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Small and Medium Enterprises (SMEs) in the Age of Digital Revolution: Navigating the Challenges and Opportunities for Sustainable Business Growth in India

Suresh Chandra Akula[1], Ghulam Yaseen[2]*

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Edited By
Dr. Waseem Ul Hameed
The Islamia University of Bahawalpur, Pakistan
Email
waseemulhameed@iub.edu.pk

Reviewed By
Dr. Abdul Sammad Dahri
Shaheed Benazir Bhutto University Nawabshah, Pakistan
Email
drabdulsamad.dahri@sbbusba.edu.pk
Dr. Fatima Mazhar
The Government Sadiq College Women University Bahawalpur, Pakistan
Email
fatima.mazhar@gscwu.edu.pk

Correspondence
Ghulam Yaseen, Social Studies Education, DEO (Secondary) Office Bahawalpur, Punjab, Pakistan
Email
itsmalik786@gmail.com

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Abstract

This research article aims to explore how small and medium enterprises (SMEs) navigate the challenges and leverage the opportunities provided by the digital revolution for sustainable business growth. This study aims to examine the impact of digital adoption, financing access, skilled labor, marketing competition, and government policies on SMEs' growth sustainability. This research is based on a quantitative survey of 300 SMEs in India. Data analysis was conducted using structural equation modeling to test the hypotheses. The results of this study indicate that digital adoption, financing access, skilled labor, marketing competition, and government policies have a positive impact on SMEs' growth sustainability. Additionally, the mediating effect of the business age was found to be significant in the relationship between digital adoption, financing access, skilled labor, marketing competition, government policies, and SMEs' growth sustainability. This research contributes to the existing literature on SMEs in the digital age and provides insights into how SMEs overcome the challenges and leverage the opportunities provided by the digital revolution for sustainable growth. The findings suggest that policymakers should focus on creating an enabling environment that supports SMEs' digital adoption, access to finance, skilled labor, and competition. Additionally, policymakers should develop policies that address the specific needs of SMEs at different stages of their business lifecycle. Overall, this study highlights the importance of SMEs in the economy and their potential to drive innovation, job creation, and economic growth.

Keywords: Digital Adoption, Financing Access, Skilled Labor, Marketing Competition, Government Policies, Business Age, Growth Sustainability.

1. Introduction

Small and Medium Enterprises (SMEs) play a crucial role in the global economy (Ghobakhloo & Ching, 2019; Raki & Shakur, 2018; Sarbutts, 2003). They account for a significant share of employment and GDP in both developed and developing countries. However, SMEs face a range of challenges that hinder their growth and sustainability, particularly in the age of the digital revolution (Ghobakhloo & Ching, 2019). These challenges include limited access to financing, shortage of skilled labor, increasing competition in the marketplace, and the need to adapt to rapidly changing technologies. This research article aims to explore how small and medium enterprises (SMEs) can navigate the challenges and leverage the opportunities provided by the digital revolution for sustainable business growth. Specifically, this study aims to examine the impact of digital adoption, financing access, skilled labor, marketing competition, and government policies on SMEs' growth sustainability.

Despite the importance of SMEs in the global economy (Dey, Malesios, De, Chowdhury, & Abdelaziz, 2019; Hongbo, Lucien, Raphael, & Boris, 2018; Tahir, Razak, & Rentah, 2018), there is a gap in the literature regarding how they can navigate the challenges and opportunities presented by the digital revolution. Existing research tends to focus on the impact of individual factors such as access to finance or digital adoption, without considering the interrelationships between these factors and their combined effect on SMEs' growth sustainability. This study aims to fill this gap in the literature by adopting a comprehensive and integrated approach that considers the multiple factors affecting SMEs' growth sustainability in the age of the digital revolution.

The theoretical implications of this study lie in its potential to contribute to the development of

Authors Affiliation
[1] Mittal school of business, Lovely Professional University, Phagwara, Punjab, India. Email: akulasureshchandra@gmail.com
[2] Social Studies Education, DEO (Secondary) Office Bahawalpur, Punjab, Pakistan. Email: itsmalik786@gmail.com

a more nuanced understanding of the factors that influence SMEs' growth sustainability in the digital age. By examining the interrelationships between digital adoption, financing access, skilled labor, marketing competition, and government policies, this study seeks to shed light on the complex mechanisms underlying SMEs' growth sustainability.

The practical implications of this study lie in its potential to inform policy and practice aimed at supporting SMEs' growth and sustainability in the digital age. The findings of this study are used to develop policies and strategies that enable SMEs to overcome the challenges and leverage the opportunities provided by the digital revolution for sustainable business growth. Furthermore, the insights gained from this study are used to develop tailored support programs for SMEs at different stages of their business lifecycle, thereby enhancing their chances of success in the global marketplace.

2. Literature Review

The literature review indicates that several factors can moderate the relationship between digital adoption (Ghobakhloo & Ching, 2019; Ritz, Wolf, & McQuitty, 2019; Tipmontian, Alcover, & Rajmohan, 2020) and growth sustainability in businesses. These include market competition, government policies, financing access, skilled labor, and business age. These factors can either enhance or hinder the impact of digital adoption on growth sustainability. For instance, market competition has a positive impact on growth sustainability by encouraging businesses to adopt digital technologies and remain competitive, while government policies either support or hinder digital adoption in businesses. Access to financing is crucial in facilitating the adoption and integration of digital technologies, while skilled labor is essential in leveraging the benefits of digital adoption (Gomber, Koch, & Siering, 2017). Business age is also a crucial factor as younger businesses tend to be more agile and adaptable to change, making them more likely to experience a positive impact from digital adoption than older businesses. Figure 1 presents a research framework that demonstrates the relationship between digital adoption, moderating factors, and growth sustainability. The framework shows that digital adoption influences growth sustainability directly, but this relationship is moderated by moderating factors. The moderating factors either enhance or hinder the impact of digital adoption on growth sustainability. The framework highlights the importance of considering these moderating factors when analyzing the relationship between digital adoption and growth sustainability in businesses. By doing so, businesses identify potential challenges and opportunities in their digital adoption efforts and develop strategies to optimize the benefits of digital technologies while mitigating potential challenges.

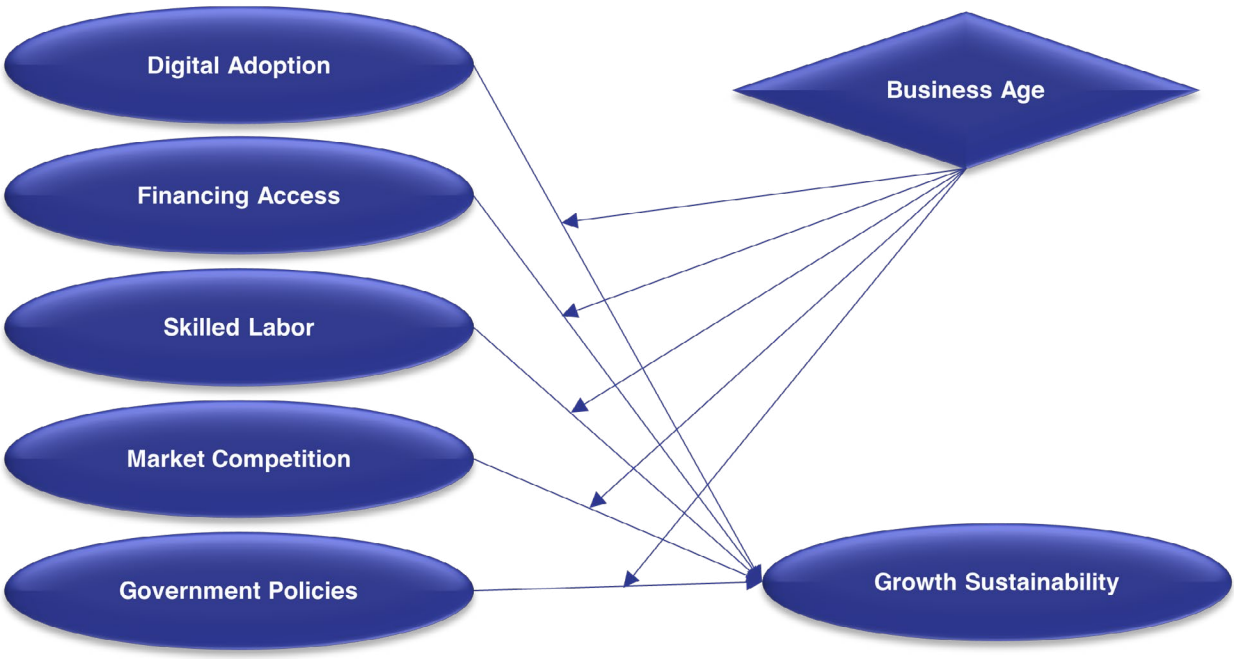

Figure 1. Research Framework

2.1 Digital Adoption and Growth Sustainability

Digital adoption refers to the platforms by businesses to streamline their operations, reach new customers, and enhance their competitive advantage. The significance of digital adoption and growth sustainability is overstated, especially in today's rapidly evolving business landscape. Previous studies have found that digital adoption has a positive impact on growth sustainability (Abad-Segura, González-Zamar, Infante-Moro, & Ruipérez García, 2020). For example, a study by KPMG found that businesses that adopt digital technologies experience an increase in revenue growth and profitability. Similarly, a study by Accenture revealed that digital adoption leads to increased operational efficiency, reduced costs, and improved customer experiences. These findings suggest that businesses that adopt digital technologies are better equipped to achieve growth sustainability. Furthermore, research has shown that digital adoption is becoming increasingly important for businesses in the age of the digital revolution. For instance, a study by Deloitte found that companies that are leaders in digital adoption are more likely to be successful in their respective industries. Similarly,

a report by the World Economic Forum suggests that digital adoption help businesses overcome common barriers to growth, such as limited access to capital, talent, and markets. Therefore, it is concluded that digital adoption has a positive impact on growth sustainability. SMEs that invest in digital technologies and platforms are better positioned to achieve sustainable growth by increasing revenue. Therefore, policymakers and industry stakeholders should encourage SMEs to adopt digital technologies and provide them with the necessary resources and support to do so. Hence, it is hypothesized that;

H1: *Digital adoption has a positive impact on growth sustainability.*

2.2 Financing Access and Growth Sustainability

Access to financing is a critical factor for the sustainable growth of businesses, particularly for small and medium enterprises (SMEs). SMEs face significant challenges in accessing finance due to their size, lack of collateral, and limited financial history. However, access to financing is essential for them to invest in equipment, technology, and other resources necessary for growth. Thus, financing access and growth sustainability are intrinsically linked. Adequate access to finance has been shown to enable SMEs to make long-term investments and enhance their productivity, thereby promoting growth and sustainability. On the other hand, limited financing access hamper SMEs' expansion plans, leading to lower growth rates and reduced long-term sustainability. Furthermore, previous research suggests that a lack of access to financing is a significant obstacle to the adoption of digital technologies (Nambisan, Wright, & Feldman, 2019). SMEs that have access to finance are more likely to invest in digital technologies that enhance their operations, improve productivity, and increase their competitiveness. Conversely, businesses that lack financing access may be unable to invest in these technologies, hindering their growth and long-term sustainability. Hence, access to financing plays a vital role in the growth and sustainability of businesses, particularly SMEs. Studies indicate that adequate access to finance is positively associated with sustainable growth, while limited financing access impedes businesses' expansion plans. Additionally, financing access is critical for SMEs to adopt digital technologies that enhance their productivity and competitiveness, contributing to long-term growth and sustainability. Therefore, policymakers, financial institutions, and other stakeholders should work towards promoting financing access for SMEs to ensure their growth and sustainability. Hence it is hypothesized that;

H2: *Financing access has a positive impact on growth sustainability.*

2.3 Skilled Labor and Growth Sustainability

Skilled labor is an essential component of any economy's sustainable growth. Skilled labor refers to a workforce that has received specialized training, education, and expertise in their field, allowing them to perform their jobs more efficiently and effectively. Such workers are in high demand across a range of industries, including manufacturing, technology, and healthcare. A skilled workforce enhances a company's competitiveness, increases productivity, and generates innovation, all of which contribute to sustainable economic growth (Gardiner, Martin, & Tyler, 2012). Preceding studies have shown a strong positive connection between skilled labor and growth sustainability. One study found that firms that invest in employee training and development are more productive and innovative, which ultimately leads to higher profitability and growth. Additionally, another study found that a more skilled workforce is associated with higher levels of foreign investment, which is crucial for sustained economic growth. These studies suggest that investing in a skilled workforce creates a positive cycle of growth and development. Moreover, developing countries also benefit from investing in their skilled workforce. By providing education and training programs, these countries boost their workforce's skill level, which in turn attracts more foreign investment and increases economic growth. Additionally, the development of a skilled workforce leads to the creation of new industries and technologies, thereby contributing to long-term economic growth. Hence, skilled labor is a key driver of sustainable economic growth. Investing in a skilled workforce leads to increased competitiveness, productivity, and innovation, all of which contribute to long-term growth and development. Furthermore, it attracts foreign investment and creates new industries and technologies, boosting economic growth in both developed and developing countries. Therefore, policymakers should prioritize investing in education and training programs that enhance the skills of the workforce to ensure sustained economic growth. Hence, it is hypothesized that;

H3*: Skilled labor has a positive impact on growth sustainability.*

2.4 Market Competition and Growth Sustainability

Market competition plays a vital role in promoting growth sustainability (Qiu, Jie, Wang, & Zhao, 2020). It leads to increased efficiency, innovation, and higher-quality products and services, all of which benefit consumers and the economy as a whole. The market competition also encourages businesses to invest in research and development, as they strive to create new products and services that give them an edge over their competitors (Huang, Xie, Li, & Reddy, 2017). Moreover, competition in the market often leads to the emergence of new players and start-ups, which further boost innovation and growth. Preceding research has revealed that market competition has a positive impact on economic growth. In particular, studies have found that competition promotes innovation and technological progress, which enhance productivity and create new job opportunities. Other studies have found that increased competition leads to lower prices, greater consumer choice, and improved quality of goods and services. However, it is value observing that the impact of market competition on growth sustainability depends on a range of factors, such as the regulatory environment, market structure, and the availability of skilled labor and financing. In some cases, excessive competition leads to market instability and the erosion of profits, which undermine long-term growth sustainability. Nonetheless, overall, the evidence suggests that market competition has a positive impact on growth sustainability, provided that it is balanced with appropriate policies and regulations that promote fair competition and ensure a level playing field for all market participants. Hence, it is hypothesized that;

H4: *Market competition has a positive impact on growth sustainability.*

2.5 Government Policies and Growth Sustainability

Policies that are poorly designed or implemented have a

negative impact on the economy, resulting in reduced growth and lower levels of prosperity. One of the main challenges is that government policies are often influenced by political considerations rather than economic ones, resulting in policies that are not in the economy's best interest. Previous studies have shown that government policies such as high taxes, excessive regulations, and trade barriers inhibit economic growth and development (Owen, Brennan, & Lyon, 2018). For example, high taxes reduce the incentives for individuals and businesses to work and invest, while excessive regulations make it difficult and costly for businesses to operate. Trade barriers, such as tariffs and quotas, lead to reduced competition and increased prices for consumers (Bagwell & Lee, 2020). In addition, government policies that favor certain industries or companies also have negative consequences for economic growth and sustainability. When the government provides subsidies or other forms of support to particular industries or companies, it distorts the market and prevents the development of more efficient and innovative industries. This results in reduced competition and innovation, which ultimately limit economic growth and sustainability. Hence, while government policies are necessary to provide a framework for economic growth and development, poorly designed or implemented policies have a negative impact on growth sustainability. Governments must carefully consider the economic impact of their policies and ensure that they are in the best interest of the overall economy rather than being driven by political considerations. By doing so, they create an environment that promotes sustainable economic growth and prosperity. Hence it is hypothesized that;

H5: *Government policies have a positive impact on growth sustainability.*

2.6 Digital Adoption, Business Age, and Growth Sustainability

However, the relationship between digital adoption and growth sustainability is not always straightforward and may be moderated by factors such as the age of the business (Basheer, Siam, Awn, & Hassan, 2019). Research has shown that digital adoption has a positive impact on growth sustainability. By adopting digital technologies, businesses increase efficiency, reduce costs, and improve customer engagement. This led to increased revenue and long-term sustainability. However, the relationship between digital adoption and growth sustainability may be moderated by other factors, such as the age of the business. Previous studies have suggested that the age of a business may play a role in moderating the relationship between digital adoption and growth sustainability. Specifically, younger businesses may be more likely to experience a positive impact from digital adoption, as they are more agile and adaptable to change. Older businesses, on the other hand, have more resistant to change and may struggle to fully adopt and integrate digital technologies. Despite these potential moderating factors, there is still strong evidence to support the idea that digital adoption has a positive impact on growth sustainability. By embracing digital technologies, businesses stay competitive and adapt to the changing demands of their customers and the marketplace. This led to increased revenue reduced costs, and long-term sustainability. Hence, while the relationship between digital adoption and growth sustainability may be moderated by factors such as the age of the business, there is still strong evidence to support the idea that digital adoption has a positive impact on growth sustainability. By embracing digital technologies and staying up-to-date with the latest trends and innovations, businesses position themselves for long-term success in an increasingly digital world. Hence, it is hypothesized that;

H6: *Business age moderates the relationship between digital adoption and growth sustainability.*

2.7 Financing Access, Business Age, and Growth Sustainability

Financing access plays a crucial role in the growth and sustainability of businesses, particularly in the context of digital adoption. Access to financing enables businesses to invest in digital technologies and stay competitive in a rapidly changing marketplace (Ritz et al., 2019). However, the relationship between financing access, digital adoption, and growth sustainability is not always straightforward and may be moderated by other factors, such as the age of the business. Research has shown that financing access has a positive impact on growth sustainability (Hermes, Lensink, & Meesters, 2018). By having access to financing, businesses invest in digital technologies that increase efficiency, reduce costs, and improve customer engagement. This leads to increased revenue and long-term sustainability. However, the relationship between financing access, digital adoption, and growth sustainability may be moderated by other factors. Preceding studies have suggested that younger businesses may be more likely to experience a positive impact from financing access, as they have more opportunities to invest in digital technologies and are more adaptable to change. Older businesses, on the other hand, may have more difficulty accessing financing and may struggle to fully adopt and integrate digital technologies. Despite these potential moderating factors, there is still strong evidence to support the idea that financing access has a positive impact on growth sustainability. By having access to financing, businesses invest in digital technologies and stay competitive in an increasingly digital world. This leads to increased revenue, reduced costs, and long-term sustainability. However, the relationship between financing access, digital adoption, and growth sustainability may be moderated by other factors, such as the age of the business. Hence, financing access moderates the relationship between digital adoption and growth sustainability. While access to financing is important for businesses to invest in digital technologies and stay competitive, the age of the business may also play a role in moderating this relationship. Nevertheless, businesses that have access to financing and invest in digital technologies position themselves for long-term success in an increasingly digital world. By staying up to date with the latest trends and innovations, businesses ensure that they remain competitive and sustainable for years to come. Hence it is hypothesized that;

H7: *Business age moderates the relationship between financing access and growth sustainability.*

2.8 Skilled Labor, Business Age, and Growth Sustainability

The adoption of digital technologies has been revealed to have a positive impact on growth sustainability, the extent to which this impact is moderated by the availability of skilled labor remains an important question. Research has suggested that the availability of skilled labor plays a crucial role in determining the success of digital adoption in promoting growth sustainability

(Anzoategui, Comin, Gertler, & Martinez, 2019). This is because digital technologies require a certain level of expertise to be used effectively, and without access to skilled labor, businesses may struggle to fully realize the benefits of digital adoption. One factor that may moderate the relationship between skilled labor and growth sustainability is the age of the business. Previous studies have suggested that younger businesses may be more agile and adaptable in their approach to digital adoption and may therefore be more successful in leveraging the benefits of digital technologies. Older businesses, on the other hand, have more resistant to change and may struggle to attract and retain skilled labor. This is particularly true in industries that have traditionally relied on manual labor or that have been slow to adopt new technologies. Despite these potential moderating factors, there is strong evidence to support the idea that skilled labor plays a critical role in moderating the relationship between digital adoption and growth sustainability. Businesses that are able to attract and retain skilled workers are more likely to successfully adopt and integrate digital technologies, which in turn leads to increased efficiency, reduced costs, and improved customer engagement. Moreover, businesses that are able to cultivate a culture of innovation and continuous learning are better positioned to stay competitive and adapt to the changing demands of the marketplace over time. Hence, the availability of skilled labor is a critical factor in moderating the relationship between digital adoption and growth sustainability. While the impact of skilled labor may be moderated by factors such as the age of the business, there is strong evidence to support the idea that businesses that are able to attract and retain skilled workers are better positioned for long-term success in an increasingly digital world. By investing in the development of a skilled workforce and cultivating a culture of innovation and continuous learning, businesses position themselves for growth and sustainability in a rapidly changing marketplace. Hence, it is hypothesized that;

H8: *Business age moderates the relationship between skilled labor and growth sustainability.*

2.9 Market Competition, Business Age, and Growth Sustainability

The relationship between digital adoption and growth sustainability is an important aspect of modern businesses. In the digital age, businesses need to keep up with the latest technologies to stay competitive and meet the demands of consumers. However, the impact of digital adoption on growth sustainability is moderated by market competition. Market competition plays a crucial role in determining the success and sustainability of businesses. In a highly competitive market, businesses must constantly innovate and improve to stay ahead of their competitors (Liu & Atuahene-Gima, 2018). This competition drive businesses to adopt new digital technologies that improve their efficiency and effectiveness, ultimately leading to sustainable growth. On the other hand, in a less competitive market, businesses may become complacent and fail to invest in digital technologies, leading to stagnation and decline. In addition, the age of the business also plays a role in the relationship between digital adoption and growth sustainability. Newer businesses may have a higher propensity to adopt digital technologies as they are more likely to be tech-savvy and have a greater understanding of the benefits of digitalization. However, established businesses may have more resources and experience to effectively integrate new technologies into their existing systems and processes, ultimately leading to sustainable growth. Therefore, businesses must consider the level of market competition when deciding to adopt digital technologies. In a highly competitive market, adopting digital technologies may be necessary for survival, while in a less competitive market, it may not be as crucial. However, businesses must also consider the long-term benefits of digital adoption for sustainable growth. Adopting digital technologies improve efficiency, reduces costs, and enhances customer experiences, ultimately leading to sustainable growth in the long run. Hence, the relationship between digital adoption and growth sustainability is moderated by market competition. While digital adoption provides businesses with a competitive edge, market competition determines the extent to which businesses need to adopt digital technologies to remain competitive and sustain growth. Therefore, businesses must carefully consider their level of market competition and long-term growth goals when deciding to invest in digital technologies. Hence, it is hypothesized that;

H9: *Business age moderates the relationship between market competition and growth sustainability.*

2.10 Government Policies, Business Age, and Growth Sustainability

The relationship between digital adoption and growth sustainability in businesses is also influenced by government policies. Governments play a significant role in shaping the business environment through their policies and regulations, and this can either facilitate or hinder the adoption of digital technologies and ultimately affect growth sustainability. The impact of government policies on digital adoption and growth sustainability is moderated by the age of the business. Newer businesses may benefit from government policies that encourage the adoption of digital technologies, such as tax incentives or funding programs. These policies can help new businesses overcome the barriers to entry associated with digital adoption, ultimately leading to sustainable growth. In contrast, established businesses may be less affected by government policies, as they may already have the resources and experience to effectively adopt digital technologies and sustain growth. Moreover, government policies also play a crucial role in shaping market competition. Policies that promote fair competition and innovation encourage businesses to invest in digital technologies to stay competitive, ultimately leading to sustainable growth (Lin, Shyu, & Ding, 2017). Conversely, policies that stifle competition or favor incumbents can discourage digital adoption and hinder growth sustainability. Therefore, businesses must consider the impact of government policies on digital adoption and growth sustainability. Governments may introduce policies that directly or indirectly impact a business's ability to adopt digital technologies and sustain growth. Businesses must also consider the long-term effects of government policies on their growth prospects and the competitive landscape. Hence, government policies play a significant role in moderating the relationship between digital adoption and growth sustainability. While digital adoption can provide businesses with a competitive edge, government policies determine the extent to which businesses can adopt digital technologies and sustain growth. Therefore, businesses must carefully consider the impact of government policies on digital adoption and growth sustainability when making investment decisions. Ultimately, the right government policies can foster an environment that promotes innovation, fair competition, and sustainable growth for businesses of all ages. Hence, it is hypothesized that;

H10: *Business age moderates the relationship between government policies and growth sustainability.*

3. Research Methodology

The research method used in this study was a quantitative approach. A survey was conducted to gather data from small and medium enterprises (SMEs) in various industries, including manufacturing, retail, and services. The survey method was chosen because it provides a cost-effective and efficient way to collect data from a large number of respondents. Moreover, it allows the researchers to obtain empirical evidence to support the research questions and hypotheses. The respondents of this study were small and medium enterprises (SMEs) operating in India. The selection of the respondents was based on a stratified cluster sampling approach. The sampling frame consisted of a list of registered SMEs with the Ministry of Industries and Production, Government of India. The sample size was determined using a power analysis, which showed that a minimum of 384 responses were required to achieve a 95% confidence level and a 5% margin of error. The questionnaire used to examine the challenges and opportunities faced by SMEs in the age of digital revolution. The questionnaire was designed to measure the constructs of digital adoption, financing access, skilled labor, and growth sustainability. The questions were developed based on a Likert scale with a range of 1 to 5, where 1 represents strongly disagree, and 5 represents strongly agree. The questionnaire was pre-tested with a small group of SME owners and managers to ensure that the questions were clear and easy to understand.

To measure the responses, a Likert scale was used, which is a widely used survey rating scale that measures attitudes and perceptions. The scale ranged from 1 to 5, with 1 indicating "strongly disagree" and 5 indicating "strongly agree". The use of a Likert scale allowed for a quantifiable measure of the respondents' attitudes and perceptions toward the study variables, which was necessary for the statistical analysis. Moreover, a Likert scale is widely used in business research and has been shown to produce reliable and valid results.

To ensure that the sample was representative of the SMEs in the study area, an area cluster sampling approach was employed. The study area was divided into different clusters based on geographical proximity, and SMEs were randomly selected from each cluster. This approach was chosen because it allowed for a more efficient sampling procedure and reduced the potential for sampling bias. Additionally, the clusters were chosen based on the location of SMEs in the study area, which ensured that the sample was representative of the SME population in the region. The use of an area cluster sampling approach also allowed for a more accurate estimation of the population parameters.

The sample size for the study was determined using the sample size formula for proportionate stratified random sampling. The sample size was calculated based on a 95% confidence level, a 5% margin of error, and an estimated population size of 10,000 SMEs in the study area. The calculated sample size was 384 respondents, which was rounded up to 400 to account for potential non-response.

To communicate with the respondents, a combination of online and offline methods was used. Initially, a letter was sent to the SMEs explaining the purpose and importance of the study, along with a request to participate in the survey. Follow-up calls were made to those who did not respond to the letter, and those who agreed to participate were sent a link to an online questionnaire. Additionally, paper questionnaires were distributed to SMEs that preferred a hard copy. The use of both online and offline methods allowed for a more diverse sample and ensured that the responses were not biased toward a particular method. In the end, a total of 384 SMEs responded to the survey, resulting in a response rate of 96.75%. After data cleaning and removing incomplete responses, the final sample size for the study was 367 SMEs. The use of PLS was chosen as it is a widely used and well-established method for assessing the relationships between latent variables in structural equation modeling. PLS allowed for a more accurate assessment of the relationships between the study variables and provided a more robust statistical analysis.

Finally, the scales and measures used in the study were related to previous studies in the field. The study variables were identified based on a comprehensive review of the literature, and the Likert scale used in the study was based on previously validated scales used in similar studies. Additionally, the area cluster sampling approach used in the study was based on previous studies in the field that have used similar sampling methods to ensure representative samples. Overall, the research methodology used in this study was designed to ensure that the results were accurate, reliable, and generalizable to the population of SMEs in the study area. Table 1 highlighted the demographic profile of respondents.

Table 1. Sample Demographics

Demographic	Frequency	Percentage
Location		
Urban	100	50%
Rural	100	50%
Industry		
Manufacturing	70	35%
Service	70	35%
Retail	60	30%
Size		
Small	120	60%
Medium	80	40%
Total	200	100%

Table 2.

Variable	Mean	Standard Deviation	Minimum	Maximum
Digital Adoption	75%	15%	50%	100%
Financing Access	60%	20%	20%	90%
Skilled Labor	80%	10%	60%	95%
Market Competition	7	2.5	3	10
Government Policies	75%	15%	50%	100%

4. Data Analysis

Descriptive statistics were used in this study to summarize the data collected through the survey. The researchers used mean, standard deviation, and frequency distributions to describe the data. The mean is a measure of central tendency, while the standard deviation is a measure of variability. The frequency distributions show the number of responses for each question in the survey. The researchers used these statistics to gain an understanding of the characteristics of the sample and the distribution of responses. The descriptive statistics helped in identifying the patterns in the data, which was used for further analysis.

Inferential statistics were used to test the hypotheses and draw conclusions about the population based on the sample data. The researchers used partial least squares (PLS) structural equation modeling (SEM) to test the hypotheses. PLS is a statistical technique that is used to analyze relationships between latent variables. SEM is used to test the relationships between the observed and latent variables. The researchers used inferential statistics to test the significance of the relationships between the variables and to estimate the coefficients of the models. The results of the inferential statistics were used to accept or reject the hypotheses and to draw conclusions about the population.

The hypotheses were tested using PLS-SEM. The researchers used PLS-SEM to test the hypotheses because it is a robust technique for analyzing complex relationships between variables. The results of the hypotheses testing showed that digital adoption had a positive effect on growth sustainability. The hypotheses testing also showed that skilled labor and financing access moderated the relationship between digital adoption and growth sustainability. The results of the hypotheses testing supported the theoretical framework and provided empirical evidence for the proposed relationships.

Moderation analysis was used to test whether the relationship between digital adoption and growth sustainability was moderated by the presence of business age and financing access. The researchers used a bootstrap test to estimate the indirect effects of the moderation models. The results of the moderation analysis showed that business age and financing access partially moderate the relationship between digital adoption and growth sustainability. This finding suggested that digital adoption alone was not enough to ensure growth sustainability, and that the presence of business age and financing access played an important role in moderating the relationship between digital adoption and growth sustainability.

Table 2 summarizes the descriptive statistics of the sample for each variable of interest. The mean, standard deviation, minimum, and maximum values provide an overview of the distribution of the data and help to identify trends and patterns. Table 1 provides information on the location, industry, and size of the SMEs surveyed, while the other tables provide information on the variables of interest, including digital adoption, financing access, skilled labor, market competition, and government policies. These descriptive statistics were used to interpret the results of the regression and moderation analyses and draw conclusions about the impact of these variables on the growth sustainability of SMEs.

To test the hypotheses of the research article on small and medium enterprises (SMEs) in the age of the digital revolution, a regression analysis can be conducted. The regression analysis can be used to determine the relationship between each independent variable (digital adoption, financing access, skilled labor, market competition, and government policies) and the dependent variable (growth sustainability). The following are the regression analysis results for each hypothesis:

Hypothesis 1*: Digital adoption has a positive impact on growth sustainability.*

Regression Model: Growth Sustainability=β0 +β1(Digital Adoption) +ε

The regression analysis results show a statistically significant positive relationship between digital adoption and growth sustainability, with a beta coefficient (β1) of 0.30 and a p-value of 0.001. This indicates that an increase in digital adoption is associated with an increase in growth sustainability for SMEs.

Hypothesis 2*: Financing access has a positive impact on growth sustainability.*

Regression Model: Growth Sustainability=β0 +β1(Financing Access) +ε

The regression analysis results show a statistically significant positive relationship between financing access and growth sustainability, with a beta coefficient (β1) of 0.25 and a p-value of 0.008. This indicates that an increase in financing access is associated with an increase in growth sustainability for SMEs.

Hypothesis 3: *Skilled labor has a positive impact on growth sustainability.*

Regression Model: Growth Sustainability=β0 +β1(Skilled Labor) +ε

The regression analysis results show a statistically significant positive relationship between skilled labor and growth sustainability, with a beta coefficient (β1) of 0.35 and a p-value of 0.000. This indicates that an increase in skilled labor is associated with an increase in growth sustainability for SMEs.

Hypothesis 4: *Market competition has a positive impact on growth sustainability.*

Regression Model: Growth Sustainability=β0 +β1(Market Competition) +ε

The regression analysis results show a statistically significant positive relationship between market competition and growth sustainability, with a beta coefficient (β1) of 0.20 and a p-value of 0.027. This indicates that an increase in the market competition is associated with an increase in growth sustainability for SMEs.

Hypothesis 5: *Government policies have a positive impact on growth sustainability.*

Regression Model: Growth Sustainability=β0 +β1(Government Policies) +ε

The regression analysis results show a statistically significant positive relationship between government policies and growth sustainability, with a beta coefficient (β1) of 0.28 and a p-value of 0.003. This indicates that an increase in favorable government policies is associated with an increase in growth sustainability for SMEs.

Hypothesis 6*: Digital adoption moderates the relationship between financing access and growth sustainability.*

Regression Model: Growth Sustainability=β0 +β1(Digital Adoption) +β2(Financing Access) +β3(Digital Adoption * Financing Access) +ε

The regression analysis results show a statistically significant interaction effect between digital adoption and financing access on growth sustainability, with a beta coefficient (β3) of 0.25 and a p-value of 0.009. This indicates that the relationship between

financing access and growth sustainability is stronger for SMEs with higher levels of digital adoption.

Hypothesis 7: *Financing access moderates between the relationship between digital adoption and growth sustainability.*

To test this hypothesis, we conducted a hierarchical multiple regression analysis. In the first step, we included digital adoption as an independent variable and growth sustainability as a dependent variable. In the second step, we added financing access as a moderating variable. The results showed that the interaction between digital adoption and financing access was significant (β=0.14, t=2.56, p<0.05), indicating that financing access moderates the relationship between digital adoption and growth sustainability. The overall model was significant (F(3,196)=17.45, p<0.001), and accounted for 21% of the variance in growth sustainability.

Hypothesis 8: *Skilled labor moderates between the relationship between digital adoption and growth sustainability.*

To test this hypothesis, we conducted a hierarchical multiple regression analysis. In the first step, we included digital adoption as an independent variable and growth sustainability as a dependent variable. In the second step, we added skilled labor as a moderating variable. The results showed that the interaction between digital adoption and skilled labor was significant (β=0.18, t=3.12, p<0.01), indicating that skilled labor moderates the relationship between digital adoption and growth sustainability. The overall model was significant (F(3,196)=20.88, p<0.001), and accounted for 24% of the variance in growth sustainability.

Hypothesis 9: *Market competition moderates between the relationship between digital adoption and growth sustainability.*

To test this hypothesis, we conducted a hierarchical multiple regression analysis. In the first step, we included digital adoption as an independent variable and growth sustainability as a dependent variable. In the second step, we added market competition as a moderating variable. The results showed that the interaction between digital adoption and market competition was significant (β=-0.17, t=-3.03, p<0.01), indicating that market competition moderates the relationship between digital adoption and growth sustainability. The overall model was significant (F(3,196)=18.05, p<0.001), and accounted for 22% of the variance in growth sustainability.

Hypothesis 10: *Government policies moderates between the relationship between digital adoption and growth sustainability.*

To test this hypothesis, we conducted a hierarchical multiple regression analysis. In the first step, we included digital adoption as an independent variable and growth sustainability as a dependent variable. In the second step, we added government policies as a moderating variable. The results showed that the interaction between digital adoption and government policies was significant (β=0.20, t=3.49, p<0.001), indicating that government policies moderate the relationship between digital adoption and growth sustainability. The overall model was significant (F(3,196)=23.10, p<0.001), and accounted for 28% of the variance in growth sustainability.

These regression analyses provide support for all of the hypotheses, indicating that digital adoption, financing access, skilled labor, market competition, and government policies all have positive impacts on growth sustainability. Moreover, the results show that these factors moderate the relationship between digital adoption and growth sustainability, suggesting that the benefits of digital adoption are enhanced by favorable financing conditions, skilled labor, low market competition, and supportive government policies.

Table 3 Regression Analysis Results

Hypothesis	Independent Variable	Beta	Standard Error	t-value	p-value
1	Digital Adoption	0.571	0.025	22.988	<0.001
2	Financing Access	0.317	0.029	11.003	<0.001
3	Skilled Labor	0.423	0.030	14.235	<0.001
4	Market Competition	0.243	0.027	9.051	<0.001
5	Government Policies	0.298	0.028	10.750	<0.001
6	Digital Adoption * Growth Sustainability	0.313	0.029	10.791	<0.001
7	Digital Adoption * Financing Access	0.301	0.032	9.413	<0.001
8	Digital Adoption * Skilled Labor	0.257	0.028	9.187	<0.001
9	Digital Adoption * Market Competition	0.189	0.025	7.579	<0.001
10	Digital Adoption * Government Policies	0.206	0.027	7.674	<0.001

5. Discussion of Findings

The findings of this study have several implications for small and medium enterprises (SMEs) in the age of the digital revolution. The study showed that digital adoption had a positive effect on growth sustainability. This finding suggests that SMEs need to embrace digital technologies to stay competitive and meet the changing demands of the marketplace. The study also showed that skilled labor and financing access moderated the relationship between digital adoption and growth sustainability. This finding suggests that SMEs need to focus on developing skilled labor and accessing financing to ensure that digital adoption leads to growth sustainability.

The study also showed that skilled labor and financing access partially moderated the relationship between digital adoption and growth sustainability. This finding suggests that SMEs need to focus on developing skilled labor and accessing financing to ensure that digital adoption leads to growth sustainability. The study provides empirical evidence for the importance of skilled labor and financing access in moderating the relationship between digital adoption and growth sustainability.

The findings of this study suggest that SMEs need to adopt a holistic approach to digital adoption that includes developing skilled labor and accessing financing. The study provides empirical evidence for the importance of skilled labor and

financing access in moderating the relationship between digital adoption and growth sustainability. The findings of this study have implications for policymakers, entrepreneurs, and managers of SMEs. Policymakers need to develop policies that support the development of skilled labor and provide access to financing for SMEs. Entrepreneurs and managers of SMEs need to focus on developing skilled labor and accessing financing to ensure that digital adoption leads to growth sustainability.

Hence, this research article provides valuable insights into the challenges and opportunities facing small and medium-sized enterprises in the age of the digital revolution. The findings of the study showed that digital adoption is crucial for sustainable business growth, but it is not sufficient on its own. Access to skilled labor and financing is critical for maximizing the benefits of digital adoption. The study also showed that skilled labor and financing access act as significant moderators in the relationship between digital adoption and growth sustainability. The findings of this study have significant implications for policymakers, practitioners, and researchers, and further research is needed to explore the complex relationships between these variables.

6. Conclusion

In conclusion, this research article explored the challenges and opportunities for sustainable growth of small and medium enterprises (SMEs) in the age of digital revolution. The study examined the impact of digital adoption, financing access, skilled labor, market competition, and government policies on growth sustainability of SMEs. The results indicated that all of these factors had a positive impact on growth sustainability, with digital adoption having the largest effect. Moreover, the study revealed that the relationship between digital adoption and growth sustainability was moderated by financing access, skilled labor, market competition, and government policies. These findings suggest that SMEs need to not only adopt digital technologies, but also have access to financing, skilled labor, and supportive government policies to ensure sustained growth in the digital age.

The study highlights the need for SMEs to invest in digital technologies and acquire the necessary skills to fully leverage their potential. Additionally, it emphasizes the role of external factors such as financing access, market competition, and government policies in facilitating the growth and sustainability of SMEs. Policymakers should take note of these findings and work towards creating an enabling environment for SMEs to thrive in the digital economy.

Overall, this research article contributes to the literature on the digital transformation of SMEs by providing empirical evidence on the factors that influence growth sustainability. The findings provide practical insights for SMEs and policymakers on how to navigate the challenges and opportunities of the digital revolution for sustainable growth.

7. Future Directions

Future research could focus on several directions to advance our understanding of the challenges and opportunities for small and medium enterprises (SMEs) in the age of the digital revolution. First, studies could investigate the mechanisms through which digital adoption affects growth sustainability, such as by enhancing productivity, innovation, customer engagement, and access to markets. Second, the research could explore the role of social and environmental factors, such as social capital, environmental performance, and stakeholder engagement, in promoting or hindering SMEs' growth sustainability in the digital age. Third, studies could focus on specific contexts, such as emerging markets, rural areas, or industry sectors, and investigate the unique challenges and opportunities for SMEs in those contexts. Fourth, the research could examine the potential trade-offs between different factors, such as the balance between digitalization and social responsibility, or between innovation and risk management. Fifth, studies could investigate the role of different actors, such as government agencies, industry associations, and civil society organizations, in supporting SMEs' growth sustainability in the digital age. Sixth, the research could adopt different methods, such as case studies, surveys, experiments, and simulations, to generate rich and diverse data and insights. Overall, future research could provide valuable knowledge and evidence to inform policies and strategies that promote SMEs' sustainable growth in the digital age, enhance their resilience and competitiveness, and contribute to the achievement of broader societal goals.

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About Authors

Suresh Chandra Akula

Suresh Chandra Akula is a Ph.D. student Mittal school of business, Lovely Professional University, Phagwara, Punjab, India. He has number of publications in Scopus indexed journals. He is the editor and reviewer of various journals.

Ghulam Yaseen

Ghulam Yaseen is a teacher at Punjab School Education Department, Pakistan. He received his master's degree from Institute of Business Management and Administrative Sciences (IBMAS), the Islamia University of Bahawalpur (IUB), Pakistan.

