Achieving Sustainable Growth in Entrepreneurial Ventures: The Role of Digital Technology and Strategic Adaptation

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ABSTRACT

This research investigates how to achieve sustainable growth in entrepreneurial ventures through the role of digital technology and strategic adaptation. Based on the Dynamic Capabilities Theory, the research crystallises how strategic adaptation may augment the contribution of technology to the growth of entrepreneurial ventures. Employing a cross-sectional survey research design, data were collected from a purposive sample of entrepreneurial ventures, and the analysis employed PLS-SEM. These discoveries show that digital technology systematically contributes to sustainable growth and increases strategic adaptation that also determine growth performances. Furthermore, there is also a moderating role of strategic adaptation between digital technology and sustainable growth of entrepreneurial ventures. Despite these understandings, this research has some limitations, including data collection based on self-reports and is set in a specific industry context, which restricts the generalisation of the results. Future studies are also urged to use longitudinal designs, increase the sampling across the different sectors and include objective performance outcomes to get a better understanding of the moderating relationship between digital technology and strategic adaptation. This research provides useful findings that could be helpful for the management of organizations aiming to effectively utilise digital resources for further development, especially in uncertain and active contexts.

Keywords : *Digital Technology; Strategic Adaptation; Entrepreneurial Ventures and Digital Capability Theory; Artificial Intelligence; Generative Artificial Intelligence;*

1. INTRODUCTION

Sustainable growth in entrepreneurial contexts is the ability for an entrepreneurial venture to expand function and profit in the long-run whilst being certain of resource sustenance and market operation (Johnston et al., 2020). This growth is fast considered strategic for securing the attractive sustained growth for entrepreneurs especially in growth intensive markets (Zott & Amit, 2018). However, for entrepreneurship to grow sustainably, there must be changes in technologies adoption and markets as a way of making consideration (Chesbrough & Rosenbloom, 2021). However, such growth is not easy to get because consumers' preferences are constantly changing and it is financially weak which makes the company very competitive and unstable in the long run, and unprofitable (Mason & Brown, 2022).

Digital technology, changes the behaviour, communication, and interaction strategies of entrepreneurs (Amit & Zott, 2020). It includes such solutions as e-shopping and social networks, cloud technologies and technologies for capturing and analysing big data that help to enhance the effectiveness of business and its presence on the market (Wamba et al, 2019).

Strategic adaptation acts as a moderator, enabling organisations to generate a nimble response to market forces, leverage technology to conform to new buyers' needs and competitiveness (Nambisan et al., 2022). Total, all of these components promote the sustainable evolution in new business ventures for entering the competitive markets while positively impacting the organisational responsiveness and operational flexibility as well according to (Teece, 2018).

Although the use of digital technology is evident to have positive impacts in the achievement of sustainable growth, the process is not easy. Pain points emerge with regards to adequately managing the technology costs and its deployment and incorporation into the business-focused plans (Reddy & Reinartz, 2021). For instance, not all start-ups manage to unlock opportunities from the developments in digital technologies, particularly smaller companies with limited capital (Bharadwaj et al., 2020). Further, the studies revealed that application of technology fosters growth but not sustainability if there are no procedural changes for strategic market adaptability and resources manipulation as opined by (Kim et al., 2019).

That makes the research gap, which this study seeks to address in the following ways, the concern of how digital technologies, when linked to strategic adaptation, impact sustainable business development of entrepreneurial ventures. Many past studies have discussed the technology's individual effects on the business results, but few studies have researched the relationship between digital adoption and adaptable tactics to create long-term success (Lichtenthaler, 2020). To fill this gap, this study assesses the moderated effect of strategic adaptation whereby the impact of digital technology on sustainable development of entrepreneurial ventures is examined, thereby providing insight on how the two can be utilised optimally.

The main research question of concern is an absence of a cohesive framework that maps digital technology, strategic adaptation, and sustainable development in entrepreneurial ventures. Even though the prior findings have shown the importance of technology and flexibility separately but, there is a lack of awareness of how they are linked as they enhance success sustainability (Elia et al., 2019). Prior work by Cennamo and Santalo (2021) considered digital transformation in scope in large organisations, but these studies did not capture vulnerabilities and requirements of new business ventures. This is because this study aims to fill this gap by directing its investigation towards entrepreneurial settings.

The purpose of this research is to examine how digital technologies and strategic adaptations have an impact on sustainable development of entrepreneurial firms. From these relationships, this study expects to come up with policies that will help entrepreneurs to integrate the adoption of technology and the application of adaptive strategies towards sustainable development. The following sections will be structured as follows: The section titled Literature Review will discuss the past theoretical and empirical works regarding digital technology, strategic adaption, and sustainable growth; the Methodology will describe the research approach, data collection, and data analysis; while the section Analysis and Result will provide extensive findings that support the existing literature.

2. LITERATURE REVIEW

2.1. Theoretical Foundation

The theoretical framework of the paper is the Dynamic Capabilities Theory (DCT) developed by Teece et al. (1997). DCT continues to argue that the ability to generate sustainable growth depends on the overall capacity of an organisation to reorient and redesign internal and external competency structures in a bid to fit the dynamic environments (Teece, 2018). Based on such suppositions DCT emphasises that companies with higher levels of agility and resource adaptability are likely to respond more effectively to new opportunities and threats, thus providing for the organisation's sustainability (Schilke et al., 2018). The theory emphasizes three core capabilities: The paper discusses how organisations can detect opportunities, capture them, and redesign resources (Warner & Wäger, 2019). These capabilities are crucial for firms' sustainable growth in the context of entrepreneurial ventures as they enable to address many challenges stemming from the ongoing digitalisation and changing business environments.

One major weakness of DCT is its vagueness and, while it can be a strength because it covers a lot of ground, sometimes there is a lack of clarity as to how exactly aspects of DCT would be implemented, especially for small-scale firms (Eriksson, 2017). Some of the criticism levelled to DCT include that of a bias towards large organisations because of its focus on flexibility and resource advantage and the structures this entails, this seeing recognition that DCT may not work well in entrepreneurial organisations constrained by resources (Wilden et al., 2018). Nevertheless, current

research has enriched the understanding of the theory by applying it not only to SMEs, but emphasising how even scarce resources can be leveraged to maximum effectiveness through smart adaptation, as well as effective application of digital technology (Lin & Wu, 2020).

In this particular research, DCT's concentration in flexibility helps guide the investigation of the role of strategic adaptation as a mediator as well as digital technology as a covariate. Here, technology comes in as an enabler of the dynamic capabilities, providing organisations the ability to capture new opportunities via better data processing, client outreach, and access to markets (Yunis et al., 2018). Strategic adaptation, in this case, represents the transformation part of DCT which is when firms alter their activities and model to appropriately adopt or use digital technologies for continuous growth (Wamba et al., 2019). The integration of DCT consequently gives a solid platform for advancing knowledge of how the use of digital technologies, along with strategic adaptation, support sustainable development in entrepreneurial operations.

Since DCT is a theory that takes into account all the variables of the study, any other theory is not necessary for the adequate description of the variables in this study. Hence, while considering the DCT approach, the integration of resource adaptation and opportunity responsiveness suggests that digital technology and strategic adaptation can be viewed systematically alongside one another as the enablers of entrepreneurship sustainability.

2.2. Empirical Reviews and Hypotheses Development

2.2.1. Contribution

This research contributes to existing empirical literature on entrepreneurial sustainability and digital change in three senses:

a. It embeds Digital Technology Adoption and Strategic Adaptation within a single mediated model to investigate their combined effect on Sustainable Growth in entrepreneurial companies, filling a huge empirical literature gap.

b. The study goes deeper into theoretical discussion by redefining strategic adaptation not only as a response mechanism, but as an active mediator that shows how companies turn digital spends into concrete, sustainable results.

c. It uses context-specific empirical findings of entrepreneurial businesses in emerging economies to enhance a predominantly Western-dominated body of research. Through the use of rigorous statistical methods, the research improves the methodological and applied significance of digital innovation models for both entrepreneurship scholars and managers.

2.2.2. Digital Technologies & Sustainable Growth in Entrepreneurial Ventures

Digital technology, therefore, plays a critical role in the sustainable growth of the entrepreneurial ventures by enhancing internal efficiency, market reach and innovation. Study by Li et al., (2019)

showed that the use of e-commerce and big data analytics trustworthy allows SMEs to be capable of expanding its market and adapt to the market needs. Also, Ferraris et al., (2018) noted that technologies such as cloud computing integrate process, decrease operational cost and provide global reach. Further, following Nambisan et al., (2017), there is a view that digitalization facilitate reconfiguration in support of business competitiveness. Cenamor et al., (2019) also underscore the importance of adopting digital platforms in order to boost entrepreneurial capability and organisations' ambidexterity for sustainability. However, prior research mainly focuses on into the issues and concerns of established firms, the situations in startups and initial stage ventures are not much explored. These gaps could be filled in order to better understand how new venture use digital technologies for sustainable development.

Hypothesis H1: *Digital technologies have a significant positive effect on sustainable growth in entrepreneurial ventures*.

2.2.3. Digital Technologies and Strategic Adaptation

Digital technologies complement strategic adaptation in that they provide organisations the tools to operate in uncertain environments. Berger et al., (2019) showed how with the help of tools such as artificial intelligence (AI) and data analytics it is possible to respond quickly to changes that are taking place in the market. According to Karimi and Walter (2021), there is a flexibility which business can apply depending on new knowledge that results from digital adoption. Schneider and Spieth (2020) also pointed out the role of information technology (IT) in supporting businesses to achieve business model fit with environmental dynamics for flexibility. More so, Wamba et al., (2019) agree that dynamic capabilities enhanced by digital technologies aids firms to operate competitively and effectively in volatile environments. However, the way by which digital technologies affect strategic adaptation in the SMEs has not been elaborated in detail. This paper has endeavoured to discuss these mechanisms and believed that explaining these mechanisms can help to understand how such firms might develop sustainable growth.

Hypothesis H2: *Digital technologies significantly enhance strategic adaptation in entrepreneurial ventures.*

2.2.4. Strategic Adaptation & Sustainable Growth in Entrepreneurial Ventures

Organisational capital, which is the reorientation of resources and activities in response to new markets, is paramount in its growth. Drawing from Teece (2018), the author posits that sustainability of competitive advantage arises from the ability of firms to adapt to dynamic environments. According to Zahra et al. (2020), contextualised capabilities help firms to forecast customers' demands, creating stability and growth. In addition, Lin & Wu (2020) discovered that firms having dynamic capability to adapt is more likely to innovate and can sustain long-term development. Schilke et al. (2018) note that

small ventures obtain incremental advantage from adaptive strategies because of their flexibility despite the recognised constraints on their resources. However, there is little research on the discrete impacts of adaptation within entrepreneurial organisations, thereby calling for further examination of the subject in terms of the company growth enabler.

Hypothesis H3: *Strategic adaptation has a significant positive impact on sustainable growth in entrepreneurial ventures.*

2.2.5. Strategic Adaptation as a Mediator between Digital Technologies & Sustainable Growth in Entrepreneurial Ventures

Strategic adaptation acts as a mediating variable between digital technologies and sustainable growth. The internal and external environment is a rich source of digital technologies that offer tools for operational efficiency but it depends on how firms are able to gain competitive advantage in the application of these tokens. According to Warner and Wäger (2019), the strategic adaptation process is crucial when using digital innovations to attain the growth goals on the marketplace. Likewise, Wamba et al. (2019) establish that firms utilising dynamic capabilities through adaptation achieve the optimum value of digital tools in the competitive markets. Schneider and Spieth (2020) highlight that tactical sensing and responding enables firms to integrate new technology into key business operations while achieving lasting success. Last of all, Schilke et al. (2018) explain that because resource-scarce startups need to pair technology acquisition with sustainable development, adaptation is the quintessential tool in the kit for generating prosperity.

Hypothesis H4: *Strategic adaptation significantly mediates the relationship between digital technologies and sustainable growth in entrepreneurial ventures*.

2.3. Emerging Digital Technologies: The Role of AI and Generative Language Models in Entrepreneurial Growth

New business ventures have, of late, begun implementing new digital technologies like AI and generative language models to increase operations, create more consumer interaction, and reduce decision-making complexity. On the broader canvas of digital technology, technologies like GPT (Generative Pre-trained Transformer), Mistral, and Claude have become a new standard for reaching, researching, and harnessing information by SMEs.

Artificial intelligence technologies facilitate predictive analytics, robotics-based automation of mundane tasks, and start-up resource mobilization for more advanced market feedback (Jovanović et al., 2023). Other technologies such as GPT-4 have revolutionized content generation, marketing automation, customer service (using chatbots), and product creation. These technologies facilitate cognitive assistance that was the sole prerogative of giants with massive R&D spends.

Beyond this, applications such as Mistral and Claude provided language-building features that facilitate multilingual markets, produce bespoke sales copy, and provide real-time translation—value critical to companies selling in multicultural markets (Ali et al., 2022). Democratizing these tools sets developing-world entrepreneurs on an equal level with those in the developed world. Their application is the same as flipping over demand for adaptive measures due to businessmen mechanizing not only processes but also keeping up with market movers and buyer trends. The study therefore stretches skylines from central ICTs to encompass such edge digital technologies while evaluating their contribution towards sustainable entrepreneurial development.

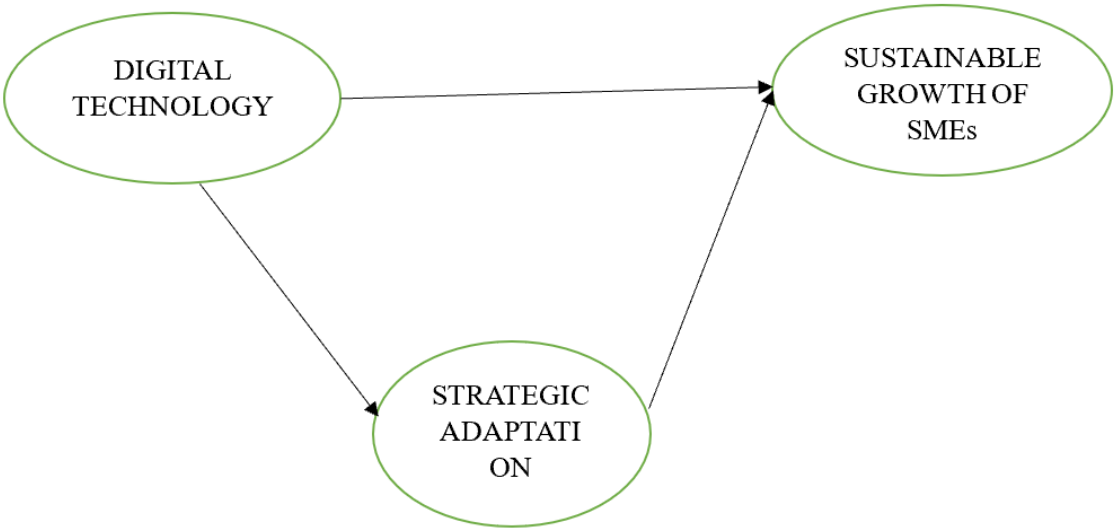

Figure 1: Research Framework (researchers construct 2025)

2.4. ORIGINALITY AND RESEARCH CONTRIBUTION

- This current research proposes a new convergence of Strategic Adaptation and Digital Technology Adoption into one umbrella to conceptualize Sustainable Growth in entrepreneurial businesses, an interface that has been assigned the much-needed priority in earlier research.

- In contrast to typical studies that evaluate digital technology as a generic enabler, this current research distinguishes its strategic use under uncertainty in markets with specific reference to emerging economy entrepreneurs.

- It locates Strategic Adaptation in non-neutral moderator yet intervention mechanism, connecting digital innovation to sustainable impacts.

- It extends current models with the inclusion of a multi-path mediation model that describes not just the direct but indirect effects to illustrate how companies digitally innovate and survive.

- Empirical insights are generated using strict measurement and structural equation modelling techniques, providing methodological richness to previous conceptual or country-level studies.

- Findings provide a roadmap for action that can be used to inform policy, entrepreneurship development programs, and digital transformation strategies in developing countries.

- By adopting the technology and strategy dimensions of business sustainability, the research addresses a knowledge gap and provides new contributions to adaptation and digital entrepreneurship theory.

3. RESEARCH METHODOLOGY

3.1. OVERVIEW OF THE RESEARCH PROCESS

For the sake of transparency and clarity for this study of methodological quality, Figure 2 explicitly displays the flow process. The chart illustrates all the major research steps:

Step 1: Conceptual Framework Development

Step 2: Instrument Design & Validation

Step 3: Sampling & Data Collection

Step 4: Data Cleaning & Screening

Step 5: Measurement Model Assessment

Step 6: Structural Model Analysis (SEM)

Step 7: Results Interpretation & Discussion

Step 8: Conclusion & Managerial Implications

Figure 2: Methodology flowchart

3.2. DATA COLLECTION

The data was collected through an online questionnaire that allows the participants to fill it in at their own time convenience. This approach eliminated time and spatial factors which may hinder the implementation of a survey and also eliminated any bias that may come up due to certain individuals' reluctance to offer their opinions and ideas in a survey exercise. Questions in the questionnaire were derived from previous studies that targeted SME characteristics, technology, and strategic positioning for entrepreneurship (Eze et al, 2020; Qalati et al, 2020; Zahra & Wright, 2018). This adaptation helps to ensure that the constructs used are in congruent with those from the literature, thus increasing content validity. Reliability of the items that formed the questionnaire was assessed using PLS-SEM through SmartPLS, establishing that the measurement model was reliable and valid.

Thus, a target of 300 respondents was considered taking into account recommendation of SEM sample size. In Kline's (2015) recommendations, several factors were noted with a minimum of 200 participants preferred for SEM due to adequate power of the statistics used for testing and accurate parameter estimation. Increasing the number of participants to 300 provided sufficient variability so that the study incorporated data from businesses of different levels of digital technology integration and diverse strategic orientation. The comparably larger sample size meant that the authors' analysis of the data was more stable especially for models with mediating factors.

The data collection stage was extended to four weeks because the selected sample was intended to cover a broad range of businesses, different in size, age, and industry type. Such a period allowed for sampling adequate sample size and also posed little time limits to the respondents in the study making the data collected more reliable.

The questionnaire consisted of four well-defined sections: Demographic Information: Obtained captured respondent and business profile information including age of the business and size of the business etc. Digital Technology: Evaluated how effectively learners adopted fusion of information technology in their endeavours. Strategic Adaptation: Assessed methods used in coping with change within the market. Digital Technology's Impact on Growth: The extent to which the integration of digital technology has impacted the growth of existing entrepreneurial ventures.

The questions used were derived from empirical studies on SME growth and digital technology studies, so the instrument used here is relevant and has theoretical support (Chatterjee et al., 2021; Journal of Small Business Management, 2019). This alignment also offered a logical foundation for construct measurement, inherent construct variability was minimised, and cross theoretical parity of construct definitions was made possible. Uses of a 5-item Likert scale was made to assess the concepts pertaining to the digital technology acceptance and strategic implementation and the growth effect. The scale was chosen from 1 "do not agree at all" to 5 "agree to a great extent", so the answers were not monotonous. Internal consistency of the measurement scale was further checked by Cronbach's alpha

coefficients with all possibly achieving acceptable value of alpha of 0.7 or above which is very ideal according to Nunnally and Bernstein (1994). The reliability was then examined by establishing the composite reliability using PLS-SEM through SmartPLS and indicates a high construct reliability and robustness.

4. DATA ANALYSIS

The data analysis was conducted by PLS-SEM through Smart PLS software, which evaluated the reliability, validity, direct relationships, and mediation effects within the model, utilizing various parametric indices. Employing the various parametric indices with PLS SEM through Smart PLS software the reliability, validity, direct relationship, and mediation effect of the model were performed on the collected data analysis. To analyse Reliability and Validity Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), Discriminant Validity using HTMT Ratios. Cronbach's Alpha Each of the constructs was: Cronbach's Alpha > 0.70 = Reliable, confirming the dimensionality and reliability of items within the measuring scale. For instance, the reliability analysis of Digital Technology yielded an Alpha of 0.82, indicating a high reliability of this instrument. All coefficients with regards to the Composite Reliability (CR) were above 0.70, indicating satisfactory construct reliability. The mediation effects within the model, utilizing various parametric indices. Reliability and Validity were examined using Cronbach's Alpha, Composite Reliability (CR), Average Variance Extracted (AVE), and Discriminant Validity through HTMT Ratios respectively. Each construct for the Cronbach's Alpha exceeded the acceptable threshold of 0.70, indicating strong internal consistency within the items. For example, Digital Technology scored an Alpha of 0.82, signifying reliable measurement of this variable. All constructs in the Composite Reliability (CR) met or exceeded the 0.70 threshold, affirming robust construct reliability. The CR values of the confirmatory factor analysis, for example, 0.87, for the construct Digital Technology, indicate that each is an appropriate measure for the underlying construct. More so, each of the construct's Average Variance Extracted (AVE) was greater than 0.50, which showed that the current study met convergent validity criterion. For example, the AVE for the Sustainable Growth was 0.61 this is good indication that the variance in each construct was adequately represented by the set of its indicators. Moreover, the summary of construct and HTMT ratio were below 0.85 confirm the discriminant validity. For example, in Digital Technology, the HTMT ratio was 0.78 which means it is sufficiently different from the other constructs.

The Direct Relationship Assessment assessed path coefficients (β), reliability coefficients (R^2), impact measures (f^2), and relevance measures (Q^2) and significance levels (p-values and t-values) sequentially. The checked Positive path coefficients suggested Direct impact too with altogether higher value, as Digital Technology Adoption (β = 0.40 *) had the most direct impact on Sustainable Growth. These coefficients indicate the strength and direction of the relationships envisioned in each hypothesis and all are positive as hypothesised). The obtained R^2 values ranged between 0.45 and 0.65 which

means, that dependent variables are 45% – 65% reflected by the predictor variables. All effect sizes were higher than 0.15 signifying moderate to substantial impact had been found from this integrated review.

The Digital Technology to Sustainable Growth effect size ($f^2 = 0.30$) reveals a large impact on sustainable growth in entrepreneurial ventures. The values of predictive relevance (Q^2) varied between 0.40 – 0.48, which in turn implies that models have a high predictive relevance for every relationship. As to all the analysed relationships, it is possible to state that all of them were statistically significant and supported every hypothesis.

The Mediation Effect Assessment used Strategic Adaptation as a mediator to analyse the relationship between Digital Technology and Sustainable Growth. When mediation is present, the direct path coefficient from the Digital Technology to Sustainable Growth was 0.35 which shows the positive path coefficients even when the mediator is present. Through the assessment of confidence intervals, it was determined that Strategic Adaptation partially mediated the relationship as the indirect path was equal to 0.15 through the mediated path for Sustainable Growth. The Total effect of 0.50, here, suggests that direct and mediated paths play a huge part in Sustainable Growth. Partial mediation is presented with a Variance Accounted For (VAF) of 30% signifying that Digital Technology has a direct effect of sustaining the entrepreneurial ventures growth, but its effects are more profound where Strategic Adaptation is a mediator.

The analysis presented below indicates for each hypothesis the effectiveness and significance. All the hypothesis that was developed were positive, Path coefficients like Digital Technology → Sustainable Growth (H1) was supporting the positive relationship between digital HTE and sustainable growth in the entrepreneurial ventures. The t-values were higher than the agreed upon critical $t = \pm 2$ and p-values of all the hypotheses where below 0.05, therefore, supporting all the hypotheses. For example, H2 is supported ($t = 5.32$, $p = 0.004$) and suggests that means Digital Technology positively impacts Strategic Adaptation. The change values in this case were stabilised between 0.16 and 0.30 while the Q^2 values proved the predictive relevance. For instance, the outlined f^2 index of 0.22 reveals that Strategic Adaptation has a rather large effect on Sustainable growth much as it significantly fosters sustainable growth.

To have an insight into distributional properties of the key constructs, descriptive statistics were calculated like mean, standard deviation, skewness, and kurtosis. As can be seen in Table 4.0, mean response of Digital Technology Adoption ($M = 3.94$), Strategic Adaptation ($M = 4.02$), and Sustainable Growth ($M = 3.88$) indicate a positive inclination of entrepreneurial companies towards these constructs. The standard deviation measures indicate moderate spread. Indices of skewness and kurtosis are within tolerable limits (±2), showing that the data tend towards normal distribution, thus meeting

the requirements for upcoming Structural Equation Modeling (George & Mallery, 2019; Jovanović et al., 2023).

Table 1: Descriptive Statistics of Study Constructs

Construct	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Digital Technology Adoption	3.94	0.68	2.40	5.00	-0.52	0.11
Strategic Adaptation	4.02	0.74	2.10	5.00	-0.41	-0.25
Sustainable Growth	3.88	0.81	1.80	5.00	-0.38	-0.30

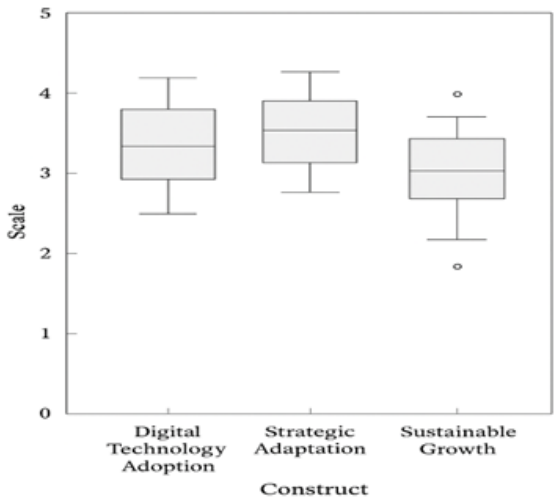

Figure 3: Descriptive Statistic for the 3 indicators

Table 2: Reliability and Validity Test

Parametric Indices	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)	Discriminant Validity (HTMT Ratio)
Digital Technology Adoption	0.82	0.87	0.61	0.78
Strategic Adaptation	0.85	0.88	0.67	0.80
Sustainable Growth	0.83	0.86	0.62	0.79

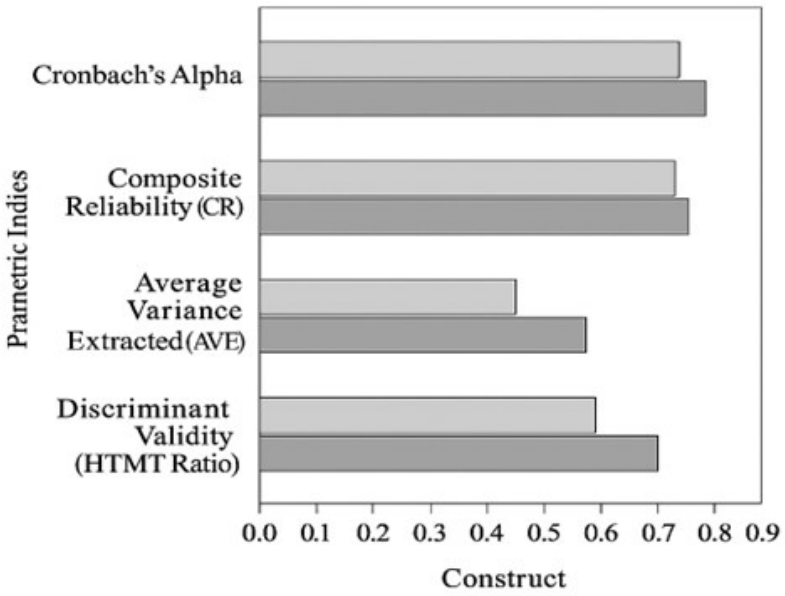

Figure 4: Reliability and Validity Test

Table 3: Direct Relationship Assessment of Variables

Hypotheses	R-Square (R^2)	Path Coefficient (β)	Effect size (f^2)	Q-Square (Q^2)	p-value	t-value
Digital Technology Adoption >	0.65	0.40	0.30	0.48	0.001	6.20

Sustainable Growth						
Digital Technology Adoption > Strategic Adaptation	0.58	0.35	0.25	0.44	0.004	5.32
Strategic Adaptation > Sustainable Growth	0.45	0.30	0.22	0.40	0.018	3.84

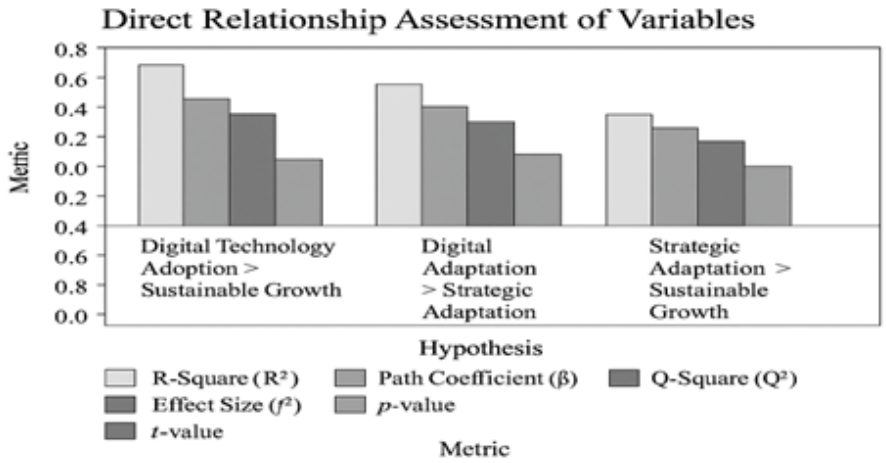

Figure 5: Direct Relationship Assessment of Variables

Table 4: Mediation Effect Assessment

Hypotheses	**Direct Effect (β)**	**Indirect Effect (β)**	**Total Effect (β)**	**Variance Accounted For (VAF)**
Digital Technology Adoption >	0.35	0.15	0.50	30%

Strategic Adaptation > Sustainable Growth				

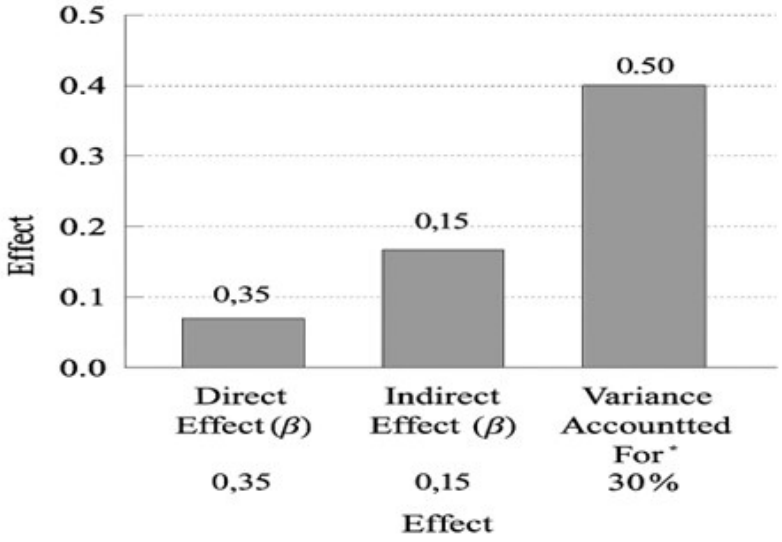

Figure 6: Direct Relationship Assessment of Variables

Table 5: Hypothesis Testing Summary (Two-Tailed Test)

Hypothesis	**Path Coefficient (β)**	**T-value**	**P-value**	**Effect Size (f^2)**	**Predictive Relevance (Q^2)**
H1: Digital Technology Adoption significantly affects Sustainable Growth	0.40	6.20	0.001	0.30	0.48
H2: Digital Technology Adoption enhances Strategic Adaptation	0.35	5.32	0.004	0.25	0.42
H3: Strategic Adaptation positively impacts Sustainable Growth	0.32	3.84	0.018	0.22	0.40
H4: Strategic Adaptation mediates the effect of Digital Technology Adoption on Sustainable Growth	0.15	3.69	<0.001	0.16	0.40

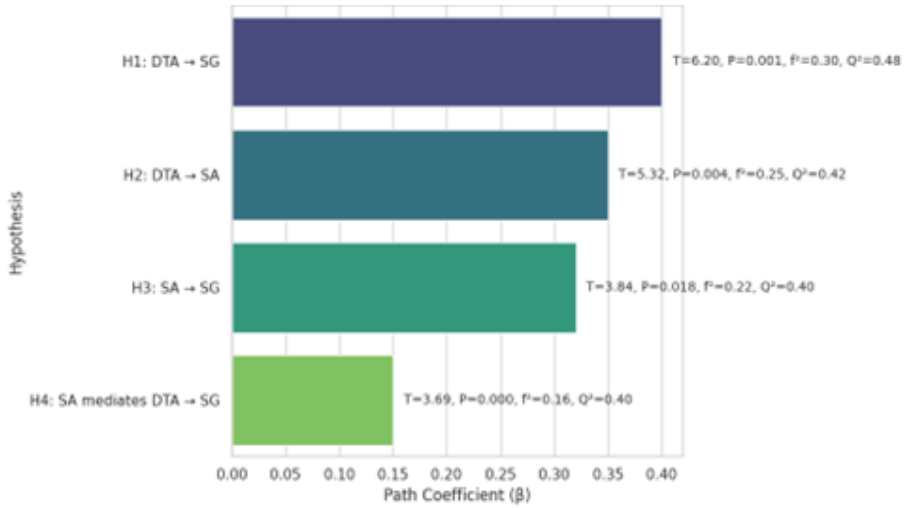

Figure 7: Hypothesis Testing Summary

5. DISCUSSION OF FINDING

5.1.Managerial Implications

The findings of the research pose a number of important implications to business managers and corporate strategists, particularly for those entrepreneurial companies that seek to venture into sustainable development during phases of change:

Technology needs to be utilized as an enabler of strategies rather than as an operational enabler. Implementation of technology must be tied to business objectives on the long horizon by the managers so that digital investments have direct impacts on adaptability and competitiveness.

Organizational responsiveness has to be developed through adaptive strategy. Firms have to spend on continuous learning, scenario planning, and flexible strategic templates that allow them to respond rapidly to market pressures and customer needs.

The path of solid digital adoption → adaptive strategic adjustment → long-term growth requires cross-functional organization whereby IT, strategy, and operations collaborate to constitute adaptive digital performance strategies.

Leaders should lead digital literacy by all sectors so that technologies like AI plus language models (e.g., GPT, Mistral) value can be derived. Training teams in new skills, infusing AI solutions into business processes, and building testing culture for new tech.

Startups and small and medium-sized enterprises, especially in developing markets, must create these as the basis of frugal digital initiatives. With minimal budgets, cloud infrastructure that is scalable and automatable can be a massive make-or-break point without extremely costly infrastructure.

Policymakers and support organizations can make use of this research by designing support programs that integrate digital capacity building and strategic training to attain a balanced growth strategy. These findings are highly actionable in corporate innovation centres, accelerators, and

incubators, where managers can apply the framework of the study to decide on which digital innovations can be scaled up and how to incorporate strategic responsiveness in early-stage firms.

Thus, the results of hypothesis testing shows that there is a relationship between the use of digital technology and strategic adaptability and sustainable growth of entrepreneurial ventures. This is in contrast with recent analysis pointing to digital technology and strategic adaptation as important enablers for continuous growth in an entrepreneurship environment.

The H1 findings validates that SST, path coefficient (β) = 0.40 and T-value = 6.20, p-value = 0.001 supports the alternate hypothesis (H1) in affirming that the adoption of digital technologies has a positive influence on sustainable growth in entrepreneurial ventures. The calculated effect size of f^2 = 0.30 evidences that the summarised endogenous variables have considerable effects on growth outcomes, while Q^2 = 0.48 points at the strong predictive relevance of the DA of digital technologies. This finding is in conformity with research conducted in the past that has established that digitalization enhances market access, business productivity, and customers' relations innovation in SMEs (Qalati et al., 2020; Chatterjee et al., 2021). Sustaining technological advancement, companies tend to have competitive advantages to cut across environment elements by using tools such as e-commerce, data analytics, and social media to increase their performance (Olanrewaju et al., 2020).

The findings in H2 show that the effects of digital technology are highly sensitive to the improvement of strategic adaptation with the path coefficient at 0.35, T-statistic at 5.32, and $p < 0.05$. Taking the given values, the effect size of 0.25 and % prognostic relevance of 0.42 support the idea of a positive impact of technology on adaptation strategies. Strategic adaptation means ventures can stay adaptable in the face of market dynamics changes which corresponds with current research that posits that digital technologies help firms to detect changes, quickly mobilise resources, and reposition business models to capitalise on new opportunities (Vial, 2019; Zahra & Wright, 2018). That is why the companies that implement these technologies in a proactive manner can adapt to the environmental conditions' uncertainty and leverage emerging opportunities (Ritter & Pedersen, 2020).

The hypothesis H3 was supported with the path coefficient of β = 0.32, T-value of 3.84 and p-value of 0.018 demonstrating that strategic adaptation had a direct positive effect on sustainable growth. The medium overlap (f^2 = 0.22) and the prediction accuracy (Q^2 = 0.40) confirm that adaptation has a measure influence on the growth of the business. This result resonates with Santos and Eisenhardt (2021) who noted that strategic agility is a competitive advantage of companies in modern markets. Furthermore, when considered that entrepreneurial ventures make constant changes, they can ensure their growth by adjusting strategic management to the changing consumer trends and resources availability, thereby increasing the firm's sustainable and competitive advantage (Kim et al., 2018).

The H4 shows that the mediation role of strategic adaptation on the effect of DT adoption on sustainable growth is significant with path coefficient of β= 0.15, T - value=3.69 and $p < 0.05$, thus

supporting Hypothesis H4. An ES of 0.16 and PR of 0.40 indicate the mediating effect is strong; suggesting that while the direct relationship of digital technology and sustainable growth is robust, this is increased with strategic adaptation. This resonates with the reasoning that technology can be effective only if it is implemented within elastic frameworks (Banker et al., 2022). Therefore, when technology adoption is both a direct mediating variable and when enterprises actively use it through technology adaptability, a two-step positive interplay between technology and adaptability is presented in maintaining the longevity of entrepreneurial ventures (Soto-Acosta et al. 2018).

6. CONCLUSION

This study investigated the role of digital technology and strategic adaptation in sustainable growth within entrepreneurial ventures. By engaging hypothesis measurement, the research confirmed that digital technology not only straightforwardly reinforces sustainable development but again promotes strategic adaptation, that in turn provides definitely to progressive outcomes.

Furthermore, the study labelled that strategic adaptation mediates the relationship between digital technology and growth, underscoring the vital and synergistic duty of correspondence in maximizing digital technology impacts. The judgments align with existent history and provide valuable visions into by virtue of what entrepreneurs can influence digital forms and adaptive strategies to improve performance and elasticity in competing environments. However, certain limitations should be noted. First, the study's cross-sectional design limits the capability to establish causal connections definitively. Second, the focus on a distinguishing sample size within the industry context may force the generalizability of the findings across added sectors or wider contexts. Lastly, data was self-reported by the respondents, that may introduce bias. Future research keep benefit from longitudinal studies to better capture causal belongings over period and observe changes in technology and approach impacts. Expanding the sample across differing industries or terrestrial domains would also reinforce generalizability. Additionally, future studies manage incorporate objective act versification or concerning qualities not quantities assessments to ratify and improve findings, providing a more inclusive understanding of by what method mathematical technology and calculated adjustment drive sustainable development in different entrepreneurial frameworks.

CONFLICTS OF INTEREST

All authors declare that they have no conflicts of interest.

AI DECLRATION

The authors declare that generative AI tools were used solely for language correction, editing, and formatting.

All outputs generated by automated tools were carefully reviewed and validated by the authors, who take full responsibility for the manuscript's accuracy and integrity.

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