

Information Technology Capabilities and Competitive Advantage of SKOL Brewery Limited Kigali, Rwanda.

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Abstract

This study assessed the effect of information technology capabilities effect on competitive advantage of Skol breweries limited Kigali, Rwanda. The study was grounded in the theoretical frameworks of technological acceptance model, perceived usefulness, perceived ease of use, user acceptability, and competitive advantage theory. A design that is descriptive was deployed. To obtain the data, a sample of 97 was selected using purposive sampling techniques from a target population of 100 that include sales marketing, production, operations, commercial, logistics, supply chain and information technology staffs of Skol Brewery Ltd Kigali Rwanda. A semi-structured questionnaire was prepared to collect the necessary data. Findings unveiled that IT infrastructure capability insignificantly affected competitive advantage positively; IT personnel capability insignificantly affected competitive advantage positively while IT management capability affected competitive advantage significantly and positively. The study recommends that the management of the brewery should invest in strengthening its IT management practices to fully leverage this advantage. This can be achieved by implementing comprehensive training programs for IT staff to enhance their skills in strategic IT alignment, project management, and data analytics.

Keywords: Information Technology Capabilities, Competitive Advantage and Skol Brewery Limited

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1.1 Introduction

Globally, the brewery sector employs both direct and indirect workers in the chain of supply, including distribution, retail locations, and advertising. Additionally, it promotes greater productivity in the malt barley supply chain, which benefits local smallholder farmers. (Afr J Agric Res. 2018;13(53):2957–71). The beverage commercialization can also lead to greater state revenue through excise and value added tax (VAT). It is a source of profit and income for workers employed by alcohol corporations (Tekie, 2019). As Dudić, Dudić, Saxunová, Peráček and Beňová, (2020) report, The Slovak Republic is known for its high-quality wines, as well as its small brewery and beer industry, which has undergone transformation since its separation from the Czech Republic. Both countries offer incentives and investments to support the industry. Over the last two decades, China's brewery business has undergone significant growth. China produced 220 million hectoliters of beer in 2000, increasing to 450 million hectoliters by 2010, making it the world's largest beer producer (Wang, 2020).

In Africa the industry has had mixed performance.as despite the potential and the growth it still faces challenges that has hindered it from been competitive. notwithstanding how the sector in Nigeria is thought to be booming. Recently, companies in the Nigerian brewing industry put forward new products in order to preserve their market share. However, these products did not meet consumer expectations and didn't survive the test of time (Chukwuma & Ike-Elechi, 2021). Nafula, Kadima and Miroga (2022) also reported that although the beverages sector has improved, the recent economic downturn caused by political instability has impacted many manufacturers. For instance, East African Breweries Limited faces significant tax liabilities and an intellectual property rights dispute with Keroche Breweries Company Limited.

Rwanda's brewery sector, which produces Banana Based Alcoholic Beverage (BBAB) and banana beer (urwagwa) alongside other alcoholic beverages has attracted investments for establishing up, modernizing, improving quality, and scaling up production facilities (Irakiza, Ugirinshuti, Kamana & Ongol, 2021). Since

2013, 24 firms have invested about 500 million Rwandan francs yearly in the banana beverage fermentation sector, with an average annual growth rate of 7%. The number of employees in companies has increased, with the factory with the most employees increasing from 58 to 350 between 2014 and 2018 (National Industrial Research and Development Agency, 2019). However, SKOL Brewery Ltd, Rwanda's largest brewery, demonstrates the battle between traditional corporate methods and technological advancement. The company's efforts to deploy e-commerce platforms and digital marketing methods have met with mixed results (Nkusi, 2020).

One of the primary challenges for organizational performance is a firm's lack of capacity to have a strong competitive edge, such as an inadequate rate of revenue, inability to generate additional capital, a low rate of margin of profit, a low level of purchase to sales, and the significant expenses associated with marketing, which often signal underlying market challenges and can pose serious, long-term issues necessitating strategic realignment (Gashayija & Njenga, 2024). Remy (2022) observed that companies nowadays no longer challenge solely on quality. Instead, they contend with their product range collaborators, including vendors, distributors, merchants, wholesalers, and end customers. Gaining competitive advantage is hence very important for companies in the brewery industry to ensure survival and productivity.

1.2 Problem Statement

Manufacturing organizations like Skol struggle to manage supplies effectively, leading to issues with order fulfillment and customer satisfaction. As a result, customers are shifting to organizations that can meet their demands more efficiently (Hope & Mulyungi, 2018). In relation to similar manufacturing businesses, Skol Brewery Ltd has the challenge of striking the correct balance between maintaining appropriate supply levels and preventing shortages or surpluses. Inadequate management may culminate in inadequate availability, causing delays in satisfying customer demand, loss of client satisfaction, reduced efficiency, lower profitability and can further result in excessive resource depletion and financial hardship (Gamariel & Annet, 2021). Customer dissatisfaction at East Africa Brewing industry stems from supply and material delivery delays, as well as personnel corruption and unprofessionalism. In today's competitive market, firms must develop effective operational systems to obtain a competitive edge, including technology capabilities (Maina, 2018).

SKOL Brewery Ltd, Rwanda's largest brewery, demonstrates the battle between traditional corporate methods and technological advancement. The company's efforts to deploy e-commerce platforms and digital marketing methods have met with mixed results. Mutsindashyaka (2021) emphasizes that the incorporation of digital technologies in Rwandan enterprises is inconsistent, with many organizations trying to integrate innovation with established traditions. Breweries like SKOL Brewery Ltd have depended on traditional business methods for decades, but they are facing upheaval. Exceptional firms are distinguished by a relentless pursuit of excellence. They distinguish themselves through a variety of techniques, including competitive pricing, fostering strong client relationships and service, developing a respected brand, capitalizing on unique manufacturing knowledge, and exploiting innovative IT capabilities. These strategies not only differentiate these organizations, but also give them a competitive advantage (Kanyingi, 2023).

Several studies have been conducted on the technological capabilities and competitive advantages of organizations; for example, Menganyi, Abayoand Muraguri(2023) discovered that marketing and technological capabilities are critical for microfinance institutions in Nairobi, Kenya, to perform and accomplish their objectives to maintain and sustain their advantage competitively. Afolabi, Olasehinde, Oladele and Onibon (2022) examined technological capabilities influence on the organizational performance of businesses in production industries and discovered that for each unit rise in technological capabilities (TC), there is anticipated rise in the level of Productivity, Product Quality, Efficiency, and competitive edge respectively.

The previous studies have helped to provide a solid background for this study as they touched on several aspects of the study. However, the studies are limited in the approach as well as the results as some of the studies focused on aspects of the concept while others only captured certain variables and yet others were conducted in limited geographical context. These gaps must be filled underpinning the necessity of this study. Hence this study assessed information technology capabilities and market expansion effect on Skol breweries limited Kigali competitive advantage in Rwanda.

1.3 Objectives of the Study

1.3.1 General Objectives

The general objective of this research is to assess the effect of information technology capabilities and market expansion on competitive advantage of Skol brewery limited Kigali, Rwanda.

1.3.2 Specific Objectives

- i. To determine the effect of IT infrastructure capability on competitive advantage of Skol brewery limited Kigali, Rwanda.
- ii. To examine the influence of IT personnel capability on competitive advantage of Skol brewery limited Kigali, Rwanda.
- iii. To assess the effect of IT management capability on competitive advantage of Skol brewery limited Kigali, Rwanda.

1.4 Research Hypotheses

- i. IT infrastructure capability has no significant effect on the competitive advantage of Skol brewery limited Kigali, Rwanda.
- ii. IT personnel capability has no significant influence on the competitive advantage of Skol brewery limited Kigali, Rwanda.
- iii. IT management capability has no significant effect on competitive advantage of Skol brewery limited Kigali, Rwanda.

2.1 Theoretical Review

2.2 Technology Acceptance Model (TAM)

Understanding how and why people accept and use new technologies is made possible in large part by the Technology Acceptance Model (TAM). Developed by Fred Davis in 1986 and rooted in the Theory of Reasoned Action (TRA), TAM seeks to identify the factors that drive technology acceptance across diverse environments. As an information systems theory, the Technology Acceptance Model (TAM) illustrates how individuals adopt and integrate new technologies into their routines (Mkhonto & Zuva, 2024). Providing a trustworthy framework that forecasts and explains user behavior toward information technology is the main objective of TAM. It was created expressly to comprehend the causal connections between user acceptance, perceived usefulness, perceived ease of use, and system design features. The model is a useful tool for both researchers and practitioners because it has been crucial in determining the factors that affect the adoption and usage of new technologies (Zaineldeen, Li, Koffi, & Mohammed, 2020).

2.2.1 Perceived Usefulness (PU)

A fundamental element of the Technology Acceptance Model (TAM) is perceived usefulness (PU), which postulates that PU has a major impact on users' attitudes and intentions regarding the adoption of new technologies. The magnitude to which a person upheld that utilizing a specific technology will improve their performance at work is known as their perceived utility (PU). Performance enhancement, task relevance,

outcome expectations, social influence, and system compatibility are just a few of its important facets (Feng, Su, Lin, He, Luo, & Zhang, 2021). Typically, surveys are used to measure PU because they gauge users' perceptions of how the technology will affect their jobs. Organizations can improve PU by making the technology's advantages plain, offering thorough training and support, allowing customization, ensuring integration with current workflows, and iteratively improving the technology in response to user feedback. Organizations can raise the possibility of successful technology adoption and efficient user utilization by understanding and improving PU (Wicaksono & Maharani, 2020).

2.2.2 Perceived Ease of Use (PEOU)

The Technology Acceptance Model (TAM), which is essential to understanding how and why people adopt new technologies, includes Perceived Ease of Use (PEOU) as a crucial component. PEOU refers to the extent to which an individual believes that using a particular technology will be free from effort. Users' attitudes toward technology and their behavioral intentions to use it are significantly shaped by it. The ability to learn, handle errors, be simple and intuitive, predict effort, and maintain consistency in design are all important components of PEOU (Gupta, Abbas & Srivastava, 2022). Researchers typically use surveys to gauge users' perceptions of the technology's ease of use in order to calculate PEOU. Optimizing PEOU entails applying user-centered design principles, giving thorough guidance and assistance, streamlining user interfaces, adding feedback mechanisms, preserving uniform design components, and supplying unambiguous instructions and support features. By concentrating on these tactics, companies can greatly enhance PEOU, which raises the possibility of successful technology adoption and guarantees that users make efficient use of new technological advancements (Wicaksono, Et al 2020).

2.2.3 User Acceptance

A key idea in the Technology Acceptance Model (TAM), which aims to explain how people come to accept and use new technologies, is user acceptance. It is primarily impacted by users' attitudes and behavioral intentions toward technology, which are shaped by perceived usefulness (PU) and perceived ease of use (PEOU). PU, PEOU, attitude toward utilizing (ATU), behavioral intention to utilize (BI) and actual system utilization are important elements of user acceptance. User acceptance is significantly affected by several other factors as well, comprising perceived compatibility, social influence, training and support, external variables, and user experience (Marikyan & Papagiannidis, 2023). Surveys measuring these variables are commonly used to measure user acceptance. Improved user acceptability can be attained by means of user-centered design, efficient communication, thorough training, feedback systems, dependability and consistency, and supportive environments. By addressing these factors, organizations can increase the probability of successful technology adoption and effective utilization which will increase productivity and efficiency (Xue, Rashid & Ouyang, 2024).

2.3 Empirical Review

2.3.1 Information Technology Infrastructure Capability and Competitive Advantage

In 2021, Awamleh and Ertugan carried out a study with the goal of determining the organizational intelligence's mediating function between competitive advantage and information technology capabilities. The information was gathered from a sample of 224 workers in managerial roles across different Jordanian e-commerce companies. The collected process data was processed using Process Macro v3.5. Conclusively, organizational intelligence and information technology capabilities are critical to enhancing competitive advantage and adapting to changes in the business environment. Due to its beneficial effects on competitive advantage, empirical evidence suggested that information technology capabilities should be developed through organizational intelligence.

Zeis, Mohammad, Alexandri, Nende, and Obsatar (2020) carried out the assessment and analyzed how mobility, accessibility, and information technology infrastructure influence competitive advantage, mediated by competitive actions within the apparel industry. This study used a quantitative methodology with a population of Indonesia's Bandung Regency's apparel industry. Using random sampling methods, samples were collected. A survey comprising 196 small and medium-sized apparel production enterprises was carried out. Structural Equation Modelling Partial Least Squares (SEM-PLS) was used to process the data. The results demonstrated that mobility, accessibility, and information technology infrastructure all had a substantial impact on competitive advantage through competitive action. This study demonstrated how competitive action, accessibility, mobility, and information technology infrastructure can generate advantages competitively in the apparel sector in Indonesia's Bandung Regency.

In 2022, Huang, Ku, and Chen carried out a study with the goal of analyzing how small and medium-sized tourism enterprises (SMEs) use cloud infrastructure to enhance the value of their online offerings to travelers. A stratified random sample was employed in the study. Following the creation of using a value-based framework and distributing 2,000 surveys, 412 valid responses were collected and analyzed through structural equation modeling. The study found that cloud-based architecture provides tourism SMEs with a competitive advantage in a rapidly changing market, enabling them to develop next-generation system capabilities. Additionally, it offers these SMEs a robust application foundation that enhances their ability to adapt to the ever-evolving demands of the tourism sector.

In 2023, Ehsan conducted an empirical investigation on the impact of Fin-Tech infrastructure on performance and competitive advantage. The goal of this study is to ascertain how Fintech infrastructure affects organizational performance and advantage competitively in the banking sector of Jordan between 2016 and 2021. A questionnaire with the intended audience of 853 Jordanian bank managers was used to collect quantitative data from 16 Jordanian banks to accomplish the inquiry's objective. The results showed that the capabilities of the bank's FinTech infrastructure, which provide dependable, fast knowledge support to handle evolving challenges in the financial markets, positively affect performance and competitive advantage.

2.3.2 Information Technology Personnel Capability and Competitive Advantage

Using Barney VRIN attributes, Makhloufi, Yaacob, and Yamin (2018) investigated IT personnel capabilities effect on sustainable competitive advantages. The goal of the inquiry was to close a significant space in the literature by linking a firm's sustained performance to sustainable competitive advantages from low-tech industries within the context of developing countries. Furthermore, the study offers an analysis of the knowledge and skills that competent IT staff members in the Malaysian furniture industry should possess. According to this study, IT staff members' abilities are typically what propel SCA, particularly in furniture companies that fuse technological know-how with artistic creativity to produce distinctive designs.

Since information technology (IT) is frequently used as a tool for competitive advantage, especially in tumultuous business environments, Agyapong, Ayentimi and Sandow (2024) conducted a study to find out how IT capability affected the Ghanaian SMEs performance. The researchers created and evaluated a model based on the supposition that business process agility (BPA) mediates the nexus among IT capability and firm performance and that the degree of investment in R&D determines the relationship. In Ghana, a developing market economy in Africa, a sample of 400 SMEs are used to test the suggested relationships. According to this study, there is a partial mediation effect of BPA between IT capability and firm performance.

Because of a major trend that has coexisted with an increase in the standardization of physical resources, high-level teams focused on organizational, technological, and human resources are found in the most advanced organizations; these teams are built around advanced digital solutions. A study on the topic of connecting human and information resources to generate competitive advantage was conducted in 2024 by Camisón-Haba, Clemente-Almendros, and Gonzalez-Cruz. The relationships amongst information and cognitive asymmetries, their implications on the growth of strategic capabilities, and their effects on competitive position were the main topics of this study. A data set comprising 418 Spanish tourism enterprises was subjected to partial least squares structural equation modeling (PLS-SEM) analysis. Outcomes demonstrated the benefits of the relationship between information assets and human resources in enhancing the competitive position of contemporary businesses.

The hotel industry is a rapidly developing field that needs investment in technology as well as attention. Thus, in order to better understand how IT capabilities impact hotels' competitiveness, Tijanni, Mohammed, Asare, & Cole (2023) carried out a study. Managers, wait staff, ICT managers, and receptionists from Tamale, Ghana's thirty-one hotels made up the 153 survey participants. A quantitative research approach was utilized to set up the link amongst IT capacity and competitive advantage. The inquiry used websites, IT systems, and IT infrastructure to represent IT competence as an independent variable. The findings showed that websites, IT infrastructure, and IT systems significantly improve competitive advantage.

2.3.3 Information Technology Management Capability and Competitive Advantage

Makhloufi, Azbiya, Laghouag, Ali, Belaid, and Tan (2021) conducted research. Additionally, they sought to ascertain if IT flexibility strengthens the link amongst core competency and SCA. Targeting middle-to-upper-level managers, the investigation utilized cross-sectional, quantitative methodology to gather information from 164 small and medium-sized businesses (SMEs) in Malaysia. The results suggest new understandings of the

crucial role that IT integration plays in achieving SCA through core competency activities. The findings indicate that core competency (CC) is positively impacted by IT assets, and CC in turn has a positive impact on SCA.

In order to create a conceptual model based on innovation capability, human resource capability, and competitive advantage—a concept that is anticipated to enhance coffee shop business performance, Novadhiyavasthi and Hidayati (2023) conducted research. In total, 200 managers and owners of coffee shops took part in this study. To help with the testing of models and hypotheses, software known as structural equation modeling, or SEM, was implemented. 200 questionnaires underwent structural equation modeling (SEM) analysis. The study's conclusions indicate that competitive advantage, human resource capabilities, and innovation capabilities can all lead to successful coffee shop business performance.

Owing to the belief that there is a lack of knowledge regarding the creation and implementation of a service system analytics capability (SSAC) model. A study on reshaping competitive advantages with analytics capabilities in service systems was conducted by Akter, Gunasekaran, Wamba, Mohiuddin, and Hani, U. (2020). This study develops and validates an SSAC model and frames its impact on competitive advantages using 251 survey data from service systems analytics managers in the United States, drawing on the resource-based view (RBV), dynamic capability theory (DCT), and the emerging literature on big data analytics. The hierarchical SSAC model was created and validated using partial least squares (PLS)-structural equation modeling (SEM) as a data analysis method. The results validate that the establishment of competitive advantages is significantly mediated by three dynamic capabilities, namely market sensing, seizing, and re-configuring.

The study conducted by Ida and Doddy (2022) aimed to investigate how business strategies can enhance the competitive advantages of small and medium-sized businesses (SMEs). The study also takes into account the significance of performance and innovation as mediating factors in the connection between competitive advantage and business strategies. 150 SMEs in the real estate and construction sectors make up the study's sample. The results demonstrated that business strategies positively affect competitive advantage and that improved business strategies increase SMEs' competitive advantage.

3.1 Research Methodology

Descriptive design was used in the research endeavor. Descriptive research design is a methodology for describing and explaining the traits, behaviors, and properties of a certain phenomenon or population. The study target population included staff of Skol breweries Ltd Kigali Rwanda in the departments of Commercial, Marketing, Production, Technical, Finance, ICT and Logistics, Supply chain that are estimated to be 100. The sample size was 97 employees of skol breweries in Sales, Marketing, Production, Operations, Commercial, Logistics, Supply chain and IT departments who was selected purposively. The analysis of data was based on the following regression model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 M + e$$

Where:

Y= Competitive Advantage

β_0 = Constant

β_1 to β_4 =Variable Coefficients

X_1 = IT Infrastructure Capability

X_2 = IT Personnel Capability

X_3 = IT Management Capability

e = Error Term

4.1 Research Findings and Discussions

4.2 Response Rate

This section highlights the input collected from participants, focusing on the number of individuals who responded to the questionnaire and shared their insights on the research topic. These responses are compared to the questionnaires that were not returned. The results of this analysis are summarized in Table 4.1.

Table 4.1: Response Rate

Response	Frequency	Percent
Retrieved	87	89.7
Unretrieved	10	10.3
Total	97	100

Source: Field Survey (2024)

The results presented in Table 4.1 disclosed a notably high response rate, with 87 out of 97 participants successfully retrieved, translating to an impressive 89.7%. This outcome aligns with findings from various studies in the field, which often report response rates ranging from 70% to 90%, suggesting that the methodology employed in this research was effective in engaging participants. Johnson (2021) found that personalized communication significantly enhances response rates, which may explain the success observed in this study. These results not only underscore the effectiveness of the research approach but also contribute to a growing body of literature emphasizing the significance of participant engagement in achieving high response rates.

4.2 Correlation Analysis

Correlation analysis is a statistical technique employed to evaluate the strength and direction of the association between two or more variables. This technique is essential for understanding how changes in one variable may relate to changes in another, thereby providing valuable perspectives for decision-making and forecasting. The Pearson correlation coefficient outcomes are revealed in Table 4.2.

Table 4.2: Correlation Results

		Competitive Advantage	IT infrastructure capability	IT personnel capability	IT management capability
Competitive Advantage	Pearson Correlation	1			
	Sig. (2-tailed)				
IT infrastructure capability	Pearson Correlation	.535**	1		
	Sig. (2-tailed)	.000			
IT personnel capability	Pearson Correlation	.517**	.746**	1	
	Sig. (2-tailed)	.000	.000		
IT management capability	Pearson Correlation	.589**	.711**	.709**	1
	Sig. (2-tailed)	.000	.000	.000	

Source: Field Survey (2024)

The outcome of the correlation noted that IT infrastructure capability had a positive and significant ($r = 0.535^{**}$) connection with competitive advantage which indicates that a robust IT infrastructure supports the brewery's operational efficiency and responsiveness to market demands. The outcomes align with the outcomes of Awamleh and Ertugan (2021); Zeis *et al.* (2020); Huang, Ku, and Chen (2022) and Ehsan (2023) who all highlighted significance of IT infrastructure capabilities competitive positioning. Additionally, the significant positive relationships among IT personnel capability ($r = 0.589^{**}$) and competitive advantage suggest that skilled personnel are essential for optimizing competitive advantage, further enhancing productivity and innovation within the organization. The results are in harmony with the findings of Makhoulfi, Yaacob, and Yamin (2018); Camisón-Haba, Clemente-Almendros, and Gonzalez-Cruz (2024) and Tijanni *et al.* (2023) who demonstrated significance of IT personnel capabilities in enhancing competitive advantage.

Competitive advantage is strongly and positively associated with its IT management capability ($r = 0.589^{**}$), suggesting that effective management of IT resources is crucial for maintaining a competitive edge. The findings are consistent with the research of Makhoulfi *et al.* (2021); Novadhiyavasthi and Hidayati (2023); Akter *et al.* (2020) and Ida and Duddy (2022) demonstrated that IT management capabilities significantly associated with

competitive advantage. The positively strong correlation between market expansion and competitive advantage ($r = 0.642^{**}$) highlights the critical role that effective market strategies play in establishing a sustainable competitive position.

4.3 Regression Analysis

Regression analysis was used in evaluating the effect of information technology capabilities on competitive advantage of Skol Brewery Limited in Kigali, Rwanda.

Table 4.3: Regression Results

Competitive Advantage	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
IT infrastructure capability	.1549516	.1220956	1.27	0.208	-.0878916	.3977948
IT personnel capability	.0975945	.1230355	0.79	0.430	-.1471183	.3423072
IT management capability	.317292	.1102077	2.88	0.005	.0980932	.5364907
_cons	1.576659	.2892004	5.45	0.000	1.001451	2.151867
R-squared	0.3791					
Adj R-squared	0.3566					
F(3, 83)	16.89					
Prob > F	0.0000					

Source: Field Survey (2024)

The findings unveiled a constant term of 1.5767 which indicates that even without any influence from the independent variables, there is a baseline level of competitive advantage present within the organization. The overall model has an R-squared value of 0.3791, meaning that approximately 37.91% of the variance in competitive advantage is explained by the independent variables included in the model. This moderate level of explanatory power suggests that while IT capabilities are important, other factors not included in this analysis also play a significant role in determining Skol Brewery's competitive advantage. The F-statistic ($F(3, 83) = 16.89$) with a p-value of 0.0000 indicates that the model as a whole is statistically significant, reinforcing the idea that at least one of the predictors contributes to explaining variations in competitive advantage.

IT infrastructure capability (coefficient = 0.1549) and IT personnel capability (coefficient = 0.0976) do not show statistically significant effects on competitive advantage, with p-values of 0.208 and 0.430, respectively. While these capabilities are essential for operational success, their lack of statistical significance suggests that an increase in the infrastructure and personnel would lead to 0.15 and 0.09 units in competitive advantage of Skol Brewery. The IT management capability has a coefficient of 0.3173, which is statistically significant ($p = 0.005$). This suggests that for every unit increase in IT management capability, the competitive advantage of Skol Brewery increases by approximately 0.3173 units, holding other factors constant. This strong positive relationship highlights the critical role that effective IT management plays in enhancing operational efficiency and responsiveness to market demands.

4.4 Hypotheses Testing and Discussions of Findings

Hypothesis testing is a critical component of empirical research, as it allows for the determination of the validity of the initial assumptions based on the collected data and statistical analyses. Each hypothesis was tested using appropriate regression statistical methods, and the results are discussed in relation to the theoretical framework and existing literature. The hypotheses were validated using 0.05 level of significance threshold.

Regarding the unique objective of the survey which sought to determine the effect of IT infrastructure capability on competitive advantage of Skol Brewery Limited in Kigali, Rwanda, the proposed hypothesis stated that IT infrastructure capability has insignificant effect on competitive advantage of the firm. The outcome noted that IT infrastructure capability insignificantly (0.208) affected competitive advantage leading to the null hypothesis being upheld. This suggests that simply having a robust IT infrastructure does not automatically translate into a competitive edge for the organization. The outcome could be attributed to the underutilized or not aligned strategic objectives of Skol Brewery's IT infrastructure are which may have failed to contribute significantly to competitive advantage. The outcome is in disagreement with those of Awamleh and Ertugan (2021) who noted that information technology capabilities are critical to enhancing competitive advantage and adapting to changes in the business environment. Zeis *et al.* (2020) who demonstrated that information technology infrastructure had a substantial impact on competitive advantage through competitive action. Huang, Ku, and Chen (2022) who uncovered that cloud-based architecture gives tourism SMEs a competitive edge in the dynamic market and the capacity to create next-generation system capabilities. Ehsan (2023) disclosed that the capabilities of the bank's FinTech infrastructure, which provide dependable, fast knowledge support to handle evolving challenges in the financial markets, positively affect performance and competitive advantage. The non-alignment in the

findings could be linked to the contextual difference in the studies as well as the measurement employed alongside the methodologies.

In relation to the unique objective of the survey aimed at assessing the impact of IT personnel capability on the competitive advantage of Skol Brewery Limited in Kigali, Rwanda, the hypothesis proposed indicated that IT personnel capability does not significantly influence the firm's competitive advantage. The results revealed that IT personnel capability had an insignificant effect ($p = 0.430$) on competitive advantage, leading to the acceptance of the null hypothesis. This suggests that the presence of skilled IT staff alone does not necessarily enhance the brewery's competitive position in the market. The findings may be due to the fact that Skol Brewery's IT personnel are not effectively aligned with strategic objectives or are not empowered to implement innovative solutions, their contributions may not translate into a competitive advantage. The finding is inconsistent with those of Makhoulfi, Yaacob, and Yamin (2018) who, IT staff members' abilities are typically what propel SCA, particularly in furniture companies that fuse technological know-how with artistic creativity to produce distinctive designs. Camisón-Haba, Clemente-Almendros, and Gonzalez-Cruz (2024) unveiled that the existence of the benefits of the relationship between information assets and human resources in enhancing the competitive position of contemporary businesses. Tijanni, Mohammed, Asare and Cole (2023) showed that websites, IT infrastructure, and IT systems significantly improve competitive advantage. The variation in the outcomes could be due to the uniqueness of the environments where these studies were performed and the techniques utilized for these studies.

In alignment with the specific objective of the survey that aimed to evaluate the impact of IT management capability on the competitive advantage of Skol Brewery Limited in Kigali, Rwanda, the initial hypothesis posited that IT management capability does not significantly affect the firm's competitive advantage. However, the findings indicated a significant effect ($p = 0.005$) of IT management capability on competitive advantage, resulting in the rejection of the null hypothesis. This finding suggests that how IT resources are managed can directly influence the brewery's operational efficiency, innovation, and responsiveness to market demands. The outcome could be linked to the effective IT management which enables Skol Brewery to integrate technology into its core business processes. For instance, IT management facilitates better data analysis, allowing the brewery to make informed decisions regarding production, marketing, and customer engagement. This capability can enhance operational efficiencies and drive innovation in product offerings, ultimately contributing to a stronger competitive advantage. The outcome aligns with those of Makhoulfi, Azbiya, Laghouag, Ali, Belaid, and Tan (2021) who indicate that core competency (CC) is positively impacted by IT assets, and CC in turn has a positive impact on sustainable competitive advantage. Novadhiyavasthi and Hidayati (2023) indicated that competitive advantage, human resource capabilities, and innovation capabilities can all lead to successful coffee shop business performance. Akter, Gunasekaran, Wamba, Mohiuddin, and Hani (2020) validated that the establishment of competitive advantages is significantly mediated by three dynamic capabilities, namely market sensing, seizing, and re-configuring. Ida and Doddy (2022) demonstrated that business strategies positively affect competitive advantage and that improved business strategies increase SMEs' competitive advantage.

5.1 Conclusion and Recommendations

5.2 Conclusion

The research investigated the effect of information technology capabilities on the competitive advantage of Skol Brewery Limited in Kigali, Rwanda, while also examining the mediating influence of market expansion. The results provided various insights into how different IT capabilities affect competitive advantage, considering the potential mediating role of market expansion. Importantly, the study revealed that the capability of IT infrastructure does not significantly enhance the competitive advantage of Skol Brewery Limited. Conclusively, Skol brewery limited does not play a transformative role in enhancing the company's competitive advantage in Kigali. This suggests that despite the potential benefits of advanced IT systems, other factors may play a more critical role in determining competitive advantage within the brewery sector. For Skol Brewery, strategies such as cost leadership and differentiation appear to be more pivotal in enhancing performance and market presence. Consequently, the brewery may need to focus on optimizing these strategies rather than solely investing in IT infrastructure, indicating a need for a broader approach to achieving competitive success in a challenging market environment.

The research further examined the effect of IT personnel capability on the competitive advantage of Skol Brewery Limited in Kigali, Rwanda. The survey results indicated that IT personnel capability has a positive yet insignificant effect on the company's competitive advantage. This finding underscores the notion that IT personnel capability does not significantly contribute to enhancing the competitive position of the brewery. This finding suggests that while skilled IT personnel are essential for operational efficiency and support, their capabilities alone may not be sufficient to differentiate the brewery in a competitive market. Other factors, such

as strategic marketing, product innovation, and customer engagement, likely play more pivotal roles in shaping the brewery's market position. Therefore, Skol Brewery may need to focus on enhancing these broader strategic initiatives rather than relying solely on IT personnel capabilities to drive competitive success.

The survey examined the effect of IT management capability on the competitive advantage of Skol Brewery Limited in Kigali, Rwanda. The results indicated a positive and significant effect of IT management capability on the company's competitive advantage. This finding emphasizes the crucial role that effective IT management plays in enhancing the brewery's competitive position. The findings indicate that effective IT management capabilities not only streamline operational processes but also facilitate better decision-making and responsiveness to market dynamics. This capability allows Skol Brewery to leverage technology in ways that improve customer engagement, optimize supply chain management, and drive innovation in product offerings. As a result, investing in and developing robust IT management practices can provide Skol Brewery with a distinct competitive edge, enabling it to navigate the complexities of the beverage industry more effectively and sustain its growth in a competitive landscape.

5.3 Recommendations

According to the survey findings, the following recommendations have been proposed. The survey recommends that the management of the brewery should focus its efforts on enhancing other strategic areas that can drive competitive differentiation. Specifically, Skol should prioritize strategic hiring and training in roles that directly impact production efficiency, marketing, and customer engagement. Investing in cross-functional teams that integrate IT with operations and marketing can foster innovation and responsiveness to market demands. Additionally, exploring partnerships with external experts or consultants can provide fresh insights and capabilities that are currently lacking within the organization. By concentrating on these strategic initiatives rather than solely on IT personnel capabilities, Skol Brewery can better position itself to achieve a sustainable competitive advantage in the dynamic beverage industry.

The management of the brewery should invest in strengthening its IT management practices to fully leverage this advantage. This can be achieved by implementing comprehensive training programs for IT staff to enhance their skills in strategic IT alignment, project management, and data analytics. Additionally, fostering a culture of collaboration between IT and other business units will ensure that technology initiatives are closely aligned with overall business goals, thus driving innovation and operational efficiency. Furthermore, Skol Brewery should consider adopting advanced IT management tools and frameworks that facilitate better decision-making and performance monitoring. By prioritizing these areas, Skol Brewery can enhance its competitive positioning and responsiveness in the rapidly evolving beverage market.

The management of the brewery should actively pursue targeted market expansion strategies while leveraging its IT capabilities. Skol Brewery should focus on identifying and entering new markets, both domestically and regionally, to increase its footprint and customer base. This can be achieved by utilizing data analytics and market research tools to understand consumer preferences and trends in potential markets. Additionally, enhancing digital marketing efforts and establishing partnerships with local distributors can facilitate smoother entry into new regions. By integrating these market expansion initiatives with its existing IT capabilities, Skol Brewery can create a synergistic effect that not only enhances operational efficiency but also strengthens its competitive advantage in the dynamic beverage industry.

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