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A Holistic Mental Model Framework for Optimizing Omnichannel Networks

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ABSTRACT

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The shift towards omnichannel retailing signifies a profound transformation in how businesses interact with consumers, driven by the growing demand for a seamless shopping experience across various channels. This study offers a detailed framework designed to enhance the effectiveness of omnichannel networks, emphasizing the integration of a comprehensive mental model with a balanced scorecard to tackle the complexities inherent in omnichannel retail. By delving into the challenges and strategies for measuring and managing key performance factors—customer experience, internal processes, learning and growth, and financial aspects—this research provides invaluable guidance for retailers. Aligning organizational objectives with omnichannel strategies enables more effective inventory management across channels, significantly boosting operational efficiency. Additionally, integrating online purchases with in-store pickup has emerged as a popular strategy, benefiting customers and retailers by streamlining operations and fostering customer loyalty. This study underscores the critical importance of a holistic approach to omnichannel retailing, offering strategic insights to achieve seamless integration and operational excellence.

1. Introduction

In today's rapidly changing retail landscape, integrating offline and online channels seamlessly has become essential [1]. This integration is crucial for creating a consistent and smooth customer experience across all channels [2]. By combining the strengths of physical and digital platforms, retailers can offer customers a flexible and convenient shopping journey, regardless of their preferred channel [3]. One key advantage of this integration is the ability to provide services such as buy online, pick up in-store (BOPIS), and easy in-store returns for online purchases [4]. These services greatly enhance convenience and flexibility for customers, ultimately increasing overall customer satisfaction and building loyalty [5]. However, achieving seamless omnichannel

integration poses several obstacles. These include the complexities of synchronizing inventory across channels, the need for advanced technology to ensure real-time data sharing, and the challenge of maintaining consistent customer service quality. Effective inventory management, order fulfillment, logistics, and customer service across all channels are essential for overcoming these challenges, which enhances operational efficiency [6]. Operational efficiency in omnichannel means delivering products at reduced costs while maintaining high quality and speed. It involves optimizing inventory management, order fulfillment, logistics, and customer service across all channels.

Data analytics and advanced demand forecasting algorithms can optimize inventory levels across different channels, reducing stockouts and overstock

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situations that enhance omnichannel performance [7]. This not only ensures product availability but also improves operational efficiency and reduces costs related to inventory management [8]. To achieve the balance between product availability and operational efficiency, retailers can implement various strategies, including dynamic inventory allocation based on real-time demand data, strategic placement of safety stock, and flexible fulfillment options [9]. Additionally, using advanced technologies, automated inventory management systems, and cloud-based analytics tools can streamline inventory processes and improve overall supply chain visibility [10].

Retailers can also enhance their omnichannel integration by deploying technologies that enable smooth communication and data sharing between traditional stores and online platforms [11]. This includes integrating point-of-sale and inventory management systems, adopting unified commerce platforms, and using customer relationship management (CRM) tools for personalized marketing and customer engagement [12].

Cross-channel sales patterns refer to customers' trends and behaviors as they interact with multiple sales channels within a single retail system. These patterns include how customers move between online and offline channels, how they respond to marketing efforts across different platforms, and how the integration of these channels influences their purchasing decisions. Understanding cross-channel sales patterns and customer behaviors is crucial for retailers to optimize their inventory management strategies [13]. By analyzing customer preferences, shopping habits, and product interactions across different channels, retailers can tailor their inventory levels and assortments to meet specific customer needs [14]. This ensures that products are available where and when customers are most likely to purchase them, ultimately enhancing customer satisfaction and driving sales revenue [15].

The balanced scorecard (BSC) is a strategic management tool that benefits retailers by integrating offline and online channels [16]. It aligns business activities with the organization's strategy across four perspectives: financial, customer, internal processes, and learning and growth. Learning and Growth emphasizes enhancing the organization's human resources, technology, and culture to ensure long-term success. For omnichannel retail, BSC evaluates financial impact, customer satisfaction, and internal processes like inventory management, encouraging learning and growth [17]. It helps track metrics such as sales growth, customer satisfaction, and order fulfillment cycle time to improve efficiency and drive customer loyalty and financial performance [18]. By

focusing on these areas, retailers can develop the capabilities necessary to support and sustain their omnichannel strategies, driving overall performance and competitive advantage.

Hence, this research aims to design a framework to enhance the effectiveness of omnichannel networks through the following pivotal inquiries:

- How can retailers optimize inventory management across diverse channels to achieve seamless omnichannel integration, ensuring real-time product availability while balancing stock levels, meeting customer demand, and enhancing operational efficiency?
- What strategies can omnichannel retailers employ to effectively measure and manage key performance factors across customer experience, internal processes, learning and growth, and financial aspects to optimize omnichannel performance and create enhanced value for customers and business?

This paper explores the multifaceted approach needed for measuring and managing omnichannel retailing, focusing on customer experience, channel integration, technology integration, and operational efficiency. It examines how these dimensions align with the financial, customer, and internal processes and learning and growth perspectives in the BSC framework. The goal is to provide insights into how retailers can assess their omnichannel performance comprehensively and use this information to improve their strategies and operations.

Figure 1 visualizes the intricate relationship between key dimensions of omnichannel retailing and the BSC framework perspective.

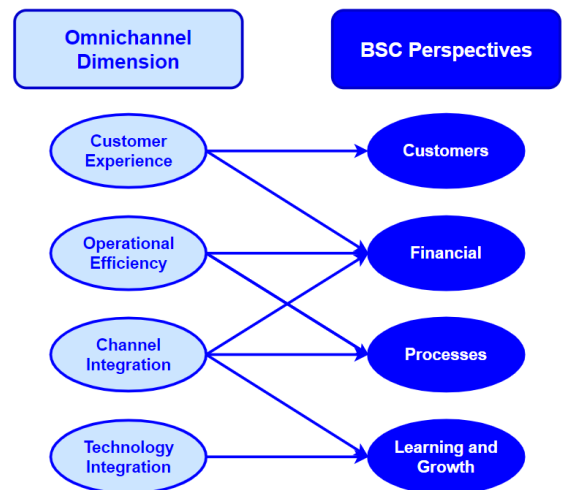


Fig. 1. Omnichannel and BSC Interactions.

The paper's structure follows: Section 2 conducts a literature review to explore variables influencing the

research model. Section 3 outlines a framework for enhancing omnichannel networks. Finally, Section 4 presents the paper's conclusions.

2. Literature Review

The evolution of retailing strategies has been characterized by a significant transition towards omnichannel approaches, which aim to provide seamless shopping experiences across various channels. [1], [2] provided comprehensive reviews of omnichannel retailing strategy, delineating it from multi and cross-channel retailing and outlining the evolving strategies. These reviews set the stage for understanding the complexities and nuances of omnichannel retailing.

Central to the success of omnichannel strategies is the integration of customer-centric principles, which prioritize customer needs, preferences, and experiences in all business strategies and operations. [5] highlighted the importance of customer involvement in value creation when developing an omnichannel marketing strategy. [19] presented a mental model for omnichannel management in retail, focusing on integrating channels and improving customer experiences. Building on this foundation, [13] developed a conceptual model to examine the factors influencing omnichannel consumer attitudes toward virtual shopping channels.

Optimizing supply chain and demand networks is crucial for successful omnichannel retailing. It ensures that products are available where and when customers want them, thereby enhancing customer satisfaction and loyalty. [4] explored this optimization in the context of omnichannel integration, constructing a joint randomization planning model of location and routing to minimize total costs under uncertain customer demands. [20] further discussed the operational implications for retail firms that adopt integrated omnichannel structures, processes, and services. Additionally, effective inventory management is paramount in omnichannel retailing. [21] - [22] utilized system dynamics modeling, a methodology for understanding the behavior of complex systems over time, to evaluate inventory management, covering the entire process from sourcing to selling.

Additionally, [23] integrated a system dynamics simulation model with a multi-period capacitated facility location problem to optimize last-mile distribution while [3] employed system dynamics to model the relationships among key factors affecting profitability, delivery time, and customer satisfaction.

However, the BSC has been widely recognized as a valuable tool for assessing organizational

performance. The BSC is a performance management framework developed by Kaplan and Norton in the early 1990s. It goes beyond traditional financial metrics and provides a balanced view of an organization's performance by incorporating financial and non-financial measures. From an omnichannel perspective, the BSC takes on added significance, enabling organizations to align their strategic objectives with the challenges and opportunities presented by the omnichannel environment [24]. [25] highlighted its use in understanding employees' expectations while [7] conducted a systematic literature review to categorize performance metrics using the BSC model. [26] further emphasized the importance of the BSC by examining financial and non-financial performance measures.

In the context of performance appraisal, [27] proposed a multi-criteria decision approach for supply chain reconfiguration, integrating the BSC and analytic network processes. [28] applied the BSC with a SWOT analysis to assess Morrison's performance and strategy. [16] discussed the limitations of systems focused solely on financial metrics.

Supply chain management and enterprise resource planning systems have also been studied for their influence on organizational performance. [29] investigated this influence. When [30] combined the BSC technique with the fuzzy technique for order preference by similarity to the ideal solution analysis method for allocating resources, [31] examined how the BSC influenced the achievement of objectives and key results in a digital agency. [8] explored the monitoring and evaluation of a strategic plan by applying the BSC.

The integration of the BSC with enterprise risk management was addressed by [11] to address supply chain risk by integrating the BSC with enterprise risk management. [9] explored the implementation of lean and green concepts in the supply chain system, highlighting the importance of sustainability.

Other studies focused on specific industries or sectors. [15] developed a conceptual framework for merging the management of supply chain risk and uncertainty with sustainable performance measurement. And [12] analyzed the competitiveness of microfinance institutions using the four perspectives of the BSC.

While [32] measured company performance using the BSC, emphasizing its multidimensional evaluation framework. [33] assessed the company's financial and non-financial performance using the BSC approach, which includes four perspectives: financial, customer, internal business, and growth and learning. In a different context, [17] addressed the analysis and prioritization of critical indicators for small and

medium-sized enterprises' supply chains.

Moreover, [34] introduced a novel application of the Analytical Hierarchy Process-BSC model in decision-making. When [35] studied the application of the BSC at Philip Electronics, [10] investigated the correlation between the BSC method and performance management system practices in the information technology sector.

Expanding on the application of the BSC [18] discussed the BSC as a framework for measuring organizational performance, emphasizing the role of strong leadership. [14] proposed new key performance indicators (KPIs) for measuring sustainability in industrial supply chains. [36] addressed the lack of consensus in the academic community regarding factors influencing the success of marketing alliances. [37] applied the BSC model to assess a government agency's performance, making theoretical contributions to management science in public sector organizations and offering a reference for future research.

In a different context, [38] developed a performance indicator system customized for political organizations, particularly in Romania. [39] proposed a theoretical framework using the BSC to measure performance in Industry 4.0 supply chains, indicating its effectiveness in modern supply chains. Furthermore, [6] employed a mixed-method approach, incorporating the BSC model, to evaluate the inadequately established revenue targets.

While existing literature extensively discusses the evolution and strategies of omnichannel retailing and the application of the BSC in assessing organizational performance, there remains a significant research gap. Specifically, there is limited exploration regarding the challenges and strategies for optimizing inventory management in omnichannel retailing and a lack of discussion on effectively leveraging the BSC or similar frameworks to optimize inventory across diverse channels. This study provides a comprehensive framework for measuring and managing omnichannel retailing, focusing on customer experience, channel and technology integration, and operational efficiency. It fills a gap in the literature by exploring the challenges and strategies for effectively measuring and managing key performance factors across inventory management, internal processes, learning and growth, and financial aspects in the omnichannel retail environment. By offering insights into how retailers can comprehensively assess their omnichannel performance and leverage this understanding to enhance their strategies and operations, this study provides valuable guidance for retailers aiming for seamless omnichannel integration and improved

operational efficiency.

3. Framework for Enhancing Omnichannel Networks

The following subsections provide a framework for analyzing the crucial components and strategies for optimizing omnichannel networks.

3.1. Customer Journey Mapping

Customer journey mapping visualizes how customers navigate various touchpoints and channels, revealing crucial insights for improving their experience. It is vital for understanding and optimizing customer interactions in omnichannel retail. In our omnichannel scenarios, customer journey mapping helps us understand how customers interact with our brand across different scenarios.

Navigating the complexities of order and shipping scenarios in omnichannel retailing reveals a dynamic landscape where customer convenience, inventory availability, and operational efficiency intersect. The following scenarios illustrate the intricacies of fulfilling customer orders across multiple channels:

Scenario 1: Buy Online, Pick Up In-Store (BOPIS) - In-Stock.

A customer places an order online and selects the BOPIS option. In an omnichannel strategy, merging brick-and-mortar stores with online platforms is essential for a smooth shopping journey. This integration lets customers buy online and collect orders in-store (BOPIS) or return online purchases at physical outlets, fostering a cohesive online-to-offline shopping experience. This fusion is termed an "Integrated facility" in this paper. The Integrated Facility has the items in stock. The customer receives a notification when the order is ready for pickup and collects it in person. This scenario showcases the seamless integration of online and offline channels, providing customers with a convenient shopping experience.

Scenario 2: Buy Online, Pick Up In-Store (BOPIS) - Out-of-Stock, Fulfilled from Fulfillment Center.

In this scenario, the customer orders online, but the brick-and-mortar is out of stock. The brick-and-mortar is a physical retail store with a physical presence in a specific location that enables customers to visit in person, browse products, interact with staff, and purchase on-site. The store staff offers to ship the items from a fulfillment center, a specialized facility designed to efficiently handle online orders' processing, packing, and shipping. It serves as a centralized hub for storing inventory and fulfilling e-

commerce orders. Fulfillment centers play a crucial role in the omnichannel strategy by supporting online sales and ensuring timely and accurate order fulfillment. Fulfillment centers are equipped with advanced automation and technology to streamline order processing, inventory management, and logistics, enabling retailers to meet customer expectations for fast and reliable delivery regardless of the channel through which the order was placed to the store for pickup. After receiving a notification, the customer agrees to collect the order in person. This highlights the importance of efficient inventory management and fulfillment processes to ensure customer satisfaction.

Scenario 3: Buy Online, Pick Up at Fulfillment Center - In-Stock.

Here, the customer orders online and selects a designated fulfillment center for pickup. The fulfillment center has the items in stock, and the customer receives a notification when the order is ready. They visit the fulfillment center to collect the order, emphasizing the flexibility and convenience of omnichannel shopping.

Scenario 4: Buy Online, Pick Up at Fulfillment Center - Out-of-Stock, Fulfilled from Brick-and-Mortar.

In this scenario, the fulfillment center does not have the items in stock. The staff offers to ship the items from a nearby brick-and-mortar store to the fulfillment center for pickup. After receiving a notification, the customer visits the fulfillment center to collect the order, showcasing the importance of a well-coordinated inventory system between brick-and-mortar stores and fulfillment centers.

Scenario 5: Buy Offline, Pick Up In-Store - In-Stock.

When customers visit a brick-and-mortar store and find the desired items in stock, they can purchase them in-store and pick up the order to avoid shipping costs or to have immediate access to the items. The store staff processes the order, prepares the items for pickup, and notifies the customer when the order is ready, highlighting the convenience of in-store pickup for offline purchases.

Scenario 6: Buy Offline, Pick Up In-Store - Out-of-Stock, Fulfilled from Fulfillment Center.

In this scenario, some desired items are out of stock in the brick-and-mortar store. The staff checks the inventory system and offers to fulfill orders from a fulfillment center. After receiving a notification, the customer visits the store to collect the order, showcasing the flexibility of omnichannel retail and

the ability to fulfill orders from fulfillment centers to meet customer needs.

Retailers can significantly enhance the shopping experience by providing flexible options and seamlessly integrating online and offline channels. Customers prioritize convenience, immediacy, and reliability, directly contributing to their satisfaction. Key factors such as efficient inventory management, effective communication, and streamlined fulfillment processes are essential for ensuring customers have a positive experience across various touchpoints. Ultimately, prioritizing customer satisfaction fosters loyalty and drives long-term success in today's competitive retail landscape.

3.2. Key Elements of Omnichannel Integration

The seamless integration of brick-and-mortar stores and fulfillment centers within an omnichannel strategy holds immense significance in modern retail operations. This integration necessitates a cohesive approach across various facets, each contributing to a unified customer experience that transcends the limitations of traditional distinctions between online and offline shopping.

Inventory management is at the core of this integration, a pivotal aspect ensuring real-time visibility of product availability across physical stores and fulfillment centers. This centralized system acts as a safeguard, averting stockouts, minimizing overstocking, and enabling customers to access products from diverse locations easily.

Order fulfillment becomes more versatile and customer-centric, allowing customers to choose how they receive their purchases. Whether opting for a physical store visit or preferring items to be shipped from the nearest fulfillment center, this flexibility enhances the overall shopping experience.

Implementing BOPIS marks a convergence of convenience between the online and physical shopping realms. This innovation allows customers to buy products online and collect them in person from nearby brick-and-mortar locations, amalgamating the ease of online shopping with the advantages of physical stores.

The provision for in-store returns for online purchases further exemplifies the seamless interaction between online and offline platforms. Enabling customers to effortlessly return or exchange items purchased online at a physical store streamlines the return process, ensuring convenience and flexibility.

Ensuring consistent pricing and promotions across all channels is imperative to eliminate customer confusion and discrepancies. This standardization

facilitates a cohesive shopping experience, regardless of the chosen purchasing platform.

Customer data integration emerges as a powerful tool when amalgamating data from brick-and-mortar and online channels. This holistic customer view fosters personalized marketing efforts, enhances product recommendations, and augments the customer experience.

Lastly, integrating cross-channel loyalty programs is a testament to the unified approach. Seamlessly allowing customers to earn and redeem rewards irrespective of their purchasing channel fosters customer loyalty and satisfaction.

Businesses effectively bridge the gap between the online and offline realms by successfully intertwining brick-and-mortar stores with fulfillment centers within an omnichannel strategy. This achievement yields a harmonized and frictionless customer experience, irrespective of the chosen mode of interaction with the brand. This integration streamlines operations and cements a lasting and engaging relationship with customers.

3.3. Optimizing Cross-Channel Inventory Allocation for Omnichannel Integration

Efficiently managing inventory across diverse channels is a critical challenge in achieving seamless omnichannel integration involving brick-and-mortar establishments and fulfillment centers. Modern customer expectations revolve around a seamless shopping experience across multiple touchpoints, be it in-store visits or online purchases. To meet these expectations and drive positive customer experiences and economic value, retailers face the arduous task of balancing stock availability, customer demand, and operational efficiency.

The central issue lies in developing a sophisticated inventory management system that optimizes cross-channel inventory allocation. The primary objective here is not just limited to mitigating stockouts or reducing overstocking; it extends toward ensuring real-time product availability throughout brick-and-mortar stores and fulfillment centers.

The challenges that surface in achieving this objective are multifaceted:

Resource Allocation emerges as a key obstacle. Optimizing inventory allocation necessitates a reasonable distribution of resources across different channels, encompassing staff, transportation, and warehousing capacities. Effectively utilizing these resources becomes paramount in ensuring a streamlined inventory flow.

Dynamic Inventory Allocation poses a considerable challenge. Inventory allocation must

adapt to changing customer preferences, seasonal fluctuations, and promotional surges. Retailers must devise strategies that dynamically balance stock levels while ensuring products remain available precisely when and where customers seek them.

Optimizing Fulfillment Routes presents another hurdle. Achieving efficient order fulfillment involves navigating multiple considerations, including the customer's location, inventory availability, and transportation costs. The decision-making process of whether to fulfill an order from a nearby store or a centralized fulfillment center demands a meticulous evaluation of these factors.

Conquering these challenges represents a monumental leap toward establishing an efficient omnichannel integration framework. Successful resolution would elevate the customer experience and augment economic value creation. Moreover, it would lay a robust foundation fostering sustained growth within the dynamic retail industry, setting the stage for innovation and continued advancement. Ultimately, addressing these complexities in inventory management is a pivotal catalyst in shaping the future of retail.

3.4. Mental Models

Mental models are mental representations of external systems employed by individuals, such as managers, to articulate, elucidate, and predict the behavior of those systems [40].

The balanced intersection of Channel Integration, Customer Experience, and Economic Value forms a harmonious constellation. When channel integration is achieved, it simultaneously leads to a high customer experience and economic value creation [19]. This ideal scenario serves as a mental aspiration and once attained, it is advised that this balanced constellation be maintained and that the objectives continue to be optimized. This successful direction indicates progress toward a sustained omnichannel approach, as shown in Figure 2.

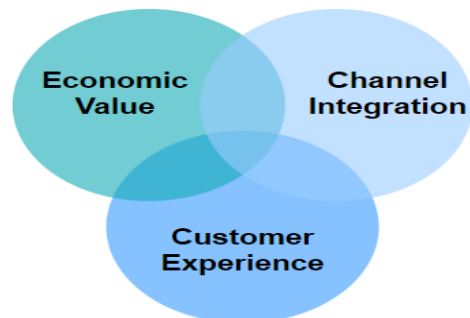


Fig. 2: Mental Model Visualized as Venn Diagram

Channel Integration occurs when channels are harmoniously combined to ensure alignment and interaction, ensuring smooth operations. Realizing this goal involves investing in digital technologies, implementing restructuring efforts, or acquiring relevant knowledge.

Customer Experience Generation is accomplished when a seamless and uninterrupted transition along the customer journey is guaranteed across all available channels. It reflects objectives that prioritize meeting customer needs.

Economic Value Creation is attained when the retailer successfully generates financial value, such as profitability. It aligns with objectives aimed at creating value for shareholders.

3.5. Balanced Scorecard

Organizations embracing the omnichannel strategy must effectively measure and manage their performance in this complex and interconnected environment. This is where the BSC comes into play.

The BSC is a performance management framework developed by Kaplan and Norton in the early 1990s. It goes beyond traditional financial metrics and provides a balanced view of an organization's performance by incorporating financial and non-financial measures. From an omnichannel perspective, the BSC takes on added significance, enabling organizations to align their strategic objectives with the challenges and opportunities presented by the omnichannel environment.

The BSC is a strategic management tool that can be highly beneficial for retailers when integrating offline and online channels. BSC helps align business activities with the organization's strategy and vision, focusing on four key perspectives: financial, customer, internal processes, and learning and growth. In omnichannel retail, BSC can provide a comprehensive framework for evaluating and managing performance.

From a financial perspective, BSC can help retailers assess the impact of omnichannel integration on revenue, cost reduction, and profitability. It allows them to track key financial metrics such as sales growth, return on investment (ROI), and cost per order, helping to ensure that the integration efforts yield positive economic results.

From a customer perspective, BSC enables retailers to measure customer satisfaction, loyalty, and retention rates. By monitoring metrics such as Net Promoter Score and customer lifetime value, retailers can gain insights into how well their omnichannel strategy meets customer expectations and drives customer loyalty.

Internally, BSC helps retailers monitor and

improve their internal processes related to inventory management, order fulfillment, and customer service. By tracking metrics such as order fulfillment cycle time, inventory turnover, and customer service response times, retailers can identify areas for improvement and streamline their operations to enhance efficiency and reduce costs.

Lastly, BSC focuses on learning and growth, encouraging retailers to invest in employee training and development and technology and infrastructure improvements. This perspective is critical for ensuring that retailers have the capabilities and resources to support their omnichannel strategy effectively.

The Omnichannel Scorecard is a versatile framework that offers guidance for individual proposals. It includes perspectives and measurement methods, indicating the need to tailor performance metrics to the specific context of omnichannel initiatives, as illustrated in Figure 3.

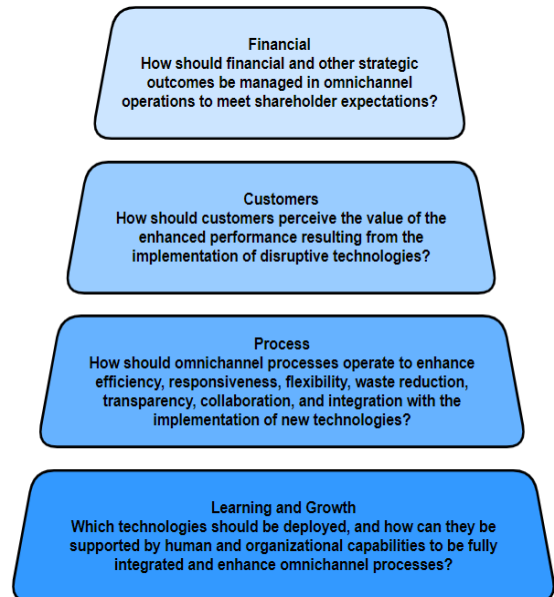


Fig. 3: BSC Perspectives in Omnichannel

By adopting the BSC in an omnichannel perspective, organizations gain a comprehensive view of their performance and ensure that strategic objectives align with the unique challenges and opportunities of the omnichannel landscape. The BSC helps businesses make informed decisions, optimize resource allocation, and drive continuous improvement across all aspects of their omnichannel operations. With a balanced approach to performance measurement and management, organizations can successfully navigate the complexities of the omnichannel environment and deliver superior customer experiences, ultimately gaining a

competitive edge in the market.

Table 1 categorizes key factors of the omnichannel scorecard across the BSC perspectives and their respective dimensions in the mental model context:

Table 1. Integrated Metrics for Omnichannel Success: A BSC and Mental Model Perspectives

BSC Perspectives	Omnichannel Dimensions in The Mental Model Context	Factors of the Omnichannel Scorecard
Customer Perspective	Customer Experience	Consumer Time Convenience
		Product Availability
		Product Variety
		Product Customizability
		Product Returnability
		Improvement of Service Quality
		Users' Retention Rate
		Retailer Effect Factors
		Delivery Time
Internal Process Perspective	Channel Integration	Cross-Channel Sales Ratio
		Channel Interaction Rate
		Channel Handoff Rate
		Inventory Availability Across Channels
		Channel Data Integration Score
		Alignment of Organizational Goals with Omnichannel Strategy
Learning and Growth Perspective		Digital Skills Acquisition
		Innovation Rate
		Technology Adoption Rate
		Continuous Improvement Initiatives
		Learning from Customer Feedback
Financial Perspective	Economic Value	Time to Market
		Organizational Agility
		Number of customers that place the order
		Market Competition Coefficient
		Order Growth Rate
		Technology Cost
		Operational and Fixed Costs of Distributor Installation
		Cost per Unit Shipping per Product Based on Distance
		Cost of Product Maintenance at the Distribution Center
		Inventory Holding Costs

3.6. Enhancing Omnichannel Retail Through Understanding Cross-Channel Sales Patterns and Customer Behaviors

In the dynamic landscape of omnichannel retail, where customers seamlessly navigate between online and offline channels, understanding cross-channel sales patterns and customer behaviors is paramount. These insights, which can vary significantly across different product categories, are key for retailers aiming to tailor their inventory management strategies and enhance overall operational efficiency.

Product Categories: Each product category exhibits its unique mix of online and offline purchase tendencies. For instance, while electronics and apparel are often researched online, they are more frequently purchased in-store. Conversely, books and consumer goods are commonly purchased online. Recognizing these patterns enables retailers to allocate inventory effectively between brick-and-mortar stores and fulfillment centers, ensuring products are available where and when customers are most likely to purchase them.

Customer Preferences: Customer preferences significantly influence cross-channel sales patterns. Some customers prefer the convenience and ease of online shopping, while others value the tactile and immersive experience of in-store shopping. By leveraging customer data, retailers can identify these preferences and tailor their inventory management strategies accordingly, enhancing customer satisfaction and loyalty.

Seasonal Variations: Seasonal changes can profoundly impact cross-channel sales patterns. For example, demand for winter clothing may peak in-store during colder months, while demand for outdoor furniture may surge online during the summer. Retailers can utilize historical sales data to forecast these variations and adjust their inventory levels accordingly, ensuring they meet customer demand and minimize excess inventory.

Promotional Activities: Promotions influence cross-channel sales patterns and customer behaviors. A well-planned promotion can drive significant traffic and sales, whether online or in-store. By analyzing the impact of promotions on sales patterns, retailers can refine their inventory management strategies to capitalize on these trends and maximize the effectiveness of their promotional efforts.

Dynamic Pricing Strategies: Analyzing cross-channel sales patterns enables retailers to implement dynamic pricing strategies based on demand. For example, offering discounts on online purchases during slow periods in-store can help drive traffic to e-

commerce platforms, maximizing sales opportunities.

Improved Marketing Campaigns: Understanding customer behaviors across different channels allows retailers to tailor their marketing campaigns more effectively. Retailers can increase conversion rates and drive sales by using targeted ads to promote online purchases to customers who have previously made in-store purchases in a specific product category.

4. Conclusion

In today's dynamic retail environment, the seamless integration of brick-and-mortar stores with fulfillment centers has evolved from a mere operational necessity to a strategic imperative for retailers committed to delivering a cohesive omnichannel experience. This integration necessitates a holistic approach that encompasses efficient inventory management, order fulfillment, and proactive customer engagement. By aligning their organizational objectives with omnichannel strategies, retailers can effectively manage inventory across channels, enhancing customer satisfaction and driving economic value. A pivotal insight revealed in this study is the critical role of real-time product availability visibility in maintaining optimal inventory levels, preventing stockouts, and minimizing overstocking, thus ensuring a seamless shopping journey for customers while streamlining operations. Furthermore, offering flexible order fulfillment options such as in-store pickup or home delivery enhances customer convenience and satisfaction, bridging the divide between online and physical shopping experiences.

The integration of online purchases with in-store pickup options, known as BOPIS, has emerged as a popular choice among customers, providing the convenience of online shopping with the immediacy of in-store pickup, benefiting both customers and retailers in streamlining operations and fostering customer loyalty. Consistency in pricing and promotions across all channels is paramount to eliminating customer confusion and ensuring a seamless shopping experience. By leveraging data from various channels, retailers can personalize marketing efforts and enhance the overall customer experience, ultimately driving increased loyalty and satisfaction. Despite the challenges of resource allocation and optimizing fulfillment routes inherent in integrating brick-and-mortar stores with fulfillment centers, addressing these challenges and implementing effective strategies can enhance the overall customer experience, drive economic value creation, and achieve sustained growth in the competitive retail industry.

This paper's contribution lies in providing a

comprehensive framework tailored to the complexities of omnichannel networks, with a specific focus on optimizing inventory management. By integrating the Mental model with the BSC across various industries, this study uniquely addresses the challenges and strategies in measuring and managing key performance factors in omnichannel retail. The insights provided in this study offer valuable guidance to retailers seeking to achieve seamless integration across channels and enhance operational efficiency.

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