

The Effect of Technology and Product Innovation on SMEs Performance through Balanced Scorecard: Government Programs as Intervening in Addis Ababa, Ethiopia

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KEY WORDS

Technology
Innovation, Product
Innovation,
Government Support
Programs, Firm
Performance, SMEs,
and BSC

ABSTRACT

This study examines the Effect of Technology and Product Innovation on SMEs' Performance through the Balanced Scorecard Government Programs as an intervention in Addis Ababa, Ethiopia. 431 SME owners and managers in Addis Ababa took part in a quantitative, cross-sectional survey design that collected primary data using multi-stage sampling, systematic random sampling, and standardized, closed-ended questions. SPSS Version 26 was used to analyze the data for descriptive and inferential statistics. The hypothesized relationships were investigated using AMOS software Version 26, which enables structural equation modeling (SEM). The findings show that both technological and product improvements considerably boost corporate performance ($\beta = 0.395, p < 0.001$ and $\beta = 0.428, p < 0.001$, respectively), with government support acting as a stimulant that largely mediates these interactions. This study offers a comprehensive understanding of performance and innovation in a developing economy by combining perspectives from the Resource-Based View, Innovation Diffusion Theory, Stakeholder Theory, and the Balanced Scorecard. Future studies should concentrate on qualitative insights, industry-specific subtleties, and long-term consequences in order to gain a deeper understanding of the contextual elements impacting innovation. This will give policymakers and SME management practical advice on how to organize focused support systems to encourage sustainable growth.

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Introduction

Innovation is important for small and medium-sized businesses (SMEs) to grow both nationally and universally (Addisu, 2024; Kassa & Kegne, 2025). According to Lin (2024), innovative SMEs play a critical role in national economies by introducing new products and technologies that increase productivity, provide employment, and advance the economy. They are fundamental for sustainable development since they also have a positive impact on economic resilience and community development (Melkamu et al., 2025).

Innovation significantly contributed to the development of small and medium-sized enterprises (SMEs) by increasing their operational effectiveness and competitiveness (Enaifoghe, 2024). By introducing new technology and improving their product offerings, SMEs were able to better meet market opportunities, which raised customer happiness and loyalty (Ketema, 2024). This dynamic facilitated employment creation and encouraged economic progress in their areas.

According to Schumpeter's concept, SMEs have learned how crucial innovation is to their growth (Lin, 2024). They started using strategic innovation methods that were suitable for their local conditions, especially in developing nations like Ethiopia (Engidaw et al., 2024). This change in emphasis highlighted how crucial it is to comprehend how outside variables, including government assistance, may affect these innovation projects' efficacy (Alhosani & Alhashmi, 2024).

Despite the potential benefits, many SMEs encountered significant barriers that prevented them from innovating (Enaifoghe, 2024). Lack of finances, access to cutting-edge technologies, and inadequate managerial skills frequently impeded their efforts (Gebrerufael et al., 2025). Additionally, government support programs frequently ignored the special needs of SMEs, underscoring the urgent need for tailored rules that may better promote innovation and boost industrial business performance.

Economic development was significantly impacted by the state of small and medium-sized businesses (SMEs), particularly in emerging nations like Ethiopia (Abate & Sheferaw, 2023). These businesses generated almost 36% of the country's GDP, employed more than 73% of urban workers, and acted as catalysts for job creation, innovation, and adaptation (Belisti et al., 2025). Despite their potential, many SMEs faced major obstacles that hindered their capacity to innovate successfully.

Due to limited access to financing, poor infrastructure, and a shortage of skilled labor, Ethiopian SMEs found it difficult to adopt technological and product innovations (Ketema, 2024). A case study of the textile industry showed that, despite the demand for creative clothing designs, many companies lacked the funds to invest in modern machinery or employee training, which hindered their ability to compete in both domestic and foreign markets.

Additionally, SMEs found it more challenging to develop due to the bureaucratic nature of government support programs (Su et al., 2024). Government-sponsored initiatives intended to provide finances and resources often have lengthy application processes and stringent eligibility standards, according to an agro-processing sector study (Lema & Bekana, 2024). This reduced the potential benefits of government support by making some business owners agitated and reluctant to take part in these programs.

Traditional factors have a big influence on Ethiopian innovation; many entrepreneurs are risk cautious, which deters them from investing in new technologies (Gebrerufael et al., 2025). A case study from a software business illustrated the challenges of convincing local farmers to adopt innovative farming technologies, highlighting the urgent need for initiatives tailored to Ethiopian SMEs' particular requirements (Dawit Udessa Gede, 2024).

Statement of the Problem

The importance of innovation for small and medium-sized businesses is highlighted by the quickly evolving global economy (Firisa, 2021; A. Z. Mamo et al.,

2025). However, in Ethiopia, where product innovation and technology are essential for economic success, reality falls short of the ideal (Eltamo et al., 2025; Paravano et al., 2025; Zabel & Brien, 2025). SMEs are unable to adopt successful innovation strategies due to obstacles such as poor infrastructure, restricted access to resources, and insufficient government backing ((Boru et al., 2025). This gap highlights the need for a greater understanding of how to maximize innovative techniques in this setting and shows a major disparity between the aspirational and actual performance of SMEs (Ndlovu et al., 2025).

Regarding the impact of government support on innovation outcomes, there is inconsistent evidence (Balzano et al., 2025; Li et al., 2024). While some studies point to a positive correlation, others show that in developing nations like Ethiopia, this kind of aid may not have a major effect on business development (Assfaw & Sharma, 2024; Yimam et al., 2025). This discrepancy reveals a theoretical gap in knowledge of how government assistance affects performance and innovation, in addition to unresolved issues regarding effective innovation approaches for various industries within the Ethiopian SME landscape and the external factors at play (Getachew et al., 2025; Munir et al., 2025).

Current studies often overlook the unique challenges encountered by Ethiopian SMEs, including cultural barriers, market constraints, and economic volatility (Gebre et al., 2025; Yimam et al., 2025). Moreover, inconsistent government regulations hamper the innovation (Balzano et al., 2025). This study aims to fill these gaps and provide useful suggestions for enhancing performance and innovation in Ethiopian SMEs by utilizing the Balanced Scorecard framework to assess the effects of government support and product and technology innovation initiatives.

Specific Objectives of the Study

1. To investigate the effect of technology and product innovation on SMEs' performance.
2. To study the intervening role of Government Support programs the relationships between

technology and product innovation, and SMEs performance.

Theoretical Framework

Several theoretical stances can be used to investigate the connection between government support initiatives, technological and product innovation practices, and company success in Ethiopian SMEs. Resource-Based Perspective (RBV): The Resource-Based View (RBV) holds that a company's unique assets and capabilities, such as organizational culture, technological know-how, and experienced personnel, are what mostly determine its competitive edge (Mardatillah et al., 2024). For Ethiopian SMEs, innovation and improved performance depend on creating distinctive features and making effective use of internal resources (Yimam et al., 2025). Additionally, external support, including government programs, can bolster these businesses' capabilities and resource bases.

Innovation Diffusion Theory (IDT) examines the dissemination of new ideas and technology, especially among SMEs. It emphasizes how outside variables, such as government assistance, can assist SMEs in implementing cutting-edge techniques (Diaz-Arancibia et al., 2024). By identifying the factors that influence adoption rates, such as perceived benefits, compatibility, and complexity, policymakers can create more effective initiatives to promote innovation among Ethiopian SMEs (Abate & Sheferaw, 2023). IDT offers a methodology for analyzing barriers to innovation adoption and potential results of government support for this process.

Stakeholder theory highlights the need of identifying and satisfying the needs of various stakeholders, including customers, suppliers, governmental organizations, and the local community, particularly for Ethiopian SMEs (Y. A. Mamo et al., 2023). According to Ahmadov et al. (2024) assert that this approach is crucial for balancing the interests of SMEs and other stakeholders with government assistance programs. The varying expectations and contributions of various groups can be taken into consideration to boost company performance and inventiveness.

Internal processes, learning and growth, customers, and finances are the four perspectives from which the Balanced Scorecard (BSC) framework integrates both financial and non-financial data (Kaneberg et al., 2025). The BSC is utilized in this study to evaluate how product and technological advances, as well as government support, impact Ethiopian SMEs' overall performance (Tamirat, 2024). The study offers a thorough grasp of the complexities found in the SME environment by carefully analyzing the connections between innovation strategies and performance outcomes.

Definitions and Origins of Key Terms

"Technology innovation" refers to the application of new or significantly improved tools, systems, processes, and technologies. As stated in Badghish & Soomro, (2024) this application seeks to tackle complex problems, produce significant advancements, and add value across several industries. Additionally, it is the deliberate application of new or significantly improved technologies to translate theoretical possibilities into tangible outcomes that provide significant breakthroughs, address difficult problems, and add value (Jea et al., 2024). This process involves the deliberate integration of novel solutions into real-world contexts to improve efficiency, drive economic and social progress, and address pressing global challenges because innovation's value is realized through its context-specific application that solves problems, increases productivity, and opens up new opportunities (Lee, 2025). Additionally, JOHNSON, (2024) defines technology innovation as the introduction of new or improved goods, services, or processes using sophisticated technology, highlighting its importance for economic advancement (Byaro & Rwezaula, 2024). Joseph Schumpeter's concept of "creative destruction" explains how new technologies can create opportunities and upend economies (Lin, 2024).

"The process of developing and launching new or improved products or services that provide added value to customers, with an emphasis on improvements in design, functionality, or usability" is how the OECD's Oslo Manual defines product innovation (Santos, 2024). Product innovation, which has its roots in marketing, prioritizes understanding consumer requirements and preferences and develops

in step with changes in consumer behavior and technology (Amajuoyi et al., 2024). In order to obtain a competitive advantage, companies must innovate their products.

Firm performance is a measure of how successfully a company operates and accomplishes its goals. It is commonly determined by factors like profitability, market share, revenue growth, and customer satisfaction (Alyahya, 2025). Frameworks like the Balanced Scorecard have been developed as a result of the notion, which began in management theory with a focus on financial measures and has expanded to include non-financial components (Kumar et al., 2024). This change underscores the realization that long-term prosperity depends on financial results, satisfied customers and employees, and efficient internal procedures.

The goal of government support programs is to assist companies, especially small and medium-sized businesses, with funding, technology development, and training (Inmor et al., 2025). These programs were developed with the intention of promoting economic development, fostering innovation, and enhancing competitiveness during the post-World War II period when countries were attempting to rebuild their economies (Škuflić et al., 2024). This type of support is crucial for promoting entrepreneurship and fixing market flaws that impede the growth of SMEs in developing countries like Ethiopia (Endris & Kassegn, 2022).

The Balanced Scorecard (BSC), a framework for performance management and strategic planning that balances non-financial and financial components, was developed in the early 1990s by Robert Kaplan and David Norton (Tamirat, 2024). From four perspectives—internal operations, customers, learning and development, and finances—it transforms strategic objectives into measurable goals (Kaneberg et al., 2025). Since it was discovered that typical financial indicators were inadequate for assessing long-term success, the BSC is now routinely employed in many industries to align operations with strategic goals.

Empirical literature and hypothesis development

Developing testable hypotheses regarding variable associations requires the use of empirical literature. To guide the creation of accurate, testable hypotheses, researchers examine earlier research to find knowledge gaps or discrepancies (Alfuth et al., 2025). They guarantee relevance and significant contributions to the subject by firmly establishing their hypothesis in the body of previous research (Chang et al., 2024).

Technology Innovation and Firm Performance

Research suggests a positive correlation between firm performance and technology innovation. According to (Fitri et al., 2024; Khalifa, 2024; Zhao et al., 2025). Innovative businesses improve their competitive edge and financial success by better adapting to market changes. According to Böhmann et al (2025) Research and development expenditures are associated with higher productivity, market share, and profitability. In general, corporate success and stable market expansion in competitive contexts are greatly aided by technology innovation (Farooq et al., 2024; Hordofa, 2024).

According to an empirical study, there is a non-linear or negative correlation between corporate performance and technology innovation (Milovanović, 2022) (Horvey & Odei-Mensah, 2025). According to Min et al. (2024) if new technologies are not used effectively, excessive investment in them may result in declining returns. Rapid changes could make technological achievements obsolete, requiring continued investment while underutilizing existing technology (Barreto et al., 2025). This could lead to financial hardship and distraction from essential duties, which could impact overall performance and demonstrate that the benefits of technological innovation are context-specific and not always present.

H1: Technology innovation has a statistically significant relationship with firm performance.

Product Innovation and Firm Performance

Empirical research indicates a high positive correlation between product innovation and corporate performance (Han et al., 2024). According to a study by (Marty et al., 2024), businesses that actively engage in product innovation generally achieve stronger sales growth and market share than their less inventive peers. According to research, companies that introduce new products are more likely to promote customer satisfaction and loyalty, which in turn increases profitability (Ghaderi et al., 2024). Furthermore, distinctive products can help companies stand out from the competition, allowing them to raise prices and improve their market position.

Although greater corporate performance is frequently associated with product innovation, empirical research reveals that this association is not always beneficial (Cabaleiro & Pedro, 2024). Businesses can put more emphasis on developing new products than on enhancing their existing ones, which would lower client loyalty and happiness. Innovation may lead to mismatched products, low sales, and financial losses if market research is not done properly. Quick changes have the potential to confuse customers and undermine brand trust, and if innovations fall short of expectations, the expenses associated with product development could put a strain on finances (Saptono et al., 2024). As a result, while product innovation might improve performance, there are situations where it can also have negative consequences.

H2: Product innovation has a statistically significant relationship with firm performance.

Product Innovation and Government Support

Government support and product innovation are positively connected, according to research, and public policies like tax breaks and subsidies increase a business's ability to innovate (Han et al., 2024; Zewdie et al., 2024). As Li & Xu (2025) discovered that government funding reduces financial risks and stimulates private sector innovation, while government-backed R&D fosters collaboration between public and private organizations. This supportive environment boosts overall business performance and competitiveness in addition to

making it easier to develop new goods, underscoring the crucial role that government plays in fostering economic growth and innovation.

An empirical study suggests that government funding and product innovation may be negatively correlated. According to Wilhelm & Wilhelm (2024) claim that companies that rely too much on government support may prioritize bureaucratic compliance over independent creativity. Furthermore, Fan & Fan (2025) note that subsidies may hinder competition by giving preference to less inventive companies over more seasoned ones. Therefore, even if government support is intended to foster innovation, it may inadvertently inhibit entrepreneurial spirit and obstruct the development of ground-breaking innovations.

H3: Product innovation has a statistically significant relationship with Government Support.

Technology Innovation and Government Support

Studies reveal a positive correlation between a company's capacity for innovation and government support for technology innovation. For example, Audretsch & Fiedler (2023) found that government funding relieves financial limitations, enabling large-scale R&D initiatives. According to Böhmman et al. (2025) state that this type of support promotes collaboration between business and academics, which accelerates technological advancements and makes knowledge transfer easier.

According to research, in some circumstances, government support may have a negative impact on technical innovation. According to Teece (2025), this kind of assistance could encourage complacency and make companies rely more on government resources than on their own innovation. Furthermore, bureaucratic processes related to government support might impede flexibility and cause delays, taking attention away from innovative goals Jayamuna I Made, (2024). Government support can occasionally have unfavorable impacts that compromise the results of innovation, even though it is meant to encourage technical progress.

H4: Technology innovation has a statistically significant relationship with Government Support.

Government Support and Firm Performance

The government's role in improving business outcomes has been highlighted by empirical research that has shown a positive association between corporate performance and government support. Government-funded initiatives boost businesses' capacity for research, which boosts innovation and output, according to a study by(Fernandez-Pinto et al., 2024). Additionally, (Degen et al., 2025) discovered that businesses that receive government support grow faster and do better financially. Effective government support is crucial for improving business performance and promoting economic development since it not only provides the necessary resources but also encourages strategic alliances and information sharing.

Government support can occasionally impede corporate development, according to empirical study (Poljaševi', 2025; Zhang et al., 2024). Make the case that an over-reliance on subsidies could lower output by inhibiting creativity and efficiency. Furthermore, Wandosell & Bobadilla, (2023) point out that this kind of assistance may lead to market distortions, enabling less competent businesses to prosper at the expense of more competent rivals. Businesses that prioritize short-term profits above long-term strategic expenditures may become complacent as a result of this dependence, which would ultimately undermine growth and competition.

H5: Government Support has a statistically significant relationship with Firm Performance

Government Support mediates the relationship between Technology Innovation and firm performance

Government support programs may act as a mediator in the relationship between technology innovation and company success, but this mediation may have both positive and negative effects. On the one hand, studies like those conducted by Alvarez-Salazar et al. (2025); Hornuf & Mattusch, (2025) show that government initiatives can provide the money and resources required to enable companies to invest in cutting-edge technologies, which enhances performance. These programs can encourage companies to investigate new technologies that they might otherwise overlook due

to financial concerns by lowering the financial risks associated with innovation.

Government assistance may promote reliance and complacency, which may lead businesses to give up on their own original ideas (Al-Faryan, 2024). According to Su et al. (2024)., this could negatively impact overall performance. Bureaucratic restrictions from government programs can occasionally hinder the flexibility required for successful innovation. Although such support may have a favorable effect on the connection between technological innovation and company success, it may also include hazards that jeopardize the potential advantages of innovation.

*H6: Government Support mediates the relationship between **technology** innovation and firm performance.*

Government Support programs mediate the relationship between Product Innovation and firm performance

Government aid programs have the ability to significantly mediate the relationship between product innovation and business performance, influencing outcomes in a number of ways (Jin & Lee, 2020). Businesses can get the funds they require to invest in the creation of new products through government initiatives like grants and tax breaks (De Rose & Malavenda, 2024). With this funding, companies can develop new products, enhance their existing

offerings, and ultimately increase their market performance. Government assistance can enhance performance and encourage the creation of new products, but it can also have unfavorable effects. Companies that rely too much on this kind of support may prioritize their financial needs over real market demands, which may result in subpar inventions that don't appeal to consumers (George, 2024). Additionally, government funding of bureaucratic procedures can stifle creativity and innovation, erecting obstacles that lower the effectiveness of innovation initiatives.

H7: Government Support mediates the relationship between Product innovation and firm performance.

Conceptual Framework

The conceptual framework, which outlines key concepts, variables, and their relationships, guides the path of the investigation. Technology innovation increases performance through research and development, whereas new product innovation increases market share and customer satisfaction, according to Kassa & Kegne(2025) analysis of the effects of government support on Ethiopian SMEs (Chang et al., 2024). Tools to promote innovation and assist policymakers in improving SMEs' performance are provided by government assistance.

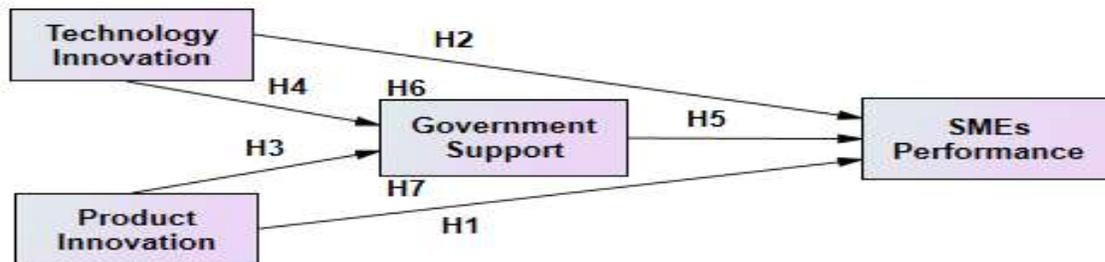


Fig. 1 conceptual framework; Source: Developed by researchers using AMOS Software, 2024

Research Methodology

Research Design and Approaches

This study uses a cross-sectional survey design and quantitative methods to investigate the connections between government support programs, technological and product innovation practices, and business performance among Ethiopian SMEs. In order to

ensure accurate and quantifiable results, the quantitative component places a strong emphasis on statistical testing of hypotheses and numerical data analysis.

Target Population, Sampling Technique, and Sample Size

The target population of 4,130 small and medium-sized enterprises (SMEs) registered with the Addis Ababa City Government comprises the study sample. In order to ensure representativeness and account for anticipated low response rates, a sample of 431 SMEs was selected using systematic random sampling techniques and a multi-stage cluster sampling approach that grouped them based on their sub-cities and Woreda/District. Yamane's formula was used to determine the sample size. Additionally, a structured questionnaire utilized to collect data contained validated scales for measuring the primary constructs.

For this investigation, a large sample size was used to minimize the expected low response rate of 15 to 20 percent and maximize the generalizability of the results (Amentie Kero & Sogbossi, 2019; Walusinski, 2018). The representative sample size is calculated using Yamane's (1967) method, which is as follows: e is the sampling error margin at 5% (recommended value of 0.05) at a 95% confidence level, n is the intended sample size, and N represents the population. To determine the sample size, the following formula was applied:

The formula is:
$$n = \frac{N}{1+N(e^2)}$$
 ----- Equation (1)
 -----(Yamane's (1967) formula)

$$n = \frac{4130}{1+4130(0.05^2)}, n = \frac{4130}{11} = 375 \dots\dots n=375,$$

$$375 +15\% \text{ of } 375 = 431$$

Therefore, the sample size is $n=431$

Measurement Scale

The scales used to measure the constructs were validated and modified from earlier empirical research. Items for Government Support Programs were taken from

Etgar, D., & Wibisono, D. (2023), (Onwuchekwa, F. (2023), Deyganto, K. O. (2022) & Cintrão, J. C. C. (2022) etc, items for Technology Innovation (Herlinawati, E., et al (2019), and Product Innovation were taken from Adel, H. M., & Younis, R. A. A. (2019) and items for Firm Performance based on the Balanced Scorecard framework (financial, customer, internal process, and learning/growth perspectives) were taken from Etgar, D., & Wibisono, D. (2023) & (Herlinawati, E., et al (2019). Standardized, closed-

ended Likert-scale questions were used to measure each topic in the survey.

Methods of data analysis

Exploratory factor analysis (EFA), using items modified for technological and product innovation Gaspar Pacheco et al. (2024) business performance from the Balanced Scorecard framework Partouvi & Najafi (2024), and government support Fainshtein et al. (2024)Fainshtein et al. (2024), confirmed factors consistent with the theoretical framework after sufficient sample adequacy was verified via the KMO measure. The interactions between constructs were then investigated using structural equation modeling (SEM) in AMOS, which showed that government assistance mediates the effect of innovation on performance. The model also indicated a strong match.

Data analysis and interpretation

Descriptive Statistics

The study surveyed 431 small and medium enterprise, with a roughly equal mix of 49.9% small enterprises (215 firms) and 50.1% medium-sized organizations (216 firms). 76.3% of owners were women, while 23.7% of owners were men, according to gender data. Owners were mostly between the ages of 41 and 50 (36.7%) or 31 and 40 (46.6%), and 48.7% had college degrees and 31.1% had finished secondary school. There was a concentration of larger businesses in the sample, as evidenced by the fact that 50.1% of businesses employed more than 30 people and 81.9% of businesses had 11–20 years of experience.

Techniques for conducting data analysis

The study's data analysis comprised 431 SMEs and used the KMO measure to evaluate sample adequacy after descriptive statistics were used to summarize demographics. Exploratory factor analysis (EFA) verified item loading on constructs in accordance with the theoretical framework.

The constructs were validated using Confirmatory Factor Analysis (CFA), and the relationships between government support, business success, and product and technical innovation were investigated using AMOS-based Structural Equation Modeling (SEM). The SEM results provided useful information on variable dynamics and supported the study's objectives

with strong model fit indices and significant direct and mediated effects.

Table 1. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.824
Bartlett's Test of Sphericity	Approx. Chi-Square	6726.08
	df	136
	Sig.	0

Source: SPSS output, 2024

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity are important tools for determining if data is appropriate for factor analysis. The high degree of sampling adequacy suggested by the KMO value of 0.824 suggests that the data may be appropriate for finding underlying factor structures. Bartlett's Test, Table 2: Total Variance Explained

which has a Chi-Square value of 6726.08, 136 degrees of freedom, and a significance level of 0, also shows a significant departure from an identity matrix. These results confirm that it is appropriate to proceed with component analysis in order to validate the correlations between variables and uncover latent connections.

Component	Initial Eigenvalues			Extraction Sum of Squared Loadings			Rotation Sums of squared Loadings		
	Total	% of variance cumulative	Cumulative %	Total	% of variance cumulative	Cumulative %	Total	% of variance cumulative	Cumulative %
1	6.160	38.499	38.499	6.160	38.499	38.499	3.57	22.317	22.317
2	2.958	18.490	56.989	2.96	18.490	56.989	3.42	21.356	43.673
3	1.917	11.984	68.973	1.92	11.984	68.973	2.77	17.334	61.007
4	1.346	8.410	77.382	1.35	8.410	77.382	2.620	16.375	77.382
5	0.693	4.329	81.711						
6	0.573	3.580	85.291						
7	0.384	2.401	87.692						

Extraction Method: Principal Component Analysis

Source: SPSS output, 2024

The Principal Component Analysis (PCA) extraction sums of squared loadings, rotation sums of squared loadings, and initial eigenvalues are displayed in Table 2. The first component accounts for 38.5% of the total variation, while the second and third components contribute 18.5% and 12.0%, respectively. The loadings are altered by rotation, with the first

component contributing 22.3% and the second 21.4%. This results in a cumulative variance of 43.7%. The first two components retain the same variance percentages after extraction. The eigenvalues of components five through seven are less than 1, indicating that they do not significantly contribute to the overall variance.

Confirmatory Factor Analysis (CFA)

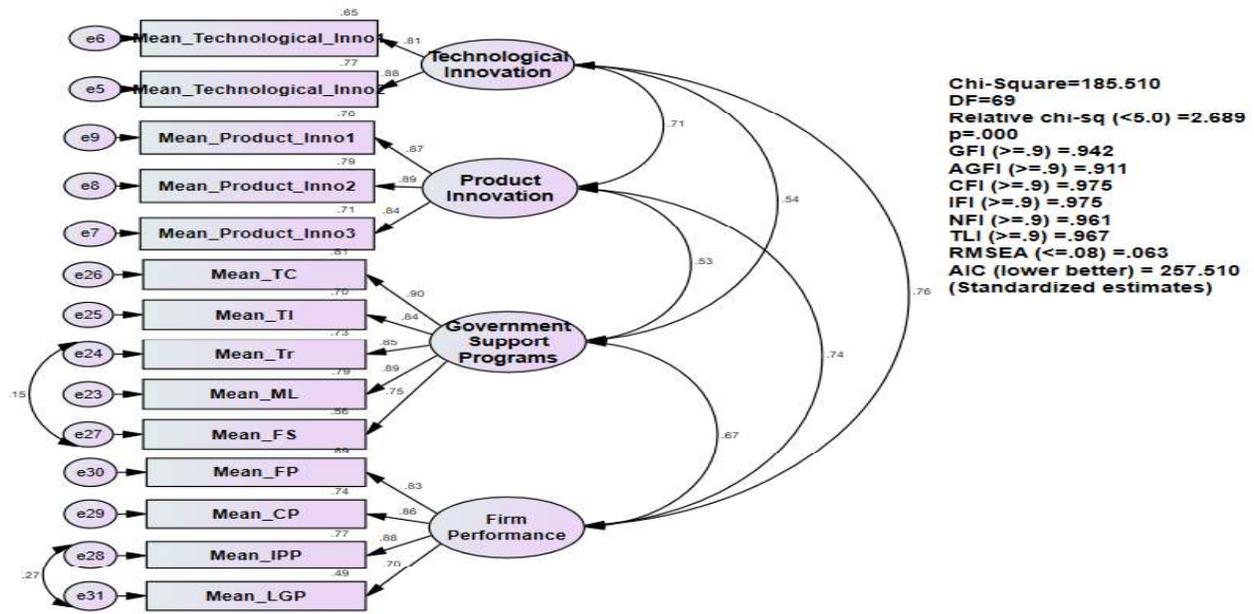


Fig.2. Confirmatory factor analysis (CFA) Source: AMOS results from 2024

Note: TI stands for Tax Incentive. Tr: Instruction
 ML: Marketing Connection, Financial Support (FS),
 Financial Perspective (FP), Internal Process
 Perspective (IPP), Customer Perspective (CP), and
 Learning Growth Perspective (LGP)

The factor structure suggested in the theoretical framework was confirmed using Confirmatory Factor Analysis (CFA), which confirmed the connections between observable variables and their latent constructs. The study looked at relationships between observed variables, as Figure 2 illustrates. The results

in Table 3 evaluated the measurement model's fit, confirming that it was in line with theoretical ideas and proving the constructs' validity and dependability.

By verifying the connections between observable variables and their latent constructs, Confirmatory Factor Analysis (CFA) supported the factor structure suggested by the theoretical framework. Figure 2 illustrates how the study looked at correlations between observed variables. The results in Table 3 evaluated the measurement model's fit, proving the constructs' validity and reliability and verifying that it was in line with theoretical ideas.

Table 3: Covariance

Covariances		Estimate	S.E.	C.R.	P
Technological-Innovation	<--> Product-Innovation	0.297	0.03	10.33	***
Technological-Innovation	<--> Government-Support-Programs	0.308	0.04	8.567	***
Technological-Innovation	<--> Firm-Performance	0.417	0.04	10.66	***
Product-Innovation	<--> Government-Support-Programs	0.250	0.03	8.664	***
Product-Innovation	<--> Firm-Performance	0.337	0.03	10.72	***
Government-Support-Programs	<--> Firm-Performance	0.411	0.04	9.986	***

Source: AMOS output, 2024

Table 3 demonstrates the strong correlation between business performance in SMEs and factors such as

marketing innovation, technological innovation, and government backing. Interestingly, there is a positive

correlation between marketing innovation and government support programs (0.308, C.R. = 8.567), corporate performance (0.417, C.R. = 10.658), and product innovation (0.297, C.R. = 10.331, $p < 0.001$). Strong correlations between government support and

Table 4: Validity Concern

Constructs	CR	AVE	MSV	MaxR(H)	\sqrt{AVE}	GSP	TI	PI	FP
GSP	0.927	0.718	0.445	0.935	0.847	0.847			
TI	0.831	0.711	0.570	0.840	0.843	0.542	0.843		
PI	0.901	0.753	0.549	0.904	0.868	0.533	0.706	0.868	
FP	0.891	0.673	0.570	0.904	0.821	0.667	0.755	0.741	0.821

Note: TPIP= Technological innovation, product innovation; GSP= government support programs; FP= firm performance

Source: Using Results from Amos software & final output using Stats Tools Package (2025)

For every construct, reliability and validity metrics are shown in Table 4, with high Composite Reliability (CR) values: FP = 0.891, GSP = 0.927, TI = 0.831, and PI = 0.901. The values of Average Variance Extracted (AVE) (GSP = 0.718, TI = 0.711, PI = 0.753, FP = 0.673) show high convergent validity. In particular, for GSP (MaxR(H) = 0.935), Maximum Shared Variance (MSV) and Maximum Reliability

Structural Equation Model and Hypothesis Testing

(MaxR(H)) verify robust measurement properties. FP = 0.821, TI = 0.843, PI = 0.868, and GSP = 0.847 are examples of square root of AVE (\sqrt{AVE}) values that surpass correlation coefficients, indicating discriminant validity. These indicators totally show that the constructs are trustworthy and well-defined for additional research.

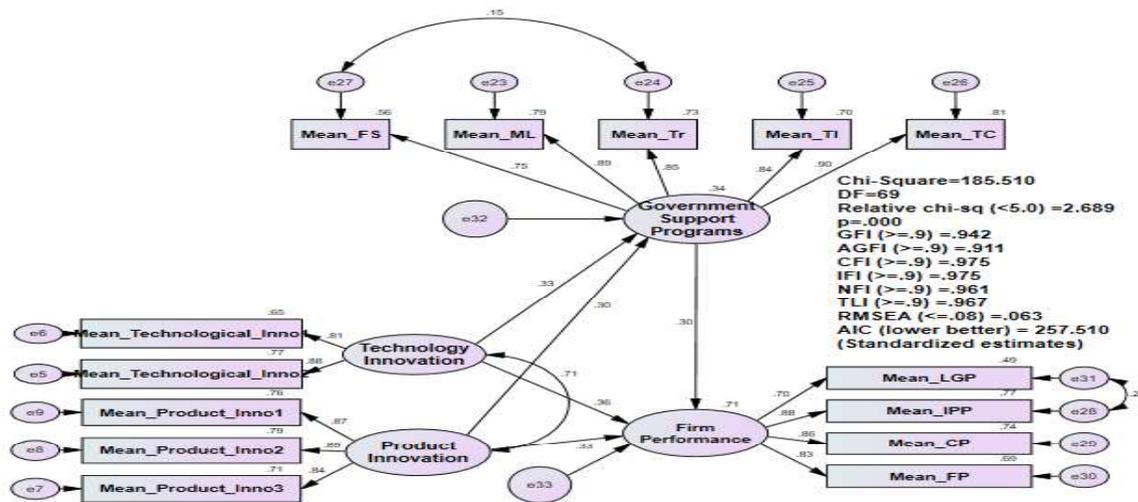


Fig 4: Structural equation model including the mediator

This study focused on the mediating role of government aid programs while examining the relationship between company performance and technology and product innovation strategies.

Government support enhances performance outcomes by boosting the effectiveness of creative strategies, according to results from structural equation modeling. Businesses that receive government support

are better able to utilize their potential for innovation, underscoring the importance of effective government initiatives in boosting the competitive advantage of SMEs.

Variable Measurement

Table 5: Tools for Variable Measurement

Measure	Threshold
Chi-square/df (cmin/df)	<3 good;<5 sometime permissible
P-value for the model	> 0.05
CFI	> 0.95 great; > 90 traditional; 0.80 sometime permissible
GFI	> 0.95
AGFI	>0.80
SRMR	<0.09
RMSEA	<0.05 good; 0.05-0.10 moderate and >0.10 bad
IFI	>0.90
NFI	>0.90
TLI	>0.90

Source: Surachman et al (2024); Wang et al (2025)

The Comparative Fit Index (CFI>0.95), Chi-square/df ratio (<3), and P-value (>0.05) are among the key metrics and standards for assessing statistical model fit that are presented in Table 5. Other important metrics are root mean square error of approximation (RMSEA <0.05), adjusted goodness-of-fit index (AGFI >0.80),

goodness-of-fit index (GFI >0.95), and standardized root mean square residual (SRMR <0.09). The Normed Fit Index (NFI), Tucker-Lewis Index (TLI), and Incremental Fit Index (IFI), all of which should be more than 0.90, allow researchers to evaluate the model's validity and robustness (Surachman et al., 2024; Wang et al., 2025).

Table 6: Indices for Model Fit

Sig.	Chi-Sq	RMR	Fitness Goodness	Fitness Confirmatory	TLI	RMSEA
0.004	2.689	0.036	0.942	0.975	0.967	0.063

Source: AMOS result, 2024

Table 6 displays various statistical measures of model quality, including model fit indices. A decent model fit is indicated by the Chi-Square statistic of 2.689 and the Root Mean Square Residual (RMR) of 0.036; nevertheless, statistical significance is indicated by the significance value (Sig.) of 0.004. The Fitness Goodness score of 0.942 and the Fitness Confirmatory score of 0.975 indicate strong performance. The Root

Mean Square Error of Approximation (RMSEA), which is 0.063 below the accepted level, indicates an adequate fit to the data. Additionally, the model is further validated with a score of 0.967 on the Tucker-Lewis Index (TLI).

Table 7: Path Coefficient (Direct effect) Results

Hypothesis	B	Beta	SE.	C.R	P	Decisions
Government-Support-Programs <--- Technological-Innovation	0.369	0.331	0.083	4.415	***	Accepted
Government-Support-Programs <--- Product-Innovation	0.405	0.300	0.097	4.172	***	Accepted
Firm-Performance <--- Technological-Innovation	0.395	0.365	0.066	5.936	***	Accepted
Firm-Performance <--- Product-Innovation	0.428	0.326	0.075	5.745	***	Accepted

Firm-Performance <--- Government-Support-Programs 0.287 0.296 0.043 6.713 *** Accepted
 Source: AMOS result, 2024

The route coefficient results show significant direct effects across the proposed linkages, and government support programs are crucial for advancing both products (B = 0.405, p < 0.001) and technological innovation (B = 0.369, p < 0.001). Both types of innovation significantly increase firm performance (B

= 0.428, p < 0.001 and B = 0.395, p < 0.001), and government support has a significant impact on performance (B = 0.287, p < 0.001). These findings demonstrate that innovation and government assistance can boost business performance.

Table 8. Mediating Role Effect

Relationship	Influence	worth	Path Influence
Technology innovation → Firm performance	direct influence	0.36	direct influence stated
Technology innovation → Government support → Firm performance	indirect influence	.33*.30=.10	indirect influence
	Whole influence	0.46	Partial mediation
Product innovation → Firm performance	direct influence	0.33	indirect influence stated
Product innovation → Government support → Firm performance	indirect influence	.30*.30=.10	indirect influence
	Whole influence	0.43	Partial mediation

Source: AMOS Software output 2024

Table 8 demonstrates that government support partially mediates the relationship between innovation and firm performance: technology innovation directly affects performance by 0.36, while government backing indirectly affects performance by 0.10, for a total of 0.46. The overall impact of product innovation is 0.43, consisting of 0.33 direct and 0.10 indirect effects. These findings highlight the critical role that government backing plays in boosting the efficacy of innovations and offer helpful information to businesses looking to improve performance through innovation.

Discussion

The study's conclusions clearly show the crucial role that technology and product innovation play as drivers of SME performance in Addis Ababa, and they are consistent with Schumpeter's groundbreaking work as well as recent researchers like Fitri et al. (2024) and Han et al. (2024), The significant positive correlations (B = 0.428 for technological innovation and B = 0.395 for product innovation) indicate that SMEs using these innovative strategies perform better in the financial,

customer, internal process, and learning/growth areas of the Balanced Scorecard. This supports the Resource-Based View by proving that these breakthroughs are practical, firm-specific resources that provide competitive advantage.

The findings, however, also tangentially align with the cautious viewpoints of Milovanović (2022) and (Saptono et al., 2024), since the success of these innovations is clearly dependent on favorable external conditions, without which the possibility of squandered investment and performance decline remains a real risk in the Ethiopian context.

Above all, our research provides empirical explanation for the conflicting information regarding government support in developing countries (Assfaw & Sharma, 2024; Yimam et al., 2025). The analysis shows that government support programs are not only directly associated with improved business performance (B = 0.287), but they also serve as a vital conduit that amplifies the impact of innovation. This mediating role, which is supported by strong indirect effects (0.10 for both innovation types), validates the

Innovation Diffusion Theory by showing that organized external assistance facilitates the successful adoption and implementation of innovative products and technologies. The findings suggest that in environments like Ethiopia's that are characterized by resource constraints and market imperfections, well-considered government interventions can lower the operational and financial risks of innovation, enabling SMEs to transform innovative activities into measurable performance gains.

The integrated approach emphasizes a crucial strategic implication: for Ethiopian SMEs, innovation and government support are complementary strategies rather than substitutes. Although innovation has a substantial direct influence, targeted government measures are required to fully achieve its potential, according to the observed partial mediation. This bridges the theoretical gap noted by Balzano et al.(2025) and provides policymakers and SME managers with a useful road map. To ensure sustained growth, governments must create programs that directly address the innovative needs of SMEs, thereby lowering the bureaucratic obstacles noted by Su et al. (2024). In order to ensure that both technology improvements and new product developments are successfully exploited to ensure long-term growth and resilience in a competitive market, SME managers should concurrently actively participate in these initiatives to boost their absorptive capacity.

Conclusion

This study unequivocally shows that innovation strategies have a significant impact on Ethiopian SMEs' success, especially in the areas of technology and product development. However, the process of turning creativity into performance cannot be guaranteed or made simpler by internal initiatives alone. The efficacy of government assistance programs is the primary distinction.

The identified theoretical and practical shortcomings are effectively filled by the study. It offers a thorough, verified model built on the BSC framework, emphasizing the crucial catalytic role of government support. It lessens the obstacles that frequently impede Ethiopian SMEs, including scarce resources, inadequate infrastructure, and bad management. To improve Ethiopia's economic resilience, job creation, and sustainable growth, a symbiotic environment

where special government programs actively encourage SME innovation is necessary.

Managerial Implications

SME owners must prioritize technology adoption and product development as necessary expenditures for expansion and manage their finances carefully. Actively pursuing government support programs can reduce the risks associated with innovation and enhance success rates. Managers should approach performance holistically, taking into account internal procedures, customer satisfaction, and staff development in addition to financial metrics, much like the Balanced Scorecard system.

Practical Implication

Policymakers aim to create support programs that are specific to the difficulties SMEs encounter, especially with regard to their size and sector. This entails lowering administrative obstacles, guaranteeing openness, and streamlining application procedures. Programs should prioritize improving technical infrastructure, talent development, and market links in addition to tax breaks and grants. To guarantee that SMEs are aware of these programs and know how to use them efficiently, government authorities must actively promote them.

Theoretical Implications

By addressing the conflicting narratives in the literature on the topic, the empirical data in this study show the beneficial mediation role of government support in the context of rising economies. In order to provide a single, cohesive model for evaluating SME performance, the study successfully integrates and evaluates a variety of theoretical viewpoints, including RBV, Stakeholder Theory, Innovation Diffusion Theory, and the BSC framework. By offering a verified model tailored to the particular institutional, cultural, and financial limitations of the Ethiopian SME context, it contributes to the body of knowledge.

Recommendations

In addition to a defined innovation plan for SMEs, businesses and policymakers should create specialized teams to manage innovation and government support in order to foster innovation and corporate success. Government agencies such as the Ethiopian Ministry of Innovation and Technology should set up a digital "one-stop shop" for SME support services and develop

industry-specific assistance programs. These algorithms can be improved over time by putting feedback systems in place. Both present and prospective business owners should have access to executive training programs that concentrate on innovation management and navigating government support procedures.

Limitation and Future Research Directions

Despite its promising results, this study's cross-sectional approach and concentration on urban SMEs in Addis Ababa restrict its applicability to rural firms. Furthermore, it is impossible to totally rule out the possibility of self-report bias, which is inherent in survey-based research, despite every effort being taken to ensure the integrity of the data. In order to establish causation and expand the geographic scope to include rural SMEs, longitudinal designs should be employed in future studies. To gain a deeper and more contextual understanding of the connection between innovation and performance, qualitative methods should also be used.

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