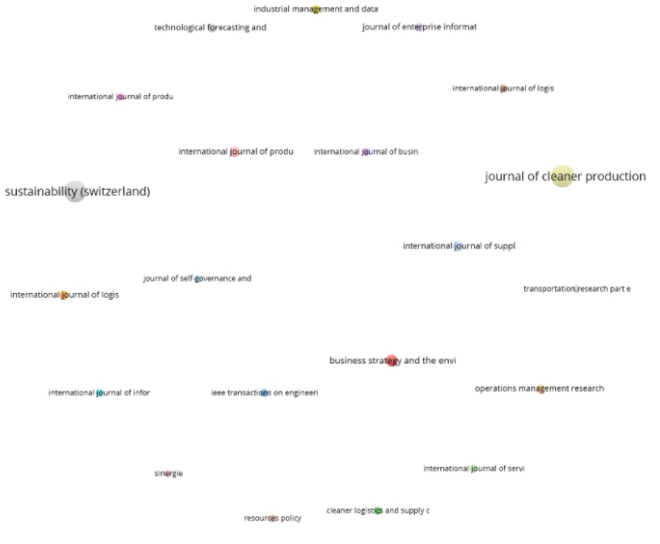


Figure 5. Bibliometric Map of Most Prominent Sources

The bibliometric map of the most prominent sources is shown in Figure 5. Evidently, due to absence of any total link strength, the map shows only the sources in the form of bubbles, where the size of the bubbles represents the number of publications made by each source. Bigger the bubble, more the documents that were published by the journal in the research area.

### 4.3.2 Most Cited Documents

The citation analysis for most cited documents was conducted by selecting the documents with a minimum of 50 citations. The final list of documents came down to be 25. These documents are arranged in Table 3 according to their ranks based on their total number of citations, along with the summaries of their main findings.

The highest number of citations was received by Saberi et al. (2018) for their paper titled "Blockchain technology and its relationships to sustainable supply chain management" which was cited by 2082 articles. This was followed by the research work on "Blockchain technology: implications for operations and supply chain management" by Cole et al. (2019) (n=589), and "Strategy development in small and medium sized enterprises for sustainability and increased value creation" by Moore and Manring (2009) (n=337), respectively.

However, no links could be found within these 25 documents.

Table 3. Citation Analysis of Most Cited Documents

| Rank | Reference | Citation | Links | Main Findings |
|---|---|---|---|---|
| 1 | Blockchain technology and its relationships to sustainable supply chain management. (Saberi et al., 2018) | 2082 | 0 | This paper explores blockchain adoption in supply chains, emphasizing its potential for secure, decentralized networks while reducing intermediaries. It highlights barriers, urges further research, and advocates industry-academia collaboration for effective implementation and sustainability. |
| 2 | Blockchain technology: implications for operations and supply chain management. (Cole et al., 2019) | 589 | 0 | This paper highlights blockchain's potential to improve supply chain management by enhancing transparency and traceability in industries like pharmaceuticals, food, and fashion. It urges managers to evaluate its necessity and develop implementation strategies. |
| 3 | Strategy development in small and medium sized enterprises for sustainability and increased value creation. (Moore & Manring, 2009) | 337 | 0 | This paper examines how SMEs drive sustainability through innovation and agility, influencing MNEs to enter sustainable markets via acquisitions or internal growth. Collaboration among SMEs, MNEs, governments, and NGOs is crucial for global sustainability. |
| 4 | Thinking differently about purchasing portfolios: an assessment of sustainable sourcing. (Pagell et al., 2010) | 311 | 0 | This manuscript revises purchasing portfolio theory, emphasizing supplier continuity in sustainable supply chains. It challenges risk-focused models, proposing that firms may increase supplier risk to enhance sustainability, integrating transaction cost, resource-based, and stakeholder theories. |
| 5 | Creating integrated business and environmental value within the context of China's circular economy and ecological modernization. (Park et al., 2010) | 286 | 0 | The findings reveal significant opportunities for electronics companies in emerging markets and provide a strong scholarly foundation for improving sustainable supply chain management practices in these economies. |
| 6 | Knowledge management in sustainable supply chain management: Improving performance through an interpretive structural modelling approach. (Lim et al., 2017) | 231 | 0 | This study links Knowledge Management (KM) with SSCM, identifying 21 criteria across social, environmental, economic, and KM aspects. Using ISM, it highlights KM and environmental factors as key drivers of SSCM performance in the textile industry. It emphasizes KM's role in sustainability while acknowledging ISM's limitations, including bias and lack of attribute weighting. |
| 7 | Sustainable supply chain management: A case study of British Aerospace (BAe) Systems. (Gopalakrishnan et al., 2012) | 197 | 0 | This paper highlights sustainability's rising importance in supply chains, stressing an integrated approach and supplier involvement while urging industry-wide research on challenges. |
| 8 | Industry 4.0 adoption for sustainability in multi-tier manufacturing supply chain in emerging economies. (Sharma et al., 2021) | 159 | 0 | This study systematically examines Industry 4.0 adoption in multi-tier manufacturing supply chains, identifying 37 drivers and 21 barriers across technological, organizational, economic, environmental, and social dimensions while analyzing their interrelationships. |
| 9 | Linking sustainability-oriented innovation to supply chain relationship integration. (Neutzling et al., 2018) | 142 | 0 | This paper proposes a framework connecting sustainability-oriented innovation with sustainable supply chain management through inter-organizational relationships. Using case studies, it emphasizes collaboration, governance, and innovation's role in driving sustainability and calls for further research. |
| 10 | Introducing an application of an industry 4.0 solution for circular supply chain management. (Mastos et al., 2021) | 135 | 0 | This study assesses an Industry 4.0 solution for circular economy supply chains, enhancing transparency and efficiency while requiring further research on broader applicability. |
| 11 | Sustainable recycling partner selection using fuzzy DEMATEL-AEW-FVIKOR: A case study in small-and-medium enterprises (SMEs). (Zhou et al., 2018) | 131 | 0 | This study proposes a hybrid MCDM approach for SME recycling partner selection, combining fuzzy techniques to balance sustainability criteria. Future research should enhance objectivity using AI and big data integration. |
| 12 | Data-driven sustainable supply chain management performance: A hierarchical structure assessment under uncertainties. (Tseng et al., 2019) | 116 | 0 | This study uses FSM-DEMATEL to assess SSCM in textiles, emphasizing social development and risk. It urges broader research and big data integration. |
| 13 | A novel decision-making model for sustainable supply chain finance under uncertainty environment. (Abdel-basset et al., 2020) | 116 | 0 | This study applies BWM, TODIM, and TOPSIS to Egypt's gas industry, identifying key supply chain finance factors while suggesting broader future research. |
| 14 | Role of green policy on sustainable supply chain management: a model for implementing corporate social responsibility (CSR). (Bhardwaj, 2016) | 112 | 0 | This paper examines environmental policy's influence on sustainability and competitiveness, noting limitations in methodology and industry scope while recommending broader sectoral research for deeper insights. |
| 15 | Sustainable supply chain management considering technology investments and government intervention. (Ma et al., 2021) | 109 | 0 | This study explores technology investment and collaboration between manufacturers and retailers, showing that higher subsidies for emission reduction enhance green technology adoption and supply chain profitability. |

| | | | | |
|---|---|---|---|---|
| 16 | Evaluating barriers and solutions for social sustainability adoption in multi-tier supply chains. (Khan et al., 2021) | 91 | 0 | This study integrates HFS, CPT, and VIKOR to prioritize social MT-SSCM solutions, emphasizing transparency and collaboration while recommending broader sectoral research and automation for improved data analysis. |
| 17 | A company-oriented model for the assessment of raw material supply risks, environmental impact and social implications. (Kolotzek et al., 2018) | 89 | 0 | This article proposes a raw material selection model addressing supply risks, environmental impact, and social factors, aiding decision-making and demonstrating applicability through a capacitor selection case. |
| 18 | Leveraging digital approaches for transparency in sustainable supply chains: A conceptual paper. (Ebinger & Omondi, 2020) | 77 | 0 | This paper examines how digital tools enhance SSCM by improving traceability, collaboration, and governance while emphasizing the need for research on integration, standardization, and data security challenges. |
| 19 | Sustainability and innovation in the Brazilian supply chain of green plastic. (de Vargas Mores et al., 2018) | 72 | 0 | This study explores green plastic innovation, emphasizing the shift to renewable resources like sugarcane. It highlights sustainability policies, supply chain impacts, carbon capture, consumer demand, and market benefits. |
| 20 | Evaluating sustainability of supply chains by two-stage range directional measure in the presence of negative data. (Izadikhah & Saen, 2016) | 70 | 0 | This paper proposes a two-stage DEA model to assess supply chain sustainability, emphasizing the manufacturer stage. Evaluating 29 medical device supply chains, it found only seven to be efficient. |
| 21 | Evaluation of critical constructs for measurement of sustainable supply chain practices in lean-agile firms of Indian origin: A hybrid ISM-ANP approach. (Digalwar et al., 2020) | 56 | 0 | This paper examines SSCM performance measurement, identifying 18 key metrics. Using ISM and ANP, it finds World Class Manufacturing practices best support SSCM and suggests refining the model with fuzzy approaches and broader surveys. |
| 22 | Towards sustainable production networks. (Geldermann et al., 2007) | 55 | 0 | This paper examines pinch analysis for sustainable production, integrating energy, water, and solvents. A bicycle coating case study demonstrates waste heat recovery benefits, emphasizing its adaptability for economic and environmental assessments. |
| 23 | Renewable chemical feedstock supply network design: The case of terpenes. (Tsolakis et al., 2019) | 52 | 0 | This study explores sustainable supply chains for renewable chemical feedstocks, using terpenes as an example. It applies supply network analysis to identify uncertainties like data limitations and evolving industry practices. |
| 24 | Sustainable supply chains in the Indian context: An integrative decision-making model. (Rajesh, 2020) | 51 | 0 | This paper proposes a decision-making model for SSCM in India using AHP and ANP. It compares two schemes, aiding managers in sustainability evaluation while recommending further research on model refinement and cost-benefit analysis. |
| 25 | Moving towards industry 5.0 in the pharmaceutical manufacturing sector: Challenges and solutions for Germany. (Sharma et al., 2024) | 51 | 0 | This article examines barriers to Industry 5.0 in Digital Engineering, proposing solutions and emphasizing human roles, standardization, and policies to improve transparency, effectiveness, and ethical autonomy in implementation. |

As there were no links between the documents, the bibliometric map shown in Figure 6 showed only the documents in bubbles.


Figure 6. Bibliometric Map of Most Cited Documents

The size of the bubbles here represents the number of articles which have cited the document. Evidently, Saberi et al. (2018) is represented by the largest bubble since it was the most cited document of all.

### 4.3.3 Most Prominent Organisations

The citation analysis was further carried out for the organisations which were publishing most research works in the field of SSCM technologies. Organisations with at least two publications were selected and put to analysis in VOSviewer, which shortlisted a total of nine organisations. Table 4 lists these organisations first in the order of number of documents published, and then in the order of average citations received per document.

The organisation with most publications as per the data was School of Business, Worcester Polytechnic Institute situated in the USA, which is the only organisation that had published more than 2 documents in the field. The rest of the organisations had all published two documents each in the area.

On the other hand, the highest number of average citations (181) was received by The Centre for Business in Society, Coventry University situated in the UK. This was followed by two Chinese universities, namely the School of Management and Engineering, Xuzhou University of Technology with average citation of 46.5, and School of Management and Economics, University of Electronic Science and Technology of China with average citation of 37, in that order.

Six of these nine organisations are located in China, which makes China the most prominent contributor with respect to organisations working in the field of SSCM technologies.

Table 4. Citation Analysis of Most Prominent Organisations

| S. No. | Name of Organisation | Documents | Citations | Average Citation | Total Link Strength |
|---|---|---|---|---|---|
| 1 | School of Business, Worcester Polytechnic Institute, the United States of America | 4 | 66 | 16.5 | 0 |
| 2 | Centre for Business in Society, Coventry University, the United Kingdom | 2 | 362 | 181 | 0 |
| 3 | School of Management and Engineering, Xuzhou University of Technology, China | 2 | 93 | 46.5 | 0 |
| 4 | School of Management and Economics, University of Electronic Science and Technology of China, China | 2 | 74 | 37 | 0 |
| 5 | School of Automation, Beijing University of Posts and Telecommunications, China | 2 | 47 | 23.5 | 0 |
| 6 | School of Computer Science, Beijing University of Posts and Telecommunications, China | 2 | 47 | 23.5 | 0 |
| 7 | Department of Business Administration, University of Piraeus, Greece | 2 | 46 | 23 | 0 |
| 8 | School of Business, Dalian University of Technology, China | 2 | 37 | 18.5 | 0 |
| 9 | School of Management Science and Engineering, Dalian University of Technology, China | 2 | 37 | 18.5 | 0 |

The bibliometric map for most prominent organisations is shown in Figure 7. There is a non-existence of internal links, and therefore the average citation ranking can be taken as the basis for determining most impactful organisation.

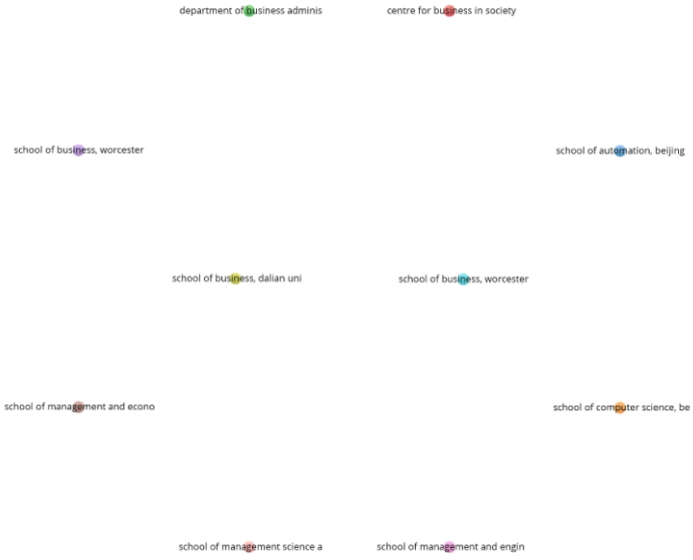


Figure 7. Bibliometric Map of Most Prominent Organisations

As stated previously, the bubbles represent the size of the contribution made by each organisation. However, due to the extracted data being repetitive of one input, the bibliometric map shows the School of Business, Worcester Polytechnic Institute, the USA, in two places instead of being one bigger bubble. Nonetheless, the separated data were added while preparing Table 4, which shows a single entry of each organisation, omitting any redundancies.

4.3.4 Most Highly Cited Authors

The citation analysis for authors was made by selecting authors who had at least two publications. As shown in Table 5, the collaborative authors are listed in the rank of their average citation, as all authors had published the same number of documents.

The most cited authors as per the data were Menon, R. R. and Ravi, V., with a total of 60 citations and an average citation of 30. This was followed by Movahedipour, M., Zeng, J., Yang, M., and Wu, X., who were cited in 47 different articles, with an average of 23.5 citations per document.

These were the top six authors who were most cited out of the 14 authors listed in the table below.

Table 5. Citation Analysis of Most Highly Cited Authors

| S. No. | Name of Authors | Documents | Citations | Average Citation | Total Link Strength |
|---|---|---|---|---|---|
| 1 | Menon R. R.; Ravi V. | 2 | 60 | 30 | 0 |
| 2 | Movahedipour M.; Zeng J.; Yang M.; Wu X. | 2 | 47 | 23.5 | 0 |
| 3 | Kusi-Sarpong S.; Sarkis J.; Wang X. | 2 | 37 | 18.5 | 0 |
| 4 | So S.; Xu H. | 2 | 21 | 10.5 | 0 |
| 5 | Oguntegbe K. F.; Di Paola N.; Vona R. | 2 | 15 | 7.5 | 0 |


Figure 8. Bibliometric Map of Most Highly Cited Authors

The size of the bubbles in the map represents the number of publications made by the authors. Since all authors had published only two documents, all the bubbles in the map are of the same size.

**4.4 Co-citation Analysis of Authors**

In order to find the connections between articles about SSCM technologies, co-citation analysis was employed in this study. Out of the 130 papers, 14 authors who had been cited in at least 50 articles, were selected for co-citation analysis.

Table 6 ranks the authors based on their total citations, along with their total link strength. The highest number of citations was received by

Sarkis, J., with a total of 275 citations, and a total link strength of 3345. The second most cited author was Seuring, S., who was cited in 180 publications and had a total link strength of 2112. Gunasekaran, A. was the third most cited author with a total of 150 citations and a total link strength of 2181.

Table 6. Co-citation Analysis of Most Highly Cited Authors

| S. No. | Author | Citations | Total Link Strength |
|---|---|---|---|
| 1 | Sarkis J. | 275 | 3345 |
| 2 | Seuring S. | 180 | 2112 |
| 3 | Gunasekaran A. | 140 | 2181 |
| 4 | Govindan K. | 116 | 1948 |
| 5 | Luthra S. | 101 | 1896 |
| 6 | Mangla S. K. | 89 | 1652 |
| 7 | Zhu Q. | 78 | 1351 |
| 8 | Dubey R. | 69 | 1259 |
| 9 | Muller M. | 63 | 938 |
| 10 | Kumar A. | 62 | 895 |
| 11 | Kouhizadeh M. | 59 | 764 |
| 12 | Tseng M. L. | 56 | 880 |
| 13 | Jabbour C. J. C. | 51 | 1061 |
| 14 | Carter C. R. | 50 | 640 |

Therefore, given that Sarkis, J. had the highest total link strength of the 14 authors listed here, their work has been the most impactful in this field of research. The second spot is taken by Gunasekaran, A. followed by Seuring, S. (who was previously ranked higher in terms of citations

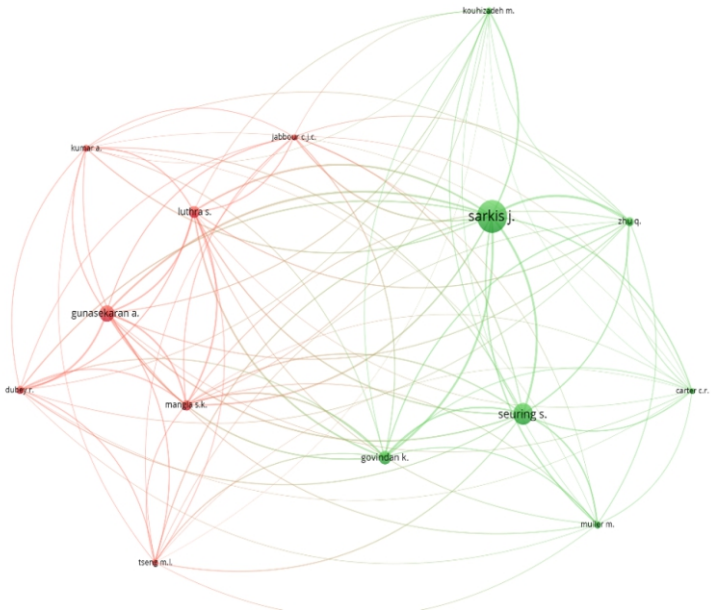


Figure 9. Bibliometric Map of Co-Citation between Most Cited Authors

The bibliometric map for the co-citation analysis of authors shows two groups, red and green (Figure 9). Same colours represent stronger and more frequent links between authors. However, the links of both groups extend to each other as well, without being limited to one's group. The bigger bubbles represent higher number of citations received by the author.

**4.5 Co-occurrence Analysis of Keywords**

Co-occurrence analysis of keywords has been used in this study to identify the articles' key points. It was conducted by selecting keywords which had a minimum of 3 occurrences in the title and abstract of the selected corpus. Table 6 lists the keywords in the alphabetical order, along with their occurrences and total link strengths.

The most occurring keyword was found to be "Supply Chain Management" which had a total of 77 occurrences in the 130 documents selected for this study. The second most occurring keyword was "Sustainable Supply Chain Management (SSCM)" which occurred a total of 49 times throughout these articles. The third most used keyword was "Sustainability" occurring 45 times throughout the selected corpus. The most occurring keyword related to technology were "Blockchain", "Analytic Hierarchy Process (AHP)" and "Industry 4.0".

Due to the exponential boost in the sustainable supply chain management research since 2013 (Amofa et al., 2023), the total link strength was highest for the keywords "Supply Chain Management", "Sustainable Supply Chain(s)", and "Sustainable Development", respectively

Table 7. Co-Occurrence Analysis of Most Used Keywords

| S. No. | Keyword | Occurrences | Total Link Strength |
|---|---|---|---|
| 1 | analytic hierarchy process (ahp) | 13 | 85 |
| 2 | blockchain | 15 | 52 |
| 3 | carbon emission | 3 | 17 |
| 4 | circular economy | 8 | 30 |
| 5 | competition | 4 | 23 |
| 6 | dematel | 6 | 26 |
| 7 | digital technology(s) | 8 | 39 |
| 8 | digital transformation | 3 | 10 |
| 9 | economic and social effects | 4 | 23 |
| 10 | emission control | 3 | 13 |
| 11 | environmental impact | 6 | 30 |
| 12 | environmental management | 4 | 27 |
| 13 | environmental technology | 8 | 49 |
| 14 | green supply chain management | 5 | 23 |
| 15 | industry 4.0 | 12 | 50 |
| 16 | information management | 3 | 13 |
| 17 | innovation | 8 | 33 |
| 18 | logistics | 3 | 12 |
| 19 | manufacture | 4 | 19 |
| 20 | manufacturing | 8 | 39 |
| 21 | multi-tier supply chain | 3 | 13 |
| 22 | operations management | 3 | 10 |
| 23 | sensitivity analysis | 5 | 33 |
| 24 | supply chain management | 77 | 249 |
| 25 | supply chain performance | 3 | 23 |
| 26 | supply chains | 11 | 40 |
| 27 | Sustainability | 45 | 140 |
| 28 | sustainable development | 40 | 182 |
| 29 | sustainable supply chain management (sscm) | 49 | 132 |
| 30 | sustainable supply chain(s) | 44 | 185 |
| 31 | technological development | 4 | 18 |
| 32 | technology | 3 | 9 |
| 33 | technology adoption | 5 | 24 |
| 34 | technology-organization-environment frameworks | 3 | 19 |

Following this, a bibliometric map was created to show the keyword occurrences with each other.

This map, which has 34 keywords in 5 coloured groups, namely blue, green, red, yellow and purple, is shown in Figure 10. The size of the circles in this network indicates where keywords occur, which indicates how important a term is in the papers. Despite the dense web of linked keywords, it is evident that keywords like "sustainability", "supply chain management", and "sustainable development" are in the lead, making the biggest bubbles due to their higher co-occurrences.


Figure 10. Bibliometric Map of Keyword Co-Occurrence Analysis

To make co-occurrence analysis easier and identify the most important terms in the articles, a density visualization map was also created using VOSviewer. Figure 11 highlights the most used keywords in this research area, along with the intensity of their usage.

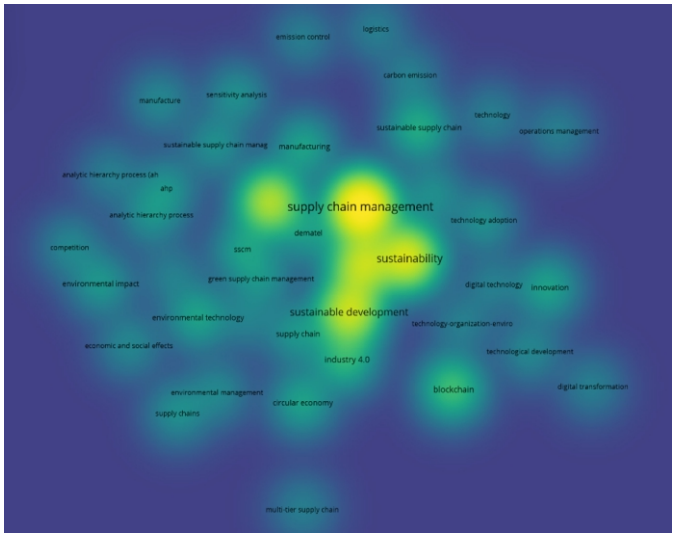


Figure 11. Density Visualisation of Keyword Co-Occurrence

The density visualization shows the most used keywords, whereas the proximity of the keywords with each other represents an increased use of nearby keywords with the most used keyword. For instance, in this case, the keywords "supply chain" and "industry 4.0" are close to the more commonly occurring term "sustainable development", which shows that they are frequently used together in publications.

**5. Discussion**

This study made a bibliometric analysis of 130 publications from the earliest available data on Scopus i.e. 2007, up till 2024. The year-wise trend analysis of publications was conducted along with bibliometric analyses, namely, citation analysis, co-citation analysis, co-country analysis, and co-occurrence analysis. This study answered all research questions and gave an overview of the development and current direction of SSCM, highlighting major gaps and prominent works in light of technology adoption. The answers to all five research questions are discussed below.

The yearly growth showed an upward trend, implying that the fairly nascent field has been growing, particularly in the past decade, and can be expected to be on the rise in the future, as well. With four months still left in 2024 (from when the data was retrieved), the year garnered the second highest number of publications. Thus, researchers could tap this growing field by working on the integration of technology into SSCM.

The country-wise analysis showed that most research work in this field was being done in China, India, and the USA, with the USA being most cooperative with other nations. This can be seen as a collaborative opportunity by academicians as well as technological development opportunity by practitioners. Research interest in the adoption of digital technology has been rising in India, which shows that there lies a scope in exploring operations management from the Information Technology perspective.

Future researchers may refer to the most cited sources, documents, and authors in the field, in order to access literature and comprehend the future direction of the research area. The most cited source was Journal of Cleaner Production which published most papers, and therefore, it can act as a good reference for researchers.

The most cited documents focused mainly on blockchain and data-driven sustainable operations, followed by industry 4.0 in SSCM. There exists a gap in the study of automated SSCM, incorporating the Artificial Intelligence perspective into its research and development.

Most organisations working in this field were located in China, making it a leading country in terms of most contributing organisations. These Chinese institutions can be approached for collaborative work or for studying their research direction.

The authors whose papers were most cited in this field were Menon, R. R. and Ravi, V. On the other hand, the most cited and most collaborative individual author was Sarkis, J. who also had the strongest link strength. This is consistent with a study by Yu et al. (2022) which found Sarkis, J. to be the most prominent author in SSCM and technological innovation, as well. Along with following and collaborating with most cited authors, the works of their collaborators may be followed as well.

Finally, the most used keyword was "supply chain management", along with others listed in the co-occurrence analysis. The top keywords like "carbon emission" focused on environmental sustainability practices in SCM, which align with the study by Seuring and Müller (2008), which observed a significant rise in environmental sustainability. The present findings are comparable with those of this study, as research on

environmental sustainability continues to grow. However, they offer a more updated perspective, indicating that IT-related keywords have gained greater prominence compared to those associated with environmental sustainability.

These keywords can be used while looking for literature in databases like Scopus, along with their related keywords that they co-occur with most often. Therefore, an inter-disciplinary study can be carried out based on this co-occurrence analysis.

**6. Conclusion**

Studying the intersection of technology and SSCM is crucial due to the increasing complexity and environmental demands facing modern supply chains. With advancements in digital technology, organizations are better equipped to manage sustainability goals, improve transparency, and optimize resource efficiency. A bibliometric analysis in this field is valuable because it provides a structured overview of current research trends, identifies influential studies, and highlights collaboration networks across countries and institutions. By mapping the existing literature, bibliometric analysis helps researchers pinpoint gaps in technology integration within SSCM, encouraging innovation and targeted research to address pressing global sustainability challenges.

The literature underscores the critical role of technology in advancing sustainable supply chain management. As organizations increasingly recognize the importance of sustainability for long-term success, leveraging technological innovations will be essential for optimizing operations, enhancing transparency, and fulfilling social responsibilities.

In conclusion, this bibliometric analysis tried to underscore the rapid development and growing interest in SSCM, particularly over the past decade. The findings highlighted significant contributions from China, India, and the USA, with key focus on technological advancements such as blockchain and data-driven sustainable operations, while opportunities remain to explore AI-driven and automated SSCM processes. By identifying influential authors, sources, and emerging research gaps, this study provides a valuable roadmap for future research in SSCM, emphasizing the potential for interdisciplinary collaboration and technological innovation within the field.

**7. Limitations and Future Direction**

This study recognizes several limitations that offer avenues for future research. Firstly, the analysis was confined to English-language publications, which may have led to the omission of valuable studies in other languages. Secondly, the bibliometric evaluation focused primarily on citation analysis, without integrating bibliometric mapping methods. Furthermore, the study exclusively utilized Scopus, disregarding other databases such as EBSCO and ProQuest, which may have provided additional insights. Future review studies could conduct a systematic literature review as well as a meta-analysis using the corpus from this study, further making a cross-national as well as interdisciplinary analysis of bibliometric results. Academicians and practitioners can further explore the field of SSCM in light of automation and AI, Internet of Things, policy impact and regulatory compliance, and data-driven decision making in the field of operations. Future research should continue to explore the intersection of technology and sustainability in supply chains, addressing existing challenges while identifying new opportunities for innovation.

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# Creativity and Innovation for Sustainability: A Conceptual Framework

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Abstract

Sustainability, the need of the hour, has long been a focus of every country. In the journey of transforming society into a prosperous, sustainable, and environmentally conscious entity, the role of creativity cannot be replaced. The question of how creativity and innovation foster sustainability has recently emerged, necessitating the development of creative approaches to provide sustainable solutions to this problem. By combining the perspectives of creativity, innovation, and sustainability, more responsible and sustainable behavior can be fostered in consumption practices. However, the integrated development of this interesting intersection is an under-researched area. Therefore, this study aims to comprehensively delineate this relationship by conceptualizing a framework and adding valuable insights to the existing knowledge on sustainable consumption.

**Keywords:** Creativity, Innovation, Sustainable Consumption, Sustainability.

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ARTICLE INFO
Received:05/09/2024 | Revised: 10/10/2024 | Accepted: 25/12/2024 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15212852
CITATION
Grover, A., & T, H. K. (2024). Creativity and Innovation for Sustainability: A Conceptual Framework. Integral Review–A Journal of Management, 14(2), 17-22.
https://doi.org/10.5281/zenodo.15212852

## 1. Introduction

The demand for products and services is increasing at an astonishing speed, becoming an irrepressible economic issue .Unsustainable overconsumption of natural resources has a devastating impact on the environment, resulting in environmental degradation .Environmental issues have become major global challenges for every country, emphasizing the need for change in the production and consumption patterns of individuals, as in this anthropogenic era, humans have become the dominant driver of the natural environment .Humans are considered a powerful resource for steering the world toward sustainability by implementing creative and innovative thinking to provide solutions to environmental problems.Various unforeseen shortages of natural resources and the alarming climate situation are beginning to make humans feel.The disastrous climate has significantly impacted people's behavior.

Moreover, expanding awareness of sustainability issues has a cogent effect on individuals' consumption patterns .Companies are increasing their endeavors to create sustainable or green products and have enhanced their marketing communication strategies in response to consumers' environmental concerns. Furthermore, businesses are focusing on developing innovative and creative ideas to position the minds of consumers for the betterment of society and the environment .—— demonstrated that implementing creative approaches to behavioral changes is the primary means of achieving sustainable goals.Creativity is a problem-solving tactic that results in innovative and valuable outcomes .Although this trait is commonly associated with the culinary arts, creating compelling presentations, and inventing new products, it also extends its boundaries to provide creative solutions to environmental problems.For propulsion toward long-term sustainability, creativity and innovation are valuable assets.Although these two are distinctive constructs, they can be interlinked to foster sustainable practices. It is often acknowledged that creativity is an essential catalyst of innovation. Sustainability is a multifaceted challenge that requires new ideas and innovative solutions. Therefore, variables such as creativity, innovation, and sustainability must be considered for prosperous and sustainable development.

## 2. Literature Review

### 2.1 Creativity

The advent of the Internet has created new prospects for harnessing individuals' creativity in product development .Creativity is a multifaceted problem-solving process that results in innovative and distinct outcomes . It has been described as described as the ability to solve existing problems that have not yet been solved and producing novel and appropriate work arising from collective efforts(Sternberg and Lubart, 2014). proposed that creativity arises from the intricate relationship between cognitive and non-cognitive traits, including emotions and rationality. According to , creativity encompasses the process of generating novel and innovative ideas. It emboldens the ability to think outside the box, encapsulating the need for creative solutions (Eisner, 2011; . portrayed creativity as the outcome of divergent and convergent thinking. In contrast, there are various assertions that creativity is built not only by personal factors but also by situational factors . asserted that creativity inculcates two dimensions namely- originality and effectiveness. The originality dimension pertains to the novelty or uniqueness of the solutions produced, whereas the effectiveness dimension refers to the practicality of the idea in addressing pertinent issues .As cited in ,creativity has long been defined as producing novel ideas and can manifest novelty and usefulness as its core dimensions. Creativity's role in the sustainability paradigm is indeed escalating"" . ) opined that creative consumers are more likely to switch their behavior towards sustainable consumption. In the quest for sustainability, based on the extant literature, this study conceptualizes the broader perspective of creativity, including problem-solving, novelty, effectiveness, and usefulness, as novel dimensions of creativity that significantly influence sustainable consumption behavior.

### 2.2 Innovation

In today's dynamic business landscape, innovation is essential for meeting evolving customer needs and maintaining competitiveness . Derived from the Latin "innovare," meaning "to do or act," innovation refers to introducing new elements that transform existing practices "" .According to , innovation is the process of adopting and executing new ideas, products, or services. Furthermore, documented the concept of “newness” as a strategic approach to transitioning towards new production technology, new plans, new organization, or administrative framework. Likewise, stated that innovation involves the creation of unique goods and services that meet the needs of customers and the implementation of improved production methods. The fundamental purpose of innovation is to address the issues faced by customers and provide viable solutions . ) discussed the value creation as one aspect of innovation.

Recently, the concept of innovation has been supplanted in the field of sustainable marketing. The UK's Department for Innovation, Universities, and Skills (2008) mentioned the broader implications of innovation in dealing with environmental challenges. This highlights the importance of implementation for organizations and the economy in this modern era to sustain a competitive world. In the current global marketplace, innovations are increasingly becoming the key drivers of success'—" .

### 2.3 Sustainability

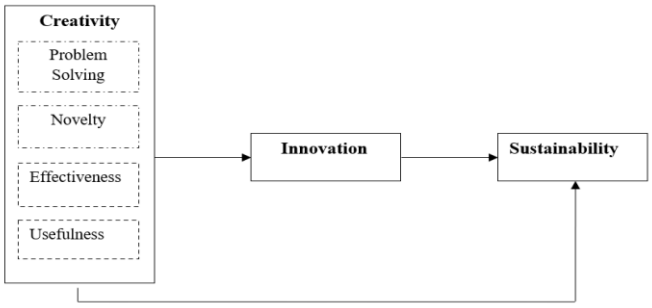
Over the decades, marketing has undergone a significant transformation. The marketing transition has occurred from the production-oriented concept to sustainability and responsible marketing . In the early 1970s, the societal marketing concept emerged, asserting that organizations should consider both the consumer's and

societies long-term interests. This emphasizes the need for sustainable and environmentally responsible marketing that meets the present needs of consumers without compromising the ability of future generations to meet their needs .The concept of sustainability first emerged as a social, environmental, and economic ideal (Caradonna 2022). demonstrated the concept of sustainability from different discourses: environmental, social, and business. While sustainability was initially focused on environmental issues, Drexhage and Murphy (2010) discussed the shifting nature of sustainability towards social and economic development. The third discourse emerged from the relationship between organizations and the social and ecological domains. From a business perspective, sustainability refers to the ability of organizations to sustain themselves over an extended period, not only in terms of financial benefits but also in terms of the management of their environmental and social assets, which constitute their capital. Over time, the need to adopt a holistic and integrated approach toward sustainability has become increasingly imperative and has been realized by several organizations .

**3. Objective of the Study**

Based on the exploratory research design, this paper seeks to conceptualize the diverse dimensions of creativity identified in previous literature and explore their impact on innovation and sustainability.

**4. Proposed Conceptual Framework**




Source: Authors' compilation

**4.1 Creativity and Innovation**

Although creativity and innovation are considered interchangeable, they have different meanings. Creativity is considered a precursor to innovation.Innovation is viewed as applied creativity that represents the stage of transforming ideas into tangible products or services that add value to an organization .Creativity and innovation go hand in hand to achieve competitive advantages in this digitally advanced world. They do not work in seclusion for the success of the organization .Various studies have elucidated that creativity constitutes the fundamental driver of innovation . Implementing creative problem-solving techniques stimulates innovation-driven thoughts and considered a prerequisite for innovation .Creative problem-solving entails generating novel and original ideas, transforming innovative ideas into real-world solutions, fostering positive change, and contributing to the evolution of industries, technologies, and society. In essence, novelty provides a spark of creativity, whereas innovation harnesses that spark to drive meaningful progress (Krasadakis, 2020).Furthermore, demonstrated that creativity produces novel and useful solutions, and Mingchuan et al. (2019) opined that usefulness significantly influences the promotion innovative behavior. In summary, creativity is about the production of novel ideas, while innovation involves implementing those ideas to deliver benefits. Hence, this study posits that creativity significantly impacts innovation.P1 Creativity dimensions (problem-solving, novelty, effectiveness, and usefulness) significantly influence innovation.

**4.2 Innovation and Sustainability**

The notion of "innovation as a key driver for sustainability" has gained significant traction from academics and businesses in the 21st century' .The combination of these two concepts gives emergence to several new terms, such as "sustainable innovation," "eco-innovation," and "sustainable-driven innovation."According to Peter (1997), eco-innovation is described as new products or processes that add value to customers and organizations without degrading the environment. Likewise, sustainable innovation can be seen as the development of new products, services, and technologies that consider human and environmental needs . opined that sustainable-driven innovation is the creation of new processes and new market space driven by social, economic, and environmental issues. In a similar vein, discussed the relationship between innovation and sustainability in environmental and economic development. postulated that innovation is essential for achieving sustainability. Based on the above, this study posits a positive relationship between innovation and sustainability.

P2Innovation significantly influences sustainability.

**4.3 Creativity and Sustainability**

The unprecedented need for sustainability requires the propulsion of continuous and creative solutions. This requires a more systemic approach to creative solution generation that challenges the rules and assumptions of the current paradigm """ .Creative problem-solving is increasingly recognized as a promising and integral process for stimulating novel and innovative sustainable solutions . In the environmental context, creative individuals with a broader perspective provide solutions not only for current environmental problems but also for sustainability and conservation (Yang et al., 2015).Creative, sustainable consumers use innovative approaches to deal with environmental problems and intend to re-customize, re-use, and re-adjust products to fit sustainable solutions and are ready to change their consumption patterns to maintain the sustainability of the environment ; '.Moreover, postulated the essence of developing business models consisting of novelty and sustainability. A business model that has undergone breakthrough innovation successfully combines these two critical elements .Additionally, effectiveness that leads to the practicality of ideas for dealing with existing issues is crucial for contributing to sustainability .Therefore, this study proposes

a significant relationship between creativity and sustainability. P3Creativity dimensions (problem-solving, novelty, effectiveness, and usefulness) significantly influenced sustainability.

**5. Conclusion and Scope for Future Research**

Amidst grappling with environmental issues, transitioning to sustainable practices requires a paradigm revolution in the form of more creative and innovative approaches. In the context of marketing, creativity reflects the adoption of consumption practices or solutions to the consumer problem that represent the act of moving forward from conventional solutions. The present study provides a comprehensive view of various domains to extend the conceptual understanding of creative and innovative solutions for sustainability. The model shows that the different dimensions of creativity significantly influence innovation, and innovation leads to sustainability. Moreover, based on the extant literature, creativity direct influence on sustainability has also been found. Compared to the direct relationship, the interlinking role of innovation can provide marketers with a more in-depth understanding of implementing innovative strategies to adopt and promote sustainable practices.

This study provides valuable insights to stakeholders, managers, marketers, and policymakers in developing strategies that fulfill consumers' evolving needs, such as novelty and change, while ensuring the conservation of the planet's resources. Furthermore, future studies can be extended by conducting empirical research based on the proposed conceptual framework. Nevertheless, research on the role of creativity in promoting sustainability is a vastly unexplored area .Therefore, a more practical view of identifying this relationship is needed.

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# Managing Generational Diversity: Leadership and Organizational Culture as Driving Forces

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Abstract

The modern workforce is becoming increasingly diverse, with Baby Boomers, Generation X, Millennials, and Generation Z contributing unique perspectives, values, and work styles to the workplace. This study investigates these generations' distinct characteristics and differences, focusing on their work attitudes, communication styles, motivational drivers, technological adaptability, and more. This study examines how these generational distinctions influence workplace dynamics and overall productivity. Additionally, this research emphasizes the importance of leadership and organizational culture in managing a multigenerational workforce. Adaptive and inclusive leadership, coupled with a culture that values diversity and promotes collaboration, are essential for leveraging the strengths of each generational group. This study outlines the best practices for fostering an environment where all generations can thrive, thereby enhancing organizational effectiveness and innovation. The findings stress the need for customized leadership strategies and cultural initiatives that address the unique needs and preferences of each generational cohort. By adopting these approaches, organizations can boost employee engagement and satisfaction, improve performance, and gain a competitive edge. This study provides valuable insights into managing the challenges and opportunities of a generationally diverse workforce.

**Key words:** multigenerational workforce, intergenerational leadership, organizational culture, generational diversity, workplace productivity.

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ARTICLE INFO
Received:13/07/2024 | Revised: 22/10/2024 | Accepted: 30/12/2024 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15212909
CITATION
Ara, U., & Sushil, S. (2024). Managing Generational Diversity: Leadership and Organizational Culture as Driving Forces. Integral Review –A Journal of Management, 14(2), 23-29. https://doi.org/10.5281/zenodo.15212909

## 1. Introduction

This global age shift in the workforce has been extensively documented in recent decades (Teng et al., 2018). Causes of such a paradigm shift are said to be an ageing workforce, no more mandatory retirement age or changes such as, improved medical facilities associated with prolonged life expectancy times and the inflow of young professionals(Burke, 2015) Such rising in socioeconomic profile seen several workforce being multigenerational (Kyles, 2005)There are three to four generations in today's workplace working side by side. The more knowledge, perceptions, experience, and expertise available, the richer the dimensions, which are different but complementary to those contributed by other generations, resulting in the "non overlapping" of these attributes (Wang & Wang 2012; Argote & Ingram 2000). However, generations also have distinct attitudes, beliefs, and behaviors attributed to them, such as differences in individual traits, driving forces, professional values, and workplace conduct (Stanley, 2010). A mismatch between leader consistency and follower expectations can result in tensions, reduced trust, misinterpretations, prejudice, or loss of performance and commitment (Cahill & Sedrak, 2012). India, despite having the largest employable and most youthful population in the world, will raise its retirement age like other developed nations because of a poorly skilled workforce (Brooke 2003). Consequently, the age diversity of the Indian workforce is expected to reach unprecedented levels, necessitating a thorough examination of age and generational factors as crucial elements in both human resource management studies and practical applications (Kunze et al., 2013). Generational diversity is recognized as a key dimension of diversity, with organizations globally making concerted efforts to combat it. Organizations, particularly in India, are moving away from treating diversity as an initiative to promote inclusivity and variety. Fifteen (15%) of their diversity programs are focused on generation and age (Cahill & Sedrak, 2012), realizing that each generation can bring something distinctive. Understanding how each generation thinks and acts allows them to work effectively together in this space as a whole, creating success for the organization. Earlier studies have also shown that intergenerational teaming is necessary for innovation and knowledge transfer because each generation has different types of competencies and experiential backgrounds which come with them. Therefore, Generational diversity is a given in fast-paced work environments today, and companies must be able to manage it successfully. Five different generations, including Baby Boomers, Generation X, Millennials, and Gen Z, work together. These different backgrounds, in turn, bring a wealth of perspectives, talents, and experiences that can create great conditions for innovation or cross-learning. However, it also presents unique challenges that must be carefully addressed. This pertains to leadership and culture, as well as how they can leverage the best of each generation with less conflict or miscommunication. Organizations are better able to capitalize on each generation's unique strengths through the creation of an inclusive work environment and a focus on intergenerational skills, which ultimately leads them toward greater success in both long-term viability and agility in a growingly complex competitive landscape.

## 2. Literature Review

### 2.1 Generational Diversity: A New Workforce Reality

In today's fast-paced work environment, organizations must recognize and manage generational diversity. The workforce has never been so diverse, with four generations. Generational diversity is the presence of multiple generations in a workforce that has been affected by different historical, sociological, and environmental factors. Baby boomers, born between 1946 1964 and identified by a work ethic that binds them to the loyalty of an employer. Anyone born between 1965 and 1980 is a Generation Xer who believes in maintaining work-life balance while looking at authority with suspicion. Millennials (1981–1996) are generally collaborative and adapt easily to new technologies. Generation Zers (born 1997–2012) have grown up with technology and gravitate toward authenticity and purpose. They are the first generation of truly "digital natives," highly tech-savvy, and naturally enterprising. Born after 2010, Generation Alpha is the first generation of children to grow up without ever having seen social media, and as a result, they are significantly more tech-savvy than any other generation. Age diversity and its effects at work have been the subject of numerous studies documented in the existing literature. However, generational diversity is not synonymous with age diversity. Numerous studies on age diversity and its effects at work are included in the existing literature. However, age diversity is not the same as generational diversity. Since age is a continuous variable, age diversity is the distribution of people according to their ages. Conversely, generational variety views a generation as a collection of people who were born, grew up, and were impacted by major events that took place during that time. The existence of workers from several generations in the workplace is referred to as age diversity (Graystone, 2019). The way age diversity is conceived differs across cultures. As a result, the diversity of generations is a study that focuses on differentiating one cohort of generations from another by examining basic qualities, including attitudes, beliefs, behaviors, personality traits, and work values.

Such generational disparities appear in multiple facets of work, such as communication modes, assumptions about leadership, and the balance between personal lives and careers. For example, Millennials and Generation Z have a preference for digital communication, whereas Baby Boomers are accustomed to face-to-face interactions. It is important to recognize and respect these differences for an organization or team to coexist peacefully. While this diversity holds infinite perspectives and skills, it also provides distinct challenges that require proper management. Leadership and organizational culture are key to capitalizing on the strengths and mitigating the challenges of varying generations, as the workforce spans multiple generations, each with unique traits in attitudes towards work, communication preferences, motivational factors, and technological adaptability.

**2.2 Baby Boomers (born 1946–1964)**

When we think of baby boomers, a beautiful picture comes to mind where they are hardworking and loyal and love job security. They often work long hours and value recognition, status, and security. While we grew up with the ability to read and write essays, Gen Z would much prefer video or audio-based alternatives. Boomers, meanwhile, rely on face-to-face communication (or phone calls), have a harder time adapting to new technologies, but are still willing!

**2.3 Generation X (Born 1965–1980)**

In contrast, Generation Z is more self-sufficient and appreciates a work-life balance; they care about results and productivity rather than long hours. Highlight: They are bilinguals in that they communicate equally well orally and electronically but still prefer direct-to-the-point communication, for example, emails, rather than face-to-face long conversations! Driven by independence, professional advancement, and self-improvement, Gen X stands for work flexibility and is technology-wise as they caught on with the digital transformation but may not be updated with trends that appeal to a younger audience.

**2.4 Millennials (born 1981–1996)**

They value the idea of work as an expression of meaning, autonomy, and quality, often leaning on group efforts. They prefer digital methods of communication (emails, IMs) and social media, and the ideal relationship is built on transparency with regular to constant feedback from their superiors. They are driven by growth and development opportunities and want their work to be meaningful and reflect their values or passion. As a result of coming from the era of new technology and having developed the ability to adapt digitally in their upbringing, Millennials are highly tech-savvy.

**2.5 Generation Z (Born 1997–2012)**

Realistic entrepreneurs are doers; they can wear many hats, are flexible, and love early stage startups. These generations prefer to communicate through chat or text and have become accustomed to the brevity that comes from social media-based virtual friends. Their priorities include job security, career advancement, and work-life balance, supplemented with a focus on mental health in a stressful world. Gen Z are digital natives and have grown up with the latest technology, so any new tool/platform is something they know how to use in a matter of hours.

**2.6 Generation Alpha (born 2013–2025)**

Will demand flexibility, creativity and a sense of purpose for working for society as how they get paid potential trends The Freelance Economy and Gig Work Will Be Attractive to This Generation This generation is primed not just for the gig economy, but also non-traditional career paths like freelancing. Their communication preferences, meanwhile, are tipped to skew more towards immersive features (AR/VR), interactive and instantaneous through social platforms. Gen Alpha is likely to value: Personal fulfilment Continuous learning Innovation Gentle, blended work-life A focus on mental well-being Due to them being the real digital natives, they are going to get used at a very young age with new technologies and AI. Growing up in an AI-driven world, this generation is well-versed in smart devices and understands many future AIs that will be part of their everyday lives.

**3. Objectives**

Based on the abstract, the key objectives of this study were as follows:

1. To examine the unique attributes, beliefs, and approaches to work exhibited by various generational groups (Baby Boomers, Generation X, Millennials, and Generation Z) within the contemporary labor force.
2. To explore the role of leadership and organizational culture in effectively managing a multigenerational workforce.
3. To identify the best practices for fostering an inclusive and collaborative work environment that leverages generational diversity.

**4. Methodology**

This study adopts a secondary research approach, analyzing existing literature, industry reports and case studies to explore generational diversity in the workplace. Data were gathered from academic sources, organizational reports, and government studies to examine generational traits, work attitudes, and leadership strategies. A comparative analysis of existing research identifies key trends, challenges, and best practices for managing a multigenerational workforce. By leveraging secondary data, this study provides a comprehensive understanding of intergenerational leadership, an inclusive organizational culture, and its impact on generational diversity, employee engagement, performance, and organizational effectiveness.

**5. Role of Leadership in Managing Generational Diversity**

One of the most important functions of leadership in an organization is to manage generational diversity. Great leaders understand that each successive generation brings new and different ideas about creating a better view of workplace diversity and faster pacing on climate negotiations, but foremost, they want them all to feel that their opinions matter. This means leadership that is flexible, compassionate, and inclusive(Clausing et al., 2003). Effective leaders will also be able to recognize the differing values, communication methods, and how work is approached among Baby Boomers, Gen X, Millennials, and Gen Z, among other generations, encouraging dialogue between these different age groups can spark new ideas that may not have been considered otherwise. Furthermore, leaders are instrumental in guiding the ways in which older and younger employees mentor each other so that knowledge can be transferred from generation to generation, and organizations can harness a wide range of skills. Leaders using reduced psychological footprint and elevated generational diversity to enhance organizational performance & resilience

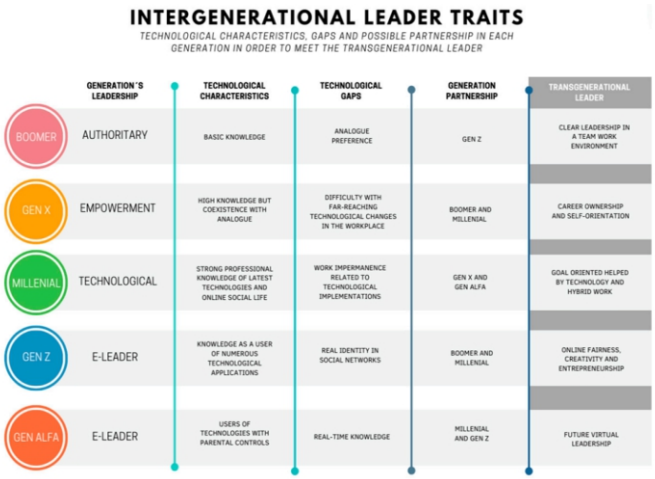
Each generation has several characteristics that are similar or like the others. For example, every generation shares several traits with other generations. For instance, Boomers and Generation Z have a fascinating connection in which they share some beliefs and trade talents. Boomers and Millennials, two groups close to Generation X, have certain traits in common. Millennials, Gen X, and Gen Z have several values in common. Boomers and Millennials are complemented by Gen Z. Finally, since all three generations are digital natives, Gen Alpha has the opportunity to collaborate with younger generations on their technology interests. Without assuming any particular state, intergenerational leadership creates a transformation tailored to each profile by determining the technical preferences of each generation through a distinctive partnership.

The conclusions drawn from this study recommend that management teams review technical performance once a week to obtain an update on each choice. Bringing generations together improves their knowledge of technology. For instance, a Gen Z employee may recognize that this communication code is onerous, yet a Gen X professional may find it practical and effective to call a partner for a short period of time. Reaching a consensus on particular internal communications could be the answer to this circumstance.

**5.1 Intergenerational leadership**

The idea that each generation has something valuable to offer the workplace and one another forms the basis of intergenerational leadership. This calls for carefully considering the needs and characteristics of the generations to foster real ties and engagement between them. Leaders with an intergenerational mindset promote intergenerational collaboration, reciprocal respect and ongoing education. Additionally, they advance equality by using horizontal leadership as an alternative to traditional hierarchies.

A compelling illustration of intergenerational leadership and its transformative potential may be found in the UN Women's 2020 Generation Equality Forum, which highlights the importance of key enablers of gender equality, intergenerational collaborations, and young leadership. The forum demonstrates how the experiences of advocates and visionaries of all ages, coupled with the contributions of younger generations, can result in significant solutions for a more equitable world. This project demonstrates how power sharing between generations may support a fair agenda for all generations. In addition to considering potential intergenerational cooperation, intergenerational leadership integrates the personalities and technological deficiencies of each age group with the qualities of various leadership philosophies.




source: Ramírez-Herrero et al., 2024

The technological traits of each generation create a diverse environment. While Gen X has acclimated to technological advancement while coexisting with conventional dynamics, the Boomer age lacks a basic understanding. While Gen Z is distinguished by their broad understanding of technical applications at the user level, Millennials are well-versed in technological innovation and online adherence to IT users with parental supervision. However, the part regarding technological inadequacies demonstrates the Boomers' analog preference and their ensuing indifference to technological advancement, and Gen X may find it difficult to adjust to significant changes in the workplace. Due to their propensity for employment mobility, Millennials may pose a risk to investments that depend on their labor or the utilization of emerging technological platforms. Despite their lack of familiarity with business practices, Generation Z has used technology in their digital social media pursuits. In conclusion, Gen Alpha has a possible curiosity in acquiring up-to-date data, but they lack familiarity with the operational mechanisms of the company's technological domain.

Every generation shares or is comparable to another in several ways. For instance, Boomers and Generation Z get along well and share ideals in addition to swapping talents. Generation X shares certain traits with the generations surrounding them, Millennials and Boomers. Millennials and Gen Z share certain values. Gen Z is a good balance between Millennials and Boomers. Lastly, as all three generations are digital natives, Gen Alpha may collaborate with younger generations on their technological interests. Without presuming any certain state, intergenerational leadership determines the technical choices for each generation through a unique partnership to build a transformation suited to each profile.

**6. Strategies for fostering intergenerational leadership**

**6.1 Communicate clearly**

Effective communication is essential for managing teams comprising people from various age groups. Keep in mind that Employees from different generations use different vocabularies and communicate in

different ways. For someone from an older generation, memes, new lingo, and emoticons may not be as commonplace as they are among Gen Z members. When making general communications in this situation, it is essential to create a consensus that does not exclude anyone and makes sense to the team. A communication style guide is one option, but if you want to take a lighter approach, consider making an office dictionary that lists the most common slang terms and acronyms used by staff members, along with their definitions.

**6.2 Adopt engaging channels**

In the workplace, communication involves not only what you say but also where you say it. Leaders must create channels of communication within their teams that benefit all the parties involved. You may have already seen some humorous TikTok videos where Gen Z and Millennials whine about meetings that might have been emails. People who grew up in the digital age tend to be like this, while Boomers and Gen-Xers prefer in-person connections. Determining the most effective communication strategy for a multigenerational team requires an understanding of these distinctions. Make the most of the variety of applications available, such as Microsoft Teams, Chantty, and Slack, and discover which one suits your needs. When required, in-person meetings should be set up.

**6.3 Combat stereotypes**

Stereotyping is strictly prohibited in discussions of generational disparities. Each generation possesses unique traits shaped primarily by the eras in which they were raised. Broad generalisations, on the other hand, like "Gen-Xers are dismal" or "Gen-Zs are lazy," are misleading and might impair your judgement. Due to workers' presumptions about other generations rather than focusing on each person's unique needs and viewpoints, generational stereotyping causes conflict within teams. One strategy to challenge these rigid notions is to provide avenues for colleagues of all ages to get to know each other better. Owens recommends developing programs for intergenerational mentorship and cooperation. This promotes comprehension, knowledge transmission and successful intergenerational communication.

**6.4 Encouraging knowledge transfer**

The team's skill set can also be increased through mentoring programs. The knowledge that each generation has to provide can be advantageous to the other generation. Strong knowledge transfer is established through team member mentoring. For example, older generations can provide invaluable knowledge and advice to younger colleagues, keeping them informed about trends and new technologies. Your more seasoned staff members may also be able to provide an in-depth analysis of the company's ideals and changes over time if they have been with the company for a very long period.

**6.5 Leverage unique talents and skill sets**

One of the primary advantages of a multigenerational workforce is the diverse range of talents and expertise that individuals from different age groups bring. A prime example of this is the natural proficiency that Millennials and Gen-Zs typically demonstrate in utilizing social media platforms and emerging technological tools. Conversely, younger employees who began their professional journeys in remote work settings might struggle with conducting presentations and face-to-face meetings effectively—an area where Boomers and Gen Xers often excel. As a leader, it is your responsibility to discover more efficient ways to utilize each ability while promoting growth and learning.

**6.6 Offer career development opportunities**

Recall our earlier discussion of stereotypes. It is critical for managers to refrain from presuming to know exactly what each generation desires in their career path. Instead, a career development strategy that considers everyone is needed.

Access to opportunities for professional development and advancement should be guaranteed to all employees by multigenerational leadership. These steps have the potential to reduce conflicts and increase employee happiness. "People are less likely to feel threatened by others, are happier in their jobs, and are more receptive to the different needs and viewpoints of others when they feel supported in their work.

**7. Organisational Culture as a Catalyst for Generational Integration**

An organization's culture is comprised of its shared values, beliefs, and customs. It is a vital component in managing generational diversity. A powerful cultural voice brings everyone together with a common identity that can bridge the growing generational divides resulting from new perspectives and subsequent values.

An inclusive organizational culture fosters equity, respect, and collaboration among employees, regardless of their generational identity. This environment promotes lifelong learning and the ability to adapt, both of which are required to leverage the full breadth of value/work across all age groups. If an organization believes in continuous learning, however, it might put in place intergenerational mentoring schematics where seasoned Baby Boomers share takeaways with younger staff members (since Millennials and Generation Z may consequently give way to novel technologies and trends).

Managing generational diversity requires cultural flexibility Harrison & Flexible Culture, which is a culture that is amenable to change and evolves according to the needs of a fit-for-the-future workforce. This can take shape in one of two ways: challenging conventional work setups, for example, implementing flexible working hours and new technologies to cater to the needs of younger generations. With a flexible mindset, an organization is better equipped to provide all employees with the freedom and support that will help them deliver their best work, regardless of their generation.

**8. Fostering Intergenerational Inclusion: Strategies for Embracing a Multigenerational Workforce**

To level opportunities on a cohesive generational platform, organizations worldwide must implement diversity and inclusion programs. Organizations need to start executing strategies that actually advance this goal rather than resorting to the cookie-cutter approach. For example, storytelling sessions or panel discussions allow employees to talk about their experiences, obstacles they have overcome, and even display empathy in other forms. Promoting intentional language that encourages mindful communication, along with resources and training to use inclusive language, can also be very helpful in bridging the generational gap. Furthermore, holding celebrations that embrace the rich cultural stories of multigenerational workers can further foster a sense of inclusiveness.

Another important means by which we can create an inclusive culture, even if it is a challenging one for many HR professionals to comprehend and get right, is to promote cross-generational mentorship. Organizations can set up networking events and mixers to promote collaboration among employees of different generations in an informal setting. Another idea is to pair employees of all ages in mentorship programs, where each can learn from the other: knowledge and skill building will benefit everyone and help bring generations together. This, in turn, bridges a completely new generational gap, which sees the younger and older generations learning from each other, with all age groups having the benefits of experience on hand.

Diversity and inclusion can bring enormous, but it also makes explicit the importance of achieving which is dependent on whether or not leadership follows through with their commitment to change. Not only must leaders talk about diversity and inclusion, but they must also even more imperative that they show it through their examples. For example, having leadership teams that mirror the generational diversity of employees and participate in meetings and brainstorming with individuals from different age groups. Leaders should also be trained to manage a diverse workforce and the generational gaps they may encounter. They should be followed up with accountability elements to hold leaders responsible for encouraging and promoting these initiatives.

***Horizontal cohesion*** or intergenerational bonding is imperative in tackling generational diversity issues in the workforce. While this can be a hurdle to manage, it also presents great potential for businesses to manage five generations of workers. Balancing teams with younger, mid-career, and older employees supports intergenerational collaboration that makes use of each group's strengths. This means that generations can try different experiences of leadership roles through alternating work cycles.

***Culture of continuous learning and development*** By forming Employee Resource Groups (ERGs) specifically created for each generation, organizations can satisfy the unique learning style of every group while providing support and networking opportunities. By listening to employees and honing learning programs based on what is required, the organization stays nimble in responding to a fickle workforce.

Moreover, successful companies understand that a sustainable corporate culture is one in which everyone can be a part of it and grow together. While there are numerous challenges in leading a multigenerational workforce, being proactive in managing the culture is the best way for any organization and its employees. These are only a few ways in which organizations can achieve meaningful results. As the workforce becomes increasingly diverse, this process should not be taken lightly. Organizations either manage their culture or the culture manages them. For those desiring to develop thriving cultures, developing a robust discussion on diversity and inclusion is an ideal that prompts the dialogue necessary for designing unique cultural journeys.

**9. Conclusion**

Managing generational diversity in the workforce presents challenges and opportunities for organizations. Through strong leadership and an inclusive culture, companies can harness the strengths of each generational cohort and create a work environment that is both efficient and balanced. Leadership and culture serve as fundamental pillars in fostering intergenerational collaboration, ensuring that employees from different age groups work cohesively while contributing their unique skills and perspectives to the organization. Organizations that prioritize generational diversity gain a competitive edge because they are better equipped to adapt to the evolving business landscape.

This research effectively met its goals by investigating the crucial elements of generational diversity. Initially, by examining the unique traits, principles, and work approaches of Baby Boomers, Generation X, Millennials, and Generation Z, the investigation underscored how these variations influence workplace interactions. Additionally, it explored the crucial role of leadership and organizational culture in managing a multigenerational workforce, emphasizing how inclusive leadership strategies enhance teamwork and engagement. Finally, this research identifies best practices for fostering an inclusive and collaborative work environment, demonstrating that organizations that implement tailored diversity initiatives and leadership approaches can improve employee satisfaction, innovation, and overall productivity.

As the future of work continues to evolve, organizations that embrace generational diversity, promote collaboration, and leverage inclusive leadership will thrive. By integrating intergenerational leadership with a strong organizational culture, companies can transform generational differences into a strategic advantage, fostering innovation, attracting top talent, and ensuring long-term success in an increasingly dynamic business world.

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# Investigating The Association Between Flexible Work Arrangements and Work-life Balance Among Educators In Lucknow's Educational Institutions: A Cross-Sectional Study

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Abstract

This study investigates the link between Flexible Work Arrangements (FWAs) and work–life balance (WLB) among educators in Lucknow's educational institutions. Given the critical importance of WLB for educators' well-being and job satisfaction, this research investigates the challenges educators face in achieving WLB, the impact of institutional support, and the role of FWAs in enhancing WLB The study utilized a cross-sectional survey design with purposive sampling, targeting 400 educators from various institutions. Chi-square tests were used to analyze associations between demographic factors, availability of FWAs, and educators' perceptions of WLB. The findings revealed significant associations between certain demographic profiles and the availability of FWAs, with flexi-time being the most commonly offered arrangement. However, a substantial proportion of educators reported a lack of FWAs in their institutions. This study underscores the potential of FWAs in improving educators' WLB, offering valuable insights for institutions aiming to aid their faculty's well-being and productivity.

**Keywords:** WLB; Flexible Work Arrangements; Educators; Institutional support

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ARTICLE INFO
Received:15/08/2024 | Revised: 19/11/2024 | Accepted: 26/01/2025 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15212955
CITATION
Ali, A., & Siddiqui, O. (2024). Investigating the Association Between Flexible Work Arrangements and Work-Life Balance Among Educators in Lucknow's Educational Institutions: A Cross-Sectional Study. Integral Review –A Journal of Management, 14(2), 30-37. https://doi.org/10.5281/zenodo.15212955

## 1. Introduction

WLB is essential for managing both professional and personal responsibilities to enhance overall satisfaction and minimize conflict. For educators, maintaining this balance is particularly significant as it has a direct impact on their well-being and job satisfaction. The connection between work and personal life has been studied extensively, highlighting the interconnected nature of these two spheres. Maintaining a clear boundary between work and personal life is crucial for sustaining a healthy balance. In the teaching profession, WLB plays a pivotal role in reducing stress and burnout, both of which are common challenges. It has been argued that achieving WLB contributes to better mental health, enhanced job satisfaction, and improved work performance. It allows educators to dedicate time to family, leisure, and self-care, thus preventing work demands from overshadowing personal life. However, educators in Lucknow face obstacles, including heavy workloads, extended hours, and increased digital communication, blurring the line between professional and personal lives. Flexible work arrangements (FWAs) can mitigate these challenges by offering alternative schedules and remote work options. Common FWAs include compressed workweeks, job sharing, and telecommuting, all of which offer more personal time and flexibility in managing workloads.

This study explores the relationship between Lucknow's educators' demographic profiles and the availability of FWAs in their institutions. It also investigated how educators perceive the impact of FWAs on their WLB. By examining these associations, this study provides insights into how FWAs can enhance WLB and identify the most effective types of FWAs for educators. The findings may assist institutions in implementing policies that support WLB, leading to improved educational well-being, job satisfaction, and student outcomes.

## 2. Literature Review

Work-life Balance (WLB) is essential for educators' well-being, especially in management institutions where balancing multiple roles is challenging **(Ha, 2020)**. Increasing responsibilities have led to stress and job dissatisfaction, thus impacting overall performance **(Malik & Allam, 2021).** This review focuses on the challenges educators face in achieving WLB, the impact on their well-being, the role of institutional support, and the potential of Flexible Work Arrangements (FWAs) in improving WLB, specifically in Lucknow. Addressing cultural and demographic factors is crucial for effectively managing WLB challenges.

### 2.1 Challenges in Achieving WLB

Educators, particularly in management institutions, are under significant pressure to meet professional responsibilities such as teaching, administrative duties, and faculty development programs. These demands increase stress, leading to lower job satisfaction and well-being **(Malik and Allam, 2021).** WLB, which is the balance between professional and personal life that minimizes stress, is essential for job satisfaction, performance, and retention. However, increasing work demands make it difficult for educators to maintain WLB. Longer working hours, continuous job responsibilities, and difficulties disconnecting from work lead to burnout, adversely affecting mental and emotional health **(Udoh et al., 2024).** Educators with family responsibilities struggle even more, intensifying the challenge of balancing work and life.

### 2.2 Impact on Educators' Well-being

Failure to achieve WLB has detrimental effects on educators' mental, physical, and social well-being. The stress associated with managing both work and personal demands can lead to burnout, dissatisfaction, and the desire to leave the profession **(Udoh et al., 2024).** Research shows that educators in institutions with extended work hours, extra commitments, and frequent travel are more susceptible to stress and burnout, particularly among women who face a disproportionate share of household responsibilities **(Mason et al., 2019).** This imbalance has long-term impacts on educators' personal lives and professional effectiveness.

### 2.3 Institutional Support and WLB

Institutional support is critical in helping educators manage their WLB. Social support from institutions and families serves as a coping mechanism that enhances quality of life and job satisfaction **(Ahmad et al., 2018).** Institutions that offer flexible working conditions or foster supportive environments have reported higher job satisfaction and reduced burnout among educators. Conversely, a lack of institutional support, on the other hand, leads to dissatisfaction and turnover intentions **(Vu & Nwachukwu, 2021).**

### 2.4 Flexible Work Arrangements (FWAs)

FWAs are non-traditional work options that allow flexibility in working hours, location, or job structure. They offer employees greater control over their schedules, which leads to improved WLB. In India, FWAs that align with cultural values of trust and autonomy are effective in empowering educators to take ownership of their work and enhance overall job satisfaction **(Ali & Siddiqui, 2024).**

**Types of FWAs**

**Flexible Hours:**

**Flexi-time:** Employees can choose the timing of initiation and completion of their workdays within management-defined limits, ensuring that they are present during core hours **(Omondi & K'Obonyo, 2018).**

**Compressed Workweek:** Employees work extended hours over a condensed workweek, such as four 10-hour days, instead of the traditional five 8-hour days **(Van der Lippe & Lippényi, 2020).**

Part-Time Work: Employees have reduced working hours compared with the norm **(Austin-Egole et al., 2020).**

**Shift Work:** Work is divided into different shifts, allowing continuous production **(Austin-Egole et al., 2020).**

**Flexible Location:**

**Telecommuting/Telework:** Employees operate from geographically dispersed locations, often from home, using information and communication technologies **(ICT)** to stay connected to their workplace **(Austin-Egole et al., 2020).**

Home-Based Work: Similar to telecommuting, this arrangement allows employees to perform their duties from home **(Kossek et al., 2023).**

**Flexible Length of Work**

**Compressed Workweek:** As mentioned earlier, this involves working longer hours for fewer days **(Van der Lippe & Lippényi, 2020).**

Short-Term Breaks: Employees take breaks from employment without losing their jobs, such as part-year employment, sabbaticals, scheduled vacations, etc. Such arrangements help prevent burnout and allow employees to acquire new skills or attend to their personal needs **(DeMatthews et al., 2021).**

**2.5 Association Between FWAs and WLB**

Research has consistently shown that FWAs positively affect WLB. Studies highlight that FWAs improve job satisfaction, mental health, and performance, as educators with control over their schedule experience improved WLB **(Fox et al., 2022).** However, poorly managed FWAs can blur the boundaries between work and personal life, leading to additional stress **(Franken et al., 2021).** Organizational support is critical for ensuring that FWAs enhance their WLB. Technological advancements have made it easier to implement FWAs, allowing educators to work remotely and effectively manage their time **(Stephan, 2018).** However, institutions must balance the benefits of FWAs with the risks of overwork or isolation.

**2.6 Research Gap**

Despite extensive research demonstrating the positive effects of FWAs on WLB across various professions, there is a notable lack of empirical evidence specifically addressing how FWAs influence WLB among educators in Lucknow's educational institutions. The unique cultural, institutional, and demographic characteristics of this region call for targeted investigation. This study sought to elucidate the relationship between demographic profiles and the provision of FWAs, as well as the relationship between educators' perceptions of FWAs and their perceived WLB, to address the existing research gap. By focusing on these aspects, this research will provide insights into whether and how FWAs can significantly improve WLB for educators in Lucknow, thus addressing the specific needs and challenges within this context.

**3. Research Methodology**

This study utilized a cross-sectional survey design with a self-administered questionnaire to examine the associations between demographic factors, availability of FWAs, and educators' perceptions of WLB within educational institutions in Lucknow. A purposive sampling technique was employed, targeting 400 educators from various institutions and educational levels across Lucknow. Data collection was conducted over a three-month period from May to July 2024, using both online and offline methods. The study analyzed non-parametric data using SPSS version 25, applying chi-square tests exclusively to assess the associations between the variables of interest in alignment with the study's objectives. This approach provides valuable insights into the potential impact of FWAs in addressing WLB challenges faced by educators in this region.

**3.1 Research objectives**

Based on the identified research gaps, the following objectives were formulated.

1. To analyze the association between the availability of Flexible Work Arrangements (FWAs) and the designation of educators in Lucknow's educational institutions.
2. To examine the relationship between the availability of FWAs and the number of years educators have spent in their current jobs at Lucknow's educational institutions.
3. To assess the impact of perceptions of FWAs on perceived work-life balance (WLB) among educators in Lucknow's educational institutions.

**3.2 Hypotheses**

To fulfil the objectives mentioned above, the following hypotheses were proposed:

**H0 1:** There is no significant association between the Availability of Flexible Work Arrangements and the designation of educators in Lucknow's educational institutions.

**H0 2:** There is no significant association between the Availability of Flexible Work Arrangements and no. years in the current job of educators in Lucknow's educational institutions.

**H0 3:** There is no significant association between Perception towards Flexible Work Arrangements and the perceived WLB among educators in Lucknow's educational institutions

These hypotheses were designed to explore the potential of FWAs in addressing the WLB challenges faced by educators in Lucknow, contributing to a broader understanding of how institutional support can be customized to meet the specific needs of this demographic.

**4. Results**

The demographic profile of the respondents provides insight into their key characteristics, offering a foundation for understanding the study's findings. Below is a table presenting these demographic details.

Table 1- Demographic profile of the respondents

| Variable | Category | Frequency | Percent |
|---|---|---|---|
| **Gender** | Male | 221 | 55% |
| | Female | 181 | 45% |
| | **Total** | **402** | **100.00%** |
| **Age (in years)** | 23 to 33 | 215 | 53.50% |
| | 34 to 44 | 103 | 25.60% |
| | 45 & above | 84 | 20.90% |
| | **Total** | **402** | **100.00%** |
| **Marital Status** | Single | 168 | 41.80% |
| | Married with kids | 196 | 48.80% |
| | Married without kids | 38 | 9.50% |
| | **Total** | **402** | **100.00%** |
| **Designation** | Professor | 84 | 20.90% |
| | Associate Professor | 55 | 13.70% |
| | Assistant Professor | 70 | 17.40% |
| | Lecturer | 31 | 7.70% |
| | Adjunct/Ad hoc | 64 | 15.90% |
| | Teaching assistant | 37 | 9.20% |
| | Visiting Faculty | 61 | 15.20% |
| | **Total** | **402** | **100.00%** |
| **Years in current position** | Less than 5 | 224 | 55.70% |
| | 5 to 10 | 39 | 9.70% |
| | More than 10 | 139 | 34.60% |
| | **Total** | **402** | **100.00%** |

**Interpretation:** The respondents' demographic data showed a moderately balanced gender distribution with 55% male and 45% female participants. The majority were younger, with 53.5% aged between 23 and 33 years old. In terms of marital status, most were married to children (48.8%), followed by single individuals (41.8%). The respondents' designations were diverse, with the largest group being professors (20.9%) and assistant professors (17.4%). Most had been in their current position for less than five years (55.7%). This profile provides a thorough and detailed analysis of the participants, highlighting the predominance of younger married individuals in lower-level academic positions across predominantly private and college settings.

Information regarding the availability and use of Flexible Work Arrangements among educators in Lucknow's educational institutions.

Table 2- Type of flexible work arrangement (FWA) \ offered by the institution

| **Type of flexible work arrangement (FWA) is offered by your institution** | | Frequency | Percent |
|---|---|---|---|
| Valid | Flexi-time (Choose work hours) | 183 | 45.5 |
| | Part-Time Work (Reduced work hours) | 19 | 4.7 |
| | Shift Work (Rotating work shifts) | 10 | 2.5 |
| | Short-Term Breaks (Temporary work leave) | 3 | 0.7 |
| | None | 187 | 46.5 |
| | Total | 402 | 100 |

**Interpretation:** The data show that the most common type of flexible work arrangement (FWA) offered by institutions is "Flexi-time," with 45.5% of respondents reporting its availability. "Part-Time Work" is available to 4.7% of respondents, while "Shift Work" and "Short-Term Breaks" are offered to only 2.5% and 0.7%, respectively. Notably, a significant proportion (46.5 %) of the respondents reported that their institutions offered no flexible work arrangements. This distribution highlights that, while flexi-time is the most prevalent form of flexibility, there is a considerable lack of other types of flexible arrangements in the institutions surveyed.

Table 3- How frequently do you utilize flexible work arrangements offered by your institution (e.g., remote workdays and flextime schedule adjustments)?

| **How frequently do you utilize flexible work arrangements offered by your institution (e.g., remote workdays, flextime schedule adjustments)?** | | Frequency | Percent |
|---|---|---|---|
| Valid | Never use | 50 | 12.4 |
| | Rarely use | 137 | 34.1 |
| | Use frequently | 215 | 53.5 |
| | Total | 402 | 100 |

**Interpretation:** The data reveal that the majority of respondents frequently utilize flexible work arrangements, with 53.5% reporting

regular use. In contrast, 34.1% used these arrangements rarely and 12.4% never used them. This distribution indicates that while a significant proportion of respondents take advantage of available flexible work options frequently, there is still a notable proportion of individuals who either rarely or do not utilize these arrangements at all. This suggests that, while flexible work options are available, their adoption and usage vary among educators.

**Chi-square analysis:** Association between demographic profile of educators and the Availability of Flexible Work Arrangements in Lucknow's educational institutions

**H0 1:** There is no significant association between the Availability of Flexible Work Arrangements and the designation of educators in Lucknow's educational institutions.

Table 4- Crosstab & Chi-Square tests: Availability of Flexible Work Arrangements and the designation

**Crosstab**

| | | | To what extent do you feel your institution supports flexible work | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | Institution actively discourages | Institution provides limited support | Institution has no clear policy | Institution provides some support for flexible work | |
| Designation | Professor | N | 7 | 52 | 4 | 21 | 84 |
| | | % | 8.30% | 61.90% | 4.80% | 25.00% | 100.00% |
| | Associate Professor | N | 0 | 29 | 3 | 23 | 55 |
| | | % | 0.00% | 52.70% | 5.50% | 41.80% | 100.00% |
| | Assistant Professor | N | 0 | 67 | 0 | 3 | 70 |
| | | % | 0.00% | 95.70% | 0.00% | 4.30% | 100.00% |
| | Lecturer | N | 0 | 5 | 0 | 26 | 31 |
| | | % | 0.00% | 16.10% | 0.00% | 83.90% | 100.00% |
| | Adjunct/ Ad hoc | N | 0 | 3 | 0 | 61 | 64 |
| | | % | 0.00% | 4.70% | 0.00% | 95.30% | 100.00% |
| | Teaching assistant | N | 0 | 0 | 0 | 37 | 37 |
| | | % | 0.00% | 0.00% | 0.00% | 100.00% | 100.00% |
| | Visiting Faculty | N | 0 | 29 | 0 | 32 | 61 |
| | | % | 0.00% | 47.50% | 0.00% | 52.50% | 100.00% |
| Total | | N | 7 | 185 | 7 | 203 | 402 |
| | | % | 1.70% | 46.00% | 1.70% | 50.50% | 100.00% |

**Chi-Square Tests**

| | Value | Asymptotic Significance (2-sided) |
|---|---|---|
| Pearson Chi-Square | 220.909[a] | 0 |

**Interpretation-** The chi-square test reveals a statistically significant association between the availability of flexible work arrangements and the designation of educators in Lucknow's educational institutions ($p < 0.001$). This indicates that the distribution of flexible work support varies significantly across different academic ranks. For instance, teaching assistants and adjunct/ad hoc faculty predominantly report high support (100% and 95.3%, respectively), while professors and associate professors experience more varied levels of support. This significant result leads us to reject H0 1, which stated that there is no significant association between flexible work arrangements and the designation of educators.

**Chi-square analysis:** Association between Availability of FWA and the no. of years in current job of educators in Lucknow's educational institutions

**H0 2:** There is no significant association between the Availability of FWA and the no. years in the current job of educators in Lucknow's educational institutions.

Table 5- Crosstab & Chi-Square tests: Availability of FWA and the no. of years in current job

**Crosstab**

| | | | To what extent do you feel your institution supports FWA? | | | | Total |
|---|---|---|---|---|---|---|---|
| | | | Institution actively discourages | Institution provides limited support | Institution has no clear policy | Institution provides some support for flexible work | |
| Years in Current Position | Less than 5 | N | 0 | 68 | 0 | 156 | 224 |
| | | % | 0.00% | 30.40% | 0.00% | 69.60% | 100.00% |
| | 5 to 10 | N | 0 | 36 | 0 | 3 | 39 |
| | | % | 0.00% | 92.30% | 0.00% | 7.70% | 100.00% |
| | More than 10 | N | 7 | 81 | 7 | 44 | 139 |
| | | % | 5.00% | 58.30% | 5.00% | 31.70% | 100.00% |
| Total | | N | 7 | 185 | 7 | 203 | 402 |
| | | % | 1.70% | 46.00% | 1.70% | 50.50% | 100.00% |

**Chi-Square Tests**

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 101.306[a] | 6 | 0 |

**Interpretation:** The table indicates a significant association between the availability of FWA and the number of years educators have been in their current position ($p < 0.001$). This suggests that the level of support for FWA varies significantly depending on tenure duration. For example, educators with less than five years in their current role reported a high level of support (69.6%), while those with 5 to 10 years reported much lower support (7.7%). Conversely, those with more than ten years of experience had a mixed distribution of support. Therefore, we rejected H0 2.

**Chi-square analysis:** Association between Perception towards FWA and the perceived WLB among educators in Lucknow's educational institutions

**H0 3**: There is no significant association between perceptions of FWA and perceived WLB among educators in Lucknow's educational institutions.

Table 6- Crosstab & Chi-Square tests: Perception towards FWA and the perceived WLB

**Perception towards FWA * WLB**

| | | | WLB | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | | Very Low Level | Low Level | Moderate Level | High Level | Very High Level | |
| Perception towards Flexible Work Arrangements | Very low level | N | 0 | 0 | 0 | 9 | 0 | 9 |
| | | % | 0.00% | 0.00% | 0.00% | 100.00% | 0.00% | 100.00% |
| | Low level | N | 6 | 8 | 0 | 1 | 6 | 21 |
| | | % | 28.60% | 38.10% | 0.00% | 4.80% | 28.60% | 100.00% |
| | Moderate level | N | 0 | 1 | 88 | 23 | 0 | 112 |
| | | % | 0.00% | 0.90% | 78.60% | 20.50% | 0.00% | 100.00% |
| | High level | N | 0 | 0 | 47 | 9 | 16 | 72 |
| | | % | 0.00% | 0.00% | 65.30% | 12.50% | 22.20% | 100.00% |
| | Very High level | N | 0 | 0 | 25 | 0 | 163 | 188 |
| | | % | 0.00% | 0.00% | 13.30% | 0.00% | 86.70% | 100.00% |
| Total | | N | 6 | 9 | 160 | 42 | 185 | 402 |
| | | % | 1.50% | 2.20% | 39.80% | 10.40% | 46.00% | 100.00% |

**Chi-Square Tests**

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 569.662[a] | 16 | 0 |

**Interpretation:** Table shows a significant association between the perception of FWA and perceived WLB among educators ($p < 0.001$). This indicates that educators' perceptions of flexible work arrangements are closely linked to their perceptions of WLB. For instance, those with a "very high" perception of FWA also report "very high" levels of WLB (86.7%), while those with a "very low" perception report predominantly "high" level of WLB (100%). Conversely, those with "low" perceptions of FWA tended to report a range of WLB levels, with fewer achieving the highest balance scores. Thus, we reject H0 3.

## 5. Discussion

The present study aimed to investigate the influence of demographic factors and availability on educators' perceptions of FWA and WLB in Lucknow's educational institutions. The results not only support the literature but also fulfil

research objectives by providing insight into the relational dynamics of WLB at workplaces in educational institutions.

Alignment with Prior Literature

These findings confirm the observations of earlier studies that identified FWAs as a significant determinant of WLB. Studies such as Piszczek et al. (2021) and Allen et al. (2013) highlighted flexible schedules as a critical factor in reducing work-family conflict and increasing job satisfaction among educators. In line with the above studies, this study also found that educators with access to FWAs reported improved WLB, highlighting the positive influence of flexibility in managing professional and personal roles.

Demographic factors, such as marital status and parental responsibilities, highlighted in earlier studies, such as Rosa (2022), also played a very important role in educators' WLB. This study extends these findings by demonstrating how access to and utilization of FWAs vary across designations and career stages, with a lack of institutional support for mid-level educators, a demographic often neglected in previous studies.

### 5.1 Achievement of Research Objectives

The objectives of the study were met when the following were addressed:

**1. Demographic influence on WLB**

Chi-square tests revealed a significant relationship between demographics, such as designation and tenure, and availability of FWA, thus satisfying the purpose, which is to explain how demographics influence perceptions related to WLB. It also shows that early careerists gain more flexibility, indicating institutional initiatives toward retaining employees, although difficulties faced by mid-career professionals suggest areas for improvement.

**2. Assessment of the role of FWAs in the WLB**

The findings established that educators consider FWAs significant in realizing WLB, which is in line with the aims set forth in assessing their role. A high percentage of educators who do not have access to FWAs stands at 46.5%; this is a critical gap, and thus, the need for more flexible policies is called for.

**3. Testing Educators' Perceptions of WLB Improvement Through FWAs**

Most participants indicated that their WLB would improve when FWAs became available or better implemented in an effort to assess their perception of possible improvements. Such a finding also echoes through literature, calling for institutions' support as ways of depleting stress levels in enhancing well-being among educators throughout by Kumpikaitė-Valiūnienė et al. (2021).

## 6. Conclusion and Suggestions

The findings revealed a significant relationship between the demographic profiles of educators in Lucknow and the availability and perception of FWA. The balanced gender distribution, coupled with a younger demographic, primarily in lower academic positions, highlights the need for tailored support to enhance WLB. Notably, while "flexi-time" is the most prevalent option, nearly half of the respondents report a lack of FWAs, indicating a critical gap that must be addressed. To foster a more supportive environment, it is essential to promote policies specifically designed for younger, married educators with children, and to enhance FWA options across all academic ranks. To improve the current situation, institutions should consider implementing a wider array of flexible work options beyond just "flexi-time." Options such as remote work, compressed workweeks, and job sharing can cater to the diverse needs and preferences of educators. Actively encouraging the use of these arrangements will help recognize the varied circumstances educators face, based on their roles and responsibilities. Moreover, it is crucial to ensure consistent support for FWAs across all levels, foster a sense of equity, and improve job satisfaction.

Regular assessments of the impact of these arrangements on the WLB will also be beneficial for refining strategies. Institutions should gather feedback from educators to understand the effectiveness of existing policies and make necessary adjustments. Additionally, providing training for administrators and educators on the benefits and implementation of FWAs can further enhance their adoption and acceptance. By prioritizing these suggestions, educational institutions can significantly enhance educators' well-being and retention. The following key recommendations were proposed:

- Introduce a variety of FWAs, including remote work, compressed workweeks, and job sharing, to meet diverse educational needs.
- Educators should be actively informed about available FWAs and how to utilize them effectively, ensuring that all staff members are aware of their options.
- Create policies that specifically address the needs of younger married educators with children to support them in managing both professional and familial obligations.

- Provide consistent support for FWAs across all academic ranks to foster a culture of fairness and inclusivity.
- Conduct periodic evaluations of FWA effectiveness and gather feedback from educators to refine policies and practices continuously.
- Offer training for both educators and administrators on the benefits and management of FWAs to enhance understanding and increase uptake.

By implementing these recommendations, educational institutions can foster a more conducive and supportive environment that promotes both educator satisfaction and overall institutional effectiveness.

Future scope of study

Future research could broaden this study by investigating the effects of specific types of FWAs, such as telecommuting or flexible hours, on educators' WLB in different regions and educational levels. Longitudinal studies could be conducted to examine the sustained impact of FWAs on educators' well-being and job satisfaction over time. Additionally, future research could explore the influence of institutional culture and leadership on the successful implementation of FWAs, as well as the potential challenges and barriers that may arise.

**7. Limitations and implications**

This study had several limitations that warrant acknowledgment. Among these, the cross-sectional design restricts the ability to establish causal relationships between FWAs and WLB outcomes. Secondly, the focus on educators within Lucknow may restrict the extent to which the findings can be generalized. Furthermore, dependence on self-reported data introduces the probability of response bias, as educators' perceptions of FWAs may vary. Despite these limitations, this study underscores the importance of educational institutions, particularly private ones, to consider adopting more flexible work policies. Such measures could enhance workforce satisfaction and productivity, ultimately benefiting educators and students.

**Acknowledgment**

We would like to extend our deep sense of gratitude to Integral University for the resources and facilities available to us for conducting this research. We also wish to thank the participants, whose valuable contributions made this study possible. Additionally, we acknowledge the support and encouragement of our colleagues, friends, and family, who served as a consistent and reliable foundation of support throughout the research process.

**Conflict of Interest**

The authors declare no financial or personal affiliations that could influence or bias the content of this study. All research was conducted independently, without any financial or personal relationships that could affect the findings or interpretations of this manuscript.

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# A Study on Factors Influencing the Promotion of Online Business Among Women Respondents in Thiruchirappalli District

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Abstract

Online business refers to the buying and selling of goods and services through electronic platforms such as mobile applications and the Internet. These applications play a crucial role in facilitating e-commerce by enabling transactions and interaction. Mobile applications, in particular, have significantly impacted female respondents, offering them financial support and entrepreneurship opportunities. The number of women entrepreneurs engaged in online businesses is growing rapidly, contributing dynamically to the global economy.

This study identifies the factors influencing online business and its impact on women entrepreneurs in the Tiruchirappalli District. A sample of 100 respondents was selected using convenience random sampling. This study employs chi-square analysis to evaluate the factors influencing women in online businesses and their overall impact. The findings suggest that online businesses eliminate intermediaries, allowing manufacturers to sell directly to consumers and enabling small- and medium-sized entrepreneurs to expand their market reach.

**Keywords:** E-commerce, women entrepreneurs, online business, mobile applications, market expansion, intermediaries.

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ARTICLE INFO
Received:10/09/2024 | Revised: 12/11/2024 | Accepted: 12/02/2025 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15213007
CITATION
Anandhi, G., & Parameswari, V. (2024). A Study on Factors Influencing the Promotion of Online Business Among Women Respondents in Tiruchirappalli District. Integral Review –A Journal of Management, 14(2), 38-43. https://doi.org/10.5281/zenodo.15213007

**1. Introduction**

Online businesses are emerging as transformative tools for empowering women, particularly in developing regions. Women entrepreneurs, including small business owners, can utilize Information and Communication Technology (ICT) to explore new opportunities, enhance communication channels, and balance work with domestic responsibilities.

Many women, especially those skilled in crafts, design, and culinary arts, have leveraged their talents to meet the growing demand for products sold online. These include wearable items, household products and packaged foods. The geographically flexible nature of e-commerce allows women to generate income while effectively managing household responsibilities.

As the world transitions to post-pandemic normalcy, supporting women entrepreneurs who relied on e-commerce during the pandemic is crucial to ensure their businesses survival and growth. The Indian female labor force participation rate has significantly improved, reaching 37% in 2022-2023. Government initiatives and the rise of e-commerce have contributed to this positive trend in the industry.

Strategies to Boost Women's Participation in Online Businesses

The contemporary online business environment presents significant opportunities for female entrepreneurs. To maximize their participation and success, several strategic measures can be implemented.

- **Improving Access to Education and Business Skills:** Providing women with education tailored to digital commerce, such as e-commerce operations, digital marketing, and financial management, can build their capacity to thrive in online businesses. Specialized training programs should address practical challenges and equip women with the skills required to navigate the digital economy.
- **Facilitating Access to Capital:** Financial independence is vital for entrepreneurial success. Establishing funding mechanisms, such as low-interest loans, grant programs, and investment platforms specifically designed for women, can help overcome financial constraints. Moreover, extending these opportunities to women in urban and rural areas ensures inclusive growth.
- **Introducing Gender-focused Government Policies:** Government initiatives must address the unique challenges faced by female entrepreneurs. Policies that provide financial incentives, tax benefits, and support for adopting digital tools can create a more equitable business environment for women entrepreneurs. Targeted assistance for underrepresented sectors and regions can further strengthen their market presence.
- **Simplifying E-commerce Policies:** A transparent regulatory framework with simplified procedures for business registration and operations can encourage more women to venture into online businesses. Streamlining compliance requirements and ensuring fair competition can further enhance entrepreneurial journeys.

Enhancing Digital Connectivity and Resources: Affordable Internet access and the availability of digital devices are crucial for bridging the digital divide. Governments and private sector collaborations can focus on improving infrastructure, particularly in remote areas, to empower women with the tools required to succeed in online businesses.

- **Fostering Networking and Mentorship:** Creating networks for women entrepreneurs to share experiences and learn from successful business leaders can boost their confidence and innovation. These platforms offer guidance, support, and opportunities for collaboration, fostering a community of empowered women in e-commerce.
- **Supporting Work-Life Balance:** Many women face challenges in balancing work and personal life. Introducing flexible work arrangements, affordable childcare services, and remote work opportunities can help women dedicate time to their businesses without compromising their family responsibilities.

By implementing these measures, the participation of women in online businesses can be significantly enhanced, contributing to economic development and the achievement of gender equality.

**2. Literature Review**

Recent literature underscores the transformative impact of digital tools and platforms on female entrepreneurs. The key factors include affordable Internet, government support, social media marketing, and financial inclusion. Challenges such as digital literacy, access to resources, and societal barriers remain; however, targeted interventions can bridge these gaps and enhance women's participation in online businesses.

Gupta and Bansal (2024) A recent study focusing on emerging technologies like AI and automation in online businesses led by women. The study finds that integrating these technologies enhances operational efficiency and provides a competitive edge in the digital marketplace.

Singh and Kumari (2023) explored the impact of digital platforms on rural female entrepreneurs. This highlights how mobile applications and online marketplaces enable women to overcome geographic and societal barriers. Access to smartphones and affordable Internet has significantly increased participation in online businesses.

Anand and Gupta (2022) The authors analyze the role of government schemes in promoting female entrepreneurship in India. They found that financial assistance, mentorship programs, and subsidized digital infrastructure have been instrumental in empowering women to adopt e-commerce platforms.

Choudhury et al. (2021) This study focuses on the post-pandemic recovery of women-led businesses. It emphasizes the critical role of e-commerce and social media in sustaining operations, allowing them to reach global markets despite local restrictions.

Bhatia and Roy (2020) This study identifies the challenges faced by women entrepreneurs in transitioning to digital platforms. Lack of digital literacy, limited access to financing, and societal constraints are the key barriers. The authors suggest targeted training programs to

address these problems. Rathore and Sharma (2019) The research highlights how social mediaInstagram and Facebook have revolutionized online marketing for women entrepreneurs. It notes that digital advertising is a cost-effective tool for expanding market reach and building a brand identity. Balakrishnan and Saraswathi (2018) This study investigates the influence of mobile applications on women entrepreneurship in South India. These tools significantly enhance communication with customers, streamline transactions, and improve business efficiency. Mehta and Kapoor (2017) examined the adoption of digital payment systems by female entrepreneurs. The study reveals that mobile wallets and UPI platforms have made financial transactions more accessible, fostering trust in online business. Alam et al. (2016) This study evaluated the entrepreneurial traits of women in e-commerce. This emphasizes that creativity and adaptability are crucial for sustaining online businesses, especially in competitive markets.

Kumar and Desai (2015) explored the role of educational programs in promoting entrepreneurship among women. The findings suggest that training in digital marketing, business management, and financial planning increases the likelihood of success in e-commerce ventures. Mishra and Kiran (2014) Rural women entrepreneurship: concerns and importance', found that entrepreneurship among rural women increases the prosperity of the country in general and of the family. Balachandran & Sakthivelan, (2013) defined that entrepreneurs have created more opportunities to invent, to innovate, to produce and to process with economic cost and greater values. cost and greater values. Alam, Jani & Ismail (2011) relied on entrepreneurial traits for sustainable growth. This study results on the influence of entrepreneurial trait that is, creativity on the day to day operations of the business and locus of control do not reflect on accountability in their job.

### 3. Statement of the Problem

Various factors influence women's decisions to start online businesses, particularly to meet family needs. These factors include economic necessity, the desire for independence, high achievement, status identity, availability of resources, family culture, and ease of direct marketing. Many women, especially homemakers, face financial challenges as family expenses continue to increase. Consequently, they are increasingly seeking ways to earn money and fulfill their financial requirements. This study aims to identify the factors influencing women to engage in online businesses and to analyze the impact of online businesses on women in the Tiruchirappalli district.

### 4. Objectives of the Study

- To identify the factors that promote online businesses among female respondents.
- To analyze the impact of online business on female respondents.

### 5. Hypotheses of the Study

- **$H_{01}$:** There is no significant relationship between the factors influencing online business and educational qualifications.
- **$H_{02}$:** There is no significant relationship between the impact of online business on women and their occupation.

### 6. Research Methodology

This study employs a mixed-methods approach, utilizing both primary and secondary data. Primary data were collected through structured questionnaires administered to 100 female respondents engaged in online businesses. The sample was selected using convenient random sampling to ensure the inclusion of a diverse group of women from different occupations. Secondary data were gathered from books, journals, and online sources to provide a comprehensive background and context for the study. The study area is Tiruchirappalli District, which was selected because of its significant number of women involved in online businesses. The respondents were chosen from various occupations, including employees, business owners, and housewives, to explore the differences in their engagement with online business platforms and their purchase intentions.

### Tools Applied

The study primarily uses the Chi-Square Test to analyze the relationship between different factors influencing women's involvement in online businesses, such as their educational qualifications and occupation. The Chi-Square Test was chosen because it allows for the testing of associations between categorical variables, providing insights into the relationship between the factors and their impact on online business participation.

Table 1 Association Between Factors Influencing Online Business and Education

| Factors | Economic Factors | Social Factors | Personal Factors | Psychological Factors | Total |
|---|---|---|---|---|---|
| Low | 7 | 6 | 7 | 4 | 24 |
| Moderate | 13 | 8 | 7 | 4 | 32 |
| High | 14 | 12 | 11 | 7 | 44 |
| Total | 34 | 26 | 25 | 15 | 100 |

Source: Authors Compilation

- Computed Chi-Square Value: 1.1822
- Degrees of Freedom (df): 6
- Level of Significance: 5%

**Interpretation:** The computed chi-square value (1.1822) is less than the critical table value at the 5% level of significance with six degrees of freedom. Therefore, the null hypothesis ($H_{01}$) was accepted, indicating no significant relationship between the factors influencing online business and educational qualifications.

Table 2 Association Between Online Business Impact of Women respondents and Occupation

| Online business impact of women respondents | Occupation | | | |
|---|---|---|---|---|
| | Employee | Business | Housewife | Total |
| Low | 14 | 16 | 16 | 36 |
| Moderate | 16 | 14 | 14 | 34 |
| High | 16 | 15 | 19 | 30 |
| Total | 36 | 35 | 39 | 100 |

- Computed Chi-Square Value: 11.828
- Degrees of Freedom (df): 4
- Level of Significance: 5%

Interpretation: The computed chi-square value (11.828) is greater than the critical table value at the 5% level of significance with four degrees of freedom. Therefore, the null hypothesis ($H_{02}$) is rejected, and the research hypothesis is accepted, indicating a significant relationship between the occupation of women and the impact of online business on their lives.

**7. Findings**

The study revealed a significant relationship between the impact of online business and the occupation of female respondents. This suggests that different professional backgrounds influence how women engage with online businesses and the outcomes they experience. A notable finding is that economic needs serve as the primary motivator for women to start and sustain online businesses. Many women reported that engaging in online business not only helped them gain financial independence but also significantly improved their social standing in their community. Furthermore, housewives have increasingly adopted online businesses as a feasible source of income. Many housewives indicated a rise in their income, leading to greater financial satisfaction and a sense of empowerment in their lives. These findings highlight the transformative potential of online businesses for women, particularly in terms of economic freedom and personal development.

**8. Limitations of the Study**

Although this study provides valuable insights, several limitations should be acknowledged. First, the small sample size of 100 respondents limits the ability to generalize the findings to a broader population. This limitation can affect the robustness of the conclusions drawn from the data. Second, the use of convenient random sampling introduces potential bias, as it may not accurately represent the diversity of women engaged in online businesses across different regions or socioeconomic status. Additionally, the study was geographically confined to the Tiruchirappalli District, which restricts the applicability of the results to other areas with potentially different socioeconomic or cultural contexts. Moreover, the study considered only a few influencing factors, excluding other important variables such as technological access, government support, and market dynamics, which could affect women's involvement in online businesses. The reliance on self-reported data from questionnaires also introduces the possibility of response bias, as participants may have provided answers that reflect social desirability, rather than their actual experiences. Furthermore, the study's short-term focus does not provide insights into the long-term sustainability or the challenges of online businesses for women. Additionally, this study did not delve into the specific technologies or platforms used by entrepreneurs, which could provide a deeper understanding of how women utilize digital tools. Finally, this study did not account for sectoral differences, such as how women in different business sectors might face distinct challenges or opportunities in the online business landscape.

**9. Conclusion**

The empirical testing of the hypotheses in this study provides valuable insights into the factors that influence women's involvement in online businesses. The analysis confirmed that economic necessity, resource availability, and occupation play significant roles in shaping women's engagement with online businesses. The study revealed that women in different occupations experience varying impacts from online businesses, with economic needs serving as the primary motivator for their participation in online businesses. Housewives, in particular, have increasingly adopted online businesses as a viable source of income, leading to greater financial independence and satisfaction.

The study also highlighted the barriers faced by women, particularly in terms of technical knowledge and skill gaps, which limit their ability to fully capitalize on online business opportunities. However, the positive relationship between occupation and the impact of online business suggests that tailored support, such as digital literacy programs and financial resources, can empower women to overcome these challenges. Overall, the findings emphasize the transformative potential of online businesses for women, especially in improving their social status and economic independence through entrepreneurship. Future efforts should focus on addressing these limitations to further empower women entrepreneurs in the digital economy.

**10. Scope for Further Study**

Future studies on female entrepreneurs in online businesses could focus on several important areas. A comparative analysis of different regions in India could highlight the varying factors influencing women in this sector. Research on specific challenges, including technical, financial, and infrastructural obstacles, could provide practical solutions. The impact of digital literacy programs should be evaluated to understand their role in empowering women to use the Internet. Investigating the role of social media in business promotion and customer engagement can offer valuable insights. Longitudinal studies tracking the progress of female entrepreneurs over time could provide data on the long-term sustainability and growth of online businesses. Examining the effectiveness of government schemes to support women entrepreneurs would also be beneficial. Additionally, exploring the psychological and social impacts of online businesses on women could offer a deeper understanding of their personal and societal transformations. A sector-specific study could identify key opportunities in industries such as apparel, food and crafts. Finally, research on emerging technologies such as AI and blockchain could uncover how they can enhance women's entrepreneurial ventures. International comparative studies could also provide a broader perspective on the global challenges and opportunities for women in online business. These research directions would help empower women in the digital economy.

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# Mattala Rajapaksa International Airport (MRIA): A White Elephant

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ARTICLE INFO
Received:03/08/2024 | Revised: 27/11/2024 | Accepted: 19/01/2025 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15213084
CITATION
Ahmed, S. (2024). Mattala Rajapaksa International Airport (MRIA): A White Elephant. Integral Review –A Journal of Management, 14(2), 44-46. https://doi.org/10.5281/zenodo.15213084

## Background

Mattala Rajapaksa International airport Sri Lanka HambantotaMattala Rajapaksa International Airport (MRIA) is anserving southeast. It is located in the town of Mattala, 18km from. It is the third international airport in the country, after Ratmalana International Airport and Bandaranaike International Airport (BIA) in Colombo.

The MRIA was constructed to decongest the increasing traffic at Bandaranaike International Airport in Colombo. The initial plan was to convert Weerawila Airport into an international airport. However, it was not widely accepted because of environmental concerns.

However, the Strategic Enterprises Management Agency (SEMA) did not favour constructing an international airport in Mattala. Instead, it suggested that BIA be expanded and the Airfield in Puttalam be improved as a base to be used for emergency landing as it was associated with low transportation costs, as it was located in the vicinity of an air corridor. However, the government did not accept this proposal.

In 2004, the International Air Transport Association produced a report that stressed that investment in a second runway in BIA would be a better alternative to creating a new airport. However, this suggestion was also not accepted, and the construction of a new airport (MRIA) was approved by the government.

Apart from decongesting traffic at BIA, there were other reasons for constructing the airport MRIA. It was also intended to boost the tourism industry. The Hambantota district was selected as it was in the vicinity of many tourist sites, such as Arugam Bay, Nuwara Eliya, Yala National Park, and Udawalawe National Park. (See Box1, Box-2, Box-3 and Box-4). Furthermore, Mahinda Rajapaksa belonged to Hambantota.

The project cost was US$209 million (financed by $190 million loan from the Chinese government). Construction of Phase One commenced on November 27, 2009, and by the end of February 2012, the construction of the runway, apron, and taxiways was completed ahead of schedule.

**Airport (MRIA):** The first stage of the airport was completed. A total of 2,000 hectares had been reserved for the project, of which 800 hectares had been used for stage one. The passenger terminal covered an area of 10,000 m2. It serves one million passengers per year and handles 45,000 Mt of air cargo. It has 12 windows for check-in and two gates for embarking and disembarking. In addition, the terminal is equipped with a restaurant, medicine shop, and a resting and relaxing area for business class passengers.

The first aircraft to land at MRIA was on October 16, 2012. It was a Hawker Beechcraft B200 King Air of the Pakistan Civil Aviation Authority. This was an instrument-testing aircraft equipped with Air Traffic Control (ATC) testing equipment. The test flights were conducted for eight days. It tested the instrument landing system (ILS) and other flight controls that existed at MRIA

In January 2013, a Sri Lankan Airlines Airbus A330-200 landed at the airport. This was the second aircraft to land at the airport after an Airbus A320. It is said that the Airbus A320 brought 125 orphaned children from BIA. .

MRIA was constructed at the initiative of Mahinda Rajapaksa, who was the President. He inaugurated it in March 2013. It is said that he also hails from the same place as the other two. Afterthe airport opened, many airlines provided services at this

In March 2013, the Civil Aviation Authority certified international flights to MRIA. This granted permission to the MRIA to receive flights from abroad.

**International Operations:** The airport was opened for flight operations on March 18, 2013. The first commercial flight to land at Mattala was SriLankan Airlines Flight 226 from Dubai. The second was an Air Arabia flight from Sharjah and a Flydubai flight from Dubai.

**Low Demand: Rajapaksha hailed from the Hambantoat District.** It was his pet project. He wanted to convert Hambantota District into a commercial hub and also planned to construct a cricket stadium and an international port. **It was a poor and rural area and could not garner the revenue that was planned.**

**The demand at the MRIA was very low. As such, many airlines that flew to Mattala stopped their services by 2018. It was thought that it would attract tourists, but that too failed.** Although it was located close to many tourist destinations, it could not generate sufficient revenue as it lacked adequate transport links, accommodations, and facilities, which should accompany any tourist site. *

SriLankan Airlines used MRIA as a hub until 2015. It had to shut down its hub on January 17, 2015. This was largely because Sri Lankan Airlines was making huge losses on all routes. Mihin Lanka also ceased flying from the MRIA.

All international airlines ceased operations at Mattala by 2018. Flydubai started a daily triangle route through Colombo to Dubai. (from Colombo to Dubai to Mattala). Cinnamon Air also started direct flights to Colombo in May 2016. It also stopped its flights in 2018. Another reason was hitting birds on the routes. In 2018, Flydubai also stopped flying to MRIA for similar reasons.

Even though MRAI is a large airport, with very few flights taking off from there, it soon was named as "The World's Emptiest International Airport" by Forbes. Therefore, a proposal was made to utilize it for other services. For instance, proposals were placed to use it for parking space, for setting up flying schools, and for maintaining aircraft.

Furthermore, in 2016, the MRIA was unable to generate revenue to repay the loans. As such, the Sri Lankan government called for Expressions of Interest to start business activities to generate funds from the airport. airport.

**Problems in Construction:** Aviation experts stated that the runway orientation of the airport was such that it was difficult for the aircraft to turn. As only one taxiway had been built, it was difficult for the pilots to turn the aircraft while taking off and landing. This is because the pilots had to turn their airplanes by 180 °. In addition, the air traffic handling capacity has become very poor. It further came to light that the opinions of Sri Lankan pilots were not sought at the planning stage.

**Environmental Concerns:** The MRIA was built in an elephant and migratory bird habitat. During the planning stages of the project, it was opposed by environmentalists, but it received a go-ahead signal. 2,000 acres of forest were cleared to construct the MRIA, which displaced an estimated 200 elephants. Migratory birds, which frequented that locality, had collided with airplanes that were taking off from or landing at the MRIA. Thus, there was a high risk of accidents.

**A Respite:** Renovation of a runaway was taking place at the BIA. This gave a respite to MRIA as it became busy temporarily with a minimum of five flights per day. This was the only period when the airport became busy.

**Covid-19 Pandemic:** During the COVID-19 pandemic, the airport was used for ship crew changes, repatriation flights, charters, and seafarer flights. Therefore, the MRIA recorded high traffic during this period. SriLankan Airlines, Emirates, Philippines AirAsia, Air India, IndiGo, TUI fly Netherlands, Myanmar Airways, and Alliance Air used Mattala Airport for repatriation and seafarer flights. In June and July 2020, the MRIA catered to over 50 flights serving 2,188 passengers. On August 9,

2020, it commenced using the MRIA for transporting cargo. Such a flight from this airport to the US was operated by Emirates.

Antonov Airlines started using MRIA as a transit base. It used the MRIA for re-fuelling and as a rest station for its crew. Wizz Air Abu Dhabi planned to commence flights at MRIA on August 1, 2023; however, it withdrew.

**Present status:** Currently, demand is low, with only four flights taking off in a month. Expansion was planned for phase two but did not start until 2016. The plan was not executed because of the low demand and low revenue generation capacity of the airport. In the second stage, the terminal would be expanded with the number of jetways. A new hangar and cargo apron were also planned for construction. Stage 2 is expected to raise MRIA's capacity to 5–6 million passengers annually.

**On April 26, 2024, the Government of Sri Lanka reported that it had leased out the MRIA to two companies, Shaurya Aeronautics (Pvt) Limited of India and Airports of Regions Management Company of Russia, for the management of the airport for 30 years.**

**Question:** What was the objective(s) of creating the new airport MRIA in Sri Lanka? How far do you think the objective(s) was/were achieved? If yes (no), please provide a reason for your answer.

*(It is interesting to note that the unused air cargo terminals were leased by the Paddy Marketing Board (PMB) to store the bumper harvest rice from the region, which allowed the Airport to generate revenues larger than flight-related activities).

**Box-1: Arugam Bay**

Arugam Bay is a seaside where surfers from around the world come to take part in international competitions. Toward the north, another attraction is the beaches of Trincomalee, wherein tourists laze in the sun and also engage in snorkelling. Moving south coast takes the traveller to even more beaches.

**Box-2: Nuwara Eliya**

Nuwara Eliya has beautiful mountains. In the vicinity is also the hill city of Kandy, which was the last kingdom of Sri Lanka before it fell to the British. It is famous for the golden-roofed Temple of the Tooth, which houses a sacred relic of the Lord Buddha. It is also known for many tea plantations, waterfalls, and botanical gardens.

**Box-3: Yala National Park**

Yala National Park is Sri Lanka's most popular nature reserve. It is a home to elephants, leopards, sloth bears and over 200 species of birds.

**Box-4: Udawalawe National Park**

Udawalawe National Park is a park known for giving shelter to hundreds of elephants

**Box-5: Air Traffic Control**

The objective of Air Traffic Control is to prevent collision, organize and expedite the flow of traffic in the air, and also provide information and support to pilots.

**Box-6: Instrument Landing System**

Instrument Landing System is a radio navigation system that helps aircraft land safely when visibility is poor. It provides vertical and horizontal guidance to pilots and enables them to approach the runway at night or in bad conditions.

**Box-7: Expression of Interest**

Expression of Interest is a formal document which conveys interest in a business opportunity, transaction, or position. It can be used by individuals or companies.

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# Occupational Health, Safety, and Productivity in the Fragrance Industry in Kannauj, India

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Abstract

Kannauj, known as the "Perfume Capital of India," has a long history of producing traditional scents, especially attar. Renowned for its artisanal techniques, the city's fragrance sector makes a substantial contribution to both local and national economies. However, the industry has issues with occupational health and safety (OHS), which can affect employees' productivity and well-being. This case study looks at the OHS procedures that are already in place in the fragrance sector in Kannauj, identifies common risks, and makes suggestions to improve efficiency and safety.

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ARTICLE INFO
Received:29/08/2024 | Revised: 16/12/2024 | Accepted: 03/03/2025 | Published Online: 14/04/2025
DOI: https://doi.org/10.5281/zenodo.15213151
CITATION
Badruddin, A. (2024). Occupational Health, Safety, and Productivity in the Fragrance Industry in Kannauj, India. Integral Review –A Journal of Management, 14(2), 47-51.https://doi.org/10.5281/zenodo.15213151

**1. Introduction**

Kannauj, often known as the "Perfume Capital of India," is famous for its centuries-old heritage of producing natural fragrances and attars. Kannauj's fragrance industry has thrived for generations, with over 350 units employing thousands of artists and laborers to produce high-quality items such as attars, essential oils, and incense sticks, many of which are sold worldwide. This old craft has been practiced for generations and is strongly ingrained in the region's culture and economy. Traditional distillation procedures, although maintaining cultural legacy, frequently expose participants to serious health risks. Ensuring strong OHS standards is critical for protecting workers and sustaining productivity. However, this artisanal industry has major occupational health and safety (OHS) problems, which can have an influence on worker productivity and well-being. This case study investigates these concerns and provides recommendations for potential remedies to improve worker well-being and industrial efficiency.

**2. Fragrance Market Scenario**

The worldwide perfume market was valued at roughly USD 39 billion in 2018, and is expected to reach USD 48 billion by 2024, increasing at a CAGR of 3.6%. The fast shift in the lifestyle preferences of the younger generation has resulted in a significant growth in demand for this business. In addition to changing lifestyles, rising disposable income and increased urbanization have resulted in strong demand for the perfume industry. Furthermore, some producers provide high-quality goods at reasonable rates in order to target the urban market, which has accelerated the expansion of the perfume sector worldwide. International players have made many efforts toward product packaging, including launching perfumes in rollerballs and separate bottle sprays. The perfume market is divided into a number of categories, with feminine scents holding the largest market share and outperforming all other categories globally. The market has been further divided into department shops, internet retailers, and supermarkets, to mention a few, under the distribution channel. Specialty retailers currently have the most share. One of the most crucial factors is that, for every given new entry, the capital expenditure needed to establish a perfume production factory is quite cheap. The fast increase in urbanization, population, and advertising—a crucial component—are additional important variables that drive demand for this market. The fast increase in urbanization, population, and advertising—a crucial component—are additional important variables that drive demand for this market. In particular, e-commerce has grown quickly on a worldwide scale and has enormous development potential, particularly in developing nations. One of the most important instruments available to the cluster for growing its operations on the global market is this one. Due to a projected increase in demand for perfume and aroma items, particularly cosmetics and toiletries, international perfume makers have discovered prospects in India. The leading nations in the perfume business worldwide are Brazil, the United States, France, Germany, and Russia. Currently, the majority of the worldwide market share is held by Brazil. Four international companies control almost two thirds of the fragrance and flavor market in India, with about 1000 local Indian companies holding the remaining share. India is now a doorway to the South East Asian fragrance and flavor industry because to the country's expanding market demand and rising acceptance of Indian F&F components. Suppliers of raw materials, producers of basic ingredients, blenders, and end users are the main players in the flavor and fragrance value chain.(FFDC)

**3. Overview of the Fragrance Industry in Kannauj**

The Essential Oil Industry and Kannauj Attar Known as "Ittr Nagri" or the "perfume city of India," Kannauj is well-known around the world for producing attar oils. Since before the Mughal era, the city has been renowned for its natural atmosphere. It is estimated that the Kannauj fragrance business generates over 400 Cr in revenue, of which 20% comes from exports. Since the industry is closely related to the agricultural sector and serves as a hub for a variety of products, including mint, pamarosa, lemongrass, citronella, sughanmanthri, mehandi, etc., Kannauj has enormous potential. Kerala, Rajasthan, Himachal Pradesh, Karnataka, Andhra Pradesh, and the North Eastern States are among the states from where a number of different plants and herbs are imported. Small-scale and cottage businesses are the main drivers of Kannauj's fragrance sector. For the creation of essential oils and attar, natural substances including flowers, herbs, and spices are distilled. Employees work in unofficial settings and frequently employ traditional techniques like the deg-bhapka system, a manual distillation method that requires high temperatures and a lot of physical labor. Notwithstanding its handcrafted appeal, the sector is constrained by a lack of technology, insufficient safety precautions, and a disregard for worker health, which affects sustainability and productivity. (Technologies of Perfumery in India)

**4. Technology Centre – Fragrance and Flavour Development Centre Overview**

The only government institute for fragrances and flavors in India is the Fragrance and Flavour Development Centre, Kannauj (FFDC). It was founded in 1991 by the Ministry of Micro, Small & Medium Enterprises and received the necessary funding from the Uttar Pradesh government to build infrastructure and land. All technological inputs, including equipment, technical specialists, and training, were provided by UNIDO. The primary goal is to serve, maintain, and improve the standing of farmers who grow aromatic crops, as well as the industrial sector involved in the distillation of aromatic oils and their value addition. The goal of the FFDC is to increase its competitiveness in both domestic and international markets. The goal of the FFDC is to act as a liaison between R&D institutes, producers of essential oils, and manufacturers of fragrances and flavors. It also contributes to quality evaluation and agrochemical technologies. The FFDC aims to serve, maintain, and improve the standing of farmers and businesses involved

in the production and processing of aromatic crops. Agronomical methods and advice on post-harvest technologies, product storage, packaging, sampling, and marketing are being adopted by the industry with the assistance of AI. Through its laboratory, it offers testing and quality control services for goods and raw materials. In Odisha, the FFDC has two extension centers in Kanpur and Behrampur. In general, the FFDC provides farmers and businesses with a wide range of services. The services provided fall into three categories: quality testing and certification, processing and production, and training and consulting. (FFDC)

**Cluster at Glance**

| | |
|---|---|
| Principal Products Manufactured in the Cluster | Rose water, various perfumes produced by using rose, jasmine and other flowers, mehandi paste, body jells, ayurvedic medicines, other fragrances and gulkand |
| No. of functional units in the clusters | About 375 units |
| Turnover of the cluster | Approx. 400 Cr. |
| Value of exports from the clusters | Approx. 20% Employment in cluster Approx.100,000 (Direct & Indirect) |
| Employment in cluster | Approx.100,000 (Direct & Indirect) |

Source: FFDC, Cluster Report

**5. Key Stakeholders and Institutional Framework**

Kannauj has a sizable fragrance sector with a robust institutional and stakeholder framework. Strong bonds are formed among stakeholders through interconnections, which have aided in the growth of the community and market for attar and essential oil producers. Governmental Organizations: Governmental organizations are crucial for the general growth of the flavor and fragrance sector. These organizations are in charge of carrying out many federal and state programs and efforts for the last mile delivery of various benefits and thus have a significant impact on policy choices.

Micro, Small, and Medium Enterprises-Development Institute (MSME-DI): The Institute works to accomplish this goal by conducting various activities, such as vendor development programs, buyer-seller meetings, and awareness and modernization campaigns. To support the local industry, the District Industries Center (DIC) runs the One District One Product (ODOP) program and offers UAM registration services.

By creating industrial infrastructure throughout the state and enabling the distribution of land to businesses, the UP State Industrial Development Corporation Ltd. (UPSIDC) supports the industry. For performance and credit rating, single-point registration, MSME databank, National SC-ST Hub, raw material supply, consultancy, training, and other services, the Ministry of MSME's National Small Industries Corporation (NSIC) is the nodal agency. (FFDC, Cluster Report)

**6. Current OHS Procedures in the Fragrance Sector in Kannauj**

The Factories Act of 1948, which requires standards for worker health, safety, and welfare, is one of the legislations that regulate India's OHS framework. Employers are responsible for providing personal protective equipment (PPE), performing risk assessments, conducting health surveillance, and providing safety training. Through monitoring and inspections, government agencies such as the Ministry of Labor and Employment and state labor ministries ensure compliance. (Generis Global Legal Services)). The 'deg and bhapka' procedure for distillation is an ancient process used by the fragrance business in Kannauj. Although these methods are essential to the history of the sector, they may not always be in line with contemporary safety regulations.

Source: Author

**7. Occupational Health Challenges**

Due to the nature of their jobs, employees in Kannauj's fragrance sector are susceptible to several occupational health risks.

- **Chemical Vapor Exposure:** Employees who handle raw materials and distillation procedures frequently come into contact with volatile organic compounds (VOCs). Long-term health disorders, including asthma, skin irritation, and respiratory problems, can result from prolonged contact with these fumes.
- **Thermal Risks:** High-temperature furnaces are used in the conventional distillation process. Particularly during the hottest

summer months, workers are at risk of burns, heat exhaustion, and dehydration.

- **Musculoskeletal Disorders:** Back discomfort and joint disorders are caused by manual labor, which includes heavy lifting, extended standing, and repeated chores.
- **Lack of Personal Protective Equipment (PPE):** Owing to a lack of knowledge or resources, the majority of workers do not wear PPE, such as goggles, masks, or gloves. This makes them more susceptible to illness and injury.
- **Psychosocial Stress:** Workers' mental health issues, such as stress and anxiety, are exacerbated by informal working conditions, poor pay and job uncertainty.
- **Inadequate Ventilation:** Conventional distillation plants, also referred to as "deg bhapkas," frequently lack adequate ventilation. Employees working in these cramped areas are subjected to heat stress and toxic fume accumulation, which can lower their output and cause long-term health issues.
- **Ergonomic Concerns and Repeated Jobs:** Many employees handle repeated jobs, such as blending, bottling, and packing perfumes. Poor ergonomic procedures can result in fatigue, musculoskeletal issues, and decreased productivity.
- **Limited Awareness and Training:** Many employees lack official training in occupational health and safety procedures because the sector is artisanal. This can lead to inappropriate workplace procedures and hazardous chemical handling.

**8. Safety Challenges in the Workplace**

As the fragrance business in Kannauj is informal, occupational safety is frequently disregarded. The main safety issues are as follows:

- **Fire hazards:** The use of combustible materials and open flames in areas with inadequate ventilation increases the possibility of fire incidents.
- **Inadequate Ventilation:** The health dangers associated with chemical exposure are exacerbated by the fact that many distillation machines work in cramped areas with insufficient ventilation.
- **Inadequate Training:** Workers frequently do not receive sufficient instruction on how to handle tools and materials safely, which can result in mishaps and injuries.
- **Lack of Standardized Safety Protocols:** Workers are exposed to preventable dangers because the industry does not follow official safety regulations.

**9. Recommendations for Improvement**

To ensure the sustainable growth of Kannauj's fragrance industry, it is essential to address the challenges of occupational health and safety. The following recommendations can help achieve this goal:

- **Adoption of Modern Safety Practices:** Worker safety and productivity may be greatly increased by using contemporary safety measures, such as improved ventilation systems, fire safety procedures, and safer chemical storage. Modern automated systems can replace outdated distillation techniques, increasing safety and lowering health hazards. This change can be facilitated by government financial assistance and subsidies.
- **Provision of PPE:** Offering workers reasonably priced, high-quality PPE and instructions on how to use it correctly can shield them from health hazards. Employers should supply employees with the PPE they require, including masks, gloves, and heat-resistant apparel. Awareness-raising campaigns can motivate employees to regularly take precautions.
- **Awareness Campaigns:** Employers and employees may learn the value of workplace safety by holding OHS courses and awareness campaigns.
- **Implementation of Safety Standards:** One way to reduce hazards is to create and implement workplace safety regulations specific to the fragrance sector. To guarantee compliance, routine audits and inspections must be conducted.
- **Training Programs:** Extensive training programs must be established to educate employees about safe practices, danger detection, and emergency response protocols.
- **Health and Wellness Programs:** Employers should organize regular health check-ups, provide health insurance, and promote wellness programs to improve worker well-being.
- **Risk Assessment:** Comprehensive evaluations are conducted to identify and mitigate potential hazards.
- **Collaboration with Stakeholders:** Small-scale fragrance businesses can implement safety measures with assistance from NGOs and government agencies. Compliance can be promoted through training initiatives and the provision of safety equipment subsidies. Collaboration among government, business groups, non-governmental organizations, and academic institutions may spur innovation and help implement health and safety programs.
- **Ergonomic Improvements:** Employees can experience less physical strain, improving their well-being and output, by redesigning workplaces and offering ergonomic equipment.
- **Improved Workplace Infrastructure:** Improving workplace infrastructure may improve worker safety and productivity. Examples include the installation of appropriate ventilation systems and fire safety devices.
- **Testing and Monitoring:** Regular health check-ups and air quality monitoring in production units can help identify and mitigate risks early.

**10. Best Practices and Case Examples**

Despite these challenges, some initiatives and practices have shown promise in addressing health, safety, and productivity issues.

1. **Modernization of Equipment:** A few Kannauj businesses have begun utilizing more effective and safe contemporary distillation machines. Closed-loop systems, for example, lessen fire risks and exposure to dangerous gases.

**2. Training and Awareness Programs:** To inform employees about workplace dangers and the value of personal protective equipment (PPE), NGOs and neighbourhood groups have started training initiatives.

**3. Government assistance:** Certain organizations have benefited from government initiatives, such as the Micro, Small, and Medium Enterprises (MSME) assistance programs, which have assisted them in modernizing their infrastructure and implementing safer procedures.

**4. Employee Cooperatives:** By enabling employees to jointly bargain for better pay and working conditions, cooperative models enhance job satisfaction and lower stress levels.

**5. Health Camps:** Regular health examinations conducted by NGOs and municipal health agencies aid in the early identification and treatment of occupational health issues.

## 11. Conclusion

Occupational health and safety issues are impeding the expansion of Kannauj's fragrance business, despite its enormous cultural and economic significance. A multifaceted strategy combining modernization, education, and governmental initiatives is needed to address these problems. The industry can increase production and protect its legacy for future generations by putting worker health and safety first. The fragrance sector in Kannauj has the potential to be an example of equitable and sustainable growth in conventional sectors if all players work together. The fragrance sector in Kannauj is an essential component of India's cultural and economic legacy. However, to maintain and expand this industry, it is imperative to address occupational health and safety issues. Occupational health and safety issues are impeding the expansion of Kannauj's fragrance business, despite its enormous cultural and economic significance. In addition to increasing output, investments in worker training, safety precautions, and contemporary machinery can help maintain traditional workmanship for future generations. In addition to being morally right, providing a safe workplace is a calculated step toward improving the industry's long-term sustainability.

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# Navigating Challenges in the Indian Market A Case Study of Nestle's Response to the Israel Boycott

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ARTICLE INFO
Received:27/07/2024 | Revised: 16/11/2024 | Accepted: 20/03/2025 | Published Online: 14/04/202 5
DOI: https://doi.org/10.5281/zenodo.15213190
CITATION
Usmani, K. A., & Usmani, M. A. (2024). Navigating Challenges in the Indian Market – A Case Study of Nestle's Response to the Israel Boycott. Integral Review –A Journal of Management, 14(2), 52-54. https://doi.org/10.5281/zenodo.15213190

## 1. Company Overview

Nestle, a globally recognized leader in the food and beverage industry, has built its reputation on quality, innovation, and sustainability. As one of the largest food companies, it operates in numerous markets, adapting its strategies to meet local consumer demands and challenges. It is a Swiss multinational food and beverage company headquartered in Vevey, Switzerland. With a strong presence in India, Nestlé has faced various challenges, including regulatory issues, supply chain disruptions, and consumer sentiment shifts. Recently, the company has had to navigate the complexities of the Israel boycott, which has influenced consumer behavior and market dynamics in India.

## 2. Challenges in the Indian Market

India is a key market for Nestlé, contributing significantly to its global revenue. However, socio-political issues, including calls for boycotts related to international affairs, have posed challenges. The Israel boycott movement has affected consumer perception, with some groups urging a shift away from brands with perceived geopolitical affiliations.

## 3. Background

In 2023, Nestlé faced significant reputational challenges in the Indian market driven by the ongoing debate surrounding the boycott of Israeli products. The tensions were heightened by social media campaigns and grassroots movements calling for a re-evaluation of partnerships and business practices that were perceived to conflict with human rights and ethical standards. Nestlé's response to the Israel boycott, particularly in the Indian market, can be understood through the lens of its broader strategies in handling international controversies and adapting to diverse markets. The company has faced significant challenges, such as the infant formula boycott, which required strategic shifts in marketing and corporate responsibility. In India, Nestlé has had to navigate a complex consumer landscape, balancing local preferences and regulatory challenges while maintaining its global brand image. This case study highlights Nestlé's approach to managing such challenges and adapting its strategies to maintain market presence.

## 4. The Challenge

The Israel boycott posed a dual threat to Nestlé: it risked damaging the company's brand reputation and potentially impacting sales in a market characterized by its diverse consumer base and heightened political sensitivities. The key concerns raised by stakeholders included:

**Reputation Damage:** Negative sentiments targeting companies operating in or supporting Israel could lead to consumer boycotts or a decline in brand loyalty among socially conscious consumers in India.

**Sales Impact:** As the boycott gained momentum, there were worries about potential declines in sales figures, as Indian consumers

increasingly preferred companies aligning with their values.

Nestlé disclosed that consumer reluctance toward global brands, influenced by geopolitical tensions, has slowed its real internal growth (RIG) metric—a key indicator of sales volume growth excluding price increases. The company's RIG declined from 2.2% in Q2 2024 to 1.3% in Q3. Deutsche Bank highlighted that this slowdown reflects the effects of consumer boycotts, particularly as Nestlé faces criticism from the BDS movement due to its connections with Israel. Osem, one of Israel's major food companies, has positioned Nestlé as a primary target for activists opposing its regional business operations. Nestlé reported a 2.5% decline in year-over-year sales, amounting to 67.1 billion Swiss francs ($77.6 billion) for the first nine months of 2024. The drop in real internal growth was especially pronounced in North America, its largest market, where reported sales decreased by 2.6%. As a result, Nestlé now anticipates a slight reduction in its full-year operating profit margin to 17%, compared to 17.3% in 2023.

**Boycott, Divestment, Sanctions (BDS):** The Boycott, Divestment, Sanctions (BDS) movement is a Palestinian-led initiative advocating for freedom, justice, and equality. It is based on the principle that Palestinians should have the same rights as everyone else. The boycott aspect involves cutting support for Israeli and international companies involved in violating Palestinian human rights. Divestment campaigns call on institutions such as banks, local councils, churches, pension funds, and universities to withdraw investments from Israel and businesses that contribute to what BDS describes as Israeli apartheid. Sanctions efforts aim to pressure governments to uphold their legal responsibilities by ceasing support for Israeli policies. This includes banning trade with illegal Israeli settlements, ending military and free-trade agreements, and suspending Israel from international organizations like UN bodies and FIFA.

**5. Strategic Business Planning**

- The boycott highlighted the importance of strategic business planning in response to international controversies. Nestlé's experience underscored the need for businesses to develop dynamic strategies that consider global and local market dynamics. (Pagan, 1986).
- The company's response involved adapting marketing strategies and engaging with stakeholders to rebuild trust and brand reputation (Pagan, 1986).

**6. Nestlé's Response**

Nestlé has taken a proactive approach to address these challenges by:

- Strengthening local engagement and communication to reassure Indian consumers of its commitment to ethical business practices.
- Emphasizing its deep-rooted presence in India with investments in local sourcing, manufacturing, and employment.
- Increasing transparency regarding its global operations to maintain trust.
- Reinforcing its focus on sustainability, nutrition, and corporate responsibility to align with Indian consumer values.
- Nestlé continues to adapt to evolving market conditions, ensuring resilience amid socio-political challenges. By reinforcing consumer trust and maintaining its commitment to India, Nestlé remains a strong player in the Indian food and beverage industry.

**7. Strategic Response**

To effectively address the challenges posed by the boycott, Nestlé recognized the need to take proactive measures that went beyond a reactive public relations stance. The company adopted a multifaceted approach guided by the following three strategic recommendations:

**Engage in Stakeholder Dialogue**

Nestlé initiated an open and transparent dialogue with its stakeholders, including consumers, non-governmental organizations (NGOs), and government entities. This engagement was critical in fostering a better understanding of concerns and misconceptions regarding the company's operations. Town hall meetings, focused discussions, and feedback sessions were conducted across various platforms to gather insights and sentiments from the community.

**Review Business Operations**

In light of the discussions, Nestlé revaluated its business operations in Israel. The company undertook a thorough assessment to ensure compliance with international law and human rights standards. By exploring alternatives and potential modifications to its operations, Nestlé aimed to demonstrate its commitment to ethical business practices and align with the values held by its Indian consumer base.

**Develop a Comprehensive CSR Strategy**

Recognizing the importance of corporate social responsibility (CSR), Nestlé launched a comprehensive CSR strategy that addressed human rights, sustainability, and social responsibility. This initiative involved actively supporting local communities in India through healthcare, education, and nutrition programs. By focusing on creating positive impacts within the communities it serves, Nestlé sought to reinforce its brand values and commitment to ethical practices.

**8. Marketing and Strategy in India**

- In India, Nestlé has had to adapt its marketing strategies to cater to a diverse consumer base with varied regional preferences. This includes leveraging digital platforms and social media to effectively reach target audiences (Hemdev, 2024).
- The company has also faced regulatory challenges, such as the Maggi noodles controversy, which required strategic repositioning and brand management to regain consumer trust. ("What Went Wrong?", 2022).

While Nestlé's response to the Israel boycott is not directly addressed in the provided papers, the company's experience with the infant formula boycott and its strategic adaptations in India offer insights into how it might navigate similar challenges. The focus on corporate accountability, strategic planning, and market adaptation are likely key components of its approach.

**9. Results and Impact**

The strategic engagement and proactive measures taken by Nestlé yielded positive outcomes:

**- Enhanced Brand Trust:** The open dialogues helped address consumer concerns, leading to increased transparency and trust in the Nestlé brand.

**- Sales Stabilization:** By demonstrating its commitment to ethical practices and community support, Nestlé managed to stabilize sales figures in the Indian market amidst the backdrop of the boycott.

**- Strengthened Community Relations:** Through targeted CSR initiatives, Nestlé forged stronger ties with local communities, enhancing its reputation as a socially responsible brand.

**10. Conclusion**

Nestlé's ability to navigate the challenges presented by the Israel boycott in the Indian market underscores the importance of stakeholder engagement, ethical business practices, and a robust CSR strategy. By addressing concerns head-on and aligning its operations with the values of its consumers, Nestlé not only mitigated potential reputational damage but also reinforced its commitment to making a difference in the communities it serves.

**11. Recommendations**

Moving forward, Nestlé should continue its stakeholder engagement efforts, regularly reassessing its business practices to align with changing consumer expectations and international norms. By fostering transparency and accountability, Nestlé can maintain its position as a trusted leader in the market.

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