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Commercial Banks



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Technology Innovation Strategy and the Competitiveness of Kenyan Commercial Banks



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ABSTRACT

Purpose: This study investigated the effect of Technological innovation strategy on the competitiveness of Kenyan commercial banks. The study was anchored on Schumpeter's Innovation Theory, the Value Innovation Theory and innovation diffusion Theory.

Methodology: The study adopted a positivist philosophy and descriptive-correlational design. Primary data were collected from bank executives, complemented by secondary data from the Central Bank of Kenya.

Findings: Bivariate regression analysis established that product innovation strategy has a positive and statistically significant effect on competitiveness $F(1,134) = 74.983, p < .001$. Using data from innovation-focused executives across 39 licensed banks, competitiveness was measured through market share, return on equity and customer satisfaction. Technological innovation was assessed through adoption of new systems, Integration of digital channels and use of Artificial Intelligence and data analytics. A simple linear regression analysis was conducted to test the hypothesis that technological innovation significantly influences bank competitiveness. The results indicated a positive and statistically significant relationship between technological innovation and competitiveness, suggesting that while technology adoption is critical.

Unique Contribution to Theory, Policy and Practice: The findings contributes to knowledge, policy, and practice by demonstrating that technological innovation strategies, when effectively implemented, provide measurable competitive advantages for banks, thereby extending theoretical understanding of innovation in emerging markets. It offers policymakers evidence-based insights to develop supportive frameworks for technology adoption, fintech collaborations, and AI integration, while guiding banking practitioners on aligning technological investments with strategic objectives to enhance market share, profitability, and customer satisfaction.

Keywords: *Technological Innovation, Competitiveness, Commercial Banks, Kenya, Innovation Strategy*

Background of the Study

The competitiveness of commercial banks in today's financial environment increasingly depends on their ability to adopt, integrate, and leverage technological innovations. Globally, the financial services sector has undergone profound transformations due to rapid technological advancement. Banks are now able to improve operational efficiency, expand service delivery, enhance customer experiences, and reduce transaction costs through innovations such as digital banking platforms, blockchain technologies, artificial intelligence, and automated processes (PwC, 2017; Ernst & Young, 2019). These innovations have not only streamlined traditional banking operations but also enabled the emergence of new business models, including fintech partnerships, mobile money services, and digital lending platforms, reshaping global banking competitiveness landscapes.

At the regional level, particularly in emerging markets, technological innovation has served as a critical enabler for financial inclusion and market expansion. Studies indicate that banks which adopt digital banking channels and innovative payment systems can reach underserved populations and reduce operational costs associated with physical branches (Kithinji & Wanjohi, 2021). Moreover, regional financial institutions are increasingly recognizing technology as a strategic tool for differentiation, with investments in analytics, customer relationship management systems, and cybersecurity measures being central to maintaining competitive advantage. Despite these developments, the effectiveness of technology-driven strategies in enhancing competitiveness remains varied, with some banks failing to realize the anticipated gains due to challenges in integration, regulatory compliance, and workforce adaptability.

Locally, in the Kenyan banking sector, technological innovation has played a transformative role in reshaping how banks operate and compete. Kenya has emerged as a global pioneer in mobile banking and financial technology adoption, with innovations such as mobile money platforms, agency banking, digital wallets, and integrated banking applications revolutionizing the delivery of financial services (CBK, 2022). Partnerships between commercial banks and fintech firms have further accelerated technological adoption, enabling banks to offer faster, more secure, and more convenient financial services. These innovations have not only improved accessibility and convenience for customers but have also allowed banks to reduce operational costs, increase transaction efficiency, and offer diversified financial products. Despite these advances, the impact of technological innovation on competitiveness in Kenyan banks remains uneven. While some banks have successfully leveraged technology to gain market share, enhance customer loyalty, and achieve operational efficiency, others have struggled to translate technology investments into sustained competitive advantage due to challenges such as high implementation costs, integration difficulties, limited customer adoption, and regulatory compliance (Ngumi, 2014; Wanyoike, 2016).

The dynamic interplay between technological innovation and competitiveness underscores the need for a strategic approach to technology adoption. It is not sufficient for banks to implement innovative solutions; the effectiveness of such innovations is largely determined by how well they

are aligned with broader organizational strategies, customer needs, and market conditions (CBK, 2023). In this context, examining the relationship between technological innovation strategy and competitiveness in the Kenyan banking sector is critical for understanding whether technology serves merely as an operational tool or as a strategic lever that can sustain long-term competitive advantage. By providing empirical evidence on this relationship, the study seeks to inform policy, guide managerial decision-making, and contribute to the broader discourse on the role of innovation in enhancing the performance and competitiveness of commercial banks.

Statement of the Problem

Despite substantial investments in technological innovation by Kenyan banks, ranging from mobile platforms and digital lending to core banking system upgrades, questions persist regarding the actual impact of these innovations on competitiveness. Some banks, despite adopting cutting-edge technologies, continue to struggle with customer acquisition, profitability, or differentiation, while others have leveraged technology to expand market share and strengthen customer loyalty (KBA, 2021; CBK, 2023). Previous studies have produced mixed results: some indicate strong positive effects of technology adoption on competitiveness (Wanyoike, 2016; Gikandi & Bloor, 2010), while others highlight marginal or non-significant impacts due to challenges of scalability, customer readiness, and regulatory constraints (Ngumi, 2014).

This gap underscores the need for empirical examination of the direct relationship between technological innovation strategy and competitiveness in the Kenyan banking sector, providing evidence that can guide both academic discourse and policy formulation.

Objective of the Study

To assess the relationship between Technological innovation strategy and the competitiveness of Kenyan Commercial banks.

Theoretical Framework

Schumpeter's Theory of Innovation

Schumpeter (1934) and (1942) was among the first scholars to attempt to define Innovation under economic theory and entrepreneurship. In his earlier papers, he describes economic state of equilibrium for firms in a stable industry of routine economic activities, which is unsettled by the disequilibrium effects of innovation. The launch of new products and procedures, according to Schumpeter (1934), pulls economic systems away from equilibrium.

In expounding the change from mundane economic growth to the dynamic economic expansion, Schumpeter introduced the concept of 'new combinations' referring to the introduction of a new product(s), new feature of a product, new production method, new market, new source of raw material supply. He further argues that innovation is establishing new production function that eventually leads to implementing new organization.

While the critics of this theory argue that it is overly broad and neglecting minor advancements as it combines technical, organizational and marketing innovations, which should be separated, supporters of the theory argue that Schumpeter's theory of Innovation forms the foundation for innovation strategies as it is "new combinations" and new production function that eventually lead to a new organization. This is achieved through enhanced or new processes, products, service offerings, business models and/or novel technologies availed to the current or new markets (Kiveu, Namusonge, & Muathe, (2019). Subsequent research on innovation strategies references this theory and proceed to unpack the "new combinations" to granular innovation strategy types.

In their research on the evolution and relevance of Schumpeterian entrepreneurship model, Mehmood, Alzoubi, & Ahmed (2019) argue that Schumpeter developed a dynamic model attributed with definition of innovation as the development of novel products and/or processes. McDaniel (2000) argues that the definition of innovation as the establishment of a novel production function comprised of five specific parameters leading to a new production function. These are (1) introduction of a new product, (2) introduction of a new production method, (3) opening of new market(s), (4) identification of a new source of supply of new materials, and (5) the creation of a new organization in an industry. Kiveu, Namusonge., & Muathe (2019) argue that theory informs the various innovation strategies that a firm can use to generate value. This enhances firm's competitiveness as a firm innovating using these strategies can deepen their market share or venture into new market spaces created by the new combinations. The theory is relevant to this study in identifying innovation strategies that a firm can adopt to enhance their competitive advantage. It recognizes innovation strategies as the new production function and combinations that leads to a new organization.

Value Innovation Theory

Kim & Mauborgne (2004) socialized the concept of value innovation that emanated from their 1997 Harvard Business Review essay and later authored the book Blue Ocean Strategy in 2005. Value innovation is a strategic principle of "blue ocean strategy," a corporate approach that focuses on establishing new markets rather than fighting existing competition. Following that, Amit & Zott (2012) proposed value innovation theory, which describes a pursuit of both distinctiveness and relatively inexpensive strategies providing value for both the consumer and the organization. Buyers derive value from an offering's utility minus its price, whereas a firm derives value from an offering's price minus its cost. When the complete system of utility, cost, and price is aligned, value innovation is simple to achieve.

The four action framework, according to the duo includes, first, to eliminate the factors that are below the industry's standards and the firms spend a lot to compete in but have less value to the organizational' competitiveness, bringing no profits. Secondly, the organization should reduce those factors that are below the industry's standard, the products and services they overdesigned at the completion and stress the firms' cost structure with little gain from the overdesigned services. Thirdly, companies should focus on elements that can be improved much above industry standards

and are beneficial to customers but are overlooked by their competitors. These factors usually do not have enough factor inputs. Fourthly, the firm should create factors that should be created but the industry has never presented. These factors can produce new demand for both the existing customers and open up new market for companies. This Eliminate-Reduce-Raise-Create Grid forms drive that pushes organizations to create a new value and identify the new market blue ocean. This framework encourages businesses to not only focus on eliminate and create value factors but also lessen and raise factors (Zhang & Zhu., 2022).

Value innovation theory is not a prescriptive theory on the type of innovation strategies a firm should adopt but rather a pragmatic strategic approach an organization can use to create innovation capabilities and value for the customers and establish uncontested market space. Kim & Mauborgne (2004) argue that, any organization can use the value innovation to eliminate the factors it competes on and build something novel for new market demands. Value innovation and blue ocean strategies not only enhance competitive advantage of a firm but goes ahead to eliminate factors that the firm competes in, in the current market. This is by creating products and/or services that have no direct competition through a combination of both differentiation and low cost strategies (Sarasini & Langeland., 2021).

Implementing Value Innovation faces some challenges especially for heavily regulated industries where a firm's options are limited, however, with a pragmatic eliminate-reduce-raise-create approach; a firm can identify innovative ways to beat competition. Zhang & Zhu (2022) uses Value Innovation Theory to study how business model innovation is promoted through social media strategic capability. Liao, Shu-Hsien; Kuo, Fang-I.; Ding, Li-Wen (2017) in their study on evaluating the effect of supply chain collaboration value innovation on competitive advantage found that the Taiwan Networking firms significantly improved their competitive advantage by using value innovation strategies. In their study, Kim & Mauborgne (2004) noted that Compaq were able to give users additional services space on their server product with twice the performance and a third of the price by adopting value innovation and hence stayed on top of the server industry.

The theory is relevant to this study in linking innovation strategies to firm's competitive advantage. It argues that a firm can not only eliminate the factors it competes on in the current market, but also create uncontested market space through simultaneous pursuit of innovation strategies that create value for both the customer and the business.

Innovation diffusion Theory (Roger 1962)

The Innovation Diffusion Theory (IDT) explains how innovations are communicated and adopted over time within a social system.

It identifies five critical elements that influence the adoption process: (1) Innovation Characteristics (relative advantage, compatibility, complexity, trialability, observability); (2) Communication Channels (methods through which information flows); (3) Time (rate of adoption); (4) Social System (the norms and structure of the adopting group); and (5) Adopter

Categories (innovators, early adopters, early majority, late majority, and laggards). The theory highlights that innovations diffuse more effectively when perceived as offering significant advantages, aligning with existing values and needs, and being relatively easy to understand and use. Adoption progresses as information spreads through effective communication channels and social structures.

Innovation Diffusion Theory provides a robust theoretical framework to examine how innovation strategies influence the competitiveness of Kenyan commercial banks. The theory's emphasis on the process of innovation adoption aligns well with the study's focus on understanding how banks integrate innovation into their strategies and operations to drive competitive advantage. By utilizing IDT, the study bridges the gap between innovation as a concept and its practical application in driving competitiveness within Kenya's banking sector. The theory helps frame the pathways and barriers to innovation adoption, ultimately guiding actionable recommendations for fostering an innovation-driven competitive edge. It helps assess how banks perceive the benefits and feasibility of adopting innovation strategies, such as marketing innovation, technological innovation, and process innovation, Examine how information about new strategies and practices is disseminated within and across banks, influencing adoption rates; Investigate how different bank tiers and leadership styles affect the pace and depth of innovation adoption. Analyze how social and structural norms within banks enable or hinder innovation diffusion at organizational innovation strategy level.

Dynamic Capability Theory

Teece et al. (1997) developed the dynamic capacities theory in response to a significant weakness of the resource-based perspective of the company, which has been criticized for presuming resources and disregarding aspects surrounding resources. Dynamic capabilities take into account how resources are generated, integrated into the company, and used to gain a competitive edge. It is defined as the ability to develop, integrate, and reconfigure internal and external competences in order to respond quickly changing environs (Kiveu, Namusonge, & Muathe, 2019). Dynamic capabilities, which are formed by a firm's dynamic resources, assist firms in adjusting their resource mix in order to maintain a competitive edge that would otherwise be swiftly worn away. These dynamic capabilities are strategic assets that act as a collection of highly technical resources and competencies that are limited, appropriate, and difficult to trade or mimic, providing the organization with a competitive edge. Kiveu, Namusonge, & Muathe (2019) argue that the concept of dynamic capabilities offers a wider framework for understanding how firms utilize their dynamic capabilities to create value that gives them competitive advantage in an extremely dynamic environment. Wade and Hulland (2004) looked at the dynamic capabilities as innovation capabilities and strategies, which can be useful to firms' adaptation in rapidly changing environments. The development, integration and release of these resources can create innovation capabilities for the firms that directly or indirectly boost their competitive advantage. Given market positions and dependency on current paths to them, the dynamic capabilities indicate the firm's

ability to establish and sustain new and inventive kinds of competitive advantage. In their study, Kim and Mauborgne (2005) found out that Amazon leveraged on their dynamic capabilities to create innovation capabilities and value innovation strategies that significantly improved their competitive advantage to emerge as the world's leading online book retailer.

The theory is relevant to this study in linking innovation strategies to firm's competitive advantage. It argues that internal dynamic capabilities of a firm are rare innovation capability resources that a firm can give a firm a competitive advantage. It further argues that when a firm possesses rare resources and/or unique strategies that cannot be imitated by other firms, it has potential to compete and perform better than the other firms.

The McKinsey 7S Framework

Peters and Waterman (1980) developed the McKinsey 7S model/frameworks a strategic planning tool aimed at depicting how organisation effectiveness, performance and competitiveness can be achieved through the interactions of seven key elements/factors:(1) Strategy, (2) Structure, (3) Systems, (4) Shared values, (5) Style, (6) Skills and (7) Staff. A key note of the model is that all the seven elements are interlocked such that a change in one requires change in the other elements, for the firm to operate effectively. The framework argues that right alignment and fortification of these seven factors can help a firm gain competitive advantage and improve performance. The theory argues that, for a strategy to be competitive and yield desired results for the firm, it must be implemented well and in alignment with the other six elements of the McKinsey 7S model.

The model/framework is relevant to this study as it demonstrates the linkage between strategy and other organizational elements that enhance firm's competitiveness and performance. The framework can be used to determine how innovation strategies can be alignment alongside other firm elements to create and sustain competitive advantage. Chmielewska, Stokwizewski, Markowska, & Hermanowski (2022) uses McKinsey 7S framework to evaluate the performance of public hospitals. Muigai, & Gitau (2018) used the McKinsey 7S Framework in their study on the effect of innovation strategies on the performance of banking industry in Kenya and found out that the model explained the linkage between the innovation strategies to other organization factors that enhance banks performance.

Trade theory of Competitive Advantage and Porters Diamond Model

The trade theory of competitive advantage developed in earlier years of 1990s by Michael Porter was the origin of explaining competitive advantage, albeit larger focus on national and country competition relative to another (Fagerberg & Srholec, 2017). Melitz (2003) seminal theoretical model was the first formal adoption of empirical research on industry and firm level competitiveness. The economic and business literature like Falciola, Jansen, & Rollo (2020) recognizes and quotes that it is the firms, not nations, which compete in international markets and countries do not buy or sell goods overseas; companies do.

To improve the Trade theory of competitive advantage, Porter (1990) developed Porter's Diamond Model, an important development in the concept of competitiveness with a systematic approach for measuring and comparing the determinants and indicators of competitiveness. The model allowed probing why some countries were more competitive than others and why some industries within nations are more competitive than others (Chen., & Yang, 2021). This model comprises of four determinants of competitive advantage: demand conditions, factor conditions, firm's strategy, related and supporting industries and structure and rivalry. The Porter's concept is that these factors interrelate with each other to form conditions that converge innovation and competitiveness. However, Porter's diamond model has faced criticism as narrowly focusing on domestic indicators when analyzing competitiveness (Chung, 2016).

The theory and the model is relevant to this study as it points to the conditions or determinants that a firm can use to improve their innovation capabilities and subsequently influence the competitive advantage. Tsai, Chen, & Yang, (2021) uses Porters Diamond Model to study competitiveness of Solar Photovoltaic Industry in Chung (2016) uses Porters Diamond Model to study the competitiveness of the logistics cluster among Asia Main Countries. Márkus (2008) used Porters Diamond Model to measure firm-level competitiveness for a 500-company sectoral representative sample and validated that the model provides a relevant framework to measure relative competitiveness of firms.

Conceptual Framework

Independent Variables

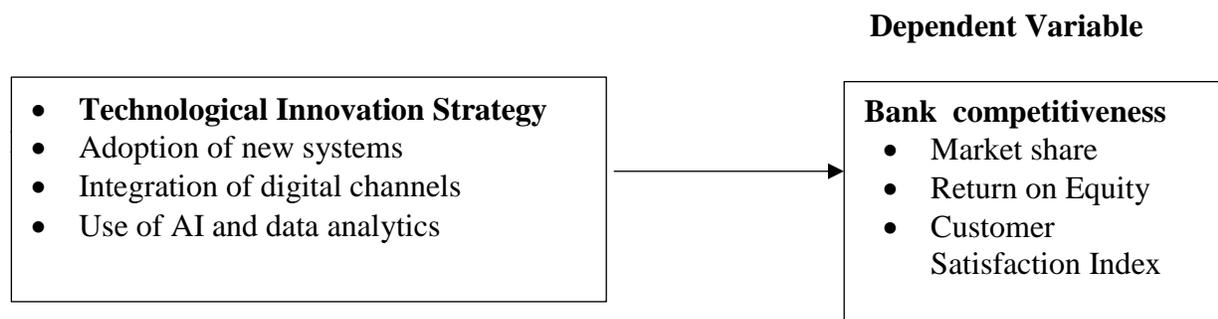


Figure 1: Conceptual Framework

Technological Innovation Strategy

Technological innovation is defined as the process through which a company or organization develops new and/or enhanced techniques that result in new or improved goods or manufacturing processes by using technological knowledge (Mutegi, 2018). It covers everything from concept generation to research and development to commercialization and distribution of new and improved techniques, processes, products, and services across the economy (Wangila, 2018). The goal of technological innovations, also known as new technology exploitation (NTE), is to improve the performance of products or manufacturing processes by increasing efficiencies, automating

manual processes and reducing associated human errors, or providing technological enablers to business processes, all of which improve the firm's competitiveness. The Management's incapacity to recognize and handle breakthrough technology innovation frequently leads to inefficiencies and discontent in the business.

Wangila (2018) identifies three types of technological innovations namely: adoption of new technologies or systems; Modifications of current technologies and Changes in the production techniques.

Research done on the impact of technology innovation and firm's competitiveness indicate positive and significant correlation. Technological innovation such as mobile and internet banking significantly enhances bank competitiveness and financial inclusion (Koori et al., 2020; Asongu & Nwachukwu, 2019). Recent evidence confirms its role in improving performance and efficiency (Mbuthia & Datche, 2023; Kimotho, 2022; Ondiek, 2021; Ogalloh, 2023). Study done by Mochama (2021) on Kenyan financial technology (fintech) companies found that statistically significant effect of technology innovation on firm's competitiveness, in that, holding all other factors constant, a unit increase in technological innovation resulted to 0.226 increase in competitive advantage. Mugo, & Macharia (2021) found that technological innovation had a positive significant effect on competitive advantage of Kenyan telecommunication companies, with a unit increase resulting to 0.19 increase in the competitiveness. Mutegi (2018), Wangila (2018), Mburu. (2016), Amboka & Ssemugenyi (2014) all indicate that technological innovation is an independent variable that has positive significant effect on firm's competitiveness.

This study considers technological innovation as an independent variable because of the following reasons: (1) technological innovations enhance productivity by eliminating human inefficiencies resulting to reduced waste, human errors and hence low production cost per unit. (2) Technological innovation enables shorter production cycles enabling mass production and hence the business is able to meet wider market demands giving it deeper penetration. (3) Technological innovations enables the firm to do product differentiation by either improving existing product or creating new products that give it a competitive edge in the market, to even explore untapped market segments. (4) Technological innovations enhances the ability of an organization to quickly adapt to changes in the market and customer needs by availing more alternate channels, ability to customize products and iteratively collect feedback from customer and hence improve customer experience.

Firms use technology innovations to improve production process by building more efficiencies, more channels or shorten production cycle to meet growing customer demands and deepen market penetration.

This translates to sustained or creation of new competitive landscape either through differentiation enabled by technological innovation or low production cost due to increased production efficiencies. Consequently, we raise the hypothesis that technological innovation has a positive impact on firm's competitive advantage.

Competitiveness

Firm's competitiveness is a multivariate construct including both financial and nonfinancial indicators and hence the variables should be measured in a co-joined manner Doncheva (2020), Maudos, (2017), Depperu, & Cerrato (2005). Generally, superior market or economic performance are considered as the indicators of competitive advantages (Depperu, & Cerrato; 2005) with profitability being regarded as the most important metric for determining competitive performance. Profitability ratios can be used to gauge economic performance in the short term, while financial performance metrics such as Return on Assets (ROA), Return on Sales (ROS), Return on Investment (ROI), Value added per org employee, and others are employed in the long run. In a market or industry where products are largely homogenous, relative productivity and cost leadership are good indicators of competitiveness. The nonfinancial indicators of competitiveness mostly used are market share, customer loyalty/satisfaction index, suppliers' loyalty, staff retention etc. as fronted by Doncheva (2020), Maudos, (2017), Depperu, & Cerrato (2005).

Market share

This is a relative indicator of firm's control of the market, usually measured as a percentage of the customer size, transaction volumes etc. relative to the industry total (Doncheva, (2020), Maudos, (2017), Depperu, & Cerrato, (2005). Since firms might chase market share at the price of profitability, the competitiveness indicator becomes skewed, evaluation should take into account both profitability and market share. A profitable market share should take into account a firm's market share while maintaining the industry profitability norm. Most of the studies have primarily used market share as the synthetic measure of competitiveness of firms. Kata (2012) measures the competitiveness of local banks using market share. The bigger the market share, the more competitive the firm is considered.

Return on Equity (ROE)

This variable indicates profitability as a factor of the equity investment to the business (Doncheva, 2020). Return on Equity (ROE) is an indication of the ability of the firm to satisfy shareholders and attract financial investment with sustained return to shareholder's value. It indicates how well the bank is utilizing its equity to generate profits for its shareholders and is calculated as:

ROE is a widely used profitability metric in the banking industry because it provides insights into the bank's ability to generate returns for its shareholders relative to the equity invested. A higher ROE indicates better profitability and efficiency in utilizing shareholder funds. Muigai, & Gitau (2018) uses Return on Equity (ROE) to measure performance of banks and as an indicator of the competitiveness of the banks. Firms with high ROE compared to their peers are considered more competitive.

Customer Satisfaction

Customer satisfaction is a widely accepted non-financial indicator of firm competitiveness. It reflects how well a firm meets or exceeds customer expectations, which directly influences loyalty, retention, and long-term profitability. In banking, where products are often homogenous, superior service quality and customer experience become key differentiators of competitiveness. Higher satisfaction leads to greater loyalty, fewer defections, and increased referrals, all of which bolster performance (Mutambik, 2023; Tegambwage & Kasoga, 2024).

Empirical studies show that higher customer satisfaction predicts stronger market share and profitability and is associated with repeat patronage and reduced switching costs. Wamburi, Kibe & Yatic (2024) found that customer intimacy strategies explained 67.5% of competitiveness variability among Tier III Kenyan banks ($R = .822$). Kenyan banking data confirms by KBA report highlights that poor service remains the top reason (47.3%) customers switch banks, ahead of high fees and weak digital capabilities. In Kenya, the Customer Satisfaction Index (CSI) by the Kenya Bankers Association (KBA) and Central Bank of Kenya (CBK) reports consistently link higher satisfaction scores with stronger deposit growth and competitive positioning (KBA, 2020–2024; CBK, 2020–2024).

Thus, customer satisfaction is a robust and practical measure of competitiveness, complementing financial indicators such as ROE and market share by capturing the customer-driven dimension of competitive advantage.

RESEARCH METHODOLOGY

The study adopted a quantitative research approach, using survey data collected from innovation focused across commercial banks in Kenya. Competitiveness was operationalized through indicators such as market share growth, return on equity and customer satisfaction. Technological innovation strategy was measured by examining the extent of new product development and rollout, customization of products, and value added services to improve existing offerings.

The research was anchored in a positivist philosophy, which emphasizes objectivity and the use of quantitative methods to test hypotheses. A convergent parallel mixed methods design was adopted, whereby both quantitative and qualitative data were collected concurrently, analyzed separately, and triangulated during interpretation. Quantitative data comprised structured survey responses and secondary data from the Central Bank of Kenya (CBK) and Kenya Bankers Association (KBA), while qualitative insights were obtained from open-ended questionnaire responses.

The study population consisted of 199 bank executives drawn from the 39 licensed commercial banks in Kenya, representing the units of observation. A census approach was used, complemented by purposive stratified sampling to ensure adequate representation from each bank tier. The unit of observation was innovation-focused bank executives, while the unit of analysis was the individual banks categorized by tier. Respondents were executives directly involved in strategy, innovation, product development, operations, and ICT.

Data collection was undertaken using structured questionnaires as the primary source, supplemented by secondary data from CBK reports and annual publications from commercial banks. Data analysis involved descriptive statistics to summarize the sample (means, standard deviations, and frequencies), correlation analysis to assess relationships among variables, and simple linear regression analysis to evaluate the bivariate effect of product innovation on competitiveness. Results were presented in tables and regression models to ensure clarity and comparability.

Bivariate regression analysis was used to examine the direct relationship between Technological innovation and competitiveness. The model was specified as:

$$Y = \beta_0 + \beta_1 X, \text{ where}$$

Y = Competitiveness of the bank

X = Technological innovation strategy

RESEARCH FINDINGS AND DISCUSSION

Descriptive Analysis

Technological Innovation Strategy

The objective of this study was to assess the impact of technological innovation strategies on the competitiveness of Kenyan commercial banks. Respondents were asked to indicate their agreement with various statements on a five-point Likert scale. The results indicate a strong emphasis on technological innovation strategies among Kenyan commercial banks, with an overall mean score of 4.37 (SD = 0.37), suggesting that banks prioritizing technological innovation are likely to outperform their competitors. Specifically, 94.9% of respondents agreed that their banks implemented new or improved technologies to create or enhance products and services (M = 4.39, SD = 0.644). Additionally, 91.5% agreed that their banks regularly reviewed technological architecture and infrastructure to align with business needs and strategy (M = 4.56, SD = 0.650). A significant 93.2% of respondents confirmed that their banks had embedded data and analytics into banking processes to improve customer experience and product management (M = 4.51, SD = 0.679). Furthermore, 96.6% agreed that customers could access banking products and services through various digital channels such as mobile banking, USSD, web, WhatsApp, and cards (M = 4.68, SD = 0.539). Regarding automation, 71.2% of respondents agreed that their banks had automated most banking processes using artificial intelligence and robotic process automation tools (M = 3.98, SD = 1.058). Additionally, 89.8% agreed that technology infrastructure allowed for quick deployment and innovation of products (M = 4.31, SD = 0.650). A further 94.9% agreed that the adoption of new technologies had resulted in improved business performance (M = 4.58, SD = 0.649). Lastly, 83.0% agreed that their bank's size influenced their ability to adopt technological innovations (M = 4.29, SD = 0.966).

These findings align with previous studies, such as those by Koori, Wanjiku, and Atheru (2020), who found that mobile banking, agency banking, and internet banking innovations significantly enhanced financial inclusion in Nairobi County. Similarly, Onyango (2022) reported that technological innovations like mobile banking, ATMs, and agency banking together accounted for 66.4% of the variance in banking performance.

Table 1: Descriptive Statistics on Technological innovation Strategy

S/No	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std Deviation
1	We implement new or improved technologies to create or improve products and services	0.00%	1.69%	3.39%	49.15%	45.76%	4.390	0.644
2	We have implemented robust cyber security measures to protect customer data and digital assets	0.00%	1.69%	3.39%	32.20%	62.71%	4.559	0.650
3	Adoption of new technologies in banking has resulted into improved business performance	0.00%	1.69%	3.39%	30.51%	64.41%	4.576	0.649
4	We develop cloud-native applications for our bank business processes and products	0.00%	6.78%	11.86%	33.90%	47.46%	4.220	0.911
5	We regularly review our technological architecture and infrastructure to align it to business needs and strategy	0.00%	0.00%	8.47%	44.07%	47.46%	4.390	0.644
6	We have embedded data and analytics in banking to improve processes, customer experience and product management	0.00%	1.69%	5.08%	33.90%	59.32%	4.508	0.679
7	We have automated most of our banking processes using artificial intelligence and robotic process automation tools	0.00%	13.56%	15.25%	30.51%	40.68%	3.983	1.058
8	Our technology infrastructure allows us to deploy and innovate our products quickly	0.00%	0.00%	10.17%	49.15%	40.68%	4.305	0.650
9	Customers can access our banking products and services through various digital channels like mobile banking, USSD, web, WhatsApp, cards etc.	0.00%	0.00%	3.39%	25.42%	71.19%	4.678	0.539

10	Our bank's size influences our ability to adopt technological innovations	1.69%	5.08%	10.17%	28.81%	54.24%	4.288	0.966
	Average score	0.17%	3.22%	7.46%	35.76%	53.39%	4.37	0.379

Competitiveness of Kenyan Commercial Banks

The descriptive findings demonstrated that respondents generally perceived their banks as competitive. Overall, 91.5% (M = 4.3447, SD = 0.4228) of executives agreed that their banks had delivered consistent performance over the past five years. Similarly, 89.8% (M = 4.390, SD = 0.670) confirmed that customer bases had grown, largely driven by innovative products and customer-centric value propositions.

Customer satisfaction and experience emerged as particularly strong indicators. Respondents rated customer satisfaction with their banks' products and services highly (M = 4.492, SD = 0.728) and confirmed that their offerings met customer needs better than competitors (M = 4.508, SD = 0.679). These results underscore the critical role of customer experience in sustaining competitiveness. Agility in translating new ideas into marketable products was somewhat lower but still positive (M = 4.237, SD = 0.858), suggesting that while banks innovate, not all innovations are rapidly commercialized. Talent competitiveness was also evident, with 81.4% (M = 4.220, SD = 0.930) affirming that their institutions could attract and retain top performers, while sustainable shareholder returns were endorsed by 88.1% (M = 4.424, SD = 0.792).

Table 2: Descriptive Statistics on Bank's Competitiveness

S/No	Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Std Deviation	SD
1	The bank has consistently delivered competitively favorable performance over the last 5 years	0.00%	3.39%	5.08%	40.68%	50.85%	4.390	0.743	
2	The banks customer base is consistently growing as a result of offering innovate products with compelling value proposition	0.00%	0.00%	10.17%	40.68%	49.15%	4.390	0.670	
3	The bank translates new ideas quickly into new products and services that meet customer needs	0.00%	3.39%	16.95%	32.20%	47.46%	4.237	0.858	
4	Our customers report high overall satisfaction with the bank's products and services.	0.00%	3.39%	3.39%	33.90%	59.32%	4.492	0.728	
5	Our products and service experience meet customers' needs better than competitors.	0.00%	1.69%	5.08%	33.90%	59.32%	4.508	0.679	
6	The bank has consistently offered sustainable shareholder returns over the last 5 years	0.00%	3.39%	8.47%	30.51%	57.63%	4.424	0.792	
7	The bank attracts and retains top talent in the market, that drives innovation and business performance	1.69%	3.39%	13.56%	33.90%	47.46%	4.220	0.930	
	Average score	0.24%	2.66%	8.96%	35.11%	53.03%	4.3447	0.4228	

Simple Linear Analysis

To determine the influence of Technological innovation strategy on the competitiveness of the Kenyan commercial banks, a linear regression was used and as shown in table the regression model was statistically significant ($r^2 = 0.359$, $p < 0.05$). This therefore implies that Technological innovation strategy positively and significantly influences the competitiveness of commercial banks in Kenya. The results further indicates that Technological innovation strategy accounts for about 35.9% of the variations observed in the competitiveness of commercial banks in Kenya.

Table 1: Regression Model Summary, Technological innovation and competitiveness (all banks)

a) Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.599 ^a	.359	.354	.33983

a. Predictors: (Constant), Technological innovations strategy

b) ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.659	1	8.659	74.983	.000 ^a
	Residual	15.475	134	.115		
	Total	24.134	135			

a. Predictors: (Constant), Technological innovation strategy

b. Dependent Variable: Bank Competitiveness

c) Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.367	.345		3.963	.000
	Technological Innovations	.680	.079	.599	8.659	.000

a. Dependent Variable: Bank Competitiveness

From the regression coefficients results, the regression equation connection technological innovation strategy and commercial banks' competitiveness therefore becomes:

$$Y = \beta_0 + \beta X + e$$

$$Y = 1.367 + 0.680X_1 + 0.079$$

Where: Y= Bank Competitiveness and X₁ = Technological innovation strategy

The findings further implies that improvement in technological innovation strategy by one unit will increase the competitiveness of commercial banks by 0.599 units.

Test for Hypothesis

The first objective of the study was to assess the relationship between Technological innovation Strategy and Competitiveness of Kenyan Commercial Banks.

H_{01} : Technological Innovation Strategy has no significant role on the competitiveness of Kenyan Commercial Banks.

The regression model was statistically significant ($r^2 = 0.359$, $p < 0.05$). This therefore implies that Technological innovation strategy positively and significantly influences the competitiveness of commercial banks in Kenya.

CONCLUSION AND RECOMMENDATIONS

Conclusions

Technological innovation, including digital banking platforms, cloud-native applications, and cybersecurity measures, significantly influenced competitiveness, particularly in large banks (Tier 1). The study's descriptive and regression analyses demonstrated that banks investing in technology infrastructure and digital solutions achieve faster deployment of products and improved service delivery. These findings support the Dynamic Capability Theory and Value Innovation Theory, suggesting that banks can leverage technological resources to create superior value propositions while optimizing operational efficiency. This corroborates with the findings by Mbutia & Datche (2023), who reported that strategic technological innovations significantly enhance bank performance.

The study is also consistent with the works of Kimotho (2022) who found that financial technologies, particularly mobile banking, significantly enhance operational efficiency in commercial banks. Ondiek (2021) echoed similar sentiments, highlighting that over 90% of KCB's transactions had migrated to digital platforms, resulting in enhanced service delivery and cost optimization. Ogalloh (2023) highlighted that during the COVID-19 pandemic, technological innovations enhanced service delivery across 38 banks, corroborating the importance of technology as a strategic competitive lever. The results also resonate with Mugo and Macharia (2021), who found that technological innovation enhances competitive advantage in Kenyan financial institutions

Contrarily, Wainaina & Njeru (2021) caution that technological innovations can disrupt operations and customer experiences if not well-integrated, leading to short-term declines in customer satisfaction and profitability. Their findings suggest that a mismatch between technological rollout and internal capabilities may erode performance before any gains are realized. This provides a compelling argument for phased implementation and comprehensive change management processes. This highlights the importance of aligning technological advancements with organizational capabilities and customer needs.

Recommendations

For academics, the study contributes to innovation literature by demonstrating the contingent nature of technological innovation effects. For policymakers, the results underscore the need to promote enabling environments that encourage not only technological adoption but also capacity-

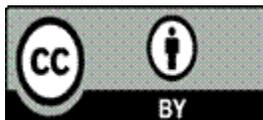
building in organizational and strategic alignment. For industry practitioners, the findings call for a holistic innovation approach that integrates technology with customer and market-driven strategies to achieve sustainable competitiveness.

Future research should investigate the joint effect of Technological innovation with other innovation strategies like, Product, marketing, process and organizational innovation in competitiveness of Kenyan commercial banks. Additionally, a further study is recommended on the moderating factors such as bank size in shaping the relationship between Technological innovation and competitiveness.

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