

A Study of the Effect of Innovation and Technology on Saudi Arabian Small and Medium-Sized Enterprises Internationalization

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Abstract

The research paper studies the effect of innovation and technology on the internationalization of Saudi Arabian Small and Medium Enterprises. This study employed various conventional theorists of internationalization and attempted a comparative analysis of ongoing innovation, technology and its implementation in Small and Medium Enterprises (SMEs). The data was collected from senior managers, CEOs, and owners of Saudi Arabian small and medium enterprises that are applying innovation and technology in small and medium-sized businesses. The sample size of this survey study, 234 respondents, was collected and analyzed using Model Regression (Model Fit). The findings show that new innovations drive international expansion, are strongly associated with new product internationalization, and that revenue growth from innovation affects international expansion. In addition, the results show the role of technology in the internationalization of SMEs, which is strongly associated with technology upgradation and quality, to ensure cost efficiency through technology enhancement and tool synergy between technology upgradation and quality.

Keywords

Innovation, Technology, Internationalization, SMEs, Saudi Arabia

1. Introduction

The process of Internationalizing small and medium enterprises (SMEs) is intricate, and it has different definitions from one country to another around the world. The concept encompasses a range of phenomena, including export markets,

trade, cross-border clusters, collaborative partnerships, alliances, affiliated companies, and partnerships that extend beyond the boundaries of a single country. According to [Ruzzier et al. \(2006\)](#), internationalization is the process of modifying corporate practices or expanding involvement in global operations. It pertains to increasing engagement in global operations or adjusting business operations and can differ depending on variables such as company magnitude, age, and management style.

Small and Medium enterprises (SMEs) comprise 90% of businesses and contribute to 50% of the total global employment ([World Bank, 2022](#)). However, notwithstanding the substantial contributions made by small and medium enterprises (SMEs) to national economies, their impact on the globalized economy is significantly reduced. Most nations under its jurisdiction have significant participation by large corporations in the export market, with around 90% of these companies being involved ([OECD, 2018](#)). Conversely, small and medium-sized firms (SMEs) have a far lower level of participation in the export market, with rates ranging from 10% to 25%.

The Small and Medium Enterprises at the General Authority (Monsha'at), established in 2016, aims to enhance the role of small and medium enterprises (SMEs) in the Saudi Arabian economy. Monsha'at's objective is to raise the contribution of SMEs from 20% in 2016 to 35% by 2030, aligning with the broader goals of Vision 2030 ([Monsha'at, 2022](#)). Monsha'at is making progress towards its stated objective, as shown in a recent release by the organization. According to the announcement, by the conclusion of the third quarter of 2021, the Small and Medium Enterprises (SMEs) sector's contribution to the Gross Domestic Product (GDP) of the economy had increased to 28.7% ([Argaam, 2022](#)). In accordance with the Vision 2030 initiative, the Kingdom of Saudi Arabia has set out the objective of increasing the proportion of non-oil exports in the non-oil gross domestic product (GDP) from 16% to 50% ([Government of Saudi Arabia, 2016](#)). Given the significant contribution of small and medium enterprises (SMEs) to the current economy and the anticipated continuation of this trend in the foreseeable future, it is imperative to facilitate the participation of SMEs in the export market and their overall internationalization efforts. These efforts are crucial in order to align with the government's overarching objectives of promoting export growth and diversification.

Innovation and technology both play a role in helping small and medium-sized enterprises (SMEs) expand internationally. Businesses are able to export more easily to international markets because innovation helps them create competitive products that help them overcome obstacles to entering foreign markets. According to [Mancini and González \(2021\)](#), SMEs benefit from innovation networking, which assists the SMEs in transferring technology to access international business markets by utilizing the advantage of outside knowledge and relationships such as HEIs and PRIs. Moreover, intellectual property and its management can be crucial in supporting SMEs in innovation strategies, particularly in high-tech industries

such as investment and finance (Xing et al., 2016). Businesses are seeing changes in organizational structure and business strategy driven by the effective application of technology, which is becoming an increasingly important component in company expansion. Small and medium-sized businesses can tap into new avenues for growth and success in global markets thanks to digital technologies. Innovation can be one of three kinds, or it can be a combination of different kinds.

Innovation has a pivotal role in the process of internationalizing small and medium-sized enterprises (SMEs) in Saudi Arabia, as the research indicates. Therefore, the Uppsala Model and the Innovation Model offer valuable insights into the dynamics of corporate innovation and the potential for worldwide technological expansions. These theoretical frameworks provide evidence for the concept that innovation has a substantial impact on the increase of new business ventures expanding internationally. The extent to which small and medium-sized enterprises (SMEs) utilize technology is a crucial factor in determining their success in overseas markets. The Uppsala model serves as an illustration of how technical advancements streamline intricate procedures for firms seeking to access international markets. The significance of technology diffusion in the connection between global markets and small and medium-sized enterprises (SMEs), specifically in Saudi Arabia, is reinforced by this.

The use of technology for the internationalization of Small and Medium Enterprises (SMEs) presents a range of obstacles that can vary depending on the specific context of each business. Common obstacles encountered by SMEs globally when leveraging technology for international expansion include technical, economic, cultural, regulatory, market access, language, and technological literacy challenges. Technical obstacles encompass inadequate internet connectivity, particularly in remote or less developed areas, difficulties in integrating new technologies with existing systems, and cybersecurity vulnerabilities. Economic obstacles involve high initial costs for acquiring and implementing advanced technologies, limited access to funding, and uncertainty regarding the return on investment from technology adoption.

This paper provides an extensive overview of how innovation and technology impact the efforts of small and medium-sized enterprises (SMEs) in Saudi Arabia to expand internationally. It is highly significant and timely with Saudi Vision 2030. This paper presents the relationship, innovation, and technology in the internationalization of SMEs, particularly in the Saudi context. The methodology section will outline the study's research method and techniques. The results section will present the findings of the effect of innovation and technology on the internationalization of SMEs in Saudi Arabia. The discussion section will provide a specific analysis of the obtained findings, emphasizing the significant findings concerning the internationalization of small and medium-sized enterprises (SMEs) in Saudi Arabia. The conclusion will provide a concise overview of the primary discoveries derived from the investigation and a summary of the direct contributions made by the study and propose potential implications for further explanation

that advance the findings reported in this article.

2. Literature Review

2.1. Internationalization of SMEs

In the past several years, a growing body of research has focused on the internationalization process of small and medium-sized enterprises (SMEs). However, several scholars have shown a growing interest in internationalization for small and medium-sized businesses (SMEs) in recent years (Steinhäuser et al., 2021). Research in this field is yet divided even though this theme has developed based on various theoretical frameworks (Paul et al., 2017). Internationalization is the process of an organization engaging in commerce in the global marketplace that requires adapting the operations management structure, strategies, and resources to fit the outside market (Johansson & Vahlne, 1977). Nevertheless, as the number of small and medium-sized enterprises (SMEs) engaging in internationalization grows, recent research has shifted its focus towards several vital factors. These factors include the owner-managers international attitude, the globalization of the firm's industry structure, the presence of established global networks, and the potential for expansion into foreign markets. These four elements are considered crucial in understanding the internationalization process of SMEs. A study by Rutihinda (2011) found that successful organizations are led by owner-managers who possess a global vision and have established worldwide networks. These factors are crucial in determining the internationalization of small and medium-sized enterprises (SMEs). However, several factors assist SME internationalization, including innovation and technology.

2.2. Effects of Innovation in the Internationalization of SMEs

In recent years, researchers have recognized that innovation helps SMEs internationalize. Some authors believe innovation and internationalization are highly interconnected strategic processes, while others believe firms must innovate before internationalizing. Some scholars believe innovation can help a company expand internationally by increasing exports (Paul et al., 2017). However, previous research has disputed the relationship between innovation and internationalization. Some studies suggest a positive relationship (Xie & Li, 2013), meaning innovation increases internationalization. However, earlier innovation and internationalization studies found negative correlations, such as increasing size and the level of exports (Wakelin, 1988). The relationship between innovation and internationalization requires several considerations (Lewandowska et al., 2016). In particular, innovation type and degree are key to such correlations (Saridakis et al., 2019).

Scholars generally define innovation as the process of improving products, services, methods, and strategies to enhance business practice and firm performance (Castaño et al., 2016). A company's ability to internationalize determines its global survival. If innovation and internationalization are linked, a firm's global survival depends on its innovation. A company or organization internationalizes by gradually

expanding internationally (Paul et al., 2017). Internationalization could be considered as exporting. The value of goods and services exported from one country to another during trade can be measured (Love & Roper, 2015). Export should be seen as the first step towards internationalization. To internationalize, a company that exports goods and services can start business processes abroad. Internationalization can be operationalized using export propensity (Idris & Saridakis, 2018). Innovative SMEs will have a competitive advantage in the local and global markets (Paul et al., 2017).

Companies can now do business abroad thanks to globalization. Globalization enables firms with short product life cycles to innovate and explore internationalization strategies, even when new (Castaño et al., 2016). This suggests that firms must be innovative to compete internationally (Geldres-Weiss et al., 2016). Thus, firms should perform better if they invest in the latest technologies that increase yield and efficiency in their products and services. This could mean the firm excels in the local market, but specializing may not mean the same strategies work internationally. Innovation may not necessarily lead to internationalization, but innovative firms have a better chance of securing the international market if they start operations there. To maximize revenue, firms that capitalize on their innovative capabilities in the local market may specialize. Innovation discourages internationalization because strategies may not fit international market processes (Idris & Saridakis, 2018; Saridakis et al., 2019). General innovation and export observations have been made in the literature. A company that successfully integrates innovation into its business practices is more likely to generate higher export revenues than if it falls behind competitors (Rodil et al., 2016). Innovation usually boosts exports (Azar & Ciabuschi, 2017). Firms that want to expand or enter international markets usually invest in their innovation.

When studying innovation and internationalization, the type of innovation is also essential (Saridakis et al., 2019). Product life cycles classify them. Companies introduce new products in the local market to see how they perform in regional target groups, which they then use as baseline references for exporting to other countries. Product life cycles will determine how often performance metrics can be measured to identify innovation opportunities. Shorter product life cycles allow for more innovation (Idris & Saridakis, 2018). If foreign market performance measurements are similar, the firm can offer innovative products or services (Paul et al., 2017). Other studies have not found a link between innovation type and internationalization (Dohse & Niebuhr, 2018).

Innovation can be product- or process-specific. Product innovation is more critical than process innovation in exporting (Becker & Egger, 2013). Process innovation supports product innovation and the firm's exporting capabilities (Saridakis et al., 2019). Firms often focus on product and process innovation to internationalize (Lewandowska et al., 2016). Due to resource constraints, not all firms can innovate products and processes. Newer firms, especially SMEs, which need more funds to improve their process due to their age in the market, are more

likely to invest in product innovation than process innovation (Pedeliento et al., 2018).

2.3. Effects of Technology in the Internationalization of SMEs

Technology integration is a complex concept, as not all firms have the same level, type, or scale of integration. However, studies have not explored the relationship between technology channels and export performance. Technology integration can introduce new sales channels, such as online sales, which can help distribute product information and brand knowledge in both local and foreign markets. Information technology, such as internet connectivity and networking capabilities, can increase a firm's knowledge of the foreign market, allowing for further customization for both local and overseas customers. Communication technology, particularly for vast information exchange, has been seen to play a role in internationalization. Technology also allows companies to maintain direct relationships with customers overseas, provide outsourcing opportunities, and provide customer service in countries with less costly labour. This allows firms to internationalize their processes or set up operations remotely, providing better services and gaining a competitive advantage. A company's technological integration choices are highly dependent on its internal processes, including export intentions or behaviours. The firm's human capabilities and technological infrastructure must support its export intentions.

In the globalized era, technology is indispensable for providing exceptional customer service. The advancement of technology is expanding the possibilities for enhancing international customer service. Technology can enhance international customer service by accelerating communication, optimizing efficiency, reducing costs, and improving quality. Technological research and development can provide a competitive advantage in the market. Furthermore, being knowledgeable about the market entails understanding potential customers' requirements, customs, and technological disparities compared to the local market (Burgers et al., 2008). In today's economies, which are driven by knowledge and characterized by rapid pace, competition becomes increasingly challenging. Businesses must continuously generate additional sources of income in order to adjust to evolving consumer preferences and industry norms (Burgers et al., 2008). However, most companies prioritize their management and organizational structures towards activities that involve exploiting resources, such as refining goods and processes. These organizational frameworks need to be improved in order to support innovation, which is crucial for identifying new commercial opportunities (Burgers et al., 2008). Project management requires fresh perspectives to respond effectively to technological advancements and market shifts. Delivering exceptional customer service to clients around the globe, including those in foreign nations, necessitates proficiency in advanced technological abilities. Expanding into foreign markets is already challenging and even more complicated when considering the technological infrastructure. Larger container ships, aeroplanes, skyscrapers, dam

walls, and cutting-edge scientific projects such as the International Space Station exemplify the scale and influence of technological advancements. With the increasing amount of evidence at the nanoscale, technology is becoming smaller in size. Envision the potential medical and agricultural advantages derived from gene sequencing. Hence, **Figure 1** below indicates the role of technology in enhancing the global competitive advantage and customer value.

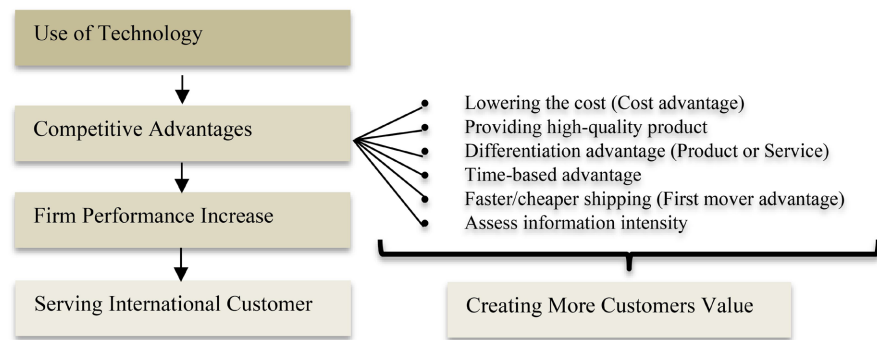


Figure 1. Factor flowchart, Author's create.

Technology is appealing because it reduces manufacturing costs by reducing labour. Many industries are replacing humans with machines due to improved productivity and lower costs. Example: Zara uses technology to operate with minimal human input (Luz et al., 2021). This strategy lets companies keep salary money and boost profits. Thus, investing in technology increases success and reduces labour. Technology improves organizational efficiency. Today, tech and non-tech companies are focused on optimizing their operations with technology, entering new markets, and serving international customers. Thus, firms earn more.

2.4. Saudi Arabia's Vision of SMEs (2030)

King Salman Bin Abdulaziz Al-Saud's Vision 2030 plan states that Saudi Arabia will be a global model of excellence in every area by 2030. Prince Mohammad Bin Salman Al-Saud, the Crown Prince of Saudi Arabia, presented the Vision with three main pillars (The Embassy of the Kingdom of Saudi Arabia, n.d.). The country's role as the Arab and Islamic world's centre is fundamental. Over a billion Muslims pray facing the Saudi Kaaba (Qibla). Saudi Arabia values having the Two Holy Mosques. The second pillar is a determination to lead international investment. Saudi Arabia has excellent investment potential, which could diversify and sustain its economy. The third pillar uses the country's strategic location to make it a global hub connecting Asia, Europe, and Africa.

Saudi Arabia is a commercial hub and gateway to the world due to its location between significant waterways (Vassiliev, 2013). Small and medium-sized enterprises are often cited as key drivers of economic growth and job creation in developing and developed economies. The 2030 Vision has three main themes and three pillars: a vibrant society, a thriving economy, and an ambitious nation. In

order to achieve Vision 2030's goals, a prosperous economy must be established first. Saudis have a high standard of safety and community quality. They are proud of their national identity and centuries-old cultural heritage. The second idea is to expand people's opportunities by promoting an educational system that meets business needs and offers financial opportunities to large and small businesses and individual business owners.

Because of this, the Saudi government is expanding its investment resources to open more economic sectors, increase economic diversity, and create jobs. The Saudi government wants to close the gap between higher education and the job market. As part of the third theme, the Saudi government will use effectiveness and accountability at all levels to be effective, open, accountable, and perform well. In addition, the Saudi government will create the best environment for its citizens and the private and non-profit sectors to take responsibility for and provide initiatives to address future opportunities and challenges. SMEs contribute 20% of Saudi Arabia's GDP, compared to 70% in developed economies. Despite efforts to improve the business environment in the Kingdom, SMEs may still need faster and more complicated legal and administrative procedures. They also need help attracting the right skills, capabilities, and funding, with financial institutions providing only 5% of the total funding, far below the global average. By 2030, the Kingdom of Saudi Arabia (KSA) will improve funding access and encourage financial institutions to fund SMEs up to 20% of their total funding (Vision 2030, n.d.). The newly established SME Authority aims to review laws and regulations, remove barriers, facilitate funding, and allow young people and aspiring business owners to market their ideas and products. It will also create more business incubators, training institutions, and venture capital funds. These will help entrepreneurs learn and network. Digital commerce and international partnerships will help small and medium-sized enterprises (SMEs) market and export their products and services. The Saudi government stressed its ambitions and responsibilities in each category.

Saudi Arabia's primary income is mainly from crude oil production and membership in OPEC. Saudi Arabia has the world's largest underground oil reservoir and is a significant oil exporter (OPEC, n.d.). Saudi Arabia also has the fifth-largest gas reserves and the ninth-largest natural gas production (Worldometers, 2015). The Saudi government recently introduced Vision 2030, which outlines its capabilities and long-term goals. Vision 2030 is based on a thriving society, a prosperous economy, and an aspirational nation. The pillars use national resources to help Saudis achieve their goals (Vision 2030, n.d.).

Based on Figure 2, there was a consistent growth in the number of newly registered firms from 2006 to 2020, except for 2016 and 2020. The number of newly registered enterprises in 2016 was roughly 448 fewer (-4.06%) compared to the previous year, while in 2020, it was approximately 1447 lower (-8.33%). "New companies registered" refers to the quantity of newly established limited liability corporations (or entities with a comparable legal standing) that are officially

registered during a certain year. In addition, it is anticipated that once the SMEs Vision 2030 has been realized, the number of new businesses registered in which SMEs play a significant role will increase.

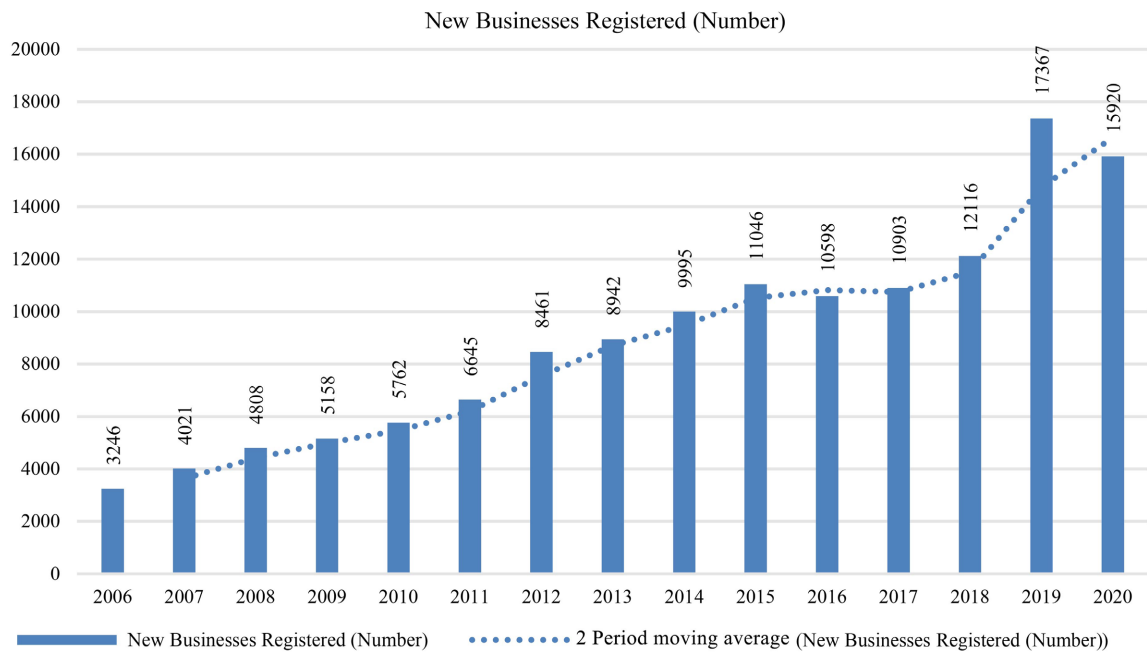


Figure 2. Source: (The World Bank, 2020).

Finally, the Saudi Vision 2030 initiative aims to make Saudi Arabia a global leader by 2030 by leveraging its strategic location in the Arab and Islamic regions, encouraging investment, and improving government efficiency and private sector involvement. The initiative focuses on boosting the growth of small and medium firms (SMEs), which currently make up only 20% of the GDP. Challenges such as legal obstacles, lack of skills, and financial limitations hinder SMEs' development. The strategy aims to alleviate these issues, simplify rules, and promote entrepreneurship through incubators and venture capital. Saudi Arabia is also pursuing economic diversification through expansion into new industries, fostering a favorable business environment, strategic investments, and reducing reliance on oil.

3. Methodology

The current study is part of a larger project on innovation and technology in Saudi Arabian SME Internationalization. The study presented in this paper is primarily causal in nature. Consequently, this paper focuses on a study of the effect of innovation and technology on the internationalization of SMEs Saudi Arabian Small and Medium enterprises. The focus is on SMEs' perceptions of internationalization activities (causal) and the determination of their relationship between related variables and factors in order to determine and understand the role these elements play, especially innovation and technology-related factors. In order to determine the relation between the variables, the paper adopted a quantitative method.

Quantitative research, as defined by the authors [Aliaga and Gunderson \(2000\)](#), is an approach used to understand a phenomenon through the collection and analysis of numerical data ([Martha & Brenda, 2000](#)). In the research, the quantitative research method is used to verify (confirm) or disprove (refute) the central research question as well as other separate specific research questions.

Consequently, descriptive statistics, regression, and correlation analysis were used to analyze the quantitative data to determine the relationship and effect between innovation, technology, internationalization of SMEs, and the economic conquest of Saudi Arabia. Moreover, the data analysis will be done using a computer programme, STATA 18 and Excel Microsoft. In this paper, the findings of the data analyzed are presented using tables, graphs, and charts to provide a clear and succinct representation of the results.

The study aimed to understand the situation of 300 to 500 small and medium-sized firms (SMEs) using a statistical analysis strategy. The sample size was determined to be large enough to obtain at least 300 replies, aligning with the statistical analysis strategy. By utilizing the response rate obtained from the pilot research as the basis for the final survey, we were able to approximate the total sample size as shown: $Total\ Sample\ Size = (Total\ Responses\ Required) / (Pilot\ Response\ Rate) \times 100$. A total sample size of 400 to 500 was required to gather 200 to 400 replies from SMEs, with an additional 200 respondents to account for potential deficiencies due to unfulfilled or partially executed responses. The total sample size was deemed suitable for this investigation, with a total count of 413 individuals. The number of respondents was approximately 234, indicating a high level of participation in the study. The study's findings suggest that a larger sample size is necessary for statistically meaningful work, such as principal component analysis, multiple regression, t-test, and the chi-square test.

A quantitative data-collection method was used to acquire information for this research. A structured questionnaire has been developed based on this study's research objectives and literature review. In order to collect data for the study, the research team conducted closed-ended questionnaires that were distributed to a larger sample of SMEs in Saudi Arabia. The questionnaire includes closed-ended questions with pre-defined response options, covering topics such as the types of technology and innovation used, their benefits, and their impact on internationalization. The questionnaire has been pilot-tested with a small sample of SME owners and managers to ensure clarity and validity. [Denzin and Lincoln \(2005\)](#) assert that qualitative research must consider the concepts of validity and reliability. Nevertheless, due to the absence of any intentions to measure the extent of validity and reliability, they are handled in a distinct manner, similar to how they are approached in quantitative research ([Norman & Lincoln, 2005](#)). [Stenbacka \(2001\)](#) states that reliability can be assessed through the purpose of explaining in quantitative research and the generation of understanding in qualitative research. Qualitative research methods employ a deductive (interpretivist) approach as an alternative to quantitative research in order to differentiate themselves. For

instance, Lincoln and Guba (1985) identify credibility, neutrality or confirmability, consistency or dependability, and applicability or transferability as the most favourable qualitative paradigm terms. In order to prevent any misunderstandings, this study employs the terminology of Lincoln and Guba as it pertains to quantitative research (Lincoln & Guba, 1985). The questions were designed to elicit information about the effect of innovation and technology on the internationalization of SMEs in Saudi Arabia. Following the completion of the data collection, the responses were analyzed using statistical methods and were examined using a strategy of causal research statistics. Therefore, regression analysis was used on the quantitative data to determine the connection between innovation, technology, and internationalization of SMEs, as well as the economic success of SMEs, particularly in Saudi Arabia.

4. Results

This section provides the findings of a significant relationship between innovation and the level of technology adoption in the internationalization of SMEs in Saudi Arabia. Consequently, the null hypothesis (H_0) is the default assumption, indicating no significant relationship between variables. Testing is often done to determine if sufficient evidence exists to support an alternative hypothesis (H_a or H_1). The alternative hypothesis suggests a substantial relationship or effect, and it is more important than the null hypothesis.

The study utilized stratified random sampling, which involved splitting the population into several groups based on shared traits to determine possible responders. The researchers employed purposive sampling to investigate phenomena, as it granted them the freedom to select subjects according to their own discretion. This research paper uses descriptive methods to examine events efficiently.

Therefore, this paper conducted an in-depth analysis of data collected using questionnaires. The demography profile of the respondent included the following: gender, company, occupation and number of years of experience in various positions. **Table 1** below shows the SME respondents in the Kingdom of Saudi Arabia:

As indicated in **Table 1**, the study included 234 participants from a sample size of 413 individuals. The gender distribution of the respondents indicated that 87 (37.179%) were female and 147 (62.821%) were male. The inclusion of gender diversity in the dataset enhances its depth and breadth, facilitating gender-specific analyses and providing valuable insights into the ways in which distinct genders perceive and interact with the research topic. The second is the size of the Company; as a crucial variable in research pertaining to this topic, the dimensions of the SMEs indicate that 94 respondents (40.170%) were affiliated with medium-sized enterprises (SMEs), whereas 140 respondents (59.829%) were affiliated with small-sized enterprises. Gaining knowledge regarding the manner in which the responses were influenced by the size of the company enables customized analyses and provides insights into the distribution of respondents across various company

sizes. The third is occupation; based on the occupational distribution of the participants: 88 individuals (37.768%) were employed as senior managers, 68 individuals (29.184%) were CEOs, and 77 individuals (33.047%) were business owners. The existence of these discrete positions within small and medium-sized enterprises (SMEs) is crucial, given that they almost certainly contribute to unique vantage points regarding innovation and technology adoption. The fourth chart is (Number of Years in this Position); a total of 63 (39.743%) of the respondents have less than five years of experience in their current positions, 66 (28.205%) have five to ten years, 52 (22.222%) have ten to twenty years and 23 (9.829%) have more than twenty years of experience. The divergences in experience provide a perceptive aspect to the research results, illuminating the potential impact of an individual's tenure on their attitudes and actions concerning the subject matter of the study.

Table 1. Demographic profile of SME respondents in KSA.

Demographic Profile	Number of Respondents	Percentage (%)
Gender:		
Male	147	62.821%
Female	87	37.179%
Total	234	100%
Size of the Company:		
Small Size	140	59.829%
Medium Size	94	40.170%
Total	234	100%
Occupation:		
Senior Manager	88	37.768%
CEO	68	29.184%
Owners	77	33.047%
Total	233	100%
Number of Years in this Position:		
Less than 5 years	93	39.743%
5 - 10 years	66	28.205%
10 - 20 years	52	22.222%
More than 20 years	23	9.829%
Total	234	100%

4.1. Regression Analysis

This study uses regression analysis to study the effect or role of predictive relationships between significant elements that affect the efforts of small and medium enterprises (SMEs) to internationalize their operations.

4.1.1. Innovation in SMEs Internationalization of Saudi Arabian

The regression model of innovation in the internationalization of Saudi Small and Medium Enterprises (SMEs) shows a high level of reliability in predicting the effects of incremental international growth. It effectively accounts for 72.09% of the variability observed in the data, which includes factors such as Research and Development Investment, New Innovation, and Technology Implementation. **Table 2** provides the results of the regression analysis of innovation in the internationalization of SMEs.

H_01: There is no significant relationship between innovation and the internationalization of SMEs in Saudi Arabia.

H_a1: There is a significant relationship between innovation and the internationalization of SMEs in Saudi Arabia.

Table 2. Regression analysis of innovation in the internationalization of SMEs in KSA.

Variable	1. The variables effect of Innovation in the internationalization of SMEs in KSA					
	Obs	Mean	Std. Dev.	Min	Max	
RnDInvest	234	1.974359	0.8637829	1	5	
NewInnov	233	1.83691	0.8194894	1	5	
TechImplem	234	1.910256	0.7837277	1	5	
NewProdIntl	234	2.482906	1.1203	1	5	
TechFacilitate	234	2.111111	0.9653017	1	5	
RevenueIncrease	234	1.991453	0.907723	1	5	
TechCostEfficiency	233	2.012876	0.9399224	1	5	
IntlExpansion	234	2.547009	1.11944	1	5	
Source	2. Regression Model of Innovation in the Internationalization of SMEs in KSA					
	SS	df	MS	Number of obs	232	
Model	210.267556	7	30.0382223	F (7, 224)	84.85	
Residual	79.30141	224	0.354024	Prob > F	0.0000	
Total	289.569	231	1.25354531	R-squared	0.7261	
				Adj R-squared	0.7176	
				Root RMSE	0.595	
IntlExpansion	3. Regression Coefficients and T-Value of Innovation in the Internationalization of SMEs in KSA					
	Coef.	Std. Err.	t	P > t	[95% Conf.	Interval]
RnDInvest	0.0177272	0.058127	0.30	0.761	-0.0968185	0.1322729
NewInnov	0.1770259	0.0720987	2.46	0.015**	0.0349474	0.3191043
TechImplem	-0.045945	0.06523	-0.70	0.482	-0.1744879	0.082598
NewProdIntl	0.767799	0.0456486	16.82	0.000***	0.6778433	0.8577547
TechFacilitate	0.077026	0.0626185	1.23	0.220	-0.0463707	0.2004226
RevenueIncrease	-0.131983	0.0631501	-2.09	0.038*	-0.2564272	-0.0075388
TechCostEfficiency	0.0817451	0.0580251	1.41	0.160	-0.0325998	0.1960899
_cons	0.3038337	0.1249407	2.43	0.016**	0.0576242	0.5500432

Moreover, this hypothesis testing utilizes the “Chi Square P Value” metric, which is computed in Excel and subsequently confirmed by verification in STATA. If the “Chi Square P Value” is less than 0.05, it is possible to reject the null hypothesis and accept the alternative hypothesis. Conversely, if the “Chi Square P Value” exceeds 5% (0.05), it is not possible to reject the null hypothesis, and one must accept it. To enhance comprehensibility and minimize intricacy, the following are the demonstrated Excel techniques. **Table 3** shows the chi-square test of the results hypothesis of innovation in the internationalization of SMEs in the Kingdom of Saudi Arabia.

Table 3. The hypothesis of innovation in the internationalization of SMEs.

Variables	Strongly Disagree	Disagree	Agree	Strongly Agree	Neutral	Total
Research and Development	5	3	109	72	45	234
New Innovation	3	5	110	86	29	233
Technology Implementation	1	5	112	75	41	234
International Expansion	13	33	75	45	68	234
New Product	13	30	81	48	62	234
Technology Facilitate	4	15	91	70	54	234
Revenue Increase	4	9	101	76	44	234
Technology Cost Efficiency	4	12	96	77	44	233
Total	47	112	775	549	387	1870
Actual Value	159		1324			
Expected Value	741.5		741.5			
Chi-Square P Value = 4.49205330682029E-198						

The chi-squared test resulted in a p -value of 0.000, indicating statistical significance at a significance level of 0.05. Based on the chi-square p -value, this hypothesis can reject the null hypothesis that there is no significant correlation between innovation and the internationalization of SMEs in Saudi Arabia. There is evidence of a substantial association between innovation and the internationalization of SMEs in Saudi Arabia.

This study focuses on the innovation and internationalization of SMEs in Saudi Arabia. It reveals that new innovations drive international expansion, emphasizing the importance of new products and services in driving growth. A strong association between new product internationalization and international growth indicates a high correlation between SMEs’ international expansion and this variable. Technology’s facilitative role is also evident, with a slight increase in the perception of technology fostering internationalization and actual growth. Revenue growth from innovation affects international expansion, suggesting that innovation managers should focus on both internationalization and revenue-generating efforts.

4.1.2. Technology in SMEs Internationalization of Saudi Arabian

The technology regression model for the internationalization of SMEs in Saudi Arabia, which includes variables such as “Technology Adoption”, “Technology Upgrade”, “Technology Quality”, “Technology International Entry”, “Technology Cost Efficiency”, and “Internalization Success Measure”, effectively forecasts the influence of internationalization on small and medium-sized enterprises (SMEs). **Table 4** presents the regression data analysis of technology on the internationalization of SMEs in KSA.

H_02: The level of technology adoption does not have a significant impact on the success of SMEs in the international market in Saudi Arabia.

H_a2: The level of technology adoption has a significant impact on the success of SMEs in the international market in Saudi Arabia.

Table 4. Regression analysis of technology in the internationalization of SMEs in KSA.

Variable	1. The variables effect of Technology in the Internationalization of SMEs in KSA				
	Obs	Mean	Std. Dev.	Min	Max
TechAdoption	233	1.699571	0.6662102	1	4
TechUpgrade	234	1.952991	0.8247328	1	5
TechQuality	234	1.893162	0.7592889	1	5
TechIntlEntry	234	2.401709	1.076952	1	5
TechCostEfficiency	234	2.07265	0.9533428	1	5
IntlSuccessMeasure	234	2.217949	0.9976036	1	5
Internationalisation	234	2.149573	0.8176302	1	5

Source	2. Regression Model of Technology in the Internationalization of SMEs in KSA				
	SS	df	MS	Number of obs	233
Model	123.265876	6	20.5443126	F (6, 226)	148.95
Residual	31.1718926	226	0.137928728	Prob > F	0.0000
Total	154.437768	232	0.665680036	R-squared	0.7982
				Adj R-squared	0.7928
				Root RMSE	0.37139

Internationalization	3. Regression Coefficients and T-Value of Technology in the Internationalization of SMEs in KSA					
	Coef.	Std. Err.	t	P > t	[95% Conf. Interval]	
TechAdoption	0.0093188	0.041652	0.22	0.823	-0.0727572	0.0913949
TechUpgrade	0.1539955	0.0447084	3.44	0.001**	0.0658969	0.2420942
TechQuality	0.1355644	0.0424953	3.19	0.002**	0.0518267	0.2193021
TechIntlEntry	0.350752	0.0332699	10.54	0.000***	0.2851932	0.4163108
TechCostEfficiency	0.196849	0.0381866	5.15	0.000***	0.1216017	0.2720964
IntlSuccessMeasure	0.0961511	0.0317102	3.03	0.003*	0.0336657	0.1586366
_cons	0.1141984	0.0837386	1.36	0.174	-0.05081	0.2792067

This hypothesis testing uses the “Chi Square P Value” measure, calculated in Excel and verified in STATA. A “Chi Square P Value” of 0.05 or less allows rejection of the null hypothesis and acceptance of the alternative hypothesis. The null hypothesis must be accepted if the “Chi Square P Value” exceeds 5% (0.05). Below are Excel ways to simplify and improve readability.

Moreover, this hypothesis testing utilizes the “Chi Square P Value” metric, which is computed in Excel and subsequently confirmed by verification in STATA. If scenario 1 is the $P < 0.05$, it is possible to reject the null hypothesis and accept the alternative hypothesis. While if scenario 2 is the $P > 0.05$, it is not possible to reject the null hypothesis, and one must accept it. To enhance comprehensibility and minimize intricacy, the following are the demonstrated Excel techniques. **Table 5** presents the chi-square test that examines the hypothesis of technology’s role in the internationalization of small and medium-sized enterprises (SMEs) in the Kingdom of Saudi Arabia.

Table 5. The hypothesis of technology in the internationalization of SMEs.

Variables	Strongly Disagree	Disagree	Agree	Strongly Agree	Neutral	Total
Technology Adoption	1	7	104	75	47	234
Technology Upgrade	1	3	114	75	41	234
Technology Quality	11	26	82	54	61	234
International Expansion	10	26	84	51	63	234
Technology International Entry	1	6	104	80	43	234
Revenue Increase	5	11	94	72	52	234
Technology Cost Efficiency	6	18	93	60	57	234
Total	35	100	793	561	382	1871
Actual Value	135		1354			
Expected Value	744.5		744.5			
Chi-Square P Value = 4.9874708448367E-216						

The chi-squared test yielded a p -value of 0.000, which is less than the significance level of 0.05. According to the chi-square p -value, we can rule out the null hypothesis that the level of technology adoption does not have a significant impact on the success of SMEs in the international market in Saudi Arabia. This means that there is evidence that the level of technology adoption has a significant impact on the success of SMEs in the international market in Saudi Arabia.

Finally, this part clarifies the findings of this study related to the effect of innovation and technology in the internationalization of SMEs in the Saudi context. Thus, there are several findings related to the effect of innovation on the internationalization of SMEs in KSA, including a significant relationship between technology expertise and innovation, which highlights the importance of SMEs

strategically leveraging technology to create new products or services. Hence, enhancing their success in international markets and the fact that innovation in all areas of a company's operations is fundamental to the performance of small and medium enterprises (SMEs) in Saudi Arabia's international market. In addition, revenue growth from innovation affects international expansion, suggesting that innovation managers should focus on both internationalization and revenue-generating efforts. On the other hand, the findings related to the effect of technology on the internationalization of SMEs in KSA. Firstly, the study found a high correlation between SMEs' technology adoption and worldwide market access. Technological system restructuring improves product quality and lowers costs, emphasizing the need for business practice monitoring. Secondly, the technology improved SMEs' worldwide performance, innovation, and market expansion. Cost efficiency and inventiveness promote competition in global markets. Finally, the performance has been the effect by technology adoption in Saudi Arabia's SMEs in the global markets.

5. Discussion

This section endeavors to provide knowledge that is assisted and used by small and medium enterprises (SMEs) for innovation and technology adoption, which is identified in the objective paper. The discussion section will examine and condense notable findings directly applicable to the paper, thereby aiding in achieving the research purpose. This part aims to integrate the conclusions from the preceding section with the reviewed literature while explaining the process and channels that rely on innovation and technology for the internationalization of small and medium-sized enterprises (SMEs).

The findings support the notion that technological advancements greatly assist small and medium-sized enterprises (SMEs) in gaining a competitive advantage in internationalization through enhanced analytical capabilities. During the statistical analysis, a strong and reliable correlation between innovation and the externalization of small and medium-sized enterprises (SMEs) was clearly observed. SMEs that prioritize innovation as the foundation of their operations, whether by enhancing existing products, processes, or technologies, demonstrated a significant inclination towards internationalization, unlike non-innovative SMEs. It demonstrates ingenuity. With the help of technological advancement, SMEs are increasingly utilizing foreign markets as a crucial tool. Assisting small and medium-sized enterprises (SMEs) in adopting new practices not only enhances their competitiveness but also equips them with the necessary resources to thrive in international business environments worldwide. An analysis of the results revealed that implementing a culture of innovation in small and medium-sized enterprises (SMEs) was a strategic approach to pursue that enhanced SMEs internationalization.

The research demonstrates that the use of technology and innovation enhances the competitiveness of small and medium-sized enterprises (SMEs) by improving

their operational efficiency and worldwide market competitiveness. Conventional small and medium-sized enterprises (SMEs) are engaging in partnerships and embracing agile business methodologies, hence facilitating their worldwide expansion and incorporation of contemporary practices. The findings of our study support the notion that technical advancements significantly enhance the penetration ability (market penetration) and growing global market shares being held by small and medium-sized enterprises (SMEs) in the process of internationalization. The statistical research revealed a strong positive correlation between innovation and the externalization of small and medium-sized enterprises (SMEs). Small and medium-sized enterprises (SMEs) that prioritize innovation as the foundation for all their endeavors, including the enhancement or advancement of products, processes, or technologies, exhibit a notable skewing towards internationalization, a phenomenon that is absent in SMEs lacking innovation. It demonstrates ingenuity. Foreign markets are increasingly becoming a crucial place for small and medium-sized enterprises (SMEs). Facilitating the adoption of novel methodologies in small and medium-sized enterprises (SMEs) not only enhances their ability to compete but also equips them with the necessary resources to thrive in international business environments worldwide. Upon reviewing the results, it became evident that fostering a culture of innovation within small and medium-sized enterprises (SMEs) is a strategic approach to adopt.

The research paper has therefore discussed in detail the effect of innovation and technology on the internationalization process of small and medium-sized enterprises (SMEs) in Saudi Arabia. The first hypothesis studied the effects of incremental or disruptive breakthroughs on the process of internationalization. Statistical studies indicate a direct relationship between innovation and internationalization, where small and medium-sized enterprises (SMEs) that prioritize innovation are better able to engage in globalization. The selection of innovation, whether in the form of a product or a method, may have a fluctuating impact on the internationalization process. Adopting modern technologies enables SMEs in Saudi Arabia to internationalize and effectively compete in the global market. The pace of technological advancements in a certain industry impacts how small and medium-sized enterprises (SMEs) expand their operations globally. Industries characterized by significant innovation, such as information technology, biotechnology, and renewable energy, enjoy greater global prominence. The qualitative data provides evidence that strongly confirms the initial hypothesis, stating it demonstrates a robust and consistent correlation between innovation and internationalization in Saudi Arabia. Nevertheless, the study also emphasizes the significance of fostering an atmosphere of innovation inside small and medium-sized enterprises (SMEs) and allocating resources towards research and development in order to enhance their international standing. There is a significant relationship between innovation and the internationalization of SMEs in Saudi Arabia. Therefore, **Figure 3** shows the market demand increase through innovation in the internationalization of SMEs.

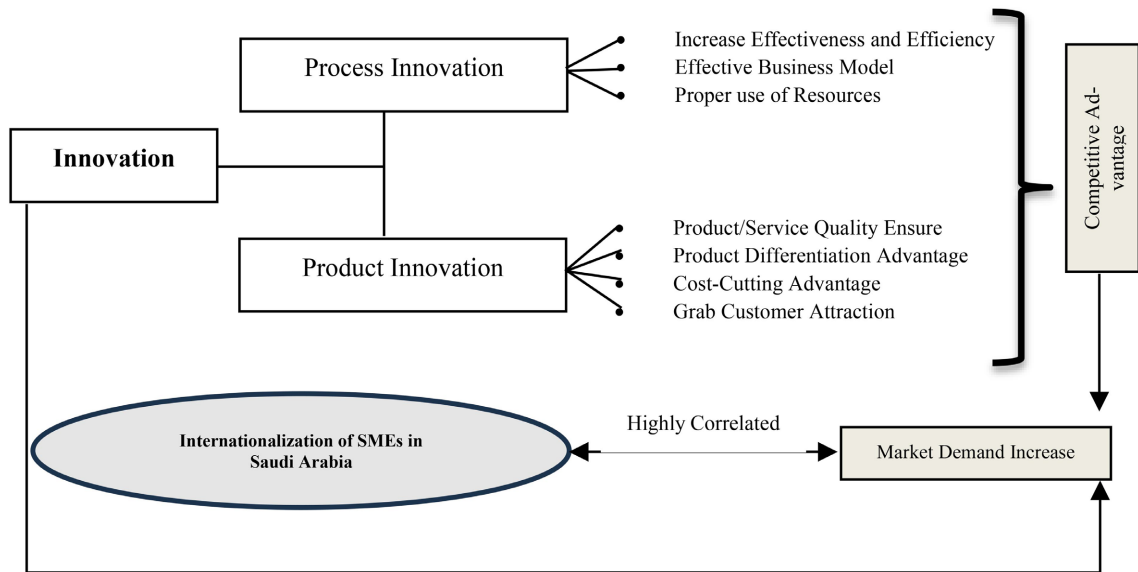


Figure 3. Internationalization of SMEs: Market Demand Increase through Innovation.

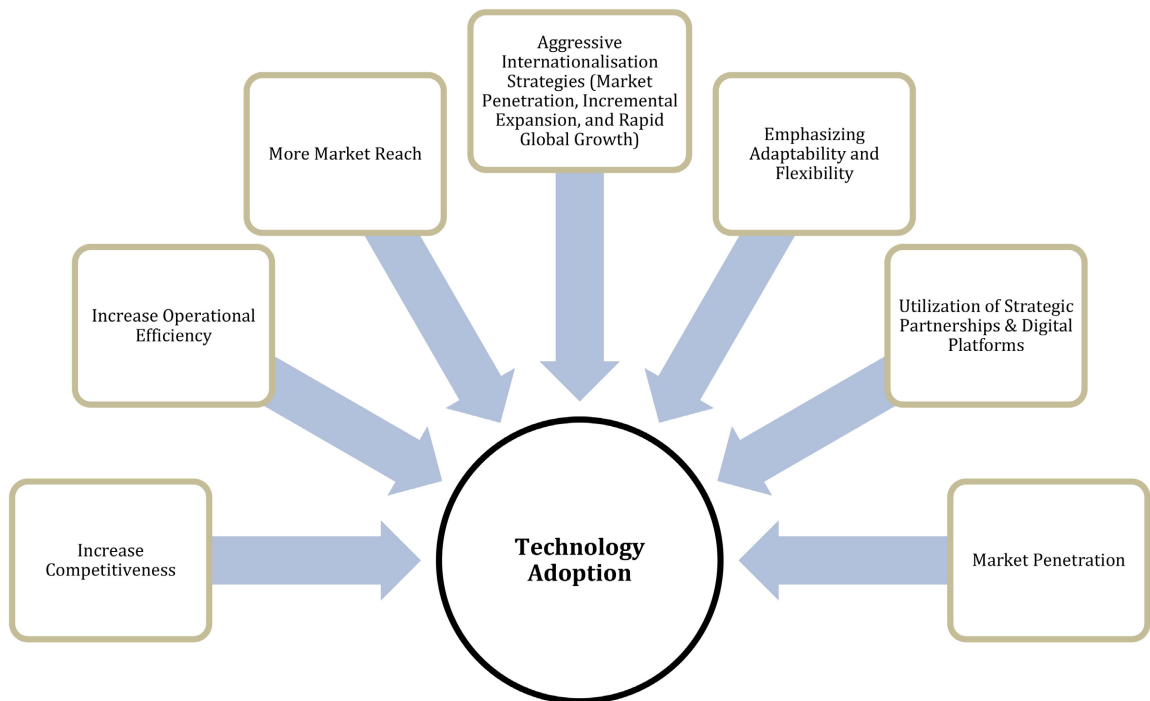


Figure 4. Technology adoption and its impact.

The research reveals that high levels of technology adoption significantly predict the performance of Saudi Arabia-based SMEs in the international markets. The study found a strong connection between the level of technology adoption among SMEs and their success in the international market. SMEs with lower levels of technology adoption showed lower success in the international market. Plasma, a company that implemented digital platforms, data analytics, and automation, achieved higher levels of export growth, market penetration, and revenue inflation

in remote markets. The adoption of technology was also strongly tied to various indices of international market performance, such as market share, customer satisfaction, and brand figures. The research emphasizes the importance of continuous innovation and techniques of adopting cutting-edge technology for market success. The qualitative data serves as the baseline for hypothesis 2, as the utilization of technology by SMEs is the decisive factor in their internationalization and executive strategies. The study found an intermittent positive affinity between the regression analysis and the high commitment to technology, which is associated with the significant performance of the international market among SMEs. **Figure 4** illustrates various factors that impact the adoption of technology.

Regression analysis predicts the impact of independent variables on dependent variables, such as innovation expenditure and technology adoption rate, on SME internationalization parameters. A correlation study enriches the analysis, revealing a positive correlation between innovation spending and SME internationalization success. Strong managerial skills and strategic partnerships are crucial for success. Technology adoption positively impacts internationalization outcomes, with higher adoption allowing for foreign sales opportunities and foreign subsidiaries.

This paper confirms the concepts and trends of existing articles, indicating SMEs' internationalization strategy. Many research papers, including those by *Ilan Alon (2004)*, *Jonathan L. Calof and Paul W. Beamish (1995)*, *Sylvie Chetty and Colin Campbell-Hunt (2003)*, *Hamid Etemad (2009)*, *Jan Johanson and P.F. Wiedersheim (1975)*, and others, emphasise the importance of innovation, technology adoption, and other factors. Moreover, the authors' studies (*Etemad, 2009*) show that technology adoption, innovation, and resources help SME internationalization. The comprehensive focus of CEOs and senior managers was innovation, technology integration, international expansion, resource development, managerial expertise, and networking strategies. This research confirms that these factors are crucial for SMEs seeking international growth (*Chetty & Campbell-Hunt, 2003*). As a result, evidence and knowledge support SME internationalization strategies, but there is still much to learn, especially about specific aspects.

The study indicates a direct relationship between the amount of funds spent on innovation and the extent to which small and medium-sized enterprises (SMEs) in Saudi Arabia engage in internationalization. The study also emphasizes the influence of technology adoption on internationalization outcomes. The study revealed a positive correlation between the level of investment in innovation and the global expansion of small and medium-sized enterprises (SMEs). However, the inclination towards investing in creative expenses is directly correlated with the ability to enter the domestic market and establish a presence in the global business arena. Small and medium-sized enterprises (SMEs) that adopt technology are more likely to have increased opportunities for foreign sales, such as setting up foreign subsidiaries. On the other hand, SMEs that have a low adoption of technology face limited opportunities, mainly focusing on local markets.

6. Conclusion

In sum, the survey demonstrated a strong and meaningful correlation between the effect of innovation and technology on Saudi Arabian SMEs. The inquiry into the effect of innovation and technology on the international expansion of small and medium-sized enterprises (SMEs) in Saudi Arabia has uncovered a number of significant findings. The importance of innovation and the use of technology in facilitating the access and competitiveness of these enterprises in global markets is clear. Implementation of advanced technologies not only boosts the operational efficiency of these small and medium-sized enterprises (SMEs) but also enhances their ability to expand their market presence and adapt to growth.

This study has also demonstrated that technology-based business models play a crucial role in enabling Saudi small and medium-sized enterprises (SMEs) to overcome traditional obstacles to entering international markets, such as exorbitant expenses and limited understanding of global markets. Advancements in product development, customer engagement, and supply chain management have greatly facilitated international expansion. In addition, digital platforms have become essential tools for SMEs to enter global markets without the need for a physical presence. This has enabled them to reduce entry costs and have more flexibility.

Nevertheless, although innovation and technology offer significant possibilities, they also pose difficulties. Continuous adaptation and learning are necessary due to the swift rate of ever-technological advancement changes. Small and medium-sized enterprises (SMEs) must prioritize ongoing technological advancements and skill enhancement in order to maintain competitiveness. Furthermore, it is imperative for the government to provide regulatory and infrastructural assistance in order to create a favorable environment for the development and global expansion of these businesses.

Ultimately, Saudi Arabian small and medium-sized enterprises (SMEs) must adopt innovation and exploit technology as essential prerequisites for achieving continued success in the international sphere. As businesses continue to deal with the challenges of expanding internationally, their capacity to innovate and adjust technologically will play a crucial role in determining their global achievements. In order to ensure the continued international growth of Saudi SMEs, policymakers and business leaders should prioritize the development of strong support systems that improve technological competencies and innovation capabilities. Small and medium-sized enterprises (SMEs) frequently opt for internationalization because it offers cost-effectiveness and high efficiency through technology, which are typically seen as impractical considerations when expanding into global markets. This process not only offers cost-efficiency but also instils a feeling of pride in them.

Limitation and Future Research

There are several limitations of this research study, which is focused on the effect

of innovation and technology in Saudi Arabian SMEs. Therefore, the primary focus of this article on innovation and the use of technology may lead to the disregard of other important elements that contribute to the worldwide behavioral shift of small and medium-sized enterprises (SMEs). In addition to innovation and technology, other variables such as market dynamics, legislative environment, and managerial feasibility may also have a big impact on the strategies of SMEs when expanding internationally. The omission of these criteria may have limited the extent to which the study may provide conclusive findings. Furthermore, future studies might prioritize investigating the intricate interplay of innovation, technology, and other contextual elements such as government regulations, market circumstances, and industry-specific dynamics.

Conflicts of Interest

Regarding the publishing of this research paper, the authors expressly state that never have any conflicts of interest.

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