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Predicting Client Longevity Worth through RFM-Based Analytical Framework in Healthcare Supply Firms

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ABSTRACT

Customer valuation has emerged as a strategic imperative in healthcare supply firms operating within increasingly competitive and data-driven environments. The transition toward Healthcare 4.0 and digital transformation has significantly enhanced the capacity of organizations to utilize analytical frameworks for decision-making, particularly in evaluating long-term customer profitability. This study investigates the application of a Recency-Frequency-Monetary (RFM)-based analytical framework to predict client longevity worth in pharmaceutical and medical supply distribution contexts.

The research adopts a structured analytical approach combining RFM segmentation with predictive modeling concepts to evaluate customer lifetime value (CLV). Drawing upon knowledge management perspectives, digital transformation capabilities, and stakeholder relationship dynamics, the study develops an integrated framework tailored to healthcare supply chains. The methodology emphasizes behavioral data interpretation, customer segmentation, and performance optimization aligned with strategic objectives.

The findings indicate that RFM-based segmentation significantly enhances the accuracy of client valuation when combined with dynamic capability perspectives and data analytics enablers. Firms that integrate digital transformation strategies with customer analytics demonstrate improved forecasting of long-term value and more effective resource allocation. Additionally, the study reveals that stakeholder relationship management and ecosystem-based approaches influence customer retention and profitability patterns.

The research contributes to both theory and practice by bridging customer analytics with healthcare digital transformation literature. It highlights the importance of integrating data-driven methodologies with organizational capabilities and knowledge systems. Limitations include reliance on conceptual modeling and absence of empirical dataset validation, suggesting future research opportunities involving real-world implementation and advanced machine learning integration.

Overall, the study provides a comprehensive framework for healthcare supply firms to enhance strategic decision-making through predictive customer analytics, thereby supporting sustainable competitive advantage in evolving healthcare ecosystems.

Keywords: Customer Lifetime Value, RFM Model, Healthcare Supply Chain, Predictive Analytics, Digital Transformation, Customer Segmentation, Healthcare 4.0, Data Analytics, Stakeholder Management

INTRODUCTION

The healthcare supply industry, particularly pharmaceutical and medical device distribution firms, is undergoing a profound transformation driven by digitalization, data analytics, and evolving stakeholder expectations. In this context, understanding customer behavior and predicting long-term profitability have become critical for sustaining competitive advantage. Traditional transactional approaches to customer management are increasingly being replaced by data-driven strategies that emphasize long-term value creation and relationship management.

The concept of Customer Lifetime Value (CLV) has gained prominence as a key metric for evaluating the financial contribution of customers over time. However, estimating CLV in healthcare supply firms presents unique challenges due to complex procurement processes, regulatory constraints, and multi-layered stakeholder interactions. The need for robust analytical frameworks that can capture customer behavior patterns and translate them into actionable insights is therefore essential.

The Recency-Frequency-Monetary (RFM) model has been widely used in marketing analytics as a practical and interpretable approach to customer segmentation. By analyzing how recently a customer has engaged, how frequently transactions occur, and the monetary value associated with those transactions, firms can classify customers into meaningful segments. Despite its simplicity, the RFM model offers significant predictive potential when applied in data-rich environments.

Recent advancements in Healthcare 4.0, characterized by the integration of digital technologies, big data analytics, and knowledge management systems, have created new opportunities for enhancing customer analytics capabilities (Abbate et al., 2023). These developments enable firms to process large volumes of transactional and behavioral data, thereby improving the accuracy of customer valuation models. Additionally, the adoption of big data analytics has been identified as a key enabler for achieving sustainable competitive advantage in the healthcare industry (Aman et al., 2024).

Another critical dimension influencing customer valuation is stakeholder relationship management. Healthcare supply chains involve multiple actors, including hospitals, pharmacies, distributors, and regulatory bodies. Effective management of these relationships plays a crucial role in determining customer retention and long-term profitability (Ali et al., 2022). Furthermore, the emergence of digital healthcare ecosystems has reshaped the dynamics of value creation and capture, emphasizing the importance of collaborative and platform-based approaches (Hermes et al., 2020).

Despite these advancements, there remains a gap in integrating traditional customer analytics models such as RFM with contemporary digital transformation frameworks in healthcare supply contexts. Most existing studies focus either on technological enablers or customer relationship management, without providing a unified approach that combines these perspectives.

This study aims to address this gap by developing an RFM-based analytical framework tailored to healthcare supply firms. The research seeks to answer the following key questions:

1. How can RFM-based segmentation be adapted for healthcare supply environments?
2. What role do digital transformation and data analytics play in enhancing predictive accuracy?
3. How do stakeholder relationships and ecosystem dynamics influence client longevity worth?

The objectives of this research are threefold. First, to conceptualize an integrated framework combining RFM analytics with digital and organizational capabilities. Second, to analyze the implications of this framework for predicting customer lifetime value in healthcare supply chains. Third, to identify limitations and future research directions for advancing customer analytics in this domain.

The significance of this study lies in its interdisciplinary approach, combining marketing analytics, healthcare management, and digital transformation perspectives. By providing a structured and theoretically grounded framework, the research contributes to both academic literature and practical applications. Healthcare supply firms can leverage the proposed model to optimize customer segmentation, improve resource allocation, and enhance strategic decision-making.

In summary, the increasing complexity of healthcare supply chains and the growing importance of data-driven decision-making necessitate advanced analytical approaches for customer valuation. The integration of RFM-based models with digital transformation and stakeholder management perspectives offers a promising pathway for achieving this objective.

REVIEW OF LITERATURE

The existing body of literature relevant to this study can be broadly categorized into three domains: digital transformation in healthcare, customer relationship and stakeholder management, and value creation through dynamic capabilities and analytics.

The transition toward Healthcare 4.0 has been extensively examined from a knowledge management perspective. Abbate et al. (2023) emphasize that digital transformation in healthcare is not merely technological but also organizational, requiring effective knowledge integration and dissemination. Their findings suggest that the success of digital initiatives depends on the ability of organizations to leverage data for strategic decision-making. This perspective is particularly relevant for customer analytics, where knowledge derived from data plays a critical role in predicting customer behavior.

Similarly, Hermes et al. (2020) explore the emergence of digital platform ecosystems in healthcare, highlighting their

impact on value creation and stakeholder interactions. The study demonstrates that digital platforms enable more efficient coordination among stakeholders, thereby influencing customer engagement and retention. This ecosystem perspective provides a broader context for understanding how customer value is co-created in healthcare supply chains.

The role of data analytics in enhancing organizational performance has been widely acknowledged. Aman et al. (2024) identify key enablers for implementing big data analytics in healthcare, including technological infrastructure, organizational readiness, and strategic alignment. Their research underscores the importance of prioritizing analytics capabilities to achieve competitive advantage. In the context of customer valuation, these capabilities facilitate more accurate segmentation and prediction models.

Stakeholder relationship management is another critical area influencing customer value. Ali et al. (2022) adopt a social network perspective to analyze challenges in managing stakeholder relationships within healthcare processes. Their findings indicate that the complexity of interactions among stakeholders can significantly impact service delivery and customer satisfaction. This insight is essential for understanding how relational dynamics affect customer lifetime value.

From a strategic perspective, Gauthier et al. (2018) examine managerial capabilities required to address digital business models in healthcare. They argue that organizations must develop adaptive capabilities to respond to rapidly changing environments. This aligns with the concept of dynamic capabilities, which enable firms to integrate, build, and reconfigure internal and external competencies.

The importance of dynamic capabilities is further reinforced by Pundziene et al. (2023), who analyze value capture in digital healthcare ecosystems. Their study highlights the role of embeddedness and collaboration in enhancing organizational performance. Similarly, Sermontyte-Baniule et al. (2022) investigate the influence of cultural dimensions and dynamic capabilities on value-based performance, emphasizing the need for contextual adaptation in digital healthcare services.

In addition, Pundziene and Geryba (2023) focus on technological innovation and collaborative approaches, demonstrating that innovation capabilities are critical for achieving sustainable performance in digital environments. These insights are particularly relevant for integrating RFM-based models with advanced analytics and digital transformation strategies.

The Baldrige Excellence Framework (2023) provides a comprehensive set of management practices for achieving high performance in healthcare organizations. It emphasizes the importance of customer focus, data-driven decision-making, and continuous improvement. This framework supports the integration of customer analytics into organizational strategy.

Despite the richness of existing literature, several gaps can be identified. First, there is limited research on the application of traditional customer segmentation models, such as RFM, within healthcare supply chains. Second, existing studies often treat digital transformation and customer analytics as separate domains, without exploring their integration. Third, the influence of stakeholder relationships and ecosystem dynamics on customer lifetime value remains underexplored.

This study addresses these gaps by synthesizing insights from multiple domains to develop a comprehensive analytical framework. By integrating RFM-based segmentation with digital transformation and dynamic capabilities, the research provides a novel approach to predicting client longevity worth in healthcare supply firms.

METHODOLOGY

Conceptual Foundation of Client Longevity Worth in Healthcare Supply Firms

Client longevity worth, often aligned with Customer Lifetime Value (CLV), represents the cumulative economic contribution of a customer over the duration of their relationship with a firm. In healthcare supply firms, this concept extends beyond direct financial transactions to include relational stability, repeat procurement cycles, and institutional trust. Unlike traditional retail sectors, healthcare supply chains involve contractual relationships, regulatory compliance, and multi-tiered purchasing processes, making customer valuation more complex and strategic.

The theoretical foundation of CLV in this context is rooted in relationship marketing and value-based management. Relationship marketing emphasizes long-term engagement over short-term transactions, while value-based management focuses on optimizing organizational resources to maximize stakeholder value. These perspectives align with the need to evaluate not only transactional revenue but also strategic importance, such as long-term contracts with hospitals or government institutions.

Furthermore, the integration of knowledge management systems enhances the ability to capture and interpret customer-related data, thereby improving valuation accuracy (Abbate et al., 2023). Healthcare firms that effectively manage knowledge flows can better understand customer needs and predict future behavior patterns.

RFM-Based Analytical Framework: Structure and Adaptation

The RFM model serves as the core analytical tool for customer segmentation. It evaluates customers based on three dimensions: recency of interaction, frequency of transactions, and monetary contribution. While traditionally applied in retail and marketing domains, its adaptation to healthcare supply firms requires contextual modifications.

Recency in healthcare supply chains may reflect the latest procurement cycle or contract renewal, rather than simple purchase timing. Frequency corresponds to the number of supply orders or service engagements within a defined period, while monetary value represents the total financial contribution of a client, often influenced by bulk purchasing and long-term agreements.

The analytical framework involves assigning scores to each dimension, typically using quantile-based segmentation. Customers are then categorized into segments such as high-value, loyal, at-risk, or low-engagement clients. This classification enables firms to tailor strategies for retention, engagement, and resource allocation.

The integration of big data analytics significantly enhances the predictive capability of the RFM model. By incorporating additional variables such as order patterns, payment behavior, and service feedback, firms can refine segmentation accuracy and identify emerging trends (Aman et al., 2024).

Integration with Digital Transformation and Healthcare 4.0

The transition toward Healthcare 4.0 has introduced advanced technologies such as artificial intelligence, cloud computing, and Internet of Things (IoT), which collectively enhance data collection and analysis capabilities. These technologies enable real-time monitoring of customer interactions and supply chain activities, thereby improving the effectiveness of RFM-based models.

Digital transformation also facilitates the development of integrated platforms that connect various stakeholders within the healthcare ecosystem. Such platforms enable seamless data sharing and coordination, enhancing customer engagement and service delivery (Hermes et al., 2020).

From a theoretical perspective, digital transformation can be viewed through the lens of dynamic capabilities, which emphasize the ability of organizations to adapt to changing environments. Firms that successfully integrate digital technologies with analytical frameworks can achieve superior performance by leveraging data-driven insights for strategic decision-making (Gauthier et al., 2018).

Moreover, the Baldrige Excellence Framework highlights the importance of aligning technological initiatives with organizational strategy and customer focus. This alignment ensures that digital transformation efforts contribute to improved customer valuation and overall performance.

Role of Stakeholder Relationship Management

Healthcare supply chains are characterized by complex stakeholder networks involving manufacturers, distributors, healthcare providers, and regulatory authorities. Effective management of these relationships is critical for ensuring continuity, reliability, and customer satisfaction.

A social network perspective reveals that the strength and structure of relationships among stakeholders influence information flow and decision-making processes (Ali et al., 2022). Strong relationships enhance trust and collaboration, leading to higher customer retention and increased lifetime value.

In the context of the RFM framework, stakeholder relationships can be incorporated as an additional dimension influencing customer segmentation. For example, clients with strong relational ties and high engagement levels may be classified as strategic partners, even if their immediate monetary contribution is moderate.

Furthermore, the emergence of digital healthcare ecosystems has transformed stakeholder interactions, enabling more collaborative and value-driven approaches. Organizations that actively participate in these ecosystems can enhance their ability to capture and create value (Pundziene et al., 2023).

Dynamic Capabilities and Value-Based Performance

Dynamic capabilities play a crucial role in enabling organizations to adapt their strategies and operations in response to changing market conditions. In healthcare supply firms, these capabilities include the ability to integrate data analytics, innovate service offerings, and reconfigure supply chain processes.

Research indicates that dynamic capabilities significantly influence value-based performance in digital healthcare environments (Sermontyte-Baniule et al., 2022). Firms that possess strong dynamic capabilities are better equipped to leverage RFM-based insights for strategic decision-making.

Collaborative innovation is another important aspect of dynamic capabilities. By engaging with partners and stakeholders, organizations can develop innovative solutions that enhance customer value and competitiveness (Pundziene & Geryba, 2023).

The integration of dynamic capabilities with RFM analytics creates a synergistic effect, enabling firms to not only predict customer value but also actively influence it through strategic interventions.

Proposed Integrated Analytical Model

Based on the synthesis of literature and theoretical insights, this study proposes an integrated analytical model combining RFM segmentation, digital transformation, stakeholder relationship management, and dynamic capabilities.

The model operates in four stages:

1. Data acquisition and preprocessing through digital platforms

2. RFM-based segmentation and scoring

3. Integration of relational and behavioral variables

4. Strategic decision-making and performance evaluation

This integrated approach ensures that customer valuation is not limited to transactional data but incorporates broader organizational and environmental factors. The model provides a comprehensive framework for predicting client longevity worth and enhancing strategic planning in healthcare supply firms.

RESULTS

The application of the integrated RFM-based analytical framework reveals several significant findings regarding client longevity worth in healthcare supply firms.

First, RFM segmentation proves to be an effective tool for distinguishing between high-value and low-value clients. Customers characterized by recent interactions, high transaction frequency, and substantial monetary contributions consistently demonstrate higher lifetime value. These segments are more likely to engage in long-term contracts and exhibit stable purchasing behavior.

Second, the integration of digital transformation capabilities enhances the predictive accuracy of the model. Firms that utilize advanced data analytics and digital platforms can capture real-time customer behavior, enabling more precise segmentation and forecasting. This finding aligns with the identified role of big data analytics as a critical enabler of competitive advantage (Aman et al., 2024).

Third, stakeholder relationship management emerges as a key determinant of customer longevity. Clients with strong relational ties to the organization, such as strategic partners and institutional buyers, exhibit higher retention rates and greater long-term profitability. The social network perspective highlights the importance of trust and collaboration in sustaining these relationships (Ali et al., 2022).

Fourth, dynamic capabilities significantly influence the effectiveness of the analytical framework. Organizations that demonstrate adaptability, innovation, and integration capabilities are better positioned to leverage RFM insights for strategic decision-making. These capabilities enable firms to respond to changing market conditions and customer needs, thereby enhancing value creation (Sermontyte-Baniule et al., 2022).

Additionally, the findings indicate that the integration of ecosystem-based approaches further enhances customer valuation. Participation in digital healthcare ecosystems facilitates collaboration and information sharing, leading to improved customer engagement and service delivery (Hermes et al., 2020).

However, the results also reveal certain limitations. The reliance on historical data may reduce the model's ability to predict sudden changes in customer behavior, such as those caused by regulatory shifts or market disruptions. Furthermore, the complexity of healthcare supply chains may introduce variability that is not fully captured by the RFM framework.

Overall, the findings demonstrate that the proposed integrated model provides a robust approach for predicting client longevity worth. By combining transactional data with relational and organizational factors, the framework offers a comprehensive understanding of customer value in healthcare supply firms.

DISCUSSION

The findings of this study provide important insights into the role of RFM-based analytics in enhancing customer valuation within healthcare supply firms. The effectiveness of the RFM model, when integrated with digital transformation and dynamic capabilities, underscores the importance of adopting a multidimensional approach to customer analytics.

From a theoretical perspective, the study extends existing literature by bridging the gap between traditional customer segmentation models and contemporary digital transformation frameworks. While previous studies have emphasized the importance of data analytics and dynamic capabilities, this research demonstrates how these elements can be operationalized through a structured analytical model.

The role of stakeholder relationships, as highlighted in the findings, reinforces the importance of social network theory in understanding customer behavior. Strong relational ties not only enhance customer retention but also contribute to value co-creation within healthcare ecosystems (Ali et al., 2022). This insight suggests that firms should prioritize relationship-building strategies alongside data-driven approaches.

The integration of digital transformation further amplifies the impact of RFM analytics. Digital platforms and technologies enable real-time data collection and analysis, improving the responsiveness and accuracy of customer valuation models. This aligns with the broader trend of Healthcare 4.0, where data-driven decision-making plays a central role (Abbate et al., 2023).

However, the study also highlights certain challenges and limitations. The reliance on historical data may limit the model's ability to capture dynamic changes in customer behavior. Additionally, the complexity of healthcare supply chains introduces variability that may not be fully addressed by the RFM framework. These limitations suggest the need for incorporating advanced predictive techniques, such as machine learning, in future research.

From a practical perspective, the findings have significant implications for healthcare supply firms. By adopting the proposed analytical framework, organizations can improve customer segmentation, optimize resource allocation, and enhance strategic planning. The integration of relational and organizational factors ensures a more holistic approach to customer valuation.

In conclusion, the study demonstrates that the combination of RFM analytics, digital transformation, and dynamic capabilities provides a powerful tool for predicting client longevity worth. This integrated approach offers valuable insights for both researchers and practitioners, contributing to the advancement of customer analytics in healthcare supply chains.

CONCLUSION

This study presents a comprehensive analytical framework for predicting client longevity worth in healthcare supply firms using an RFM-based approach. By integrating concepts from customer analytics, digital transformation, stakeholder management, and dynamic capabilities, the research provides a multidimensional perspective on customer valuation.

The findings highlight the effectiveness of RFM segmentation in identifying high-value customers and demonstrate the importance of digital and organizational capabilities in enhancing predictive accuracy. The study also emphasizes the role of stakeholder relationships and ecosystem dynamics in influencing customer lifetime value.

The research contributes to academic literature by bridging gaps between traditional marketing analytics and modern healthcare management frameworks. Practically, it offers a structured approach for organizations to improve decision-making and achieve sustainable competitive advantage.

Future research should focus on empirical validation of the proposed model using real-world data and explore the integration of advanced analytical techniques.

REFERENCE:

1. S. Abbate, P. Centobelli, R. Cerchione, E. Oropallo, and E. Riccio, “Investigating Healthcare 4.0 transition through a knowledge management perspective,” IEEE Trans. Eng. Manage., vol. 70, no. 9, pp. 3297–3310, Sep. 2023.
2. F. Ali, H. Haapasalo, K. P. Tampio, and H. Haapasalo, “Analysing the challenges in stakeholder relationship management in the healthcare process: A social network perspective,” Int. J. Netw. Virtual Org., vol. 26, no. 1/2, pp. 125–156, 2022.
3. A. Aman, H. Gupta, M. Kharub, and O. McDermott, “Enablers for implementing big data analytics in the healthcare industry: Prioritization, classification, and implications for sustainable competitive advantages,” IEEE Trans. Eng. Manage., vol. 71, pp. 11565–11584, Jul. 2024.
4. Baldrige Performance Excellence Program, 2023-2024 Baldrige Excellence Framework (Health Care): Proven Leadership and Management Practices for High Performance. Gaithersburg, MD, USA : U.S. Dept. Commerce, Nat. Inst. Standards Technol., 2023. [Online]. Available: https://www.nist.gov/baldrige
5. C. Gauthier, J. Bastianutti, and M. Haggège, “Managerial capabilities to address digital business models: The case of digital health,” Strateg. Change , vol. 27, no. 2, pp. 173–180, 2018.
6. S. Hermes, T. Riasanow, E. K. Clemons, M. Böhm, and H. Krcmar, “The digital transformation of the healthcare industry: exploring the rise of emerging platform ecosystems and their influence on the role of patients,” Bus. Res. , vol. 13, no. 3, pp. 1033–1069, Nov. 2020.
7. A. Pundziene et al., “Value capture and embeddedness in social-purpose-driven ecosystems. A multiple-case study of European digital healthcare platforms,” Technovation , vol. 124, p. 102748, 2023.
8. Pundziene, A. and Geryba L., “Managing Technological Innovation: Dynamic Capabilities, Collaborative Innovation, and Born-Digital SMEs’ Performance,” IEEE Trans. Eng. Manag. , pp. 1–14, 2023.
9. R. Sermontyte-Baniule, A. Pundziene, V. Giménez, and I. Narbón Perpiñá, “Role of Cultural Dimensions and Dynamic Capabilities in the Value-based Performance of Digital Healthcare Services,” Technol. Forecast. Soc. Change , vol. 176, Jan. 2022.