## Understanding the Role of Human Behavior in Supply Chain Operations: Exploring Behavioral Supply Chain Management

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## **Abstract**

The management of supply chains is a multifaceted domain that necessitates the harmonization and amalgamation of diverse entities, procedures, and assets. Historically, the primary emphasis of supply chain management has been on enhancing operational efficiency and minimizing expenses. Recent studies have emphasised the significance of incorporating human behaviour into supply chain decision-making procedures. The present study delves into the notion of behavioural supply chain management, scrutinizing the impact of human behaviour on the operations and outcomes of supply chain. This paper presents a comprehensive analysis of prominent behavioural theories and their relevance in the context of supply chain management. Additionally, it examines the practical implications of these theories for professionals in the field and outlines potential avenues for future research.

**Keywords:** Behavioural Supply Chain Management, Human Behaviour, Supply Chain Operation, Trust.

#### 1. Introduction:

Supply chain management has long been recognized as a critical function for organizations seeking to optimize operational efficiency and achieve competitive advantage. Traditionally, supply chain management has primarily focused on the optimization of processes, such as procurement, production, and distribution, through the application of analytical models and operational frameworks. However, recent research has shed light on the influential role of human behaviour in shaping supply chain operations and outcomes. This realization has given rise to the emerging field of behavioural supply chain management, which explores the cognitive, social, and psychological factors that drive decision-making, collaboration, and coordination among supply chain stakeholders (Tsanos et al., 2014).

The traditional methodology employed in supply chain management tends to neglect the behavioural factors that

exert a substantial influence on the efficacy and efficiency of supply chain activities. The integration of behavioural theories and concepts into supply chain practises can provide organisations with a more comprehensive comprehension of the determinants that impact human behaviour within the supply chain. This knowledge can be utilised to enhance decision-making, cultivate trust, foster collaboration, and ultimately augment the overall performance of the supply chain (Schorsch et al., 2017.).

Behavioural supply chain management recognizes that individuals and groups within the supply chain make decisions and engage in behaviour that can have substantial consequences for the entire network. Factors such as cognitive biases, risk preferences, social influence, trust, and ethical considerations can shape the outcomes of supply chain operations, influencing everything from supplier selection and relationship management to demand forecasting, inventory management, and risk mitigation. (Michael Knemeyer & Naylor, 2011).

Understanding the role of human behaviour in supply chain operations offers valuable insights for practitioners seeking to optimize supply chain performance. By taking into account the behavioural aspects of supply chain management, organizations can design more effective strategies and interventions that align with the preferences, motivations, and behaviours of supply chain stakeholders. This approach holds the potential to improve collaboration, enhance decision-making processes, reduce risks, increase resilience, and foster sustainable practices within the supply chain. (Balachandra et al., 2020.)

This research paper aims to explore and examine the concept of behavioural supply chain management, providing a comprehensive understanding of the role of human behaviour in supply chain operations. It will delve into various behavioural theories and concepts, their application in supply chain management, and their implications for practitioners. Additionally, the paper will highlight the challenges and limitations of incorporating behavioural aspects into supply chain management practices and suggest future research directions in this evolving field.

### 1.1 Background and Context

Supply chain management encompasses a network of organizations, processes, and activities that collaborate to deliver products or services to end customers. Traditionally, supply chain management has primarily focused on optimizing operational processes, such as procurement, production, and distribution, to achieve cost efficiencies and improve overall performance. However, research in recent years has highlighted the significant impact of human behaviour on supply chain operations and outcomes (DuHadway et al., 2019). Behavioural supply chain management recognises that the actions and choices of individuals and groups within the supply chain have the potential to impact the overall performance of the supply chain. The nascent discipline acknowledges the significance of comprehending the cognitive, social, and psychological determinants that propel decision-making, collaboration, and coordination among stakeholders in the supply chain. (Siemsen, 2022.)

By integrating behavioural theories and concepts into supply chain management practices, organizations can gain deeper insights into the drivers of human behaviour and leverage this knowledge to enhance decision-making, build trust, foster collaboration, and improve overall supply chain performance.(Overstreet et al., 2019)

## 1.2 Research Objectives

- To explore and analyze the various behavioural theories and concepts relevant to supply chain management.
- To understand the specific ways in which human behaviour influences key supply chain operations.
- To examine the impact of human behaviour on supply chain performance indicators.
- To identify the challenges and limitations associated with incorporating behavioural aspects into supply chain management practices.
- To investigate the potential interventions and strategies that can be employed to leverage behavioural insights for improving supply chain decision-making, collaboration, and coordination.
- To provide practical implications and recommendations for practitioners in terms of incorporating behavioural aspects.
- To suggest future research directions in the field of behavioural supply chain management.

The present study endeavours to augment the comprehension of the function of human behaviour in supply chain operations and furnish valuable perspectives for practitioners to optimise their supply chain management practises by addressing the research objectives. Additionally, the study will make a valuable contribution to the current corpus of knowledge in the realm of behavioural supply chain management, and establish a foundation for forthcoming research endeavours.

### 1.3 Research Questions

- How do various behavioural theories and concepts, such as rational choice theory, prospect theory, social influence theory, cognitive biases, decision-making under uncertainty, trust, and cooperation, apply to supply chain management?
- What are the specific ways in which human behaviour influences supplier selection and relationship management, demand forecasting and planning, inventory management, collaboration and coordination, risk management and resilience, and sustainable and ethical practices within the supply chain?
- How does human behaviour impact key supply chain performance indicators, such as operational efficiency, cost reduction, customer satisfaction, responsiveness, and sustainability?

- What are the challenges and limitations associated with incorporating behavioural aspects into supply chain management practices, including data availability and measurement, cultural and contextual factors, resistance to change, coordination and alignment issues, and ethical considerations?
- What interventions and strategies can be employed to leverage behavioural insights for improving supply chain decision-making, collaboration, and coordination?
- What are the practical implications and recommendations for practitioners in terms of incorporating behavioural aspects into supply chain strategies, enhancing collaboration and communication, developing trust and relationships, addressing cognitive biases and decision-making challenges, and designing effective incentive systems?
- What are the future research directions in the field of behavioural supply chain management, including the need for longitudinal studies, cross-cultural investigations, integration of behavioural and operational models, exploration of technology and automation, and examination of sustainability and social responsibility aspects?

## 2. Behavioural Theories and Concepts in Supply Chain Management:

#### 2.1 Rational Choice Theory:

According to rational choice theory, individuals engage in decision-making processes by assessing the potential costs and benefits associated with various options in order to optimise their own self-interest. (Simon, 1957). In supply chain management, rational choice theory helps understand decision-making processes such as supplier selection, contract negotiation, and pricing (Mentzer et al., 2001). This statement offers valuable insights into the determinants that impact the process of decision-making, encompassing the assessment of expenses, advantages, and compromises.

## 2.2 Prospect Theory:

According to the theory of prospect developed by Kahneman and Tversky, individuals' decision-making process is influenced by their subjective assessment of gains and losses, rather than objective outcomes (Kahneman & Tversky, 1979). Prospect theory is a useful tool in elucidating risk attitudes and risk perception in the domain of supply chain management, specifically in the realms of demand forecasting, inventory management, and supply chain risk management (Li et

al., 2020). Comprehending the cognitive and behavioural processes involved in risk perception and response can facilitate the development of more efficacious risk reduction measures.

### 2.3 Social Influence Theory:

Social influence theory examines how individuals' behaviors and decision-making are influenced by their social interactions and networks (Friedkin, 1998). In supply chain management, social influence theory helps explain the dynamics of collaboration, information sharing, and cooperation among supply chain partners (Li et al., 2018). It sheds light on the role of trust, norms, and social relationships in shaping supply chain performance and coordination efforts.

#### 2.4 Cognitive Biases:

Cognitive biases refer to systematic deviations from rationality in decision-making (Tversky & Kahneman, 1974). These biases can impact supply chain management decisions, including supplier evaluation, demand forecasting, and inventory management. Common cognitive biases in supply chain management include confirmation bias, anchoring bias, and overconfidence bias (Mason & Wouters, 2013). Recognizing and addressing these biases can lead to more accurate decision-making and improved supply chain performance.

## 2.5 Decision-Making Under Uncertainty:

Supply chain management often involves decision-making under uncertainty, where complete information is not available or outcomes are unpredictable (Ballas & Voß, 2005). Behavioral decision-making models, such as bounded rationality and heuristics, provide insights into how individuals and organizations make decisions when faced with uncertainty (Gaur et al., 2019). Understanding decision-making under uncertainty is crucial for supply chain managers when dealing with demand variability, supply disruptions, and market dynamics.

### 2.6 Trust and Cooperation in Supply Chains:

Trust and cooperation are essential for effective supply chain management. Trust enables collaboration, reduces transaction costs, and fosters long-term relationships (Dyer & Chu, 2003). Behavioral theories, such as social exchange theory and game theory, help understand the formation and maintenance of trust and cooperation among supply chain partners (Liu & Huo, 2014). These theories also address issues related to opportunistic behavior, moral hazard, and adverse selection, providing strategies to enhance trust and cooperation in supply chains.

## 3. Impact of Human Behaviour on Supply Chain Operations:

The subject of the influence of human behaviour on supply chain operations has gained significant significance within the realm of supply chain management. Although supply chains are commonly linked with the movement of commodities, amenities, and data, it is the individuals engaged in these operations who ultimately determine their triumph or downfall. Comprehending the significance of human behaviour in the context of supply chain operations is imperative for the purpose of enhancing efficiency, mitigating risks, and promoting cooperation among the members of the supply chain network.

Human behaviour encompasses a wide range of factors, including individual decision-making processes, cognitive biases, communication patterns, teamwork dynamics, and organizational culture. These factors significantly influence how individuals and organizations operate within the supply chain, impacting various aspects such as demand forecasting, procurement, production planning, inventory management, logistics, and customer service.

Recognizing the impact of human behaviour in supply chain operations enables organizations to address challenges and leverage opportunities more effectively. For example, understanding cognitive biases can help decision-makers recognize and mitigate their effects on decision-making processes, leading to more informed and rational choices. Similarly, understanding communication patterns and teamwork dynamics can improve collaboration and information sharing among supply chain partners, enhancing coordination and responsiveness.

Additionally, human behaviour plays a vital role in managing risks and disruptions within supply chains. By understanding how individuals perceive and respond to risks, organizations can design risk management strategies that align with human behaviour, promoting early detection, proactive mitigation, and effective recovery from disruptions.

Furthermore, organizational culture and leadership style significantly influence the behaviour of individuals within the supply chain. A culture that values transparency, trust, and collaboration fosters a positive working environment and encourages proactive engagement across the supply chain network.

## 3.1 Supplier Selection and Relationship Management:

Human behavior significantly influences supplier selection and relationship management in supply chains. Researchers have emphasized the importance of trust, communication, and mutual understanding in building strong supplier relationships (Cousins et al., 2019). Factors such as cultural differences, negotiation tactics, and personal relationships can influence supplier selection decisions (Wu & Pagell, 2011). The behavior of supply chain managers and their ability to establish and maintain effective relationships with suppliers directly impact supply chain performance.

### 3.2 Demand Forecasting and Planning:

Human behavior plays a critical role in demand forecasting and planning processes. Behavioral factors, such as biases in judgment and decision-making, can affect the accuracy of demand forecasts (Chen et al., 2019). The behavior of sales personnel, their incentives, and their relationship with customers can influence demand information sharing and the reliability of demand forecasts (Choi et al., 2017). Understanding and accounting for these behavioral aspects are essential for improving demand forecasting accuracy and enhancing supply chain planning processes.

### 3.3 Inventory Management:

Human behavior has implications for inventory management practices. Cognitive biases, such as overconfidence and anchoring biases, can affect inventory decisions, leading to inefficient inventory levels (Xiao et al., 2014). The behavior of individuals involved in inventory management, including buyers, planners, and warehouse staff, influences inventory control practices and the accuracy of inventory records (Fugate et al., 2017). Addressing these behavioral factors can help optimize inventory levels, reduce costs, and improve customer service.

#### 3.4 Collaboration and Coordination:

Behavioral aspects of collaboration and coordination impact supply chain performance. Trust, cooperation, and effective communication among supply chain partners are crucial for successful collaboration (Lambert et al., 2019). Behavioral factors, such as individual attitudes, power dynamics, and conflict resolution skills, influence collaboration and coordination efforts within supply chains (Barratt, 2004). Developing a collaborative culture and aligning incentives can promote positive behavioral outcomes, leading to improved supply chain coordination and performance.

#### 3.5 Risk Management and Resilience:

Human behavior influences risk management and resilience in supply chains. Behavioral biases, such as optimism bias and loss aversion, can lead to inadequate risk assessment and mitigation (Manuj & Mentzer, 2008). The behavior of supply chain managers and employees in responding to disruptions, their decision-making under

pressure, and their ability to adapt to unexpected events impact supply chain resilience (Ponomarov & Holcomb, 2009). Addressing behavioral factors can enhance risk management practices and build resilient supply chains.

#### 3.6 Sustainable and Ethical Practices:

Human behavior plays a vital role in driving sustainable and ethical practices in supply chains. The behavior of supply chain managers, employees, and consumers related influences decisions to environmental sustainability, social responsibility, and ethical sourcing (Seuring & Müller, 2008). Attitudes, values, and ethical considerations guide decision-making regarding sustainable procurement, responsible supplier selection, and green logistics (Linton et al., 2007). Fostering a culture of ethical behavior and sustainability consciousness can lead to environmentally and socially responsible supply chain practices.

## 4. Behavioural Interventions in Supply Chain Management:

### 4.1 Training and Education Programs:

Training and education programs are effective behavioral interventions in supply chain management. These programs aim to enhance employees' knowledge, skills, and decision-making abilities, leading to improved supply chain performance (Gunasekaran et al., 2018). Training programs can focus on specific areas such as demand forecasting, inventory management, or sustainable practices. For example, a study by Stock et al. (2018) found that training programs on sustainable supply chain practices positively influenced employees' attitudes and behaviors towards sustainability.

### 4.2 Incentive Systems and Contracts:

Incentive systems and contracts play a crucial role in shaping behavior in supply chain management. By aligning incentives with desired behaviors and outcomes, organizations can motivate supply chain partners to act in certain ways (Cachon & Lariviere, 2005). Incentives can be financial (e.g., performance-based bonuses) or nonfinancial (e.g., recognition and rewards). Contractual agreements can also specify behavioral expectations, such as information sharing, quality standards, and cooperation (Gattorna, 2010). These interventions help foster desired behaviors and promote collaboration among supply chain partners.

### 4.3 Information Sharing and Transparency:

Promoting information sharing and transparency is a behavioral intervention that improves supply chain performance. By providing access to accurate and timely information, organizations enable better decision-making and coordination (Choi et al., 2019). Information sharing platforms, such as electronic data interchange (EDI) systems or cloud-based platforms, facilitate real-time exchange of information among supply chain partners (Lee et al., 2015). Increased transparency in supply chain operations enhances trust, reduces uncertainty, and fosters collaboration.

## 4.4 Decision Support Systems:

Decision support systems (DSS) are technological interventions that assist supply chain managers in making informed decisions. These systems use algorithms, analytics, and modeling techniques to analyze complex supply chain data and provide decision recommendations (Sahay et al., 2013). DSS can support various supply chain activities, such as demand forecasting, inventory optimization, and transportation planning. By incorporating behavioral factors and cognitive biases into the decision-making process, DSS can help mitigate biases and improve decision quality (Kannan et al., 2018).

#### 4.5 Collaboration and Communication Platforms:

Collaboration and communication platforms are behavioral interventions that enhance information exchange and coordination among supply chain partners. These platforms facilitate real-time communication, document sharing, and collaboration on joint projects (Hofmann et al., 2014). Examples include web-based portals, social media platforms, and project management software. By providing a centralized communication channel, these platforms improve collaboration, strengthen relationships, and enable faster decision-making (Lee et al., 2019).

### 5. Challenges and Limitations:

Challenges and limitations are inherent in implementing behavioural interventions in supply chain management. These challenges can impact the effectiveness and success of behavioural interventions. Here's an overview of some key challenges and limitations:

## 5.1 Data Availability and Measurement:

One of the challenges in implementing behavioral interventions in supply chain management is the availability and measurement of relevant data. Behavioral factors can be subjective and difficult to quantify (Fugate et al., 2019). Gathering accurate and comprehensive data on individual behaviors, decision-making processes, and their impact on supply chain outcomes can be challenging. Additionally, accessing real-time behavioral data from supply chain partners may require trust and information sharing agreements (Bode et al., 2011). Overcoming these data-related challenges is crucial for effectively implementing behavioral interventions.

#### 5.2 Cultural and Contextual Factors:

Cultural and contextual factors pose challenges to behavioral interventions in supply chain management. Different cultural norms, values, and communication styles can influence how individuals behave in supply chains (Wieland & Handfield, 2013). Implementing behavioral interventions across diverse cultural settings requires considering these contextual factors. For example, the approach to incentive systems or communication platforms may need to be customized to align with the cultural norms and preferences of supply chain partners (Pagell & Wu, 2009). Understanding and adapting to cultural and contextual differences is vital for successful implementation.

#### 5.3 Resistance to Change:

Resistance to change is a significant challenge when introducing behavioral interventions in supply chain management. People may resist changes in their routines, roles, or decision-making processes (Melnyk et al., 2019). This resistance can stem from fear of the unknown, concerns about job security, or skepticism about the effectiveness of the interventions (Pagell & Wu, 2009). To surmount opposition to change, it is necessary to employ proficient change management tactics, articulate the advantages in a lucid manner, and engage stakeholders in the development and execution of the intervention (Gunasekaran et al., 2018).

### 5.4 Coordination and Alignment Issues:

Coordinating and aligning the behaviors of multiple supply chain partners can be challenging. Supply chains involve multiple entities with different goals, priorities, and incentives (Li et al., 2018). Achieving behavioral alignment requires addressing conflicting interests, fostering trust, and establishing common goals (Gattorna, 2010). Coordination mechanisms such as collaborative planning, forecasting, and replenishment (CPFR) and shared performance metrics can help align behaviors and promote collaboration (Hofmann et al., 2014). However, ensuring coordination and alignment across the supply chain can be complex and require ongoing efforts.

#### 5.5 Ethical Considerations:

Behavioral interventions in supply chain management raise ethical considerations. Incentive systems and contracts should be designed to avoid unethical behaviors or unintended consequences (Melnyk et al., 2019). For example, poorly designed incentive systems may lead to unethical practices such as gaming the system or neglecting long-term sustainability goals. Behavioral interventions should be guided by ethical principles and ensure that the interests of all stakeholders are taken into account (Carter & Rogers, 2008). Addressing ethical

considerations helps maintain trust, reputation, and long-term sustainability in supply chain relationships.

#### 6. Implications for Practitioners:

Behavioural interventions in supply chain management have several implications for practitioners. By considering these implications, organizations can effectively leverage behavioural insights to improve supply chain operations. Here's an overview of the implications for practitioners:

## 6.1 Incorporating Behavioural Insights into Supply Chain Strategies:

Practitioners should recognize the importance of incorporating behavioural insights into their supply chain strategies. This involves understanding the behavioural dynamics that impact supply chain performance and integrating behavioural considerations into decision-making processes and strategic planning. By aligning strategies with human behaviour, organizations can enhance their ability to anticipate and respond to market dynamics effectively.

## **6.2 Enhancing Collaboration and Communication:**

Behavioural interventions emphasize the significance of collaboration and communication among supply chain partners. Practitioners should focus on fostering an open and transparent communication culture, promoting knowledge sharing, and facilitating effective collaboration platforms. This can enhance information flow, coordination, and problem-solving capabilities, leading to improved supply chain performance and responsiveness.

### 6.3 Developing Trust and Relationships:

Building trust and strong relationships among supply chain participants is critical for successful behavioural interventions. Practitioners should invest in developing trust through reliable and consistent actions, maintaining open lines of communication, and demonstrating commitment to shared goals. Strong relationships contribute to effective collaboration, information sharing, and a willingness to adopt behavioural changes across the supply chain.

# 6.4 Addressing Cognitive Biases and Decision-Making Challenges:

Practitioners should actively address cognitive biases and decision-making challenges within the supply chain. This can involve providing training and education on cognitive biases, promoting awareness and recognition of biases, and implementing decision support systems to counteract biased decision-making. By fostering a more rational decision-making environment, practitioners can mitigate risks and enhance supply chain performance.

#### 6.5 Designing Effective Incentive Systems:

\Incentive systems play a crucial role in driving desired behaviours within the supply chain. Practitioners should design incentive systems that align with behavioural goals, promote collaboration, and reward behaviours that contribute to supply chain optimization. By linking incentives to behavioural targets, practitioners can motivate participants and reinforce behaviours that enhance performance and competitiveness.

By considering these implications, practitioners can harness the power of behavioural interventions to optimize supply chain operations. Incorporating behavioural insights into strategies, enhancing collaboration and communication, building trust, addressing cognitive biases, and designing effective incentive systems can lead to improved supply chain performance, enhanced decision-making, and stronger relationships among supply chain partners.

#### 7. Future Research Directions:

Future research directions in the field of behavioural supply chain management can further advance our understanding of human behaviour's impact on supply chain operations. Here are some potential research areas for exploration:

#### 7.1 Longitudinal Studies and Experimental Research:

Conducting longitudinal studies can provide insights into the long-term effects of behavioural interventions on supply chain performance. Experimental research can help test the effectiveness of specific behavioural interventions and evaluate their impact on decision-making, collaboration, and overall supply chain outcomes.

#### 7.2 Cross-Cultural Studies:

Investigating the influence of cultural factors on behavioural dynamics within supply chains is essential for understanding how behaviours vary across different cultural contexts. Cross-cultural studies can identify cultural drivers of behaviour, explore cultural differences in decision-making processes, and inform the design of culturally sensitive behavioural interventions.

## 7.3 Integration of Behavioural and Operational Models:

Integrating behavioural theories and models with operational models can offer a comprehensive understanding of supply chain dynamics. Future research can explore how behavioural factors interact with operational variables such as inventory management, demand forecasting, and logistics decision-making, leading to more accurate and effective models for supply chain optimization.

# 7.4 Technology and Automation in Behavioural Supply Chain Management:

With advancements in technology and automation, future research can explore the role of digital platforms, artificial intelligence, and machine learning in supporting and augmenting behavioural interventions. This includes investigating how technology can facilitate communication, decision-making, and behaviour monitoring in supply chain contexts.

## 7.5 Sustainability and Social Responsibility:

Examining the intersection of behavioural supply chain management with sustainability and social responsibility can provide valuable insights. Future research can explore how behavioural interventions can promote sustainable practices, ethical decision-making, and responsible behaviours across the supply chain, leading to environmentally and socially responsible outcomes.

By focusing on these future research directions, scholars can contribute to the evolution of behavioural supply chain management as a field. Longitudinal studies, cross-cultural investigations, integration of behavioural and operational models, exploration of technology's role, and sustainability considerations can deepen our understanding of the complex interplay between human behaviour and supply chain operations. Such research can provide practical insights for practitioners and contribute to the development of effective strategies and interventions in managing supply chains.

#### 8. Conclusion:

### 8.1 Summary of Key Findings:

The study on behavioural interventions in supply chain management has shed light on the significant role of human behaviour in shaping supply chain operations. It has highlighted various behavioural theories, such as rational choice theory, prospect theory, social influence theory, and cognitive biases, and their implications for decision-making, collaboration, and performance within the supply chain. Additionally, the study has explored the importance of trust, transparency, and communication in facilitating behavioural interventions and improving supply chain outcomes.

### 8.2 Practical Implications:

The findings of this research have practical implications for supply chain practitioners. Incorporating behavioural insights into supply chain strategies can lead to better decision-making, enhanced collaboration, and improved supply chain performance. Practitioners can leverage tools such as training and education programs, incentive systems, and technology platforms to support behavioural interventions and foster desired behaviours among supply chain participants.

### 8.3 Contribution to the Field:

This research has made a valuable contribution to the field of supply chain management by emphasizing the significance of human behaviour and its impact on supply chain operations. It has provided a comprehensive overview of various behavioural theories and their application in the supply chain context. By highlighting the challenges, limitations, and implications of behavioural interventions, this research has created a foundation for future studies and practical implementations.

## 8.4 Recommendations for Future Practice and Research:

To further advance the field of behavioural supply chain management, future practitioners and researchers should consider several recommendations. First, they should focus on longitudinal studies and experimental research to better understand the long-term effects of behavioural interventions and test their effectiveness. Additionally, cross-cultural studies can provide insights into how cultural factors influence behaviours in different supply chain contexts. Integrating behavioural and operational models, exploring technology's role, and examining sustainability and social responsibility aspects are also important avenues for future research and practice.

In conclusion, the study on behavioural interventions in supply chain management has demonstrated the significance of human behaviour in shaping supply chain operations. By understanding and leveraging behavioural insights, practitioners can design interventions and strategies that lead to improved decision-making, collaboration, and overall supply chain performance. Future research should continue to explore and expand upon these findings, enabling the field to evolve and contribute to more effective and sustainable supply chain management practices.

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