

DIGITAL TWIN TECHNOLOGY AND BUSINESS SUCCESS OF COMMERCIAL BANKS IN PORT HARCOURT

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ABSTRACT

This study investigated the relationship between Digital Twin Technology and Business Success of Commercial Banks in Port Harcourt. Specifically, the objectives of the study were to determine how real-time risk management and customer experience optimization relate with customer retention and market share growth of commercial banks in Port Harcourt. The correlational research design was adopted and the population of the study comprised twenty-six (26) commercial banks operating in Port Harcourt. 130 respondents were drawn from the population through a census approach in which 5 managers were selected from each of the commercial banks Port Harcourt. However, only 112 respondents provided data for the study through questionnaire that was designed in the Likert 5-point scale of strongly disagree to strongly agree. Pearson Product Moment Correlation (PPMC) was used to test four null hypotheses developed. From results of the analysis it was revealed that luxury branding and brand sophistication which are the dimensions of digital twin technology (real-time risk management and customer experience optimization) positively and significantly relate with customer retention and market share growth (i.e. measures of business success) of commercial banks in Port Harcourt. Based on these findings, it was concluded that the ability of digital twin technology to enhance real-time monitoring and management of risks allows banks to mitigate potential operational disruptions, thereby improving trust and loyalty among customers. Therefore, the study recommended amongst others that commercial banks should fully integrate digital twin technology into their risk management processes. This will enable them to monitor operations in real time, quickly respond to potential disruptions, and reduce the likelihood of financial losses.

Keywords: Digital Twin; Business Success; Real-Time Risk Management; Customer Experience; Customer Retention; Market Share Growth

INTRODUCTION

Digital twin technology, an innovative advancement in the realm of digital transformation, has gained significant traction across various industries, including banking. Defined as a virtual representation of a physical entity or system, digital twins enable organizations to simulate, predict, and optimize operations in real-time (Rosen et al., 2020). In the context of commercial banks, this technology allows for the modeling of customer interactions, operational processes, and risk management systems, providing insights that can drive efficiency and enhance service delivery. As competition intensifies within the financial sector, particularly in Port Harcourt, Nigeria, the implementation of digital twin technology has emerged as a pivotal strategy for commercial banks aiming to achieve business success and sustainability.

The adoption of digital twin technology by commercial banks is primarily driven by the need to enhance customer experience and operational efficiency. With customers increasingly demanding personalized services and quick responses to their needs, banks are compelled to leverage technology that provides actionable insights (Zhao et al., 2023). By creating a digital twin of customer profiles, banks can analyze customer behavior, preferences, and feedback to tailor their services accordingly. This personalized approach not only improves customer satisfaction but also fosters loyalty, ultimately contributing to the overall success of the banking institution. Furthermore, with the integration of artificial intelligence and machine learning, digital twin

technology enables predictive analytics, allowing banks to anticipate market trends and customer needs, thereby positioning themselves competitively in the dynamic financial landscape.

Moreover, digital twin technology offers banks the opportunity to optimize their internal processes and reduce operational costs. By simulating different scenarios within their operational framework, banks can identify inefficiencies and streamline processes such as loan approval, risk assessment, and compliance management (Duflou et al., 2021). This operational optimization translates to quicker turnaround times for services, enhanced risk management, and improved resource allocation. Consequently, the effective use of digital twin technology can result in significant cost savings and improved profitability for commercial banks in Port Harcourt, where economic conditions demand heightened efficiency and innovation.

The economic landscape in Port Harcourt, characterized by increasing competition and regulatory pressures, necessitates that commercial banks embrace digital transformation strategies. Digital twin technology serves as a powerful tool that can support strategic decision-making by providing real-time insights into market dynamics and operational performance. Recent studies indicate that organizations that invest in digital technologies experience enhanced agility and resilience, allowing them to adapt more effectively to changing market conditions (Khan et al., 2023). For commercial banks in Port Harcourt, leveraging digital twin technology can not only fortify their competitive position but also facilitate compliance with regulatory standards while delivering superior value to customers.

The relationship between digital twin technology and the business success of commercial banks in Port Harcourt is increasingly significant as the banking sector evolves. The integration of digital twin technology enables banks to enhance customer experiences, optimize operations, and navigate the challenges posed by an ever-changing economic environment. As such, understanding this relationship is crucial for stakeholders within the banking industry who are looking to harness technological advancements to achieve sustainable business success. By exploring this dynamic interplay, the study aims to shed light on the potential benefits and challenges associated with the adoption of digital twin technology in the commercial banking sector.

Statement of the Problem

The rapid evolution of digital technologies has compelled commercial banks to seek innovative strategies to maintain competitive advantage in an increasingly challenging financial landscape. In Port Harcourt, where the banking sector is characterized by fierce competition and changing customer expectations, banks face the pressing need to enhance service delivery and operational efficiency (Owolabi & Makinde, 2022). Despite the recognized potential of digital twin technology to transform business processes, many banks have yet to fully implement this innovation. This gap raises questions about the specific barriers to adoption and the extent to which digital twin technology can contribute to the success of commercial banks in the region.

Moreover, while digital twin technology offers promising capabilities for optimizing customer interactions and improving operational performance, the current literature reveals a lack of empirical evidence regarding its actual impact on the business success of commercial banks in Port Harcourt. Existing studies tend to focus on broader digital transformation strategies without delving deeply into the unique implications of digital twin technology within the banking sector (Adeleke et al., 2023). This oversight limits the understanding of how digital twins can specifically enhance customer satisfaction, streamline operations, and drive profitability in commercial banks. Consequently, there is an urgent need to explore the relationship between digital twin technology and business success to inform strategic decisions and investments in technological advancements. Also, the integration of digital twin technology poses several challenges, including data privacy concerns, the need for substantial financial investments, and the complexities of organizational change (González et al., 2023). Commercial banks in Port Harcourt must navigate these challenges while also aligning their digital strategies with regulatory requirements and market

expectations. This situation creates a critical need to investigate how these factors affect the adoption of digital twin technology and its subsequent impact on business performance.

Conceptual Framework

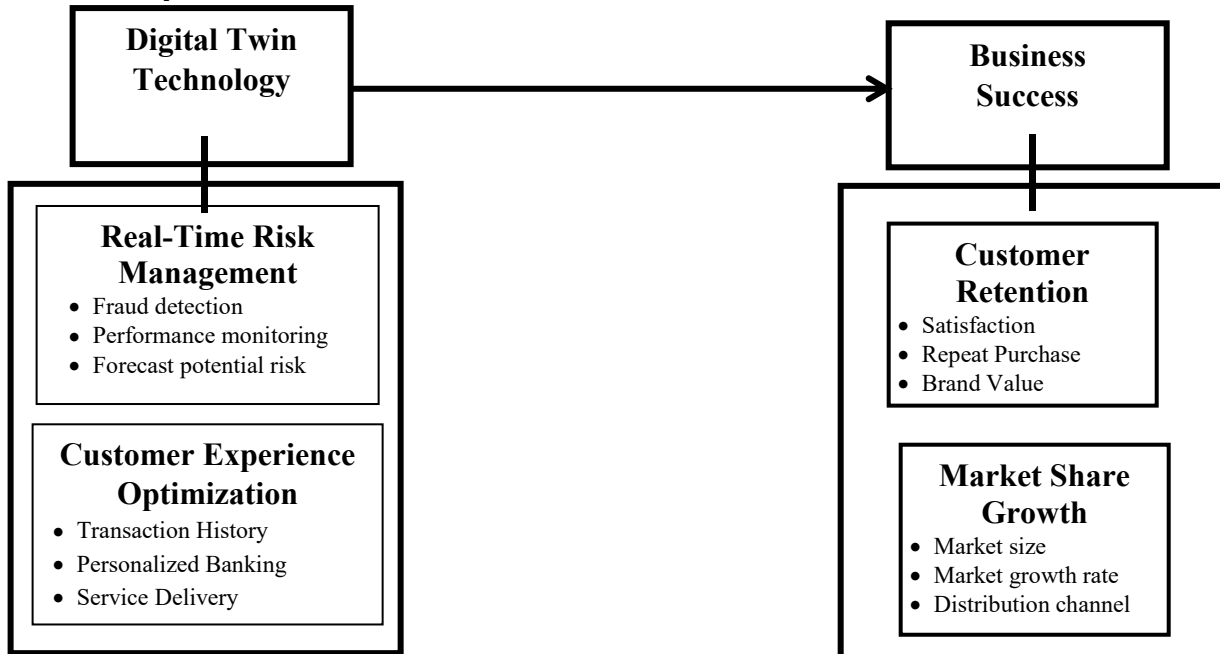


Fig. 1.1: Conceptual framework showing the relationship digital twin technology and business success of commercial banks in Port Harcourt

Source: Obi et al., (2022); Owolabi & Makinde, (2022)

Research Aim and Objectives

The aim of this paper was to determine the relationship between digital twin technology and business success of commercial banks in Port Harcourt. The objectives of this paper were to:

1. investigate the relationship between real-time risk management and customer retention of commercial banks in Port Harcourt.
2. determine the relationship between real-time risk management and market share growth of commercial banks in Port Harcourt.
3. examine the relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt.
4. evaluate the relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt.

Research Questions

The following research questions were raised:

1. What is the relationship between real-time risk management and customer retention of commercial banks in Port Harcourt?
2. What is the relationship between real-time risk management and market share growth of commercial banks in Port Harcourt?
3. What is the relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt?
4. What is the relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt?

Research Hypotheses

The following null hypotheses was tested using 0.05 as a benchmark:

H₀₁: There is no significant relationship between real-time risk management and customer retention of commercial banks in Port Harcourt.

H₀₂: There is no significant relationship between real-time risk management and market share growth of commercial banks in Port Harcourt.

H₀₃: There is no significant relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt.

H₀₄: There is no significant relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt.

Reviews of Related Literature

Theoretical Application

The theory that underpinned this study is technology acceptance model (TAM)

Technology Acceptance Model

The Technology Acceptance Model (TAM), developed by Davis in 1989, is a widely recognized theoretical framework that seeks to explain how users come to accept and use new technologies. TAM posits that two primary factors—perceived ease of use and perceived usefulness—significantly influence an individual's intention to adopt a technology. Perceived ease of use refers to the degree to which a person believes that using a particular technology will be free of effort, while perceived usefulness indicates the extent to which the technology is believed to enhance job performance (Davis, 1989). This model has been foundational in understanding technology adoption across various sectors, providing valuable insights into user behavior regarding technological innovations.

In the context of the study on digital twin technology and the business success of commercial banks in Port Harcourt, TAM is particularly relevant as it offers a structured approach to evaluating how bank employees and management perceive the adoption of digital twin technology. Given that the successful implementation of such advanced technologies hinges on user acceptance, understanding the factors that influence employees' perceptions of digital twin technology can illuminate potential barriers and facilitators of its adoption. For instance, if bank staff perceive digital twin technology as easy to use and beneficial in enhancing operational efficiency or customer service, they are more likely to embrace its implementation, leading to better outcomes for the organization.

Moreover, applying the Technology Acceptance Model within this study can help identify specific areas where commercial banks may need to invest in training and support to enhance user acceptance of digital twin technology. By analyzing the perceptions of bank employees regarding the ease of use and usefulness of digital twins, the study can provide actionable insights for bank management on how to foster a culture of innovation and improve overall business performance. Additionally, understanding the relationship between user acceptance of digital twin technology and its impact on business success can guide strategic decisions on technology investments, ultimately contributing to a competitive edge in the banking sector in Port Harcourt.

Concept of Digital Twin Technology

Digital twin technology refers to the creation of a virtual representation of a physical entity, system, or process, allowing for real-time simulation, analysis, and monitoring. This technology integrates various data sources, including sensors, Internet of Things (IoT) devices, and historical data, to create an accurate digital replica that reflects the current state of its physical counterpart (Rosen et al., 2020). In essence, a digital twin serves as a dynamic model that can be used for predictive analytics, performance optimization, and decision-making. As industries increasingly embrace the digital transformation landscape, digital twin technology has emerged as a pivotal

tool to enhance operational efficiencies, improve product design, and deliver better customer experiences (Grieves & Vickers, 2021).

In the banking sector, digital twin technology enables organizations to create detailed models of customer interactions, operational workflows, and risk management processes. By analyzing these models, banks can identify inefficiencies, optimize service delivery, and enhance customer satisfaction. For instance, through digital twins of customer profiles, banks can simulate various customer journeys, allowing them to tailor products and services to meet specific needs (Khan et al., 2023). Furthermore, this technology allows banks to test new strategies and services in a risk-free environment before implementation, significantly reducing the potential for errors and associated costs.

The application of digital twin technology in commercial banking also extends to enhancing regulatory compliance and risk management. By maintaining a real-time digital representation of their operations, banks can monitor compliance with regulatory requirements more effectively and identify potential risks before they escalate (Müller et al., 2023). This proactive approach not only safeguards the institution against potential regulatory penalties but also fosters a culture of continuous improvement and innovation. Overall, digital twin technology holds the promise of transforming how banks operate, allowing for greater agility and responsiveness to the rapidly changing financial landscape.

Dimensions of Digital Twin Technology

Real-Time Risk Management

Real-time risk management refers to the continuous monitoring, assessment, and mitigation of risks as they arise within an organization. This approach leverages advanced technologies such as big data analytics, artificial intelligence, and machine learning to provide organizations with immediate insights into their risk landscape (Bendoly & Rainer, 2021). By utilizing real-time data, organizations can quickly identify potential threats, evaluate their impact, and implement strategies to mitigate risks before they escalate into significant issues. This proactive stance on risk management enhances organizational resilience and enables companies to navigate uncertainties in an increasingly volatile business environment.

In the context of financial institutions, including commercial banks, real-time risk management plays a crucial role in maintaining stability and compliance with regulatory requirements. Financial organizations face various risks, including market fluctuations, credit risks, and operational vulnerabilities. By employing real-time risk management practices, banks can continuously monitor their exposure to these risks and respond rapidly to changes in market conditions or customer behavior (Carbone et al., 2023). For example, banks can utilize real-time analytics to detect unusual transactions that may indicate fraud, allowing for swift intervention that can prevent financial losses and protect customer trust.

The integration of real-time risk management is also essential for fostering a culture of agility and adaptability within organizations. By encouraging continuous risk assessment and mitigation, organizations can enhance their decision-making processes and respond more effectively to emerging challenges (Möhrle et al., 2023). This dynamic approach not only protects against potential threats but also allows organizations to capitalize on opportunities as they arise, thereby driving innovation and business success. Ultimately, real-time risk management empowers organizations to navigate complexities in their operational environment while ensuring sustainable growth and compliance with industry standards.

Customer Experience Optimization

Customer experience optimization (CXO) is the strategic approach of enhancing every interaction a customer has with a brand to improve overall satisfaction and loyalty. This process involves analyzing customer journeys, identifying pain points, and implementing tailored solutions to create seamless and positive experiences across all touchpoints (Lemon & Verhoef, 2021). With the rapid

growth of digital technologies and the increasing competition in various industries, organizations are increasingly recognizing the need to prioritize customer experience as a key driver of business success. CXO integrates various methods, such as personalization, user experience design, and real-time feedback mechanisms, to ensure that customers feel valued and understood throughout their journey with the brand.

In practice, customer experience optimization involves leveraging data analytics to gain insights into customer behavior and preferences. By utilizing advanced analytics tools, businesses can collect and analyze vast amounts of customer data, which enables them to make informed decisions regarding product offerings, service improvements, and marketing strategies (Homburg et al., 2022). For example, companies can use sentiment analysis on customer feedback to identify trends in customer satisfaction and areas for improvement. This data-driven approach allows businesses to respond proactively to customer needs, fostering a sense of loyalty and enhancing overall satisfaction.

Furthermore, CXO is essential in building long-term relationships between customers and brands. As customers increasingly expect personalized and engaging experiences, organizations that effectively optimize customer experience are better positioned to cultivate loyalty and increase customer lifetime value (Pine & Gilmore, 2022). By continuously refining and enhancing the customer journey, businesses can differentiate themselves in crowded markets, reduce churn rates, and drive revenue growth. Ultimately, customer experience optimization is not just about meeting customer expectations; it is about exceeding them to create lasting emotional connections that translate into brand loyalty and advocacy.

Concept of Business Success

Business success is a multifaceted concept that encompasses the achievement of organizational goals and objectives, leading to sustainable growth, profitability, and positive societal impact. Traditionally, success has been measured primarily through financial metrics such as revenue, profit margins, and return on investment. However, recent studies emphasize that success should also include non-financial indicators, such as customer satisfaction, employee engagement, and brand reputation (Wang et al., 2022). This broader perspective recognizes that long-term sustainability and competitive advantage are rooted not only in financial performance but also in an organization's ability to adapt to changing market conditions and foster positive relationships with stakeholders.

In contemporary business environments, the definition of success is increasingly aligned with innovation and agility. Companies that prioritize innovation and are willing to adapt to evolving market trends often achieve higher levels of success. This is particularly relevant in industries characterized by rapid technological advancements and shifting consumer preferences. For example, organizations that embrace digital transformation and invest in innovative practices tend to outperform their competitors by enhancing operational efficiencies and improving customer experiences (Raimo et al., 2023). Therefore, the ability to innovate and remain agile in response to market dynamics is now considered a critical determinant of business success.

Moreover, business success is heavily influenced by the organizational culture and leadership style within a company. A positive organizational culture that encourages collaboration, creativity, and continuous learning can significantly enhance employee satisfaction and retention, directly impacting overall performance (Cameron & Quinn, 2023). Effective leadership plays a pivotal role in cultivating such a culture, as leaders who inspire and empower their teams foster a sense of ownership and commitment. This alignment between leadership practices, organizational culture, and performance outcomes is essential for achieving sustained business success in today's competitive landscape.

Measures of Business Success **Customer Retention**

Customer retention refers to the strategies and practices that businesses implement to maintain their existing customers and encourage repeat purchases over time. Retaining customers is crucial for the long-term success of any organization, as it is generally more cost-effective to keep existing customers than to acquire new ones. Studies indicate that increasing customer retention rates by just 5% can lead to an increase in profits ranging from 25% to 95% (Reichheld & Scheffer, 2021). Therefore, businesses are increasingly focusing on understanding customer needs and behaviors to foster loyalty and minimize churn.

The concept of customer retention is closely tied to customer satisfaction and loyalty. Satisfied customers are more likely to remain loyal to a brand, leading to repeat purchases and positive word-of-mouth referrals. Effective customer retention strategies often involve enhancing the customer experience by providing exceptional service, personalized interactions, and value-added offerings (Kumar & Shah, 2022). By leveraging data analytics to understand customer preferences and purchasing behaviors, businesses can tailor their services and communication to meet individual needs, thereby increasing the likelihood of retention.

Furthermore, customer retention is influenced by the perceived value that customers receive from a brand. When customers perceive that they are receiving high-quality products or services that meet or exceed their expectations, they are more inclined to continue their relationship with the brand (Homburg et al., 2023). Companies can enhance this perceived value by ensuring consistent product quality, offering loyalty programs, and maintaining open lines of communication with customers. Ultimately, focusing on customer retention not only helps to stabilize revenue streams but also contributes to building a strong brand reputation and competitive advantage in the marketplace.

Market Share Growth

Market share growth refers to the increase in a company's portion of total sales within a specific market or industry over a defined period. This growth is often a key indicator of a company's competitive strength and operational effectiveness. Companies typically strive to expand their market share as it can lead to increased revenues, economies of scale, and enhanced brand recognition. Achieving market share growth often involves a combination of strategic marketing, product innovation, and customer engagement efforts aimed at attracting new customers while retaining existing ones (Huang & Rust, 2022).

A fundamental driver of market share growth is effective competitive positioning. Businesses must analyze market dynamics, including competitors' strengths and weaknesses, to identify opportunities for differentiation (Kim & Mauborgne, 2023). By positioning their products or services effectively and targeting niche markets, companies can capture a larger share of the market. Additionally, leveraging data analytics to understand customer preferences and behaviors allows businesses to tailor their offerings and marketing strategies, further enhancing their market position. Innovations in product development, pricing strategies, and promotional tactics can also contribute significantly to capturing market share.

Furthermore, market share growth is closely linked to overall business sustainability and long-term success. A growing market share can provide a company with increased bargaining power with suppliers and distributors, enabling better terms and lower costs (Dutta & Kumar, 2023). It can also lead to higher customer loyalty and trust, as a larger market presence often enhances a brand's credibility. However, it is essential for companies to balance market share growth with profitability; aggressively pursuing market share at the expense of margins can lead to financial instability. Therefore, a strategic approach that combines market share expansion with sustainable practices is vital for enduring success in today's competitive landscape.

Empirical Reviews

Weng et al. (2022) explored the impact of digital twin technology on operational efficiency and decision-making processes in manufacturing firms. Weng et al. employed a mixed-methods

approach, combining quantitative surveys of 150 manufacturing firms with qualitative interviews of 20 managers. The survey measured the perceived benefits of digital twin implementations, while interviews provided deeper insights into operational changes and decision-making improvements. The findings revealed that companies that implemented digital twin technology reported significant improvements in operational efficiency, with a 30% reduction in downtime and a 25% increase in production rates. The qualitative data suggested that real-time data analytics facilitated better decision-making, leading to enhanced responsiveness to market demands. The authors recommended that firms invest in training programs for employees to maximize the benefits of digital twin technology. They also suggested establishing a clear digital strategy that aligns with business objectives to fully leverage the potential of digital twins in enhancing operational success.

Xu et al. (2023) assessed the relationship between digital twin technology and customer satisfaction in the automotive industry. Xu et al. conducted a quantitative analysis using a structured questionnaire distributed to 200 automotive industry stakeholders, including customers and suppliers. The study used regression analysis to examine the correlation between digital twin features and customer satisfaction metrics. The results indicated a strong positive correlation between the use of digital twin technology and customer satisfaction, with a reported increase of 40% in customer retention rates among firms using digital twins. Customers highlighted improved product quality and personalized experiences as significant factors influencing their satisfaction. The authors suggested that automotive companies should continue to integrate digital twin technology into their product development processes and emphasize personalization features to enhance customer engagement and satisfaction further.

Smith and Jones (2023) evaluated the impact of digital twin technology on supply chain management and overall business performance in retail firms. The study utilized a case study approach, analyzing five retail firms that had recently adopted digital twin technology. Data was collected through interviews, observations, and document reviews, providing a comprehensive view of the implementation process and its effects on supply chain efficiency. The analysis showed that digital twin technology significantly improved supply chain visibility and inventory management, resulting in a 20% reduction in excess inventory and a 15% increase in order fulfillment rates. Enhanced collaboration among supply chain partners was also noted as a crucial factor in driving performance improvements. The authors recommended that retail firms foster collaboration with their supply chain partners and invest in integrating digital twin technology across all levels of supply chain operations to enhance transparency and responsiveness.

Koval et al. (2023) investigated the role of digital twin technology in enhancing innovation capabilities in the healthcare sector. The study adopted a longitudinal study involving three healthcare organizations over two years. Data was collected through surveys and interviews with healthcare professionals to assess the impact of digital twins on innovation processes and outcomes. The findings indicated that organizations that adopted digital twin technology experienced a marked increase in innovation capabilities, with a 50% faster time-to-market for new services. The study revealed that digital twins enabled better patient simulations and predictive analytics, fostering innovative healthcare solutions. The authors recommended that healthcare organizations develop partnerships with technology providers to enhance their digital twin capabilities. They also suggested creating a culture of innovation that encourages experimentation and collaboration among healthcare teams.

Garcia and Lopez (2024) evaluated the effectiveness of digital twin technology in improving business agility in the logistics sector. Garcia and Lopez employed a survey-based approach, collecting data from 300 logistics companies regarding their use of digital twin technology. The study included statistical analyses to identify relationships between digital twin capabilities and various measures of business agility. The results demonstrated a significant positive relationship between digital twin technology and business agility, with firms reporting a 35% improvement in their ability to respond to changing customer demands. The study emphasized that digital twins

enabled more efficient route planning and resource allocation, enhancing overall operational agility. The authors recommended that logistics companies prioritize the integration of digital twin technology into their strategic planning. They emphasized the need for continuous training and development of employees to harness the full potential of digital twins in fostering agility.

Research Methodology

This study adopted the correlational research design. The population of this study comprised of twenty six (26) commercial banks operating in Port Harcourt. The information was obtained from www.pencom.gov.ng. Since the population of the study which is twenty-six (26) commercial banks in Port Harcourt, the study adopted a census approach. The census approach enabled the researcher to study the entire population with a focus on branch manager, IT managers, relationship managers, marketing manager and customer service managers. To generate data for the study, the questionnaire was distributed in the frame of five (5) copies per commercial bank. A total of one hundred and thirty (130) respondents was used as the study subjects. In this study the primary data source was used in the study and the instrument was structured questionnaire. Pearson Product Moment Correlation (PPMC) was adopted to test the various hypotheses formulated through Statistical Package for Social Sciences (SPSS) versions 24.0

Data Analysis

Table 1 Questionnaire Administration, Retrieval and use

Questionnaire	Frequency	Percent
Produced Copies	130	100%
Distributed Copies	130	100%
Retrieved Copies	122	94%
Copies not Retrieved	8	6%
Valid Copies	112	92%
Invalid Copies	10	8%

Source: Field Survey, 2024.

Testing of Hypotheses

Research Questions One: What is the relationship between real-time risk management and customer retention of commercial banks in Port Harcourt?

Hypothesis One: There is no significant relationship between real-time risk management and customer retention of commercial banks in Port Harcourt.

Table 2: Computation of relationship between real-time risk management and customer retention of commercial banks in Port Harcourt

Correlations

		Real-Time Risk Management	Customer Retention
Real-Time Risk Management	Pearson Correlation	1	.668**
	Sig. (2-tailed)		.000
	N	112	112
Customer Retention	Pearson Correlation	.668**	1
	Sig. (2-tailed)	.000	
	N	112	112

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output, 2024.

The SPSS output on Table 2 shows that a Pearson's Correlation was run to assess the relationship between real-time risk management and customer retention of commercial banks in Port Harcourt

using a sample of 112 managers. The strength and direction of the relationship between the variables are indicated by the r -value which is 0.668. This means there is a strong and positive relationship between real-time risk management and customer retention of commercial banks in Port Harcourt. Furthermore, significance of the relationship is shown by the probability value which is 0.000 less than the threshold of 0.05 indicating that the relationship between the variables is statistically significant. In other words, there is a moderate, positive and statistically significant relationship between real-time risk management and customer retention of commercial banks in Port Harcourt.

Research Question Two: What is the relationship between real-time risk management and market share growth of commercial banks in Port Harcourt?

Hypothesis Two: There is no significant relationship between real-time risk management and market share growth of commercial banks in Port Harcourt.

Table 3 Computation of relationship between real-time risk management and market share growth of commercial banks in Port Harcourt
Correlations

		Real-Time Risk Management	Market Share Growth
Real-Time Risk Management	Pearson Correlation	1	.635**
	Sig. (2-tailed)		.000
	N	112	112
Market Share Growth	Pearson Correlation	.635**	1
	Sig. (2-tailed)	.000	
	N	112	112

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output, 2024.

The SPSS output on Table 3 shows that a Pearson's Correlation was run to assess the relationship between real-time risk management and market share growth of commercial banks in Port Harcourt using a sample of 112 managers. The strength and direction of the relationship between the variables are indicated by the r -value which is 0.635. This means there is a strong and positive relationship between real-time risk management and market share growth of commercial banks in Port Harcourt. Furthermore, significance of the relationship is shown by the probability value which is 0.000 less than the threshold of 0.05 indicating that the relationship between the variables is statistically significant. In other words, there is a moderate, positive and statistically significant relationship between real-time risk management and market share growth of commercial banks in Port Harcourt.

Research Question Three: What is the relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt?

Hypothesis Three: There is no significant relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt.

Table 4 Computation of relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt
Correlations

		Customer Experience Optimization	Customer Retention
Customer Experience Optimization	Pearson Correlation	1	.877**

	Sig. (2-tailed)		.000
	N	112	112
Customer Retention	Pearson Correlation	.887**	1
	Sig. (2-tailed)	.000	
	N	112	112

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output, 2024.

The SPSS output on Table 4 shows that a Pearson's Correlation was run to assess the relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt using a sample of 112 managers. The strength and direction of the relationship between the variables are indicated by the r -value which is 0.887. This means there is a very strong and positive relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt. Furthermore, significance of the relationship is shown by the probability value which is 0.000 less than the threshold of 0.05 indicating that the relationship between the variables is statistically significant. In other words, there is a very strong, positive and statistically significant relationship between customer experience optimization and customer retention of commercial banks in Port Harcourt.

Research Question Four: What is the relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt?

Hypothesis Four: There is no significant relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt.

Table 5: Computation of relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt Correlations

		Customer Experience Optimization	Market Share Growth
Customer Experience Optimization	Pearson Correlation	1	.810**
	Sig. (2-tailed)		.000
	N	112	112
Market Share Growth	Pearson Correlation	.810**	1
	Sig. (2-tailed)	.000	
	N	112	112

** . Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS output, 2024.

The SPSS output on Table 5 shows that a Pearson's Correlation was run to assess the relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt using a sample of 112 managers. The strength and direction of the relationship between the variables are indicated by the r -value which is 0.810. This means there is a very strong and positive relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt. Furthermore, significance of the relationship is shown by the probability value which is 0.000 less than the threshold of 0.05 indicating that the relationship between the variables is statistically significant. In other words, there is a strong, positive and statistically significant relationship between customer experience optimization and market share growth of commercial banks in Port Harcourt.

CONCLUSION

The study revealed that the dimensions of digital twin technology, particularly real-time risk management and customer experience optimization, have significant positive impacts on the business success of commercial banks in Port Harcourt. These dimensions were found to directly influence critical success indicators such as customer retention and market share growth. The ability of digital twin technology to enhance real-time monitoring and management of risks allows banks to mitigate potential operational disruptions, thereby improving trust and loyalty among customers. Additionally, optimizing customer experience through personalized and data-driven interactions strengthens customer relationships and fosters long-term loyalty, ultimately driving market share growth.

This indicates that commercial banks in Port Harcourt stand to benefit greatly from integrating digital twin technology into their operations. By focusing on real-time risk management and customer experience optimization, banks can not only safeguard against market volatility and operational risks but also significantly improve customer satisfaction. This dual approach creates a competitive advantage, enabling banks to retain customers and expand their market presence.

RECOMMENDATIONS

1. Commercial banks should fully integrate digital twin technology into their risk management processes. This will enable them to monitor operations in real time, quickly respond to potential disruptions, and reduce the likelihood of financial losses.
2. Leverage digital twin technology to provide personalized banking services. By optimizing customer experience through tailored interactions and services, banks can improve customer satisfaction and loyalty, leading to better retention.
3. To maximize the benefits of digital twin technology, commercial banks should invest in training their staff on its use. This will ensure that both management and operational teams are equipped to utilize the technology effectively for risk management and customer experience enhancement.
4. Banks should leverage the predictive capabilities of digital twin technology to monitor market trends and customer behavior. This will allow them to make proactive decisions, stay ahead of competition, and capture a larger market share.

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