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Research Paper

Nexus Between Consumer Insight and Competitive Advantage: Examining the Mediating Role of Technology Adoption in SMEs Ethiopia.

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ABSTRACT

This research examined the relationship between consumer insight, competitiveness and technology adoption in SMEs in Ethiopia. The investigators applied both primary and secondary data in this study. Structured questionnaire was used to collect data from participants. The target population of this study was comprised of 950 SMEs operating in Sidama regional state. To determine the sample size of manufacturing SMEs in this study, the researcher used Yamane (1967) formula and 282 SMEs were selected by stratified sampling method. The researcher selected sample respondents (384 employees, owners and managers) from 282 enterprises purposively. Structural equation modeling was used along with EFA & CFA to analyze data. The outcome of investigation indicated that consumer insight has significant direct influence on competitive advantage. In addition to this, consumer insight has significant effect on technology adoption and Technology has strong effect on competitive advantage. In this investigation, technology adoption was found to be partial mediator in the association. This investigation provided the result with the meaning of consumer insight to promote competitive advantage of SMEs. The research paper brings out the close nexus between consumer insight and competitive advantage in Ethiopian SMEs as has been noted, with the adoption of technology as the mediating variable in enhancing this relationship. SMEs would be able to improve innovative processes and be responsive to the dynamic market needs by combining consumer- motivational knowledge with digital and technological capacities. The results complement the theoretical knowledge of strategic competitiveness and offer practical advice in the context of SMEs that want to achieve sustainable growth, better performance, and long-term competitive positioning in highly dynamic business conditions.

Keywords: Consumer insight, technology adoption, competitive advantage, Ethiopia

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1. INTRODUCTION

The capability of small and medium-sized enterprises (SMEs) to utilize consumer insights is becoming an increasingly familiar as one of the sources of competitive advantages in the fast-changing global market of the current era (Sudirjo, 2023). Understanding the needs of the buyer well helps SMEs to tailor their products to the customer and achieve better customer satisfaction and loyalty. Consumer insight as a concept was founded on market research and behavioral economics and has since evolved to embrace the application of technology and data analytics to create valuable insights of customer behavior (Hornig et al., 2022).

Empirical researches have also indicated that customer insights have been utilized to shape corporate strategy in most of the companies. This information could help businesses to be better positioned in the market and be more profitable as it has already been proved (Ghobakhloo et al., 2022). However, the contribution of technology adoption as a mediating factor in the relationship in this specific case in relation to developed countries like Ethiopia has not been addressed much (Niguse et al., 2025). Despite the fact that most SMEs understand the importance of consumer insights, a study has shown that most of them are likely to face certain practical constraints because most of them are relatively high in the levels of their unavailability to the state-of-the-art technologies, low in the levels of their digital literacy levels among employees, and lack financial resources to efficiently employ data-driven strategies (Alkhatib & Valeri, 2024).

Furthermore, previous researches have failed to adequately address the unique challenges that Ethiopian SMEs face when implementing technological innovations and applying consumer insights. These discrepancies indicate how important it is to carry out a thorough investigation of how consumer insights, utilization of technology, and competitiveness collaborate in such a setting. The study aims to address these gaps by analyzing the role of technology adoption as an intermediary between consumer insights and competitive advantage when applied by SMEs in Ethiopia (Sudirjo, 2023; Kant et al., 2025).

The SMEs need to focus on leveraging comprehensions of buyers in order to achieve competitive advantage. SMEs should apply effective consumer-insights to lead their company plans which can

enhance their sensitivity to the market, product innovation and customer satisfaction. The reality, however, is often much different. It has been shown that many SMEs struggle to engage customer-based insights in their operations, resulting in the discrepancy between customer want and customer get (Farida & Setiawan, 2022).

Some of these studies also present contradictory evidence that on the one hand, they are sure that through consumer insights, businesses can significantly outperform their competitors, and, on the other hand, SMEs also report that their small resources and nascence of novel technologies create hard situations to collect as well as process the valuable data (Arsawan et al., 2022). As an example, even though research indicates that businesses can significantly outperform their competitors with the help of consumer insights, many SMEs say that they have a limited number of resources and lack expertise in the field of technology (Arsawan et al., This gap indicates the gaps in empiricism, when the theoretically beneficial application of consumer insights fails to yield in practice (Fatonah & Haryanto, 2022).

The researchers identified theoretical gap, particularly on the role of technology adoption in mediating this relationship. The combination between all these factors and its influence on competitive advantage is a knowledge gap since most of the existing studies focus on consumer insights or technology adoption individually (Rua & Santos, 2022). Contextual gaps are also very apparent; much of the information already available in publication is all about the developed economies, which will not necessarily be applicable to the Ethiopian market based on the specific consumer behavior, market forces, and technology limitation. The practical application of consumer knowledge by SMEs in Ethiopia is also complicated by the in-life problems like the absence of trained work force, the absence of digital systems, the absence of technological financing.

The relationship between customer insights, technology adoption, and competitive advantage of Ethiopian SMEs was addressed in a systematic manner in this paper to ensure that these gaps are closed. Within the mixed-methods approach, the research will provide a comprehensive picture to the problems to which the SMEs are facing and the options which they can employ to address the challenges. Besides the contribution in the field of academic discourse, the findings will also inform practitioners and policy makers with the information that will come in handy in future research and implementation plan to make Ethiopian SMEs competitive. Lastly, the paper is supposed to provide a glimpse of a path ahead which would provide future researchers and policy-

makers with the knowledge and tools which would enable making the SME sector more innovative and flexible.

2. LITERATURE REVIEW

2.1 Fundamental concepts

2.1.1 Consumer insight: Consumer insight is a thorough knowledge of the substance needs, motivation, attitude, and behavior of consumers to make purchase decisions. It is not limited to demographics or sales statistics and reveals the emotional, psychological, and contextual aspects of how individuals make, consume, and judge products or services (Farida & Setiawan, 2022). With the help of such research approaches as surveys, interviews, observation, and data analytics, consumer insights are created and assist organizations in revealing hidden opportunities and unmet needs. Good intuitions enable companies to create products that are relatable, develop compelling advertisement messages, and develop engaging brand connections. Finally, consumer insight is the process to convert raw data into knowledge that can be put into action to drive innovation, competitive advantage, and customer satisfaction over time in dynamic markets (Shehadeh et al., 2023).

2.1.2 Competitive advantage: Competitive advantage is the capability of the firm to surpass its competitors through the production of higher value to its customers or using more efficiency in its operations relative to its competitors. It occurs when an organization has distinct resources, capabilities, strategies or positions which can hardly be duplicated. These benefits could be based on innovation, cost leadership, high quality, good branding, well-educated human capital, or good customer relationship (Cadden et al., 2023).. Sustainable competitive advantage helps an enterprise to stay profitable and lead in the market amid competition. It is not just in terms of being different, but it is in terms of consistently performing value which the customers appreciate and choose. Competitive advantage is realized when firms fit internal strengths with external opportunities and constantly adapt to changes in the environment and invest in learning, technology, and strategic renewal (Farida & Setiawan, 2022).

2.1.3 Technology adoption: Technology adoption is defined as the process whereby individuals, organization or society adopt, implement and integrate new technologies in their operations and practices. It entails awareness, evaluation, trial, and sustained application of new things that enhance efficiency, productivity or quality of results. Perceived usefulness, ease of use, cost,

organizational preparedness, and social acceptance are some of the factors that determine technology adoption (Farida & Setiawan, 2022). The adoption should be successful, including training, enabling infrastructure, and top management commitment to change management and minimize resistance (Arsawan et al., 2022). In business, embracing technology may improve competitiveness, facilitate innovation and improve the running of business activities. It does not only consist of the purchase of tools, but how to make effective use of technology to generate value, reshape processes and help to sustain long-term strategic objectives in a fast-changing world (Rua & Santos, 2022).

2.2 Empirical literature

2.2.1 Consumer insight and competitive advantage

Empirical evidence indicates that the relationship between consumer insights and competitive advantage in the industries is high. It has been found out that organizations applying consumer insights can tailor their products and services toward the needs of the consumer in a more appropriate way and attain a superior position in the marketplace (Kumar et al., 2019). Speaking of which, companies that enable the use of data analytics and consumer feedback declare high customer satisfaction levels and customer loyalty. Not only does this evidence-based practice help to boost the sales in the short term, but it also improves the brand reputation, which puts such companies on the first line of competitors that are founded on less informed policies (Nayak et al., 2022). Although these studies highlight the importance of consumer insights to the competitiveness of the SMEs, they have not focused on Ethiopian SMEs left in contextual gap. More specifically, few studies exist regarding the use of technology use by the Ethiopian SMEs in the process of converting this into knowledge to the customers into long term competitive advantage.

Moreover, consumer insights into products development can raise the success rates of new launches many times over (Chuang & Lin 2020). It has been evidenced that where organizations conduct wide market research, that is, through surveys and focus groups, a 30 per cent greater success of the new product occurs, as compared to organizations which have not. Closer to the actual preferences of the consumers, the companies will be able to innovate more effectively and minimize the risk of poor launches and ensure the availability of the offerings to the target market (Ijomah et al., 2024). These studies regarded the quantitative analysis as the only way of gaining

customer insights that introduces a research methodological gap of a mixed-method or context-based research of Ethiopian SMEs.

In addition, the consumer insights can be used to enhance the performance of marketing considerably (Niguse, 2025). The analyses demonstrate that companies that design certain marketing operations based on the information related to customers document a significantly more elevated level of engagement, and this metric can even go beyond 25 percent (Zhang et al., 2021). Such an individual approach will not only get consumer attention in a more appropriate manner but will also become more attached relationships, which will give the conversion rate a boost and ultimately translate into winning a larger market share within the competitive market (Mohammad Shafiee, 2022). Although it has been evidenced in the research that technology enhances the effectiveness of consumer insights, the gap in the knowledge exists concerning whether different levels of technology adoption can mediate the relationship in Ethiopian SMEs that operate under varied sectors.

Lastly, consumer insights are continuously implemented, which supports the sustainability of the competitive advantage in the long-run (Huang et al. 2018). This impact can be measured by the fact that the level of performance is consistently growing with time as such companies institutionalize the practice of gathering and analyzing consumer feedback (Kinde et al., 2025). Realities prove that these organizations are characterized by an increase in market share between 15 and 20 percent over organizations without such initiatives, and this number is worth taking into consideration how to make sure the success in the business can be obtained permanently by introducing consumer insight into the business strategies (Farida & Setiawan, 2022). Despite these studies relating consumer knowledge and marketing performance to business competitiveness, the theoretical gap exists in understanding how the technology adoption contributes to the relationship between the two variables in the issue of SME competitiveness in Ethiopia.

H1: Consumer insight has positive effect on competitive advantage

2.2.2 Consumer insight and technology adoption

Consumer insights are critical in determining the use of technology by consumers because they enable organizations to develop and adopt new technologies (Nayak et al., 2022). Understanding of consumer preferences and behaviours will assist companies in developing their technological solutions in line with it (Ghobakhloo et al., 2022). Inferentially, firms that gather information on user experiences can find out the points of pain and improvement. The targeted needs have the

potential of assisting businesses to achieve user acceptance and satisfaction that will ultimately simplify the process of transitioning to new technologies. This collaboration between the expectations of the consumer and the technological opportunities does a remarkable job in terms of the enhancement of the degree of adoption (Tsiu et al., 2024). Regardless of the fact that studies that focus on the fact that consumer insights may result in the uptake of technology among the SME, there is a gap in research on the empirical exploration of the dynamic in Ethiopian SMEs, in particular, in various sectors, including food, retail, and services.

Besides, the application of technology marketing and communication strategies is informed by consumer intelligence (Agarwal & Prasad, 2020). Once businesses understand the problems and the interests of the target audience, they will be capable of creating particular messages that will strike the chords (Borji et al., 2025). Empirical evidence shows that firms that use consumer intelligence to differentiate their messages are the ones whose level of engagement and interest in technological changes they make is greater. The level of resistance to change and interest in using new technology can be lowered again by accentuating the features that will fulfill the needs of consumers on a personal level, thus accelerating the adoption process (Sudirjo, 2023). Despite the suggestion that the consumer insight orientation creates an investment in technologies, the research has a gap on how Ethiopian SMEs can utilize this technology to create competitive advantage successfully using consumer data.

Lastly, constant collection and analysis of customer knowledge can result in upgrades repeated on the technology products (Liu et al. 2021). The feedback mechanism helps companies keep on refining their products and thus they remain in touch with the consumer needs (Fatonah & Haryanto, 2022). To illustrate, an organization can implement changes in the user experience and satisfaction in real-time by actively participating in the feedback after launching a new product or service (Ogunmokin et al., 2019). Long-term investment in the consumer insights then further improves the initial adoption rates, as well as the long-term loyalty and trust in the brand, raising adoptions of the technology much easier than other companies in the future (Al Karim et al., 2024). Although the existing studies reveal that there is consumer insights moderating technology adoption among the employees, the difference in knowledge regarding the mediating role of workforce perceptions of the relationships between consumer insights and competitive advantage due to the use of technology among the Ethiopian SMEs remains.

H2: Consumer insight has positive effect on technology adoption

2.2.3 Technology adoption and competitive advantage

Adoption of technology plays a vital role in the establishment and maintenance of competitive advantage in the contemporary business environment that is dynamic. Companies that adopt new technologies such as artificial intelligence, big data analytics, and automation get an opportunity to facilitate their operations, enhance their productivity, and reduce costs (Olazo, 2023).. In this case, an example of companies utilizing data analytics is that they can extract actionable data which can guide them in making strategic decisions, and thus they will win over other companies employing traditional methods. Not only does this boost the efficiency of the operations, but it also gives business the capability to be proactive about the trends in the market that is a colossal advantage over the competitors. Even though the study revealed that technology adoption has been effective in enhancing the efficiency and competitiveness of SMEs, the study has a research gap in which the researcher suggests that the application of technology can be effectively implemented by Ethiopian SMEs in order to sustain the changes in operations to a sustainable competitive advantage.

Also, technology use enhances a customer experience, which significantly contributes to the establishment of brand loyalty and differentiation. Business organizations can get to know their customers, and communicate with them through innovative technologies such as customer relationship management (CRM) system and individualized marketing solutions (Ghobakhloo et al., 2022).. As an example, firms adopting AI-based chatbots will be in a position to provide 24/7 services, and customer satisfaction will rise. This enhanced user experience builds a positive brand image and the urge to buy the product again which ultimately becomes a sustainable competitive advantage in the market (Tsiu et al., 2024). Even though these studies show that CRM and online technology has the potential of enhancing customer experience and customer loyalty, it has been noted that there is a knowledge gap in relation to how Ethiopian SMEs can use real-time consumer insights through use of technology in achieving sustainable competitive advantage.

In addition to this, the adoption of technology would allow the process of innovation that will see the business develop new products and services quicker than the competitors businesses. Companies adopting agile activities and cloud computing can accelerate the production process of their products and launch innovations in the market much more quickly (Tidd and Bessant, 2018). This pace of market grabbing does not only gain the interest of the early adopters, but also sets the pace as the industry standard and the competitors must change fast or be superseded. Hence,

organizations are the innovators, and their application of technologies makes them stronger to compete (Cadden et al., 2023).

Lastly, effective strategic use of technology may lead to enormous barriers to entry of new players. The companies that have embraced new technologies in their platforms are often old companies that own value-added systems and processes that can scarcely be replicated by new firms. Moreover, the information obtained on such technological platforms creates massive insights and network effects that bolster market status (Wang et al., 2019). This advantage is more enhanced in such industries where technology plays a central role in dealing with customers and efficiency of operations and therefore new players cannot effectively compete. In total, by means of technologies, the short-term performance of the business is enhanced and, furthermore, the long-term competitive advantages are attained (Sudirjo, 2023). Although the above studies have realized the significance of technology adoption in innovations and competitiveness, the phenomenon has a gap in theory because not all of them clearly apply the well-known frameworks to consider the relationship between consumer insights and technology adoption in the creation of competitive advantages within Ethiopian SMEs.

H3: Technology adoption has positive effect on competitive advantage

2.2.4 The effect of consumer insight on competitive advantage with mediating role of technology adoption

It is becoming a common knowledge that the SMEs that wish to survive in competitive markets should not undervalue the interconnection between customer knowledge and competitive positioning. Consumer insight can be defined as an in-depth knowledge of the preferences, behaviors, and expectations of buyers that inform the strategic decision-making (Arsawan et al., 2022). Through proper analysis of customer information, SMEs will be in position to customize products and services to meet the needs of the target segments. This kind of informed responsiveness adds to the market relevance, customer satisfaction and overall ability of the firm to stand out among other market competitors in challenging markets. The studies provide insight into the connection between consumer insight and competitive advantage, but the connection in relation to technology adoption has a gap in research in Ethiopian SMEs in various industries.

Technology adoption is highly influential in determining the relationship between consumer understanding and competitive advantage (Zhou et al., 2024). The sophisticated online applications help SMEs to change the raw data on customers into actionable plans. These systems

include CRM software, social monitoring applications and analytics platforms that assist firms to interpret feedback that would not have been used. It has been proven that companies that technologically process customer intelligence are more innovative in their operation and that they refine their products quicker. Through this, technology plays a vital role as one who bridges the gap between customer insight and the actual performance in terms of competition. Despite the studies demonstrating that technology mediates between consumer insight and competitive advantage, there is a knowledge gap in the empirical studies on how Ethiopian SMEs deploy, as well as utilize technology to transform customer information into sustained competitiveness.

Moreover, the mediating power of technology adoption in different industries and settings differs (Kozinets et al., 2021). The ability to quickly decode customer data may be a critical aspect in maintaining competitive advantage in an SME that operates in fast-changing markets. Wireless analytics systems, such as, can enable companies of technology and retailing industries to react in response to evolving customer needs in real time. This is responsiveness that allows businesses to be relevant as tastes change. Not just customer retention, but also acquisition of new buyers, this agility makes the SME sound as customer-oriented, responsive, and highly customer-oriented (Farida & Setiawan, 2022; Horng et al., 2022).

H4: Technology adoption mediates the relationship between consumer insight and competitive advantage.

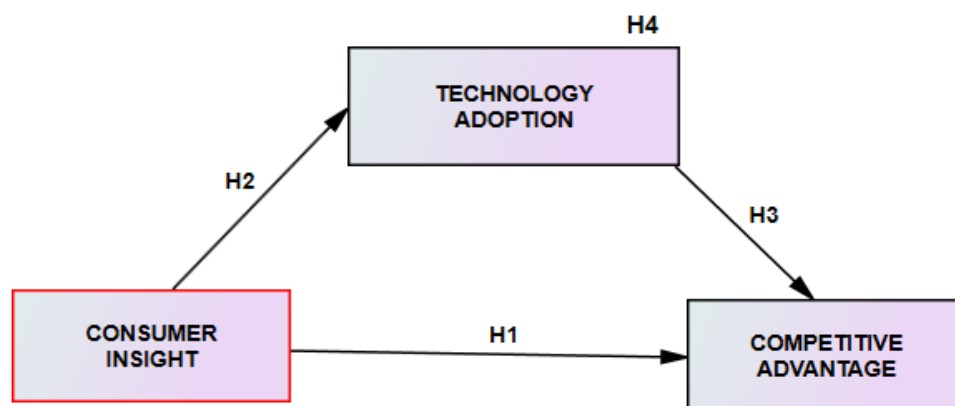


Figure 1. Conceptual framework

3. METHODS AND MATERIALS

3.1 Research approaches & designs

Every research need research method that is precisely suited to the specifications of the study topic (Creswell, 2009). Quantitative research approach was employed to check association of consumer insight, technology adoption, as well as SMEs competitiveness. The primary intent of this method is its simplicity to work with numbers, allowing for quick data collection and evaluation, which soothes overall process of analysis. Given the character as well as research purpose of investigation, in present exploration, the researchers employed multivariate statistics to examine interrelations between consumer insight, technology adoption, and SMEs competitive advantage employing both descriptive and explanatory designs.

3.2 Methods of Sample selection

There are 950 SMEs in Sidama National regional state. To determine the sample size of manufacturing SMEs in this study, the researcher used Yamane (1967) formula. By considering the level of confidence 95% and sampling error (margin of error) (5%=0.05).

$$n = N / 1 + N (e)^2 \quad n = 950 / 1 + 950(0.05)^2 \cong 282$$

Where: n = sample size, N= population size= 950, e²= margin of error at 5%

Sample size selected from each category (sector) with the help of a stratified sampling method, with a sampling fraction of $\cong 0.3$ i.e. Sample fraction = actual sample size /total population: 282/950, Stratified sampling ensures representative coverage of each sector, reducing bias and improving accuracy by reflecting the population's diverse characteristics. The sample accurately reflects the population's diversity, enhancing reliability and validity while minimizing bias through stratified sampling methods. Self-report bias was minimized by employing multiple data collection methods, enhancing data validity through cross-verification and triangulation of responses. The cross-sectional design's limitations were addressed by recommending longitudinal studies for future research, providing a framework to capture dynamics over time and establish causal relationships.

Table 1. Stratified Samples for SMEs

Sector	Number of Firms	Sample fraction	Stratified sample	Proportions
Building ,ceramics and construction	89	0.3	26	9.4%
Textile and garment	216	0.3	64	22.7%
Wood, furniture and metal work	418	0.3	125	44%
Leather and Footwear	21	0.3	6	2.2%
Agro processing, Food and Beverages	156	0.3	46	16.4%
Chemical	24	0.3	7	2.5%
Mining and handcraft	12	0.3	4	1.3%
Soap and detergent	8	0.3	2	0.84%
Pharmaceutical and Medical Equipment	6	0.3	2	0.63%
Total	950		=282	100%
Sample size	282			
Sample fraction	≈0.3			

As indicated by the above table, for this study, 282 small and medium manufacturing firms was selected. The researcher selected sample respondents (384 employees, owners and managers) from 282 enterprises purposively. Purposive sampling ensures inclusion of knowledgeable participants, while Cochran's formula provides a statistically valid sample size for reliable results. By using Cochran (2007) formula the researchers calculated sample size as follows:

$$n = \frac{z^2 \cdot p \cdot q}{e^2}, \quad n = \frac{1.96 \times 1.96 \times 0.5(1-0.5)}{0.05 \times 0.05} \quad n=384$$

Where: n, is sample size, P is success proportion which is considered 50%, Z is level of confidence which is 95% for this study, E is sampling error which is considered not more than 5%.

3.3 Operational definition of key terms

Consumer insight (X1) describes the profound comprehension of customer preferences, habits, and motives that guides product creation and marketing tactics.

Technology adoption (X2) is process by which people or organizations start utilizing and incorporating new technologies into their routines, actions, or operations is known as technology adoption.

Competitive Advantage (X3) is the distinct edge a business obtains over rivals that enables it to provide more value to its clients and outperform them in the marketplace is known as competitive advantage.

Table 2 showed the observed variables as proxies associated with each concept in the form of a meta-analysis.

Table 2. Meta-analysis

Constructs	Observed Variables	Source
Consumer insight	Purchase data	(Ye, Fei, et al., 2021, Fauzi & Ali, 2021, Sudirjo, 2023, Kozinets & Chimenti, 2021).
	Market trend	
	CRM data	
Technology Adoption	Industry report	(Ghobakhloo et al., 2022, Prados-Castillo et al., 2023, Skare& Soriano, 2021).
	Infrastructure investment	
	Sales growth	
Competitive advantage	Focus	(Dagnino et al., 2021, Farida & Setiawan, 2022, Arsawan et al., 2022).
	Cost	
	Differentiation	

3.4 Methods of data analysis

Structural equation modeling (SEM) was applied to evaluate the proposed relationships linking consumer insight, technology adoption, and competitive advantage. The mediating role of technology adoption was tested through bootstrapping techniques to estimate indirect effects with greater statistical precision. Model adequacy was assessed using standard goodness-of-fit indices to confirm the suitability of the structural framework. Prior to hypothesis testing, assumptions were verified to ensure robustness. Statistical analyses were conducted using SPSS and AMOS to support reliable and valid interpretation of results.

4. RESULTS

4.1 Data Adequacy Test

Table 3 shows the outcome of the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett test of Sphericity. KMO of 0.927 has a high degree of sampling adequacy meaning that these data can be analyzed by factors. As a rule, values of KMO that are above 0.6 are acceptable, whereas the values that are nearer to 1 are highly good indicators of sufficient sampling adequacy. Bartlett Test is used to determine the level of significant correlation between the correlation and identity matrices. The computed Chi-square statistic of 5153.275, with a degrees of freedom of 780, gives a significance level (Sig.) of.000. This is a very important finding ($p < .001$), which proves the fact that the variables are sufficiently correlated to perform factor analysis and support the validity of further analysis. On the whole, these findings justify the suitability of the data on further investigation of predisposing factors.

Table 3.KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	5153.275
	df	780
	Sig.	.000

4.2 Total Variance Explained Analysis

Table 4 shows the cumulative variance accounted by the Principal Component Analysis (PCA) which is a measure of the variability accounted by the extracted components. There are nine components with eigenvalues larger than one that was therefore retained according to criteria proposed by Kaiser. They jointly account 64.663% of the cumulative variance implying that the underlying factor structure has been sufficiently represented.

Table 4. Total Variance Explained

Total Variance Explained									
Compo nent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulati ve %	Total	% of Variance	Cumulati ve %	Total	% of Variance	Cumulative %
1	13.707	34.267	34.267	13.707	34.267	34.267	4.197	10.493	10.493
2	2.325	5.813	40.080	2.325	5.813	40.080	4.087	10.217	20.710
3	1.860	4.649	44.729	1.860	4.649	44.729	3.923	9.808	30.517
4	1.649	4.123	48.852	1.649	4.123	48.852	3.210	8.024	38.542
5	1.555	3.887	52.739	1.555	3.887	52.739	2.829	7.072	45.613
6	1.384	3.460	56.199	1.384	3.460	56.199	2.699	6.747	52.360
7	1.231	3.078	59.277	1.231	3.078	59.277	1.680	4.200	56.560
8	1.131	2.826	62.103	1.131	2.826	62.103	1.669	4.172	60.732
9	1.024	2.560	64.663	1.024	2.560	64.663	1.572	3.931	64.663
10	.953	2.384	67.047						
11	.845	2.112	69.159						
33	.180	.449	100.000						
Extraction Method: Principal Component Analysis.									

The leading dimension is represented by the first component, which explains 34.267 percent of the variance and other components are insignificant but important in that order. Following rotation, the variance explained is better distributed amongst the nine components with a range of 3.9 to 10.5 that increases interpretability. This consistent distribution proves the existence of a clear and meaningful multidimensional structure and sufficient consistency of the measurement model.

4.3 Enquiry for factor Confirmatory

To determine whether the observed indicators accurately reflect the suggested fundamental factors, CFA was used. By putting theories regarding the connections between green consumer insight, technology adoption, and competitive advantage to the test, this approach allows researchers to look at data patterns. CFA verifies theoretical constructs and guarantees that the measurement model is appropriate for the investigation by examining goodness of fit to the suggested model and actual data. The CFA results show that all factor loading values are higher than the cutoff 0.5 in Figure 2. Factor loadings, greater than 0.5 are taken into consideration for additional analysis, as recommended by Hair (2006). All of the items in this investigation are taken into consideration for additional analysis because their factor loadings are greater than the 0.5 as suggested by Hair, 2006 cutoff criteria except competitive advantage items, FC1 and from technology adoption dimensions IFI4 were removed from further analysis.

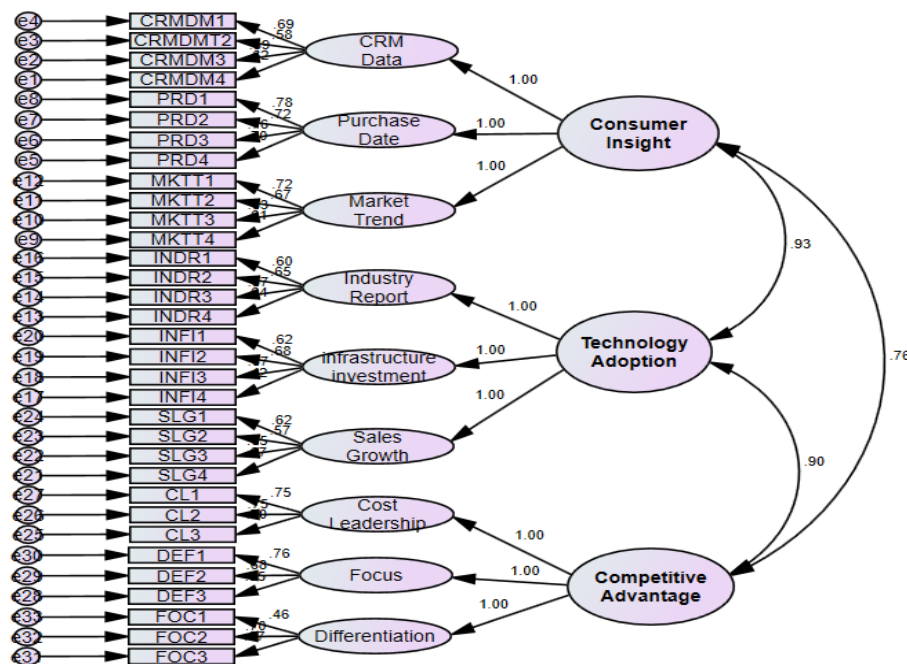


Figure 2. Confirmatory factor analysis

Table 5 shows the covariance results that show strong relationship between consumer insight and competitive advantage with an estimation of 0.554 and critical ratio of 6.755. This relationship is not a chance occurrence as indicated by the high critical ratio and probability value less than traditional level of significance. This observation indicates that the greater the knowledge a firm has on its consumers, the better placed it can be to record high competitive results. The concept of consumer insight turns out to be one of the strategic assets to influence the value propositions and improve market responsiveness. The high shared variance suggests that the enhancement of customer knowledge has a close relationship with the rise in competitive strength and especially in dynamic and highly competitive sectors in which informed decision-making is a crucial factor to future success.

Table 5. Covariance

Covariance			Approximation	S.E.	C.R.	P
Consumer Insight	<-->	Competitive Advantage	.554	.082	6.755	***
Consumer Insight	<-->	Technology Adoption	.379	.071	5.331	***
Technology Adoption	<-->	Competitive Advantage	.419	.075	5.588	***

Moreover, there are some important positive covariances between consumer insight and technology utilization (0.379; CR = 5.331) as well as between technology adoption and competitive advantage (0.419; CR = 5.588). Such findings suggest that companies that are well informed in gathering and examining customer data will embrace new technology due to the changing customer demands and response. Adoption of technology, in its turn, will help in efficiency, innovation, and responsiveness, which would help it perform better in the competition. The findings however also point to the fact that technology is not just enough but its effect is best when it is combined with strategic insight. On the whole, the trends of covariance represent a system, where consumer insight, technological capability and competitive advantage support each other.

4.4 Validation

Table 6 shows the construct validity findings based on composite reliability (CR) and average variance extracted (AVE). Constructs are all above recommended values with a CR of 0.730-0.781, which is strong internal consistency. Likewise, the values of AVE of 0.611-0.662 are above the minimum acceptable value of 0.50, which proves that there is sufficient convergent validity.

The MaxR(H) values of greater than 0.75 also support the reliability of the constructs of consumer insight, technology adoption, and competitive advantage in that the construct indicators represent a high degree of variance of the constructs. Discriminant validity is also determined because the value of AVE is greater than the maximum shared variance (MSV) of all constructs. Besides, the square roots of AVE are greater than the inter-construct correlations, which met the Fornell-Larcker criterion. The results affirm that these constructs are connected, but empirically independent, which proves the excellence of the measurement model.

Table 6. Validity Concern

	CR	AVE	MSV	MaxR(H)	CI	TA	CA
CI	0.730	0.641	0.235	0.852	0.649		
TA	0.760	0.662	0.128	0.759	0.169	0.656	
CA	0.781	0.611	0.268	0.788	0.377	0.144	0.675

Note: CI= Consumer insight; TA= Technology adoption; CA= Competitive advantage

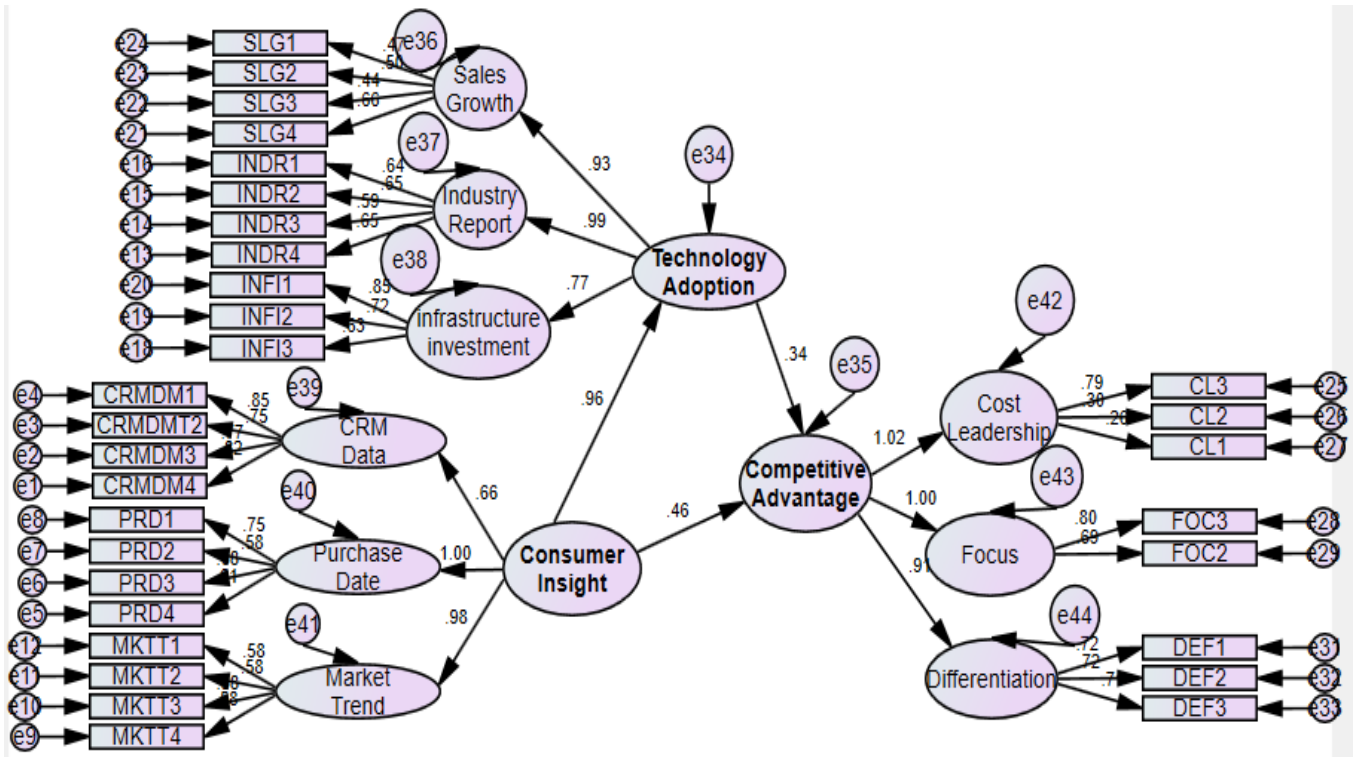


Figure 3. Equation of structural Path

4.5 Indices for Model Fit Analysis

The indices used to evaluate the overall model fit in the structural equation modeling (SEM) study are compiled in Table 7.

Table 7. Indices for Model Fit

Measurements	Criteria	Outcomes	Accepted level	Decision
Chi-square	CMIN	33.652	-	
	Degree of freedom	21	-	
	CMIN/DEF	1.738	<3	Fitted well
	P value	.150	>0.5	Fitted well
Absolute measurement of fit	RMSEA	.046	<0.08	Fitted well
Incremental fit instruments	CFI	.986	>0.9	Fitted well
	IFI	.960	>0.9	Fitted well
	RFI	.940	>0.9	Fitted well
	TLI	.972	>0.9	Fitted well
Parsimony fit measure	PNFI	.506	>0.50	Fitted well
	PCFI	.600	>0.50	Fitted well

Table 7 shows the model fit indices and it can be seen that the proposed model has an acceptable and strong degree of fit. With a chi-square (CMIN) of 33.652 and 21 degrees of freedom, $CMIN/DF = 1.738$ which is less than the recommended value of 3 thus a good fit. Also, the p-value 0.150 is greater than the acceptable minimum one, which indicates that the difference between observed and estimated covariance matrices is not significant. All these findings jointly suggest that the model is a good reflection of the underlying data structure and that the hypothesized relationships between the constructs are met by the empirical data.

The absolute, incremental and parsimony fit indexes also support model adequacy further. The RMSEA result of 0.046 is less than the acceptable cutoff of 0.08 and this is a good indication that the model fits closely with the population data. Incremental fit measures such as CFI are 0.986, IFI is 0.960, RFI is 0.940 and TLI is 0.972, which is greater than the accepted value of 0.90 thus indicating an excellent comparative fit. Additionally, the parsimony indices PNFI (0.506) and PCFI (0.600) are more than the 0.50 mark and show that the model is attaining an effective fit and simplicity balance.

4.6 Regression examination analysis

Table 8 presents the results of the regression analysis examining the relationships among the constructs of consumer insight, technology adoption, and competitive advantage.

Table 8. Regression Examination

Relative			Approx.	S.E.	C.R.	P	Ass.
Technology adoption	<---	Consumer insight	.870	.160	5.437	***	H2
Competitive advantage	<---	Technology adoption	.360	.140	2.571	***	H3
Competitive advantage	<---	Consumer insight	.940	.183	5.136	***	H1

The outcomes of the regression in Table 8 indicate strongly to the proposed relationships between consumer insight, technology adoption and competitive advantage of a firm. The consumer insight to technology adoption has a large coefficient of 0.870 with a critical ratio of 5.437 representing a very significant and positive influence. This validates H2 and implies that companies that use profound customer insights are more inclined to invest in and deploy modern technologies. Consumer insight seems to be a strategic stimulus that drives modernization and innovation. By conducting systematic analysis of customer preferences, organizations are able to match the technological infrastructure with the demand of the market creating less doubt and enhancing the quality of decisions. The position of market intelligence is emphasized in this relationship as the basis of digital transformation and operational growth.

The other regression paths indicate that both consumer insight and technology adoption have a direct positive effect on the competitiveness advantage. The technological adoption has a positive coefficient of 0.360 and the critical ratio is very significant of 2.571 which supports H3 and proves that technological capability forms part of excellent performance. In the meantime, the direct impact of consumer insight on competitive advantage is even more significant with a coefficient of 0.940 and critical of 5.136 verifying H1. This implies that customer knowledge is a prevailing competitive force that acts in isolation as well as by use of technology. Combined, these findings indicate a twofold route, namely, firms benefit as they learn about customers, and they transform that learning into technological action, to produce a strong synergy between strategic knowledge and operational implementation.

4.7 Mediating Role Analysis

According to Table 9, mediation analysis, consumer insight has a significant direct impact on competitive advantage, the path coefficient is 0.46. This implies that companies that have an in-depth knowledge of what customers need, wants, and pattern of behaviors are in a better position to differentiate their products and enhance their performance in the market. The direct path is still significant when a mediator is introduced and this shows that consumer insight plays a role of its own in competitive positioning. As a strategy, customer knowledge is a strategic core intangible resource that determines decision making, product development and value creation. This direct relationship is what validates the fact that organizations do not just rely on technological mechanisms alone; but it is the insight based strategies itself that creates some measurable competitive advantages in dynamic business environments.

Table 9. Mediating role Analysis

	Influence	worth	Path Influence
Consumer insight → Competitive advantage	Direct Influence	.46	Direct influence stated
Consumer insight → Technology adoption → Competitive advantage	Indirect Influence	.96*.34=.33	Indirect Influence Ensued
	Whole influence	.79	Partial mediation

The technology adoption has an indirect effect of 0.33 which is a product of consumer insight on technology adoption path (0.96) and the technology adoption on competitive advantage path (0.34). This observation demonstrates that consumer knowledge is a powerful trigger to the use of technology, which further enhances competitive advantage. Using customer insights, the companies will develop viable innovation by investing in the appropriate technologies, digital solutions, and upgrading processes. The strong relationship between the first relationships (0.96) indicates that consumer-based pressure is also a strong modernizing force. The technology is transformed into the strategic medium of transformation where knowledge in the market is translated into a productive process, and a creative potential. In that way, the mediator does not only mediate the relationship but enhances the impact of consumer insight as it enables the firms to respond faster, create tailor-made offerings, and improve productivity.

The net effect of 0.79 confirms the partial mediation i.e. both the direct and indirect mediation are operating concurrently. Consumer insight not only influences competitive advantage per se, but it also works via technology adoption. The partial mediation fact demonstrates that technology is important but not the only way of transforming market knowledge to performance output. The other unaccountability can also be explained by other capabilities of an organization such as the human capital, the strategic leadership and process flexibility. As a manager, the following outcome would support the two-level policy: the improvement of the customer intelligence systems as well as the active engagement in the technological infrastructure. Those companies which balance between these two dimensions are more likely to retain competitive edge, since they possess a mix of deep market understanding coupled with the tools of operation with which to implement the insight based innovation.

5. DISCUSSION

The findings of this research gave valuable insights into the relationships between competitive advantage, technology adoption, and consumer understanding with the focus on the interaction of these variables and the influence they have on each other. The high priority of knowing their consumers is the reason behind why organizations tend to adopt new technologies more, according to the high positive association identified between consumer insight and technology adoption. This underscores the importance of consumer insights in developing strategic decisions because it assists companies to identify and apply the solutions, which are more likely to meet the needs and preferences of their target market.

Further, Technology adoption play partial mediating role in the association between consumer insight and competitive advantage. This finding is similar with the finding of (Horng et al., 2022). The fact that the mere possession of insights is not sufficient but the organization must also utilize the insight to acquire technologies that would improve their competitiveness through competitive positioning is further substantiated by the high indirect effects of consumer insight on the competitive advantage through adoption of technologies. This observation advances the fact that the capability of converting consumer knowledge into feasible technical remedies is a necessity in the accomplishment of sustainable competitive success in the fast changing market environment of the contemporary world. This finding supports the finding of Ghobakhloo et al., (2022).

The fact that the competitive advantage also directly relies on the knowledge of the customer behavior and tastes also supports the argument that the knowledge of the customer behavior and tastes is one of the main factors in establishing the organization performance. This finding is similar with the finding of Fatonah and Haryanto, (2022) which indicated consumer understanding is critical to increase firm competitiveness. Business organizations which are able to collect and analyze data regarding customers are able to rise above their competitors since they have the ability of modifying their products and business strategies to suit the market needs. It is an obvious direction indicating that companies should allocate money towards customer research and data analytics as this may be a significant competitive edge.

This paper provides an insight into the competitive advantage and technology adoption, and consumer understanding relationships, specifically, as per the Service-Dominant Logic (SDL) and the Resource-Based View (RBV) theory. According to SDL, value is created during the relationship established by businesses and customers and it follows that those companies that are more competent in creating new technologies to enhance the latter are more effective in the process of implementing new technologies. The RBV theory states that a competitive advantage can be attained by diverse resources and capabilities, thus close positive relationship between consumer insight and technology adoption is a sign that there exists need to leverage the consumer insights as a strategic resource.

5.1 Theoretical implications

This research makes a contribution to the available body of knowledge by explaining the complex associations among consumer awareness, technology acceptance, and competitive advantage and forming a better understanding about making contributions to the existing theoretical frameworks of marketing and strategic management. The results validate the fact that the consumer insights are strong forces behind the technical innovation, and competitive success rather than supporting data. This research not only improves our knowledge in relation to how companies can convert consumer inputs into viable strategies, which create competitive advantages based on the focus of the mediating variable of technology adoption.

The paper is also an appeal to reconsider traditional structures, which tend to discuss these factors separately. Rather, it promotes a holistic model, which views the dynamic inter-relationships of the organizational strategy and technical developments and the customer behavior. Such theoretical framework can guide the next-generation research that explores other factors and

circumstances that can potentially impact such linkages, and will add to the discourse of strategic management and its application. In addition, the study complies with such theoretical principles as the Resource-Based View (RBV), which addresses the heterogeneity of resources in a bid to achieve an enhanced competitive advantage, and the Service-Dominant Logic (SDL), which is aimed at customer value creation as a result of contact.

5.2 Practical implications

In practice, organizations are supposed to undertake practical steps of integrating consumer insights in their operation strategies. This will not only involve data collection but also installation of systems that will facilitate real time analysis and feedback on the consumers. Included in the technologies that may assist in this process is the customer relationship management (CRM) systems and advanced analytics systems that a business may exploit. Moreover, it is recommended that companies should strive towards building cross-functional teams that may fill the divide between marketing, technology, and product development in such a way that information surrounding the consumer information would be clearly translated into product innovations and service additions. This way, companies can enjoy a greater flexibility and responsiveness to the changes in the market hence leading to greater competitive advantage. In addition, the establishment of partnerships with technology suppliers can help an organization to be on the leading edge of the trend and launch innovative solutions that can address the existing demands of consumers. This kind of aggressive behavior in the market will not only consolidate their position in the market but also result in more customer satisfaction and loyalty.

6. CONCLUSION

The study presents a worthy argument on the association like competitive advantage, adoption of technology and customer intelligence in businesses. According to the results, consumer insight is a major factor in the adoption of new technologies and companies with high in knowing that their clients now have better chances to enjoy the resulting technological advancement. This association has shown how strategic decision-making process should put into consideration consumer insights as they facilitate the identification and adoption of technologies that support consumer market requirements.

The study demonstrates a strong relationship between consumer insight and competitive advantage, significantly moderated by technological adoption, indicating that consumer

understanding is a primary source of competitive strength, yet its impact is greatly amplified when relevant technologies are applied. The observed partial mediation underscores the need for a holistic approach, where businesses not only gather consumer knowledge but also transform it into actionable technology-driven initiatives that enhance performance. Practically, the findings suggest that integrating consumer knowledge with modern technology enables firms to respond flexibly to evolving market conditions and customer needs. In today's dynamic business environment, a synergistic strategy that combines deep consumer insights with efficient technological application is essential for sustaining long-term competitiveness.

To gain deeper knowledge about the correlations between competitive advantage, technology adoption and consumer intelligence, the future study can be taken into consideration to explore a number of directions. One of the prospective directions is the analysis of particular technological groups enabling the most successful introduction of the information about customers into corporate strategies. Organizations are at liberty to invest in areas and products that can provide maximum benefits and maximize on the returns. Furthermore, the longitudinal study might be performed to understand the dynamics of the relationships under discussion with time, specifically, as the rate of the technology innovations swiftness is accelerating, and consumer habits can be considered dynamic. Additionally, cross-industry comparisons will also expose industry-based issues and best practices of technology and buyer data usage.

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