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Original Article

Leveraging Digital Technology for Competitiveness: A Study of SMEs in Kenya

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ABSTRACT

The proliferation of new technologies has significantly revolutionised nearly every aspect of life, including how business operations are undertaken. Notably, digital technologies are changing competitive paradigms, with the existing literature indicating that enterprises that adopt these technologies enhance their competitiveness and improve their performance. Like other entities, many SMEs around the world are integrating digital technologies into their operations to leverage these advantages. Anchored in the Resource-Based View (RBV) and Dynamic Capabilities Theory, this study investigated the impact of Digital Technology Adoption (DTA) on the competitiveness of Small and Medium Enterprises (SMEs) in Kenya. The RBV emphasises the strategic value of firm-specific assets such as digital infrastructure and skills, while the Dynamic Capabilities Theory advances this view by concentrating on a firm's ability to adapt, reconfigure, and renew resources in response to a changing business landscape. Using an explanatory research design, cross-sectional approach, and stratified, proportional, and random sampling techniques, data were collected using a closed-ended questionnaire and analysed using descriptive analysis and regression analysis. Descriptive statistics showed moderate to high levels of digital technology adoption (mean = 3.89) and higher competitiveness levels (mean = 4.23), reflecting a strong and consistent perception of competitiveness among the SMEs. Regression analysis indicated that digital technology adoption significantly and positively predicted SME competitiveness ($\beta = 0.578$, $p < 0.001$), explaining 30.3% of the variance ($R^2 = 0.303$). The model was statistically significant ($F = 136.617$, $p < 0.001$), with diagnostic tests affirming the assumptions of linear regression. These findings led to the rejection of the null hypothesis, corroborating the theoretical discourse by empirically validating that digital technologies serve as both valuable strategic assets and dynamic capabilities that enhance SME competitiveness and accentuate the importance of fostering a digital culture within SMEs to sustain competitive advantage.

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INTRODUCTION

The current globalised world is experiencing the 4th Industrial Revolution brought about by digital technology, which is transforming the economic structure by creating opportunities for radical growth and transformation of business processes and concepts from mass production to personalised production in a bid to cut costs (Distanont & Khongmalai, 2022). In light of the current global competition, technological changes are continuously changing competitive paradigms. Digital technologies are helping enterprises achieve competitive advantage and remain dominant in the market (Faiz, 2024). Digital technologies are forcing entities to compete simultaneously in various aspects, including product design, manufacturing, distribution, as well as communication (Lányi et al., 2021). Skare and Soriano (2021) add that digital technologies are helping businesses to better access talents and skills, develop new products and services, expand markets, and improve management. Ramdani et al. (2022) add that digital technologies are providing a competitive advantage to enterprises by promoting efficiency via better collaboration and communication.

Digital technologies are transforming the way businesses and consumers interact and exchange value (Lányi et al., 2021; Shahadat et al., 2023), and according to Nekmahmud and Rahman (2018), digital transformation is playing a significant role in economic change as well as acting as a source of competitiveness. Therefore, technological innovation has greatly altered business performance, including that of SMEs. Among other factors, Hasanah et al. (2022) note that the adoption of digital technology is needed for SMEs to be competitive. Gul (2020) notes that in the increasingly competitive environment, digital business strategies are offering businesses competitive advantages and increasing returns.

Consequently, appreciating the importance of digital technologies in enhancing their competitiveness, as most SMEs around the world are integrating them into their operations (Dimoso & Utonga, 2024). Some of the strategies they are adopting include automation, advanced digital technologies, and innovation, which have helped them mitigate the effects of global risks and remain resilient to technological disruptions.

However, Kitole and Sesabo (2024) state that the adoption of these technologies differs across regions and industries. The United States of America has 95% of its SMEs using at least one of the technologies, and their application has led to growth in profits, sales, and employment (US

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Chamber of Commerce, 2023). They are, however, less productive compared to the larger ones, partly due to the failure to adopt technology (Atkinson, 2024).

In Germany, Radicic and Petković (2023) state that while most of Germany's SMEs have adopted digitalisation in their operation, they are yet to realise the full change brought by these digital technologies. In Indonesia, Faiz (2024) noted that the SMEs manage to compete with larger entities by adopting the right digital technologies. In China, around 30% of SMEs had not yet adopted digital transformation strategies as of 2022 (Jia et al., 2024).

In emerging economies, digital technologies are helping SMEs to streamline their decision-making process. They are increasing their ability to lower operational costs, increase the flow of information, and improve the quality of their offerings to gain competitive advantages (Zide et al., 2022). In sub-Saharan Africa (SSA), among other challenges, SMEs lack comprehensive strategies for integrating digital technologies into their business objectives and operations. There is a lack of a nexus between technology adoption and their profit drivers. Consequently, they are unable to develop resilience capabilities needed for their survival, as witnessed by 70-80% of them remaining stagnant or failing in their first two years of operation (Achieng & Malatji, 2022). In East Africa, the adoption of digital technologies by SMEs is on the rise, with 76% of them integrating technologies to gain competitiveness (Matambalya & Wolf, 2021). In Kenya, the rate of technological adoption is relatively low, which stifles their competitiveness, growth, and overall performance (Korir & Mutua, 2024).

Additionally, SMEs lag the larger firms in the adoption of digital technologies relevant to their operations (Faiz, 2024). Digital technologies have also been associated with negative results on SMEs' performance due to knowledge gaps on their adoption, mismatch of business objectives, misconceptions about technology adoption, and low ability to expand resources (Yunis et al., 2018). In addition, whereas digital technology is offering a competitive edge for entrepreneurs, Distanont and Khongmalai (2022) note that SMEs still face obstacles and problems in applying digital technology. According to Prasanna et al. (2019), low utilisation level of improved technologies is a critical challenge facing SMEs in developing countries, thereby preventing them from harnessing opportunities and taking part in global trade. Similar sentiments are echoed by Shahadat et al. (2023) that in developing countries, the SMEs face challenges in their digital technology adoption compared to those in developed economies, thus lowering their competitiveness. Based on this background, this paper sought to assess the effect of digital technology adoption on the competitiveness of SMEs in Kenya.

LITERATURE REVIEW

Theoretical Review

Unified Theory of Acceptance and Use of Technology (UTAUT)

Proposed by Venkatesh et al. (2003), UTAUT combined similar constructs that were offered by many proposed models and theories, which saw several of them being ignored (Dwivedi et al., 2019). Therefore, UTAUT unified the terminologies of variables of various theories and models explaining technology acceptance. Its foundation is constructs of determinants of intention to use of use behaviour of technologies and includes social influence (SI), effort expectancy (EE), performance expectancy (PE), and facilitating conditions (FC).

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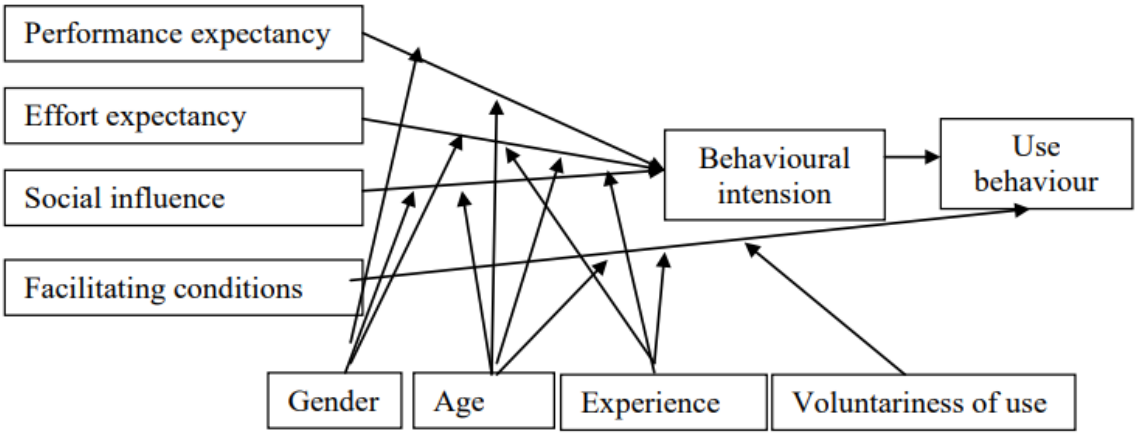
Figure 1: UTAUT



Source: *(Venkatesh et al., 2003)*

PE denotes the expectation of performance from the perspective of users, which informs their decisions to adopt certain technologies. In other words, the perceived usefulness of technologies affects their adoption by users (Sarfaraz, 2017). Its key variables include perceived usefulness derived from theory of planned behavior (TPB), technology acceptance models (TAM), and combined TAM-TPB; external motivation obtained from motivation model (MM); job-fit derived from MPCU; relative advantage from IDT; and outcome expectations from social cognitive theory (SCT) (Ahmad, 2015; Dwivedi et al., 2017). EE looks at the ease of use of the technology as perceived by the users (Sarfaraz, 2017). EE was derived from constructs of perceived ease of use from TAM, complexity from the innovation diffusion theory (IDT), and the model of PC utilisation (MPU) and ease of use from the IDT (Ahmad, 2015).

The SI is the degree to which others believe that the user of technology should adopt and use it. In other words, the desire to adopt technology is influenced by the surroundings of the user, such as people who encourage its use. SI considers three main variables: subjective norm obtained from the theory of reasoned action (TRA), TAM, TPB, decomposed theory of planned behavior (DTPB) and combined TAM-TPB; social factors obtained from MPCU; and image) effect of use on users' status) from IDT ((Ahmad, 2015). Lastly, FC is the perceived presence of technical and organisational infrastructure to support technology use. According to Venkatesh et al. (2003), these conditions include perceived behavioural control (from TAM, DTPB, TPB, and CTAM-TPB), facilitating conditions (from MPCU), and compatibility (from IDT). Under the interaction of these constructs and use behaviour or intention, Venkatesh et al. (2003) proposed age, experience, gender, and voluntariness as moderating factors. This theory was useful in explaining the adoption of digital technologies.

Resource-Based View (RBV) Theory

Penrose proposed the theory in 1959, which advanced that organisations need to use their internal resources and capabilities as the main sources of strength for their survival and attainment of competitive advantage. RBV considers the internal organisational capabilities of a firm in understanding its actions in the market (Chen et al., 2021). According to Assensoh-Kodua (2019), a resource is anything, existing or new, that has an enabling ability and may include human resources and skills, financial resources, and technological resources. An entity performs differently from others based on how it uses its resources. An

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organisation that enjoys sustained competitive advantage has its resources valuable, rare, difficult to imitate, and not easily substituted (Beamish & Chakravarty, 2021). The RBV was important in this study in showing how SMEs can adopt technologies as resources that help them in creating, nurturing, and maintaining a competitive advantage in the highly competitive market.

Empirical Review

Ferreira et al. (2019) conducted a study on the link between firm innovation and performance, focusing on competitiveness. The sample included 938 Portuguese companies, and multivariate statistical analysis was conducted. Results showed that the adoption of new digital processes contributed to greater companies' competitiveness. While the study showed that new digital processes adoption led to enhanced competitiveness, the focus was on companies, which might have different capabilities and resources to acquire and use technology that could not be the case for SMEs. Additionally, the socio-cultural and economic conditions of Portugal are different from Kenya, and the results might not be generalizable. On these grounds, it was important that a study on SMEs in Kenya be conducted.

Hasanah et al. (2022) appreciated that SMEs needed to embrace information technology (IT) to remain competitive. Therefore, they conducted a study to evaluate the role of IT on the competitiveness of SMEs in Indonesia. They adopted correlation analysis to assess the relationship among the study variables. The findings were that the use of IT enhanced competitiveness as it helped SMEs to carry out their business activities in a high-quality way. The current study adopted a regression analysis technique, as, besides looking for the relationship, it was necessary to assess the cause-effect and its magnitude.

Still in Indonesia, a study by Hartono and Herman (2019) aimed at determining the effect of information communication technology (ICT) on the competitiveness of SMEs. The study population was 135 SMEs drawn from various business sectors. Slovin's sampling technique was used to get the required sample of 101. Then, they used a simple random sampling. Data was analysed through a regression approach. Results indicated that the adoption of ICT positively and statistically significantly influenced SMEs' competitiveness. The reviewed study had a relatively small sample size, and there is thus a need to conduct a study involving a larger sample. In addition, there exists a contextual gap because the business operation environment in Indonesia is different from that of Kenya. Therefore, the current study was necessary to fill these gaps.

In Germany, Radicic and Petković (2023) conducted a study to explore the effect of digitalisation on the SMEs' technological innovations (process and product). They adopted a binary probit model as they separated the enterprises into micro, small, and medium-sized. The findings showed that digitalisation had different effects among the three sizes of firms. Further results showed that enterprises engaged in research and development (R&D) activities were not affected by digitalisation, while non-R&D firms experienced a positive effect on their products and processes. The current study considered improvement in products as a source of competitive advantage to SMEs. In addition, the study focused on Kenya, which has a very different context for SMEs operations from Germany in terms of economic and technological advancement, making Radicic and Petković's (2023) findings not generalizable. Díaz-Arancibia et al. (2024) note that in developing countries, digital transformation and adoption by SMEs are constrained by socio-economic and cultural factors.

Bradač and Huđek (2023) noted that the adoption of advanced technologies by Slovenian SMEs was limited due to the perceived complexities and usefulness in various sectors, leaving them with conventional technologies. Therefore, they conducted a study to explore the effect of digital

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technology implementation on these enterprises, understand the existing obstacles, trends, and support measures during the digitalisation process. They used the variance analysis technique. Among the findings were that even though digital technologies enhanced communication and elevated operational standards, they still faced challenges of differentiation. On this note, inability to differentiate their offerings means that they lack a competitive advantage arising from differentiation because, as put by Hamidizadeh and Taheri (2017) and Puta et al. (2018), it is one of Porter's triple strategies to competitiveness. Additionally, the Slovenian context is different from others, such as Kenya, and these results may not be generalised; thus, there was a need for another study to establish how digitalisation affected the competitiveness of Kenyan SMEs.

Adane's (2018) study was based in sub-Saharan Africa, where the author sought to explore the adoption of cloud computing by SMEs and its contribution to competitive advantage. They adopted a mixed research design and collected data from 261 respondents and 11 SMEs. The results indicated that adopting cloud computing led to business growth and improved customer experience, and ultimately competitive advantage. To realise these benefits, it was found that an adoption strategy was needed and had to include adoption goals and a roadmap. While this study offers useful insights into the effect of digitalisation on competitiveness, it focused on cloud computing, while the current study investigated all aspects of digitalisation. Additionally, the current study shifted the study context from sub-Saharan Africa to a specific country context, Kenya.

A study by Sarfo and Song (2021) was conducted in Ghana to assess the effect of e-commerce on enabling SMEs to compete on a global scale. The technological acceptance model (TAM) guided the study. Data was collected from managers and owners of SMEs and analysed through the partial least squares regression technique. Results indicated that the widespread use of e-commerce helped enterprises be able to compete in the current world of technological advancement. Since Ghana offers a different business environment from other regions, the results may not be generalised to the Kenyan case; thus, this study was necessary.

Mosbah (2024) adopted a narrative review approach to explore the status of technology adoption by SMEs and strategies to strengthen it. Results showed that technology adoption led to enhanced business operations and competitiveness of SMEs. Specifically, there was 80% agreement that technology platforms had helped SMEs compete with larger entities. Additionally, 90% of respondents were optimistic that technology would help their SMEs grow in the future, while 80% agreed that there was a reduction in costs, which would otherwise have been transferred to consumers.

METHODOLOGY

Research Design

This study adopted the explanatory research design. According to Sainani (2014), this design is useful in establishing causal relationships. It identifies factors that are causally associated with the dependent variable. Also, Skinner and Dancis (2020) note that the explanatory design shows the mechanisms by which the predictors exert their influence.

Study Population and Sample

The population of the study was the SMEs in Kenya, which are estimated to be over 45,000. However, the accessible population was 708 enterprises as contained in the Kenya Association of Manufacturers (KAM) (2023) SME directory and classified in various sectors as per the classification by the United Nations Industrial Development Organization. This population is depicted in Table 1. According to Asiamah et al. (2017), accessible population refers to the final elements that are

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eventually surveyed or from which a sampling is drawn.

Table 1: Accessible Population

	Sectors	Total
1	Agroprocessing	4
2	Automotive	47
3	Building, Mining & Construction	29
4	Chemical &Allied	85
5	Energy, Electronics, and Electricals	33
6	Food and Beverage	142
7	Leather & Footwear	11
8	Metal & Allied	65
9	Paper & Paperwood	33
10	Pharmaceuticals	17
11	Plastics & Rubber	64
12	Service & Consultancy	103
13	Textile & Apparel	55
14	Timber, Wood & Furniture	20
	Total	**708**

Source: *Kenya Manufacturers and Exporters Directory 2022-2023*

The sample was determined using the Yamane formula, which is as follows:

n = N/ (1+N (e) 2

Where:

- N is the population size (708)
- e is the margin of error (0.05 for 5%).

The sample was ascertained to be 320 and was sampled using several sampling techniques. First, a stratified sampling technique was used based on the 14 sectors. Second, proportional sampling was adopted to ensure that samples from each stratum were equal to their size in the overall population (Alam et al., 2015). Lastly, simple random sampling was used to give each study element a chance of being selected (Noor et al., 2022).

Data Collection

A questionnaire was used to collect data and was divided into five sections. Section A covered the profile of SMEs, while sections B-E covered items on the variables with a Likert scale of 5 points, where 1 - Not at all, 2 - To a slight extent, 3 - To a moderate extent, 4 - To a considerable extent, 5 - To a great extent. As advised by Boparai et al (2018), the self-administered questionnaire was deemed fit as the population was large and was all deemed literate.

Reliability and Validity

Reliability is the ability of a measure to yield consistent results, while validity is the degree to which the instrument measures what it was intended to measure (Köhler & Hartig, 2020). Reliability was measured using Cronbach's alpha, with items with values of 0.7 or more indicating internal consistency (Köhler & Hartig, 2020; Taber, 2018). Validity was assessed through expert consultation, exploratory factor analysis (EFA), and confirmatory factor analysis (CFA) (Alavi et al., 2023; Harerimana & Mtshali, 2020). EFA helps in summarising data to easily understand and interpret patterns and relationships of the observed variables and helps researchers in concentrating on a few items that explain the construct (Sürücü et al., 2022). Several options exist for decision rules, such

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as the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, where values above 0.8 are deemed excellent, 0.6-0.8 acceptable, and below 0.6 unacceptable (Loewen & Gonulal, 2015). Another approach is factor loading, where a cut-off of 0.30 has been proposed as being good (Howard, 2016). On the other hand, CFA is used to validate the factors of EFA. CFA is also used to test whether a set of observed variables influences the response variables as per an existing conceptual basis or theoretical framework (Alavi et al., 2020).

Data Analysis

The study used descriptive statistics for the purposes of summarising the study findings and took the form of means, standard deviation, and frequencies. Additionally, inferential statistics were used, focusing on correlation and regression analysis to aid in generalising. The analysis was aided by SPSS version 21. The regression model was:

$$CO = \beta 0 + a_1 DTA + e \quad \ldots\ldots 1$$

Where:

- $\beta 0$ = constant
- a_1- coefficient of DTA
- DTA = Digital technology adoption
- CO = competitiveness
- e = error term

RESULTS, FINDINGS, AND DISCUSSION

SMEs Profile

Most SMEs, 217 (68.7%), operated in the manufacturing sector, followed by 75 (23.7%) in the service sector. Agriculture, retail, and technology had 12 (3.8%), 7 (2.2%), and 5 (1.6%), respectively. Further results showed that half of SMEs (158) had been in operation for 4-6 years, 70 (22.2%) for 7-10 years, 67 (21.2%) for 1-3 years, 11 (3.5%) for less than one year, and 10 (3.2%) for over 10 years. Most of these SMEs (102, 32.3%) had annual revenues of Ksh. 5-50 million. 28.2% (89) of SMEs made Ksh. 50-100 million and 18% (57) had Ksh. 100-500 million. The SMEs with less than Ksh. 5 million in revenues were 29 (9.2%). In terms of employees, most SMEs (131, 41.8%) had below 50 workers, and those with over 200 employees were 19% (60).

Validity Analysis

Exploratory Factor Analysis

Results in Table 2 show that the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy has a value of 0.885, and following the decision rule that values above 0.8 show excellence (Loewen & Gonulal, 2015), then it follows that the factors of DTA were adequate in measuring this variable. It is further supported by the factor loadings, all of which are above 0.3, meaning they were retained. Similarly, Table 3 shows that the KMO is 0.853 and factor loadings were all above 0.3, indicating that all competitiveness items were adequate and thus retained.

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Table 2: Factor Loading for the Component Digital Technology Adoption

Code	Variable	Digital Technology Adoption
X2	To what extent does your company use digital tools and platforms in operations? (Extent of Use)	.824
X3	To what extent are digital technologies integrated into your products 2? (Level of Integration)	.854
X4	To what extent has your company invested in digital infrastructure? (Infrastructure)	.867
X5	To what extent are employees in your company effectively trained and developed in digital skills? (Capability and skills)	.862
X6	To what extent does your company use digital tools and platforms in operations? (Extent of Use)	.851
	Eigenvalues	4.138
	% variance	51.724
	Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization. a. No Rotation. Kaiser-Meyer-Olkin measure of sampling adequacy =.885 Bartlett's test for Sphericity: Approx. Chi-Square =980.058, df =15, Sig. = .000	

Table 3: Component Matrix of Competitiveness as a Factor

Code	Variable	Competitiveness
C1	To what extent does your company implement strategies to distinguish its products from competitors?	.713
C2	How effectively does your company position itself in the market to attract target customers?	.749
C3	How would you rate your company's brand recognition among your target audience compared to competitors?	.681
C4	To what extent is your brand considered trustworthy and reputable in your industry?	.755
C5	To what extent is the quality of your products superior to those offered by competitors?	.601
C6	To what extent does your company maintain customer loyalty and retention rates compared to competitors in the industry?	.780
C7	To what extent does your company respond to market changes to maintain its competitive edge?	.779
C8	To what extent does your company respond to competitive pressures to maintain its competitive edge?	.676
	Eigenvalue	4.138
	% Variance	51.724
	Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization. a. No Rotation. Kaiser-Meyer-Olkin measure of sampling adequacy =.853 Bartlett's test for Sphericity: Approx. Chi-Square =1042.553, df =28, Sig. = .000	

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Confirmatory Factor Analysis

As noted by Alavi et al. (2020), CFA was conducted to validate the factors of EFA and was performed through Analysis of Moment Structure (AMOS version 24). Table 4 and Figure 1 present the results for CFA for DTA. The standardised estimate values for all five items explaining DTA are above 0.5. In addition, all critical ratio (CR) values were above the critical value of 1.96 and with significant p values, further confirming that the studied items strongly loaded onto the DTA.

Table 4: CFA Model Estimate of Digital Technology Adoption

Paths	Unstandardized Estimate	Standardized Estimate	SE	C.R	p-value
X6<--DTA	1.00	0.813	-	-	-
X5<--DTA	1.056	0.826	0.064	16.591	***
X4<--DTA	1.087	0.844	0.064	17.080	***
X3<--DTA	1.019	0.810	0.063	16.153	***
X<--DTA	0.902	0.768	0.060	15.054	***

Note: *** =p<.001, ** =p<.01, * =p<.05, C.R =Critical Ratio, S.E =Standard error

Figure 1: Confirmatory Model for DTA

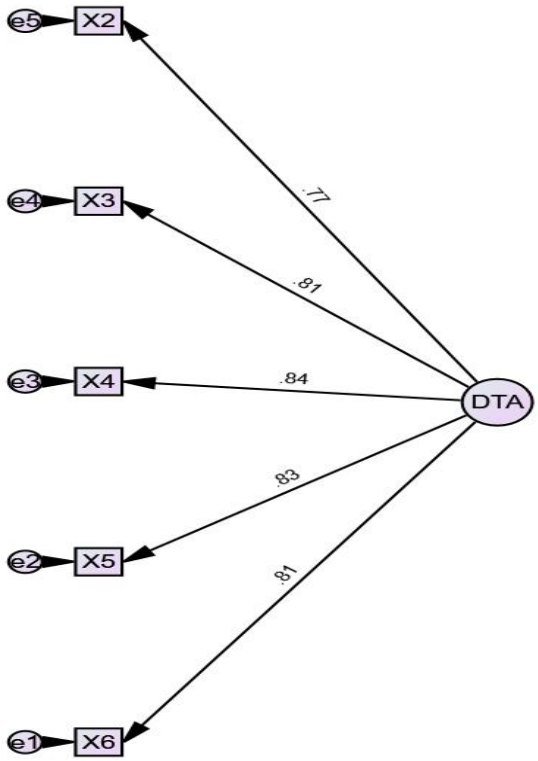

Table 5 and Figure 2 present the results for CFA for competitiveness. It is seen that the items loaded into the competitiveness component (C1, C2, C3, C4, C6, and C7) all had standardised estimated values above 0.5 with CR values greater than the critical value of 1.96. Additionally, they all had strongly significant p values, indicating they had a strong association with competitiveness, and were thus retained for analysis.

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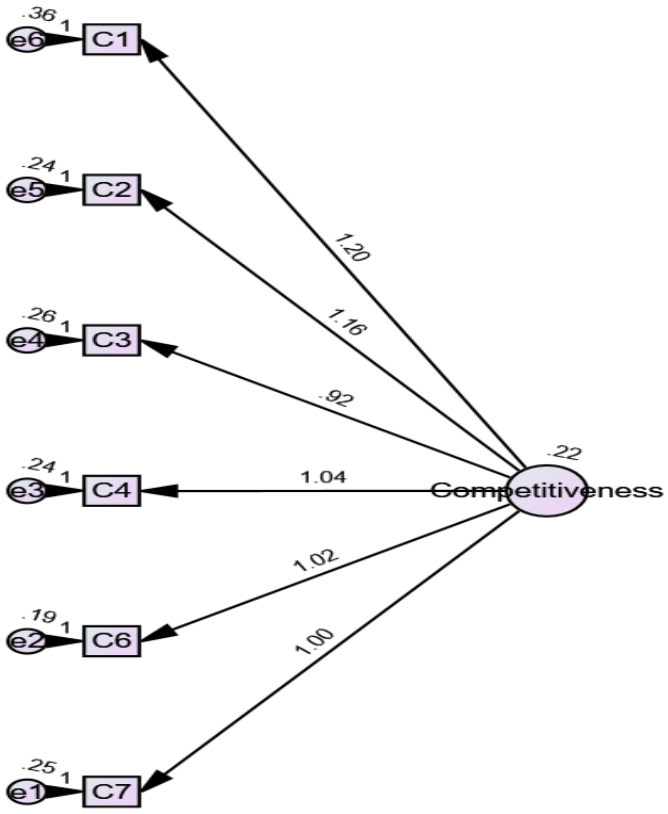
Table 5: CFA Model Estimate of Competitiveness

Estimate	Unstandardized estimates	Standardized estimates	S. E	C.R	P
C7<--Competitiveness	1.000	0.685			
C6<--Competitiveness	1.018	0.732	.091	11.169	***
C4<--Competitiveness	1.040	0.706	.096	10.835	***
C3<--Competitiveness	.918	0.642	.092	9.983	***
C2<--Competitiveness	1.162	0.743	.103	11.301	***
C1<--Competitiveness	1.201	0.681	.114	10.512	***

Note: *** =p<.001, ** =p<.01, * =p<.05, C.R =Critical Ratio, S.E =Standard error

Figure 2: Confirmatory Model for Competitiveness



Reliability Analysis

As Köhler and Hartig (2020) note, reliability is the degree to which data collection and analysis methods yield consistent results. A high reliability level is required to increase the statistical power needed to detect relationships. Cronbach's alpha (α), whose values range from 0-1, was used to measure each item's reliability, where values of 0.7 and above were deemed an indication of high reliability.

Tables 6 and 7 present the reliability analysis for digital technology adoption (DTA) and competitiveness, respectively, indicating each item's corrected item-total correlation (CITC) and corresponding Cronbach's alpha (CAID). CITC shows how well every variable's item correlates

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with the sum of all other items (Zijlmans et al., 2019), and a value of >0.3 is recommended (Hajjar, 2018). In Table 6, all six items of DTA and in Table 7, all seven items of competitiveness have CITC values above 0.3 and CAID values above 0.7, indicating high reliability, and these were not dropped.

Table 6: Reliability Analysis for DTA

Code	Item	CITC	CAID
X1	Digital is used by the firm	.731	.907
X2	To what extent does your company use digital tools and platforms in operations? (Extent of Use)	.714	.773
X3	To what extent are digital technologies integrated into your products 2? (Level of Integration)	.747	.764
X4	To what extent has your company invested in digital infrastructure? (Infrastructure)	.780	.755
X5	To what extent are employees in your company effectively trained and developed in digital skills? (Capability and skills)	.743	.765
X6	To what extent are digital technologies integrated into your company's business processes? (Integration of tech into business processes)	.742	.766

CI-TC = Corrected Item-Total Correlation; CAID = Cronbach's Alpha if Item Deleted

Table 7: Reliability Analysis for Competitiveness

	Item	CITC	CAID
C1	To what extent does your company implement strategies to distinguish its products/2 from competitors??	.611	.850
C2	How effectively does your company position itself in the market to attract target customers?	.657	.843
C3	How would you rate your company's brand recognition among your target audience compared to competitors?	.578	.852
C4	To what extent is your brand considered trustworthy and reputable in your industry?	.655	.843
C5	To what extent is the quality of your products superior to that offered by competitors?	.489	.861
C6	To what extent does your company maintain customer loyalty and retention rates compared to competitors in the industry?	.684	.840
C7	To what extent does your company respond to market changes to maintain its competitive edge?	.682	.840
C8	To what extent does your company respond to competitive pressures to maintain its competitive edge?	.566	.853

Descriptive Statistics

Digital Technology Adoption

Table 8 shows the summary of responses regarding the DTA items. The responses ranged from 1 (Not at all) to 5 (to a great extent), for most items, with the mode being 4. Overall, the mean response rate was 3.89, indicating most respondents were of the view that SMEs had adopted digital technology to a considerable extent.

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Table 8: Digital Technology Adoption

	Mean	Mode	Standard Deviation	Minimum	Maximum
Digital use by the firm	4.24	4	0.61	1	4
Extent of use of digital tools and platforms	4.01	4	0.81	1	5
Level of Integration of Digital Technologies	3.88	4	0.87	1	5
The company invested in digital infrastructure	3.80	4	0.89	1	5
Employee digital capability and skills	3.64	4	0.88	1	5
Integration of tech into business processes	3.74	4	0.85	1	5
Composite	**3.89**		**0.82**		

Competitiveness of SMEs

Table 9 shows the descriptive statistics for the competitiveness variable. Similarly, responses ranged from 1 to 5, not all to a great extent, respectively. The mode was 4 and 5, and the means were above 4. Consequently, the composite mean was 4.23 and with a low standard deviation, 0.69, indicating that there was minimal deviation of responses from the mean.

Table 9: Competitiveness

	Mean	Mode	Standard Deviation	Minimum	Maximum
Implement strategies to distinguish its products/services from competitors	4.14	4	0.82	1	5
Positioning in the market to attract target customers	4.03	4	0.72	1	5
Brand recognition among your target audience compared to competitors	4.11	4	0.68	1	5
Brand is considered trustworthy and reputable in your industry	4.50	5	0.67	1	5
Quality products or services compared to those of competitors	4.22	4	0.64	1	5
Maintaining customer loyalty and retention compared to competitors	4.47	5	0.65	1	5
Response to market changes to maintain a competitive edge	4.20	4	0.68	1	5
Response to competitive pressures to maintain a competitive edge	4.13	4	0.67	1	5
Composite	**4.23**		**0.69**		

Digital Technology Adoption and Competitiveness of SMEs

The objective of the study was to assess the effect of DTA on the competitiveness of SMEs in Kenya. It was guided by the null *hypothesis (H0); DTA has no significant effect on the competitiveness of SMEs in Kenya.* A simple regression analysis was performed, and the results are indicated in Table 10.

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Table 10: Simple Linear Regression Results for DTA and Competitiveness

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.380	.167		8.257	.000
	DTA	.578	.049	.551	11.688	.000
		R = 0.551	**R2 = 0.303**	F =136.617**		

**t-test statistics and F-statistics are significant at 0.05

It is shown that digital technology acquisition was responsible for 30.3% of the variability in SMEs' competitiveness (R2 = 0.303). The adopted model was also fit to support DTA to predict competitiveness (F = 136.617, p <0.05). Further results indicate that for each unit rise in DTA, competitiveness rose by 0.578 units and in a statistically significant way, p = 0.000. Therefore, the null hypothesis is rejected.

DISCUSSION

These findings have supported the study of Adama et al. (2024), who established that embracing IT and innovation helped enterprises to stay ahead of their rivals and respond effectively to technological advancements, changing customer needs, and market disruptions. Additionally, they are in agreement with Al-Omush's (2023) findings that embracing digital technologies had a positive effect on the sustainable competitiveness of SMEs. SMEs with a digital culture supported their digital strategy and digital capability, making them post superior results over rivals, which endure over the long run without a chance of declining. By adopting new technologies, enterprises create technological and technical competence that creates digital competitiveness (Martincevic, 2022). According to Medeiros and Maçada (2022), utilising the data from the use of these technologies and analysis of business operations helps an organisation achieve a competitive advantage.

Hasanah et al.'s (2022) findings are also supported by this study, as they established that SMEs that had adopted IT improved their competitiveness. The IT helped them to research the performance of their products relative to those of competitors to improve their quality. Additionally, IT adoption enhanced competitiveness through the promotion of goods and services via websites, social media, and marketplaces. Additionally, it enhanced their communication with other stakeholders. Indeed, Bessonova and Battalov (2020) note that digital technologies accelerate innovation that increases competitiveness through enhanced access to new markets and the opening of new opportunities for collaboration with other stakeholders.

The results further corroborate the work of Martincevic (2022), who found that digital technology use by SMEs led to the creation of sustainable competitive advantage. Digital technologies enable automation of some processes that create new and faster avenues of doing business, and offer greater visibility as well as recognition, which increase business efficiency and effectiveness, leading to competitiveness. The results are also in agreement with the study of Atanasov (2024), who found that digitalisation was associated with the growth of competitiveness and led to a new type of competitive advantage. The results also align with the findings of Hartono and Herman (2019) that information communication technology (ICT) adoption as measured through the general use of ICT, ICT market orientation, and use of communication had positive, statistically significant effect of competitiveness of SMEs through improved finance, marketing, competitive prices, and cost control.

The results also support the study of Kokoreva and Silina (2022) that digital technologies support the positioning of products and services in a manner that distinguishes them from competitors by

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creating extra consumer value. The results also agree with Shankar and Parsana (2022) study, which found that the use of digital technologies such as the artificial intelligence (AI) helped enterprises to analyse data and uncover consumer behaviors and sentiments, which informed better brand positioning, offering or more innovative services and products, leading to expanded competitive advantages. Market positioning strategies are useful in increasing product competitiveness (Kalugina & Ryapukhin, 2021; Nugroho, 2024). Digital technologies are also helping firms to position themselves as having the capacity to protect customer data, reducing privacy threats that in turn improve their trust and loyalty with a brand. A study by Parkhuts (2024) established that the use of digital technologies in businesses increased operational efficiency, consumer satisfaction as well and loyalty while allowing them to adapt to new realities.

The study has also found that DTA helps SMEs respond to market changes to maintain a competitive edge. These findings align with the study of Berawi et al. (2020), who established that digital innovation helped enterprises create competitive advantages through optimisation of end-to-end workflows as well as the integration of consumer requirements into the delivery of services and development of products. Similar findings were established by Dhanias et al. (2024) that adoption of technologies helped entities to operate efficiently, respond quickly to market dynamics, and develop innovative services and products that differentiate them from rivals. Additionally, Chukurna et al. (2024) found that digital technologies and tools are helping firms to adapt quickly to market changes and remain competitive.

CONCLUSION

In the contemporary digital age and a highly competitive business environment, businesses must adapt their operations to remain competitive. One avenue through which enterprises, including SMEs, are focusing to attain sustainable competitive advantage is the adoption of digital technologies. This study sought to assess the effect of digital technology adoption on SMEs' competitiveness in Kenya. It has been established that the adoption of digital technologies has a positive and statistically significant effect on the competitiveness of Kenyan SMEs. It is recommended that SMEs constantly invest and adopt new digital technologies in their business operations to help them attain and maintain a competitive advantage. Further studies should be conducted focusing on a larger population since the current study only included the 708 enterprises contained in the 2022-2023 Kenya Manufacturers and Exporters Directory. Additionally, research should comparatively study the effect of digital technology adoption on the competitiveness of SMEs based on their sectors.

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