ISSN (Online): 2958-3810
ISNN (Print): 2077-3420

JBAS Journal of Business and Administrative Studies

Home page: JBAS

Export and Import Knowledge as Drivers of Technological Innovation and Firm Performance: Evidence from Ethiopian SMEs

Mekonnen Tadesse[1]

KEY WORDS

Export knowledge, Import knowledge, Technological innovation, Firm performance, SMEs, Knowledge-based view

ABSTRACT

The main focus of this research is to analyze the influence of two major constructs of export and import knowledge on technological innovation and firm performance of among Small and Medium Enterprises (SMEs) in Ethiopia. In this study two theoretical views KBV and RBV has been considered. The research fully utilized the quantitative approach and the data was collected through structural questionnaire to 331 SMEs located in Addis Ababa, Ethiopia. The data were analyzed using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings of the study indicates that both export and import knowledge significantly influence technological innovation and firm performance. The result shows that the most significant predictor of performance was technological innovation so it confirming in translating international knowledge into competitive advantage. According to the mediation analysis technological innovation is partially mediates the relationships between export and import knowledge and firm performance which indicating that knowledge acquired from international operation leads to superior results primarily through innovation activities. With $R^2 = 0.421$ for performance and 0.178 for innovation, the structural model shows substantial explanatory power and with $Q^2 = 0.288$ for performance and 0.114 for innovation, the model also shows considerable predictive relevance. However, the study used cross sectional design, depend on self-reported data, and utilized data from one city limit the ability to draw causal inferences and to generalize the findings. It is recommended that future research uses the longitudinal design and an objective performance measure, and cover a wide range of SMEs sectors and regional areas.

[1] St. Mary's University, P.O.Box 1211, Addis Ababa, Ethiopia. Email tadmeko@gmail.com or Mekonnen_Tadesse@smuc.edu.et. ORCID: https://orcid.org/0009-0000-5800-5347

https://dx.doi.org/10.4314/jbas.v17i2.4

1. Introduction

The importance of small and medium-sized enterprises (SMEs) as key agents of industrialization, job creation, and assuring growth that benefits everyone has been more widely recognized in the Ethiopian economic environment (Abdissa et al., 2022; Teka, 2022). The strategic focus of the Federal Democratic Republic of Ethiopia (FDRE) on export diversification and technological development indicates the critical role of SMEs in promoting the transformation of the economy from an agriculture-based to an industrial and knowledge-driven economy (FDRE, 2021). However, Ethiopian SMEs continue to face challenges in innovation capacity, inadequate internationalization, and limited knowledge absorption from international markets (Gebreeyesus and Mohnen, 2013)

In such a context, the knowledge obtained from export and import becomes a strategic asset that enhances competitiveness. Export knowledge often related with the understanding of international market basically in identifying the preference of consumers, the choice of distribution channel and the function of government laws (Wang & Olsen, 2002). This export knowledge enables SMEs to improve their products and services as per the need of the foreign market (Negeri and Ji, 2023). On the other hand, import knowledge linked with the acquisition of knowledge and technologies from the foreign market that encourage absorption of technological innovation. Due to this process forms enable to improve their production efficiency and technological capabilities (Gömleksiz, 2023; Wang and Choi, 2023; Elia et al., 2020; Belitz and Mölders, 2013). When firms able to combine export and import knowledge they can be in a better position to launch a new or improved product or process. This strategy enhances their competitiveness in the market (Wang & Tao, 2019; Gömleksiz, 2023). Export experience also encourages market-driven innovation, responding to various customer needs. In the context of least developed countries, such as Ethiopia, where research and development (R&D) is limited, exposure to global marketing environments often serves as an indirect means for the acquisition of technology and innovation (Gebreeyesus & Mohnen, 2013; Negeri and Ji, 2023). Moreover, evidence shows that in the field of knowledge management, firms are conducive to innovation performance, and this also helps to adapt intangible knowledge resources to more tangible results (Kamaşak Moreno et al., 2016). It is also confirmed that a combination of export-derived knowledge and import-derived knowledge improves SMEs' innovation capabilities and thereby achieves stronger financial and non-financial performance (Negeri & Ji, 2023; Azari, 2020).

Even though the academic interest increases to study about this field, there is still limited research in Sub-Saharan Africa, and particularly Ethiopia. Although the context-specific nature of the study, the Ethiopian setting offers a significant empirical perspective on the way in which international knowledge influences innovation in limited-resource environments. As developing economies continue to be underrepresented in the international business and innovation literature, studies conducted in Ethiopia offer significant insights for scholars and policymakers who are engaged in similar developing contexts. This is in alignment with the focus of journals that emphasize development, entrepreneurship, and African business, where such country-specific analyses are deemed essential for the advancement of theory and the informing of policy. Most prior studies have been conducted in Asia or Europe, (Audretsch, & Guenther, 2023; Negeri & Ji, 2023) and it is therefore possible that their findings may not fully apply to resource-constrained, institutionally distinct environments such as Ethiopia. A review of relevant literature reveals several gaps in our understanding. Despite the prevalence of individual studies examining the influence of export knowledge and import knowledge on innovation and performance, there is a lack of research investigating their joint and comparative effects within SMEs working in developing-economy settings (Şeker, 2011; Negeri et al., 2023; Azari, 2020). Moreover, most studies neglect to consider the mediating effect of technological innovation, which may explain how knowledge resources are translated into higher performance (Njinyah, 2024; Rua et al., 2017; Bagheri & Zahraei, 2019). Despite the prevalence of Ethiopian industrial policy that strongly advocates for the internationalization of SMEs and the promotion of their exports, there is a lack of empirical studies that directly evaluate the joint role of trade-acquired knowledge (i.e., imports and exports) in promoting the technological innovation of SMEs (MoTRI, 2022; National Manufacturing/SME Transition Strategy, 2023; National Import Substitution Strategy for Manufacturing (MIDI) 2023 ; Negeri, 2023; Abate,

2023; UNDP, 2024). This limitation of solid evidence becomes an obstacle to produce an effective policy of concerning SMEs innovation most Ethiopian manufacturing firms have challenges in creating network and learning from latest information which highly affecting their growth and collaboration (Gebreeyesus & Mohnen, 2013). Furthermore, their R&D Infrastructure are also inadequate and they do have limited capacity to connect with international market (Teka, 2022; Kassa & Mirete, 2024). This study seeks to address the gaps mentioned by investigating the influence of export and import knowledge on technological innovation and performance among Ethiopian SMEs involved in foreign trade. Two fundamental theories KBV and RBV were integrated in this study to offer theoretical and practical insights, how global knowledge promote innovation and performance in developing countries.

1. What is the influence of export knowledge on technological innovation among Ethiopian SMEs?
2. What is the influence of import knowledge on technological innovation among Ethiopian SMEs?
3. What is the effect of technological innovation on firm performance among Ethiopian SMEs?
4. To what extent does export knowledge directly affect firm performance?
5. To what extent does import knowledge directly affect firm performance?
6. Does technological innovation mediate the relationship between export knowledge and firm performance?
7. Does technological innovation mediate the relationship between import knowledge and firm performance?

This study has several contributions. From the theoretical perspective, it makes valuable contribution to the existing literature on the theoretical framework of KBV and internal business literature. It shows a new combination of export and imports knowledge along with a single model of technological innovation and performance. Additionally, it offers empirical evidence from least developing countries in Africa and expands the geographical scope of prior studies (Smallbone et al., 2022; Ibidunni et al., 2020). From practical perspective, the study shows a direction for SME managers to consider the benefit of internationalization to enhance innovation and growth. Simultaneously policy makers can consider the establishment of technology centre, promote the collaboration between the academic institutions, research centre and industries and provide strategic solution for foreign currency challenges for local SMEs and facilitate supplier credit. All these help the local SMEs to improve their absorptive capacity and enhance their innovation capabilities.

This study focuses on Ethiopian Manufacturing SMEs engaging in export and import activities. The study incorporated four constructs such as export knowledge, import knowledge, technological innovation and firm performance. The analysis comprises product and process innovation as dimension of technological innovation and it processed non-financial performance as endogenous constructs.

2. Theoretical perspectives

2.1 Knowledge-Based View (KBV)

KBV is developed on the bases of RBV theory, which confirmed the firm's competitiveness is gained from securing valuable, rare, inimitable and non-substitute resources. The RBV is not only clarifies the strategic benefit of tangible resources but also consider the intangible resources of a firm. Accordingly, KBV takes this argument and identifies knowledge as the most important strategic resource (Grant, 1996). According to KBV, a firm is an institutional body that is created to produce, integrate, and utilize knowledge. It suggests that knowledge is the highest strategic resource for a firm and acts as the main source of competitive advantage (Grant, 1996). This idea also confirms that a firm's ability to generate, integrate, and use knowledge is a key component that affects its capability to show innovation and meet performance goals. In the context of SMEs, knowledge gained from export and import activities constitutes a key source of learning and capability development (Curado & Bontis, 2006). Export knowledge refers to the understanding of firms in global market dynamics, foreign law, cultural situations, and consumer preferences. Import knowledge, particularly related with the process of importing machinery, intermediate goods and technological inputs, is improving the absorption of external technological knowledge.

The inclusion of this import knowledge in the firm knowledge management system helps to build up the firm internal learning capabilities (Love & Ganotakis, 2013; de Araújo et al., 2022). Taking into consideration the KBV theoretical framework, import and export knowledge is viewed as the most important strategic learning process. It is not assumed as a simple firms' operational activities. By incorporating this learning process inside the firm, SME can create a dynamic capability to improve their innovation capabilities and competitiveness in local and foreign markets (Kylaheiko et al., 2011).

Resource-Based View (RBV)

This theory built up from Penrose's (1959) research on firm growth and it was more advanced by Barney (Barney, 1991). Kor et al. (2016) & Barney, (1991) stated that the competitive advantage of firms successfully gained from the efficient utilization of valuable, rare, inimitable and non-substitutable (VRIN) resources. The valuable resources used to exploit an opportunity and keep the firm from potential risks; rare resources must be valuable and not available abundantly to competitors. Inimitable resources should be complex and difficult to copy and the resources of firms must not be substitutable that provide similar benefit. This gives the competitive advantage to the original firm due to the VRIN nature of its resources (Lockett et al., 2009). Barney (1991) proposed the conceptual model of the VRIN framework which comprised both tangible and intangible resources. The export and import knowledge are also considered as a blending of these resources and require ensuring that they meet the VRIN criteria.

3. Literature Review and Hypothesis Development

The consistent influence of export and import knowledge on innovation and firm performance has been revealed in various empirical studies. However, the extent and nature of these effects vary according to the organizational factors and the context of the environment.

3.1 Export Knowledge and Technological Innovation

Love & Roper (2015) stated that export knowledge is the key intangible asset that helps to acquire experiential knowledge, which enables the firm to understand the foreign markets better and turn this knowledge into innovation. In the current modern business, firms are required to connect with outside worlds such as international customers, distributors, and competitors. This connection helps them gain valuable knowledge, which improves their technological innovation. Market-based learning is very crucial for the firm to learn and grow through the export process (Love & Ganotakis, 2013; Gkypali, Love & Roper, 2021). From this learning-by-exporting hypothesis, it can be understood that firms expose for modern technologies and lead to innovation. The understanding of these processes helps firms to improve their capabilities in product and process innovation (Audretsch & Guenther, 2023; Huy & Ngoc, 2022; Calheiros-Lobo et al., 2023: Cassiman & Golovko, 2011; Newman et al., 2017). Studies in developing countries confirmed that when firms plan for international standards, at the same time they start to improve the production process and innovate new products. For instance, Ahmad and Lee (2016) confirmed that those Ethiopian manufacturing SMEs involved in export market had learned a lot to improve their production process and innovate new products. Similarly, Avenyo et al. (2020) demonstrated that the African SMEs engaged in export market were able to be more innovative to develop new products quickly. Luo and Qu (2023) also stated that export markets improve the absorptive capacity of firms, which in turn contributes to the innovation capacity of the same firm.

Hypothesis 1 (H1): Export knowledge has a positive and significant effect on technological innovation in SMEs.

3.2 Import Knowledge and Technological Innovation

From the basic import function, firm can access modern equipment, components, expertise and technologies from foreign partners. This import function contributes for firms' innovation activities and production growth (Love & Roper, 2018; Cassiman & Golovko, 2011). The learning-by-importing concepts tells that an interaction with foreign suppliers is fundamental root for firms to acquire technological knowledge. It is very helpful to become familiar with international production standards and easy to adapt foreign technologies (He

& Dai, 2017; Zaclicever & Pellandra, 2012; Gligah et al., 2021). It is very comprehensible that importing is not simply bringing products and inputs to the firm, it is a function that how the firm learn to adapt innovative technologies, collaborate with foreign suppliers and improve quality. For instance, Liu et al. (2024) confirmed that high engagement in import activity increase firms' absorption capacity and product innovation and in this importation activities firms usually receive technological support or after sale services which in turn these activities enhance the firm internal innovation. Following KBV and dynamic capability theory, it is very essential to incorporate and transform external knowledge in to internal innovation through organizational learning process (Teece, 2018). Hence, for Ethiopian SMEs import knowledge plays a significant role to enhance growth through technological innovation.

Hypothesis 2 (H2): Import knowledge has a positive and significant effect on technological innovation in SMEs.

3.3 Technological Innovation and SME Performance

Technological innovation is very essential for the performance of SMEs that working in a competitive market with scarce resources. It is referred to as new or improved products, processes and technological system of firms (OECD, 2021; Ramdani et al., 2023). Several empirical evidences confirmed that the multi-dimensional aspect of firm performance such as profitability, market share, export intensity and survival of firms highly influenced by technological innovation (Ramdani et al., 2023). In unpredictable marketing environment, those firms engaged in continuous innovation activities can gain a competitive advantage over their competitors by responding to customer needs. In his study, Ayinaddis (2023) confirmed that adopting the technological innovation enhances the financial performance and operational efficiency of manufacturing SMEs in Ethiopia. In similar manner, Tandrayen-Ragoobur (2022) found that those SMEs engaged in innovation activities achieved significant growth in their performance and export market due to their capabilities in adopting the technologies with the need of customers. In the Asian business environment Nguyen and Nguyen (2022) identified firms technological innovation capabilities serves as the major mediator in connection between knowledge acquisition and their competitiveness. This showed that innovation plays a significant role in the operation of firms as it can translate learning into tangible performance. (Ramdani et al. (2023), found that firms with innovative ideas frequently joining the export market and successfully achieved the competitive advantage. Furthermore, the development of digital and green technologies permits the SME Sectors to reduce waste, improve energy usage and meet international standards (OECD, 2021). For Ethiopian manufacturing SMEs working with in a very scarce resources and encountered access to R&D infrastructure, the utilization of innovation sources from export and import knowledge is essential for achieving competitive advantage and growth.

Hypothesis 3 (H3): Technological innovation has a positive and significant effect on SME performance.

3.4 Export Knowledge and Firm Performance

Firms that recruit managers with international work experience are more involved in export performance (Love and Roper, 2016). Similarly, Adomako (2023) found that acquiring international knowledge improves international performance through the mediators of international orientation and business model innovation. Grant (1996) stated that, according to KBV, learning about export activities is crucial for intangible assets that improve firms' performance. RBV argues that export knowledge is a hard-to-replicate resource that can contribute to higher performance (Barney, 1991). Empirical evidence has also shown that firms with excellent export experience got profit, greater sales growth, and market expansion (Dung et al., 2024). In addition, when firms engage in the international market, they increase their production, differentiate their products, and increase their profit (Ramdani et al., 2023). In the least developing countries, like Ethiopia, where the domestic market is restricted, the export market can be an effective way to acquire and improve managerial skills. The Ethiopian SMEs benefited from the export market that their productivity and profitability increased due to the acquired knowledge from the foreign market (Negeri and Ji, 2023). This acquired export knowledge helps to minimize the transactional risk, improve customer relation and increase innovation (Oura et al., 2016). Hence the export knowledge serves as key resources for the

firms to learn, adapt and perform in un predictable market environment.

Hypothesis 4 (H4): Export knowledge has a positive and significant effect on firm performance in SMEs.

3.5 Import Knowledge and Firm Performance

Import knowledge is one of the basic factors that contributes to the growth of firm performance. This contribution emanated from importing modern technology, machinery and managerial practices (Békés, G., & Harasztosi, 2020; Ahn et al., 2016). The knowledge obtained through import improve the quality of firm products and enhance efficiency (Mallinguh et al., 2020). Pane & Patunru (2023) stated that the concept of learning by importing suggests that in order to increase productivities and innovation, firm should assimilate external knowledge by importing foreign technology from foreign suppliers. In supporting this idea, Studies confirmed that in developing countries, import play significant role in integrating modern technologies and production equipment (Békés & Harasztosi 2020; Alka, 2024). However, this positive situation is frequently challenged by underdeveloped local R&D capability and organization infrastructure. For Ethiopian SMEs where technological infrastructure is highly underdeveloped, it is very essential to gain technological knowledge through import activities in order to develop their technology and increase productivity. As Ghebreyesus & Mohnen, (2013) asserted that the utilization of imported machinery and technical training support has been identified as a key strategy to improve the quality of production and respond quickly to the fluctuating market demand. Therefore, import knowledge highly support SMEs to improve their financial and operational performance.

Hypothesis 5 (H5): *Import knowledge has a positive and significant effect on firm performance in SMEs.*

3.6 Technological Innovation as a Mediator between Export/Import Knowledge and SME Performance

The relationship between knowledge acquisition, which includes export and import knowledge, and firm performance is usually indirect, which is mostly mediated by technological innovation (Lee et al., 2016; Zhou & Wu, 2021; Ferreira et al., 2021; Guo et al., 2019; Kumera et al., 2024). Mallinguh et al. (2020) found that innovation capabilities act as a mediator between technology acquisition and firm performance in African SMEs. The KBV and dynamic capabilities theory suggest that to enhance performance, knowledge should be transformed through the innovation process (Grant, 1996; Teece, 2018). When firms get export knowledge, they learn about the trends of modern technology and consumer needs, and they can change these into product and process innovation (Love & Roper, 2015). Likewise, imported knowledge introduces firms to suppliers' networks and exposes them to modern technologies and best global practices; this is also further stimulating organizational learning and firm innovation (Adam & Alofaysan, 2023; Pinto et al., 2023). Accordingly, Wang & Tao (2019) confirmed that both import and export knowledge contribute significantly to firm innovation and performance. Empirical evidence shows that in Ethiopian state-owned enterprises, innovation capability mediates the positive effect of organizational learning on firm performance, which is also possible for SMEs (Bogale et al., 2025). Therefore, in the Ethiopian context technological innovation is expected to serve as a key link to turn export and import knowledge into outstanding firm performance.

Hypothesis 6 (H6): Technological innovation mediates the relationship between export knowledge and firm performance in SMEs.

Hypothesis 7 (H7): Technological innovation mediates the relationship between import knowledge and firm performance in SMEs.

3.7 Conceptual Framework

The following conceptual framework outlined how the four variables are connected: export knowledge, import knowledge, technological innovation, and SME performance. It shows that both export and import knowledge directly and indirectly through technological innovation influence SME performance.

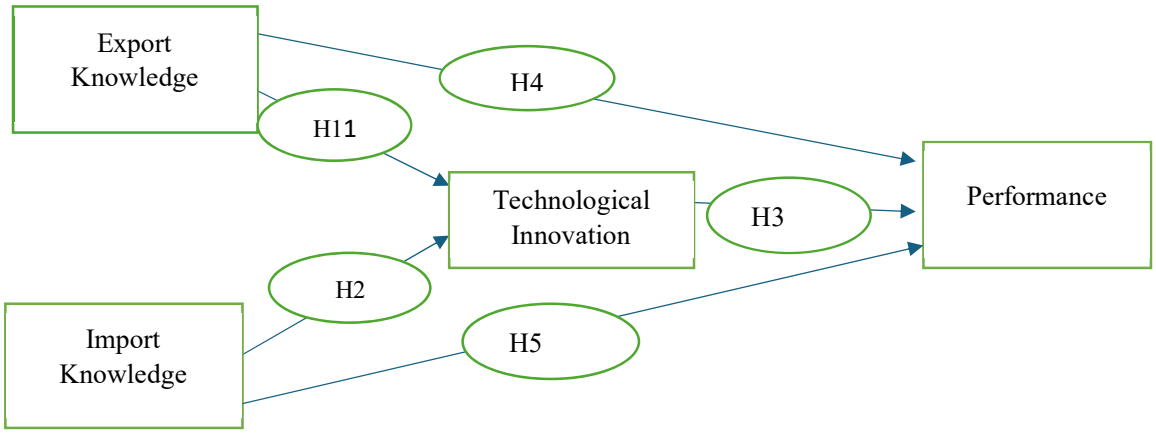

Fig. 1 Conceptual farmwork (2025)

4. Research Methodology

4.1 Research Context

According to the World Bank (2022), Ethiopia is the second most populated country in Africa, and it had an estimated population of 122 million in 2022. It achieved 6.4% economic growth in 2021/22. However, it remains one of the least developed countries in the world with a Gross National Income of USD 1020. Agenssa & Premanandam (2021) argue that the government has made strategic developments in Micro and Small-Scale Enterprises (MSSEs). The country's GTP focused on MSSEs to alleviate the challenges of youth unemployment and poverty through supporting entrepreneur growth and contributing to economic development. Despite this effort, the country's economy critically suffered with high inflation, urban unemployment, limited export market, high debt and scarcity of foreign exchange (Ethiopia Economics Association, 2018).

The definition and classification of SMEs in Ethiopia is not similar among different institution. This inconsistency could also create a problem in measurement and policy formulation. This study uses the recent regulation that was issued by Ethiopia Enterprise Development (EED). According to this regulation a small enterprise comprises 11 to 50 employees and have an asset between ETB 600,001-10 million whereas a medium enterprise also comprises 51 to 100 employees and manage a total asset of ETB 10 million to 90 million. Accordingly, if there is any discrepancy in criteria, the total assets value has priority over the number of employees for classification (FDRE, 2022). This framework shows the basic characteristics of Ethiopian manufacturing SMEs and guides the sampling strategy of this study.

4.2 Research Design

In order to investigate the relationship between export knowledge, import knowledge, technological innovation and performance of Ethiopian manufacturing SMEs. A quantitative research method and cross-sectional research design was used. Among the research philosophies, a positivist research paradigm was selected as it is established in the concrete idea that reality is objective and can be measured quantifiably through statistical analysis (Saunders et al., 2019). For analyzing the cause and effect of variables, a quantitative research method is suitable (Creswell & Creswell, 2023). The study used cross-sectional design that it allows the data collection of various firms conducted at one point in time. This also provides a clear understanding of how knowledge influences innovation and performance (Hair et al., 2021). The methodological approach has been used in similar studies on SME innovation in developing countries (Adam & Alofaysan, 2023; Adomako et al., 2023).

4.3 Target Population of the Study

In this study all manufacturing SMEs operating in Addis Ababa was the target population. The manufacturing sector was selected because it plays a key role in creating job, involvement in export and import operation and its tendency for innovation. The data about these enterprises was collected from EED, the ministry of industry and Addis Ababa city

administration sub-city industry development office. The recent statistical data indicates, there are 2558 officially registered manufacturing SMEs in Addis Ababa, which comprises 2154 small enterprises and 404 medium enterprises. For the sample representative, a stratified random sampling technique was used. The firms' owners or managers were the participant as it was supposed that they possess the most relevant knowledge about their firms' export and import activities, innovation strategies and performance outcomes. The data was collected in a structured questionnaire. A supplementary information was sourced from SMEs office records, policy documents and prior academic studies.

4.4 Sample Size and Sampling Procedure

For any research the careful determination of the right sample size is very important because it has greater impact on the validity and reliability of the study. It is also ensuring the finding are the true representation of the large population and it can be generalized. The minimum sample size was calculated by using the appropriate formula of (Yamane, 1967). This formula is suitable when the total number of populations is known. Accordingly, to determine the sample size the formula applied with a 95% confidence level and a 0.05 margin of error as follow.

$$n = \frac{N}{1+N(e)^2}$$

n= is the desired sample size,

N= is the population size, and

e= is the error of confidence

$$n = \frac{2558}{[1+2558\ (0.05)^2]} = 346$$

The result of the sample size is 346.

Before conducting the complete data collection, a pre-test of the questionnaire was done carefully. To ensure clarity and reliability, a data was collected from 20 SMEs managers and tested. Finally, the data was collected by a team of seven trained experts who were the staff of Addis Ababa sub-city SME offices. Among the distributed questionnaires, 331 valid responses (95.7%) were collected and analyzed. This sample size was above the minimum standard recommended for PLS-SEM. This also warrants strong statistical validity as noted by (Hair et al., 2021).

4.5 Variables and Measurement Instruments

The study analysed four major variables; export knowledge, import knowledge, technological innovation, and firm performance. The first three variables are independent variables while firm performance is the dependent variable. The data collection questionnaire used a five-point Likert scale where '1' means 'strongly agree. How ever for the dependent variable, firm performance, we used a different seven-point scale ranging from '1' 'very negative' to '7' 'very positive'. The study used multi-item scale to measure the four variables. These measurement scales were validated in prior studies, and the findings are reliable, valid and relevant.

The measurement of export knowledge adapted from Wang & Olsen (2002) and Zhou et al. (2023) studies. While the measurement of the import knowledge adapted from Mostafiz et al. (2022) and Zhou et al. (2023). The measurement of technological innovation was adapted from Oslo manual (OCED, 2005) and Calik et al. (2017) and lastly the measurement of non-financial performance adapted from Omran et al. (2021) and Ahmad and Jamil (2020). Due to the inaccessibility of the financial records of SMEs in Ethiopia, these non-financial, measurement scale are significantly important. It comprises various indicators such as market share product quality employee commitment and product development capability.

4.6 Data Analysis Techniques

For analysis of data, the study used SPSS (V. 27) for descriptive analysis and SmartPLS 3.0 inferential analysis. The Partial Least Squares Structural Equation Modelling (PLS-SEM) is suitable for this study as it effectively analyses the complex model with latent variables, moderate sample size and non-normal data (Hair et al., 2021).

5. Findings

5.1 Descriptive Statistics

Among the distributed questionnaires, 331 valid responses have been collected from owners and managers of SMEs in Addis Ababa. The result of a response rate was remarkable and 95.7 % was collected. The analysis of the data shows that most of

the respondents identified as male, comprising (68 %) of the sample and the largest portion (47.7 %) age group was between 30-39. Regarding education, a majority held at least a bachelor's degree (42.6 %) and half of them were firm owners (47.4 %). Most of the firms (57.7 %) have been in operation more than 3 years. When we look the size of the firm (80.4%) of them were classified as small enterprise, indicating a strong presence of small-scale business within the sector. Concerning their internationalization engagement (24.5 %) of these enterprises were actively involved in export marketing while (44.1 %) reported working in import activities.

Table 1. Demographic Characteristics of Respondents

Variable	Category	Frequency (n = 331)	Percent (%)
Gender	Male	225	68.0
	Female	106	32.0
Age Group	21–29	35	10.6
	30–39	158	47.7
	40–49	105	31.7
	50+	32	9.7
Education	Bachelor's Degree	141	42.6
	Diploma	59	17.8
	Master's	52	15.7
	Secondary & below	78	23.9
Position	Owner	157	47.4
	General Manager	94	28.4
	Others	80	24.2
Experience (Years)	1–2	21	6.3
	3–6	171	51.7
	7+	139	42.0
SME Size	Small	266	80.4
	Medium	65	19.6
Export Engagement	Yes	81	24.5
	No	250	75.5
Import Engagement	Yes	146	44.1
	No	183	55.3

Source: Field survey (2025)

5.2 Common Method Bias Assessment Using Harman's Single-Factor Test

To confirm the robustness of the study, common method bias (CMB) test was conducted. Using principal axis factoring the Harman's single-factor test was performed in SPSS version 27. The result of the test confirmed that the initial factor accounted for only 46.47 % of the total variance. This is also below the critical threshold of 50 % (Podsakoff et al., 2003). It was also identified that the multiple factors with eigenvalues greater than 1.0. This result indicates that the data are not primarily influenced by a single factor. Hence, it is confirmed that CBM is not a significant issue for this study (Appendix Table A1).

5.3 Partial Least Squares Structural Equation Modelling (PLS-SEM)

The conceptual framework of the study validated empirically with robust analytical method of PLS-SEM. It allows to examine the interrelationship between export knowledge, import knowledge, technological innovation and firm performance. It is very suitable to test simultaneously both measurement and structural model. The analysis was performed in two main stages:

- Measurement Model Evaluation: It was conducted at the initial of data analyzing. It assessed the reliability and validity of the constructs.

- Structural Model Assessment: It was conducted on the second stage. The main purpose of the analysis was to investigate the hypothesized relationship among the constructs.

This analysis shows how these knowledge-based resources, such as export and import knowledge influence the technological innovation and firm performance among manufacturing SMEs in Addis Ababa. This methodological approach was supported in the innovation and internationalization study (Donbesuur et al., 2020).

5.4 Measurement Model

This model has conducted several assessments. First, in order to ensure that each item consistently measured the proposed constructs, the reliability of the indicators was analysed. Then Cronbach's Alpha and Composite Reliability was analyzed to test the internal consistency reliability. This analysis is very essential to confirm that the items in each group were aligned. Next, the Average Variance Extracted (AVE) was calculated to evaluate the convergent validity. This result proofs whether the indicators were collectively representing the same concept or not. Finally, the analysis was made in the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio to examine the discriminant validity. In this analysis, it was ensured that each construct was distinct from others. Overall, in these analyses the robustness and validity of the measurement model were ensured.

Table 2. Measurement Model Results

	Items	Outer Loading	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
EXPORT KNOWLEDGE	4	0.889 - 0.913	0.922	0.923	0.945	0.811
IMPORT KNOWLEDGE	3	0.944 - 0.954	0.944	0.944	0.964	0.899
PERFORMANCE	14	0.797 - 0.895	0.967	0.968	0.971	0.703
TECHNOLOGICAL INNOVATION	10	0.792 - 0.869	0.943	0.945	0.952	0.663

Source: Author'scomputation,2025

The outer loading of all indicators was above 0.70 tells that each item highly contributes to its latent constructs (Hair et al., 2021). The composite reliability (CR) and Cronbach's alpha value of all constructs were above the recommended threshold of 0.70. The actual result of the analysis ranged from 0.922 to 0.971, which showed excellent internal consistency. The rho_A values also ranged 0.923 to 0.968, which validated the reliability of the constructs in relation to its indicators. The analysis result of Average Variance Extracted (AVE) values was ranged from 0.663 to 0.899 that was above the minimum criteria of 0.50 (Fornell & Larcker, 1981). This result showed that the constructs had robust convergent validity. This indicates each indicator explains more than half of the variance in the associated latent constructs. Specifically, the two constructs import knowledge (AVE = 0.899) and Export Knowledge (AVE = 0.811), demonstrated the highest level of convergence. It means, SMEs understood the international marketing dynamics and foreign sourcing strategies. The remaining two constructs, technological innovation (AVE = 0.663) and performance (AVE = 0.703) also effectively met the required criteria. Overall, the result of the analysis confirmed that the measurement model is reliable and displays strong convergent validity. Hence, all the constructs are internally consistent and correctly represent their theoretical dimension. These also allow us to move forward to analyze the structural model confidently.

5.5 Discriminant Validity

The study evaluated the discriminant's validity to confirm that the latent constructs in the model are conceptually distinct. Each construct accounts for more variance in its indicators than it shares with other constructs. In accordance with the criteria set by Fornell and Larcker (1981), the study compared the

square root of the AVE for each construct to the correlations between constructs. The results of this assessment are shown in Table 3.

Table 3. Discriminant Validity – Fornell–Larcker Criterion

	EXPORT KNOWLEDGE	IMPORT KNOWLEDGE	PERFORMANCE	TECHNOLOGICAL INNOVATION
EXPORT KNOWLEDGE	**0.900**			
IMPORT KNOWLEDGE	0.601	**0.948**		
PERFORMANCE	0.466	0.455	**0.839**	
TECHNOLOGICAL INNOVATION	0.397	0.353	0.574	**0.814**

Source: Author'scomputation,2025

In this table the diagonal element, clearly shown in bold font, represents the square root of AVE. Whereas the off-diagonal elements of the result show the correlations among the constructs. As proof in the analysis, the square root of each construct of AVE exceeds the corresponding inter-construct correlations. This is also satisfying the Fornell–Larcker criterion for discriminant validity (Fornell & Larcker, 1981). For instance, the square root of the AVE for Export Knowledge (0.900) is greater than its correlations with Import Knowledge (0.601), Performance (0.466), and Technological Innovation (0.397). Similarly, the square root of the AVE for Import Knowledge (0.948), Performance (0.839), and Technological Innovation (0.814) also shows higher diagonal values compared to their correlations with other constructs. In general, these analyses resulted in solid evidence that all the constructs, such as export knowledge, import knowledge, technological innovation, and firm performance, are distinct and measure separate conceptual areas. Thus, we can confirm that this strong discriminant validity supports the appropriateness of the measurement model. This also reassures that subsequent structural model analyses will yield reliable findings.

5.6 Discriminant Validity – HTMT Criterion

According to the standard set by Henseler et al. (2015), the HTMT was analyzed to confirm the discriminant validity. This analysis is considered more rigorous and reliable when it compared with the traditional technique. For the conceptually distinct constructs, the HTMT value should be below 0.85 to be satisfactory discriminant value. However, for conceptually related constructs, the value should be below 0.90 to be acceptable. The HTMT analysis is shown in table 4.

Table 4. Discriminant Validity – HTMT Criterion

	EXPORT KNOWLEDGE	IMPORT KNOWLEDGE	PERFORMANCE	TECHNOLOGICAL INNOVATION
EXPORT KNOWLEDGE				
IMPORT KNOWLEDGE	**0.645**			
PERFORMANCE	**0.493**	**0.475**		
TECHNOLOGICAL INNOVATION	**0.424**	**0.372**	**0.596**	

Source: Author'scomputation,2025

The above table shows that all HTMT values range from 0.372 to 0.645, indicating all the values are significantly below the threshold of 0.85. This means the analysis has no problem with discriminate validity among the study constructs. It is consistent with the Fornell-Larcker criterion that the four constructs, export knowledge, import knowledge, technological innovation and performance are distinct and measuring different conceptual domain. Therefore,

the analyses results of Fornell–Larcker and HTMT criteria showed strong discriminant validity. It supported the adequacy of the measurement model and confirmed the readiness of the data for the next analysis of the structural model.

5.7 Structural Model Assessment

The following structural model analyses tested the hypothesized relationships (H1–H7). The bootstrapping procedure with 5,000 resamples was used to conduct the assessment. Under this process the path coefficients (β values), t-statistics, and p-values had been examined. Using the coefficient of determination (R^2) the explanatory power of the endogenous constructs was analyzed. In order to determine the substantive significance of the model and the predictive capacity, the effect size (f^2) and predictive relevance (Q^2) were analyzed. The VIF value were also calculated to ensure the multicollinearity was not an issue.

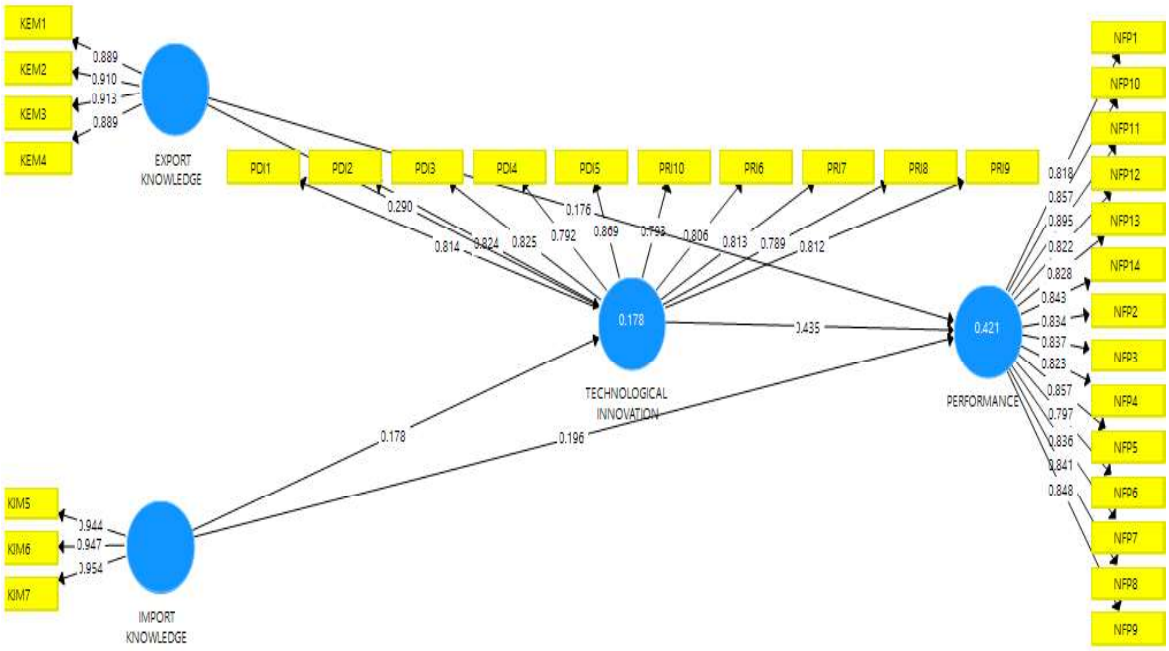

Figure 2. Structural model analyses outcome

5.8 Path Coefficients and Hypothesis Testing

The finding of this analysis supports the hypotheses. All the relationship depicted in the conceptual framework were found to be positive and statistically significant ($p < 0.05$). Specifically, Export Knowledge had a significant positive effect on both Technological Innovation ($\beta = 0.290$, $t = 5.033$, $p < 0.001$) and Performance ($\beta = 0.176$, $t = 3.043$, $p < 0.01$). This analytical result suggests that SMEs working with strong export market knowledge are more likely to achieve technological innovations. This achievement also improves their performance. This finding is consistent with prior research the confirmed export learning as the fundamental source of innovation and competitive advantage (Love & Roper, 2015).

Table 5. Path Coefficients and Hypothesis Testing Results

Hypothesis	Path	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values	Decision
H1	**EXPORT KNOWLEDGE -> TECHNOLOGICAL INNOVATION**	**0.290**	**0.295**	**0.058**	**5.033**	**0.000**	**Supported**
H2	**IMPORT KNOWLEDGE -> TECHNOLOGICAL INNOVATION**	**0.178**	**0.176**	**0.060**	**2.972**	**0.003**	**Supported**
H3	**TECHNOLOGICAL INNOVATION -> PERFORMANCE**	**0.435**	**0.439**	**0.046**	**9.515**	**0.000**	**Supported**
H4	**EXPORT KNOWLEDGE -> PERFORMANCE**	**0.176**	**0.178**	**0.058**	**3.043**	**0.002**	**Supported**
H5	**IMPORT KNOWLEDGE -> PERFORMANCE**	**0.196**	**0.194**	**0.059**	**3.327**	**0.001**	**Supported**

Source: Author'scomputation,2025

In a similar manner, import knowledge exhibited a substantial influence on technological innovation ($\beta = 0.178$, $t = 2.972$, $p < 0.01$) and performance ($\beta = 0.196$, $t = 3.327$, $p < 0.01$). This advises that importing activities has an extreme benefit for the SMEs. It increases their efficiency and competitiveness. This learning-by-importing perspective enhance innovation and growth in performance (Békés & Harasztosi, 2020; Ahn et al., 2016). The analysis result of the relationship between technological innovation and performance was found to be predominantly strong ($\beta = 0.435$, $t = 9.515$, $p < 0.001$). This states that technological innovation is a key driver of firm success and improve firm performance. In general, this study shows that an extensive export and import knowledge enhances firm performance through technological innovation. Therefore, all hypothesized relationships (H1–H5) was validated by statistically significant positive coefficients. The analysis is confirming that the knowledge acquired from internationalization serve as a strategic advantage for innovation and competitiveness among Ethiopian manufacturing SMEs.

5.9 The Result of the Mediation Analysis

The focus of this study was to determine how technological innovation mediates the relationship between export knowledge, import knowledge, and firm performance among Ethiopian manufacturing SMEs. To analyze this mediation effect, the boot strapping procedure with 5,000 subsamples was used. This statistical soft wear, PLS-SEM, is suitable for providing reliable estimates of indirect effects and their significance (Hair et al., 2021). The result of the mediation analysis presented in Table-6.

Table 6: The Result of the Mediation Analysis (Technological Innovation as Mediator)

Hypothesis	Indirect Path	Original Sample (O)	Sample Mean (M)	STDEV	T Statistics	P Values	Decision
H5	EXPORT KNOWLEDGE -> TECHNOLOGICAL INNOVATION -> PERFORMANCE	0.126	0.129	0.032	3.966	0.000	Supported
H6	IMPORT KNOWLEDGE -> TECHNOLOGICAL INNOVATION -> PERFORMANCE	0.078	0.078	0.031	2.527	0.012	Supported

Source: Author'scomputation,2025

The result show that technological innovation plays a mediating role in the relationship between export and import knowledge and performance. This relationship is statistically significant ($\beta = 0.126$, $t = 3.966$, $p < 0.001$). It means

export knowledge positively influences firms' performance both directly and indirectly through the mediator variable of technological innovation. Similarly, import knowledge significantly influence firm performance in indirect way (β = 0.078, t = 2.572, p = 0.012). This result confirmed that technological innovation act as a mediator for the knowledge obtained from international suppliers and network enhance performance. These are also empirically supported by prior studies (Love & Roper, 2015; Gkypali et al., 2021).

5.10 The Coefficient of Determination (R^2) and Effect Size (f^2)

In the structural model the coefficient of determination (R^2) shows how much the variance in the dependent variable is explained by the predictors (Hair et al., 2021). The R^2 values of 0.67, 0.33, and 0.19 reflect significant, moderate, and weak explanatory power, respectively (Chin, 1998). As presented in Table 7, the analysis of the model result shows 42.1% of the variance in firm performance and 17.8% of the variance in technological innovation, which indicates moderate and weak explanatory power, respectively.

Table 7. Coefficients of Determination (R^2)

	R Square	R Square Adjusted	Interpretation
PERFORMANCE	**0.421**	**0.415**	**Moderate explanatory power**
TECHNOLOGICAL INNOVATION	**0.178**	**0.173**	**Weak explanatory power**

Source: Author'scomputation,2025

The effect size (f^2) was also analyzed to know more about the influence of independent variable on dependent variable. It measures how much an independent variable influences the R^2 value of a dependent variable when included in the model. The f^2 values of 0.02, 0.15, and 0.35 represent as small, medium and large effect (Cohen, 1988).

Table 8. The Effect Size (f^2) analysis Results

	EXPORT KNOWLEDGE	IMPORT KNOWLEDGE	PERFORMANCE	TECHNOLOGICAL INNOVATION
EXPORT KNOWLEDGE			**0.032**	**0.065**
IMPORT KNOWLEDGE			**0.041**	**0.025**
PERFORMANCE TECHNOLOGICAL INNOVATION			**0.269**	

Source: Author'scomputation,2025

The relationship between export knowledge and performance ($f^2 = 0.032$) indicates a small effect size. This indicates that export knowledge makes modest but significant contribution to firm performance when considering other predictors. The effect of export knowledge on technological innovation ($f^2 = 0.065$) shows a small to moderate impact. The effect size for import knowledge on performance ($f^2 = 0.041$), which suggest that the ability to acquire and implement foreign knowledge has modest influence on performance. Similarly, when considering the effect size for the relationship between import knowledge and technological innovation ($f^2 = 0.025$) is small. This indicate that though import contributes to innovation, its impact is limited when it compared to other factors. When analyzed the impact of technological innovation on performance ($f^2 = 0.269$), it demonstrates medium to large effect. This result of analysis significantly exceeds the threshold of 0.15 for medium effect (Cohen, 1988) and the finding confirms that technological innovation is a significant contributor to performance. The variation of performance among the Ethiopian SMEs is strongly explained by technological innovation. Therefore, the overall f^2 analysis confirms that technological

innovation is the primary contributors to SMEs performance. On the other hand, the result showed that both export and import knowledge offer limited contributions, but they had statistically significant effects on both innovation and performance.

5.11 Predictive Relevance (Q^2)

The Stone–Geisser's Q^2 test was conducted through the blindfolding procedure to evaluate the predictive relevance of the model. When the value of Q^2 value greater than zero tells that the model has predictive relevance for a specific endogenous construct. According to Hair et al. (2021), the predictive relevance standard value of Q^2 0.02, 0.15, and 0.35 are represented as small, medium, and large respectively.

Table 9: Predictive Relevance (Q^2) of the Endogenous Constructs

	SSO	SSE	Q^2 (=1-SSE/SSO)
EXPORT KNOWLEDGE	1324	1324	
IMPORT KNOWLEDGE	993	993	
PERFORMANCE	4634	3298.167	0.288
TECHNOLOGICAL INNOVATION	3310	2934.221	0.114

Source: Author'scomputation,2025

The Q^2 value for endogenous variables of firm performance was 0.288. This result represented medium to large predictive relevance. This result tells that the relationship of export knowledge, import knowledge and technological innovation shows strong predictive capability in explaining the performance among Ethiopian manufacturing SMEs. The result of the Q^2 value of technological innovation was 0.114. This is also representing a modest but statistically significant predictive relevance. This result tells that though export and import knowledge contribute to the technological innovation, their impact is limited. In general, the structural model shows satisfactory predictive value specifically in relation to SMEs performance.

5.12 The Robustness Test of Structural Model with control variables

In order to ensure the robustness of the structural model, the study introduced the control variables such as firm age, firm size, and industry type. This was a significant step to test the relationship between the four major constructs, export knowledge, import knowledge, technological innovation and performance and key firm-level characteristics. The analysis used the bootstrapping method with 5,000 subsamples to calculate standard errors and significance values. The firm's age was included to see if older firms tend to show higher levels of innovation or performance. The firm size was also included to see whether the large SMEs have more resources and capabilities that may enhance their innovation or performance. Additionally, industry type was included to understand the differences in innovation outcomes among the diverse types of SME sub-sectors. Table 10 presented the path coefficients and significance levels for the model with these control variables.

Table 10 Robustness check of Path Coefficients including Control Variables

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
EXPORT KNOWLEDGE -> PERFORMANCE	0.161	0.159	0.058	2.796	0.005
EXPORT KNOWLEDGE -> TECHNOLOGICAL INNOVATION	0.289	0.291	0.063	4.569	0.000
FIRM AGE -> PERFORMANCE	0.137	0.135	0.052	2.639	0.008
FIRM AGE -> TECHNOLOGICAL INNOVATION	0.010	0.011	0.050	0.199	0.843
FIRM SIZE -> PERFORMANCE	-0.048	-0.047	0.041	1.165	0.244

FIRM SIZE -> TECHNOLOGICAL INNOVATION	0.001	-0.001	0.045	0.019	0.985
IMPORT KNOWLEDGE -> PERFORMANCE	0.206	0.207	0.053	3.882	0.000
IMPORT KNOWLEDGE -> TECHNOLOGICAL INNOVATION	0.179	0.180	0.066	2.723	0.007
INDUSTRY TYPE -> PERFORMANCE	-0.085	-0.086	0.043	1.986	0.047
INDUSTRY TYPE -> TECHNOLOGICAL INNOVATION	0.013	0.014	0.047	0.286	0.775
TECHNOLOGICAL INNOVATION -> PERFORMANCE	0.435	0.440	0.047	9.340	0.000

Source: Author'scomputation,2025

As presented in Table 10, the inclusion of the control variables did not change the direction significantly or strengthen the main relationships of the constructs. This is ascertaining the reliability of the model. Among the constructs, both export knowledge (β = 0.161, p = 0.005) and import knowledge (β = 0.206, p = 0.000) remain significant predictors of firm performance. Their influence on technological innovation is also considerable (β = 0.289, p = 0.000 for export knowledge and β = 0.179, p = 0.007 for import knowledge). From the list of the control variables, firm age had a positive and significant effect on firm performance (β = 0.137, p = 0.008). This is also suggesting that older firms tend to perform better than others due to their accumulated experience and established strong network overtime. However, the analysis result showed a weak negative relationship with performance. This is also suggesting that knowledge and innovation variables are more important for the success of firms than demographics-related characteristics of the firms. Overall, the robustness test confirms that the model's key relationship is statistically valid and theoretically sound, even when considering differences in firm characteristics. This finding enhances the stability and reliability of the structural model of the study.

6. Discussion

In this study, KBV and RBV have strong empirical support from the study analysis results. The two theories suggested that sustainable competitive advantages can be achieved effectively through the accumulation and utilization of valuable, rare, and hard-to-imitate knowledge resources (Barney, 1991; Grant, 1996).

The findings of the study clearly show that both export and import knowledge significantly enhance technological innovation and firm performance among Ethiopian SMEs. This also aligns with the prior studies that confirm firms with international market exposure have access to the technologies, diverse consumer preferences, and foreign management practices that foster innovation (Adam & Alofaysan, 2023; Gkypali et al., 2021; Love & Roper, 2015). Furthermore, the study aligns with the prior studies (Golovko & Valentini, 2011; Cassiman & Golovko, 2010), which explained the dual role of export knowledge in fostering innovation. This means the export knowledge promote innovation through learning by exporting and also enhance the performance of the firm. On the other hand, the key link between import knowledge and technological innovation is also explained through the firm stronger absorption capacity. In supporting this idea Pane & Patunru, (2023) confirmed that whenever firms import machinery, materials, or technologies, the firm absorptive capacity developed and their technological capabilities improved. The robust relationship between technological innovation and performance (β = 0.435, p < 0.001) align with the Schumpeterian view of innovation. It serves as a key driver of growth and productivity (Bogetoft et al., 2024; Kumera et al., 2024).

The result of the mediation analysis shows that technological innovation is a key variable in transforming the export and import knowledge of firms in to good performance. This outcome is consistent with the prior studies that confirmed innovation is vital in transforming knowledge in to competitive advantage (Kumera et al., 2024; Ferreira et al., 2021).

Lastly this robustness test with the control variables shows the stability of the structural relationship. The impact of knowledge and innovation is not affected by firm's demographic characteristics. Neither firm size nor industry type had no a significant influence on innovation. However, firm age showed a moderately positive relationship with performance. This means the older firms can benefited from their long year of experience and established network.

7. Conclusion and Recommendations

7.1 Conclusion

This study concludes the fundamental strategic intangible assets of international knowledge; export and import activities enhance SMEs innovation and performance capabilities. From the analyses result, it is well understood that technological innovation is the strongest constructs in enhancing performance. This suggests that technological innovation is a key construct in converting the firms' international experience in to sustainable competitive advantage. These local SMEs that effectively engaged in international marketing activities have an opportunity to access valuable external knowledge. As they are working in scarce resources environment, it helps to reduce the challenges in their domestic innovation system.

7.2 Managerial and Policy Recommendations

The study has suggested several important managerial and policy implication. First, the SME managers should work effectively to involve in export and import activities. These activities should be viewed as strategic opportunities to acquire valuable marketing and technological knowledge. SMEs can get access to advanced knowledge and international experience by creating good relationship with foreign distributors, buyers, and suppliers (Adam & Alofaysan, 2023; Audretsch & Guenther, 2023). Second, innovation is the core elements of SMEs strategy. In order to transform external knowledge in to new product and process, SMEs should focus on the investment of innovation training, knowledge management system and collaborative R&D initiative. They are also expected to build strong absorptive capacity in the firm to maintain their competitive advantage (Mata et al., 2023).

From policy perspective, the policy maker should create an environment for capacity building and provide financial incentive to encourage SMEs to participate in international market and technological acquisition. In addition to these, they should build an innovation hub, technological transfer center and export promotion institution to support SMEs. These supports enhance the benefit that gained from the international learning networks and foster innovation-based growth (Woźniak et al., 2023). Finally, the collaboration between universities, research centers and SMEs should be strengthen to improve applied innovation and knowledge exchange.

7.3 Limitations and Future Research Directions

This study gives valuable knowledge regarding the influence of export and import knowledge on technological innovation and performance among Ethiopian manufacturing SMEs. Accordingly, it is essential to acknowledge the limitation of this study to open an opportunity for future studies. First, the research design of the study was cross sectional, that limits the ability to process causal relationship between export knowledge, import knowledge, technological innovation and firm performance. To know more about the dynamics of these constructs, future studies should utilize longitudinal or panel data. Second, this study analyzed the data collected from the manufacturing SMEs located in Addis Ababa, Ethiopia. This situation limits the generalizability of the findings. Hence, future studies should expand the scope to include other sectors of SMEs such as services, agribusiness and firms working in the regions and rural areas. This is extremely helpful to understand broadly in the area of the study. Third, innovation has several dimensions but this study focuses only on technological innovation as key mediating variable. Therefore, future studies could explore other forms of innovation such as non-technological innovation, business model innovation and social innovation. Furthermore, future studies may entertain the moderating variables such as absorptive capacity, digital transformation and managerial capabilities. Finally, this study conducted the CMB test and confirmed that the data was free from significant bias. However, the potential social desirability bias and perceptual inflation should not be ignored. There are possibilities that the respondents may have inflated their responses regarding their firm innovation activities and performance outcome. The validity of future research can be improved by incorporating self-reported data with objective performance metrics or secondary sources. This triangulation of methods will enhance the study's robustness and generalizability.

Author Contributions

M.T, as the sole author of this article, conceptualized the study, designed the research framework, collected and analysed the data, interpreted the results, and drafted and revised the manuscript.

Declaration

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Conflicts of Interest

The author declares no conflict of interest.

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Appendix

Table A1- Common Method Bias Test- Herman Single Factor Test

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Factor	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	22.826	47.553	47.553	22.306	46.471	46.471
2	4.520	9.417	56.970			
3	3.108	6.474	63.444			
4	2.513	5.236	68.680			
5	1.732	3.608	72.289			
6	1.471	3.064	75.352			
7	1.132	2.358	77.710			
8	1.048	2.183	79.893			
9	.841	1.752	81.644			
10	.767	1.598	83.242			
11	.580	1.209	84.451			
12	.490	1.022	85.473			
13	.465	.968	86.440			
14	.428	.892	87.333			
15	.388	.809	88.142			
16	.360	.750	88.892			
17	.350	.729	89.621			
18	.327	.681	90.302			
19	.302	.630	90.932			
20	.291	.606	91.537			
21	.282	.588	92.125			
22	.258	.537	92.662			
23	.249	.518	93.180			
24	.229	.477	93.657			
25	.219	.455	94.113			
26	.211	.440	94.553			
27	.201	.419	94.972			
28	.187	.391	95.362			
29	.178	.370	95.733			
30	.173	.360	96.093			
31	.163	.339	96.432			
32	.153	.319	96.751			
33	.147	.307	97.058			
34	.140	.291	97.349			
35	.129	.269	97.618			
36	.122	.254	97.872			
37	.114	.239	98.111			
38	.107	.222	98.333			
39	.106	.221	98.553			
40	.102	.212	98.765			
41	.094	.196	98.961			
42	.092	.191	99.152			
43	.084	.176	99.328			
44	.080	.166	99.494			
45	.071	.148	99.642			
46	.063	.132	99.774			
47	.059	.122	99.896			
48	.050	.104	100.000			

Extraction Method: Principal Axis Factoring.