*International Journal of Business and Society, Vol. 25 No. 1, 2024, 388-406.*

# INNOVATION BARRIER TO SMES DEVELOPMENT: EVIDENCE FROM AFGHANISTAN

**Aimal Mirza and Siti 'Aisyah Baharudin*[1]**
*School of Social Sciences, Universiti Sains Malaysia, Malaysia*

## ABSTRACT

Innovation plays a vital role not only in large firms but also in small and medium-sized enterprises (SME) worldwide. In Afghanistan, SMEs are emerging to influence the economies by employing, contributing to exports and forming a major portion of export and tax revenues. This study aims to examine the innovation barriers to development at the SME level to offer policy implications in Afghanistan. The Two-Hierarchical Level Model (HLM) was used. A questionnaire was designed using the thematic areas of business innovation literature and adapted following Oslo's manual's recommendations. Collected in 2020 the cross-sectional data was examined through an empirical analysis by testing five research hypotheses to validate the research framework. The target population was the SME key persons in Kabul city. Results show that firm characteristics are innovation barriers, SMEs that did not innovate were smaller in terms of employees and assets, lack of finance was a reason for abandoning innovative projects, and there are hierarchical barriers that humper innovation at the organizational, value chain and market level. There is a real need to continue studying the development of the innovation barriers for SME sectors that may enrich the world communities.

***Keywords*:** Innovation barriers, SMEs, Large firms, Policy implication

*Submission: 4th October 2022*
*Accepted: 31st January 2024*
*https://doi.org/10.33736/ijbs.6922.2024*

## 1. INTRODUCTION

It is not a secret that innovation is the driving force for the enterprise competitiveness, performance, and economic growth that plays a vital role not only in large firms but also in small and medium-sized enterprises since it contributes to the micro-level productivity gains, macro-level economic growth, and development by applying new knowledge in the marketplace. Maital and Seshadri (2012) affirm that enterprises are commonly associated as the primary source of innovation that creates better life conditions by generating incomes and producing useful products and services. According to Blind *et al*. (2017) and Buse *et al*. (2019), innovation is significant to firm-level productivity and growth which means the expansion in terms of employment and profitability by creating sources of jobs and increasing the appropriate potential in the form of highly qualified human resources and financial resources that can lead to the creation of more efficient technologies. Skibiskia and Sipaa (2015) emphasize that innovation should not be analyzed as a

*Corresponding author email: Senior Lecturer, School of Social Sciences, Universiti Sains Malaysia, 04-6533346, sab16@usm.my

single event but rather as a process occurring in time that takes place in the company; it is a continuous interaction of science, technique and production where knowledge, learning, technologies and products work for hand by hand according to the enterprise potential.

It is particularly important to define the source of innovation that will determine the capacities to be successful in the market and that can establish a strong correspondence between the high economic levels and the high innovation capabilities. In, 2020 over 68 percent of the world's Gross Domestic Product (GDP) belongs to the top 20 innovative countries. The significance of organizational policy and practices on a firm's capacity to innovate since in this way stagnant or low innovation performance can be prevented. Another important issue is the employees´ capability by improving their skills through training and getting updated knowledge about the trends to achieve success. On the other hand, Afghanistan´s economy partially depends on its private sector which generates sources of jobs, pays taxes and maintains the economy. In this regard, Rasoli and Mirza (2019) affirm that large firms or big corporations are also a crucial part of the Afghan private sector, but the number of them is few in each economy.

According to the National Statistics and Information Authority (2019), the corporate sector's contribution to Afghanistan's GDP was less than 12%, primarily impacting small and medium enterprises (SMEs). SMEs greatly influence the economies by employing, contributing to exports and forming a major portion of export and tax revenues. For years, Afghanistan's SMEs have confronted significant issues that have partially reduced economic nation growth. In 2014, the World Bank conducted a survey on SME activity to understand challenges faced by small and medium-sized businesses in manufacturing and services. Key obstacles identified included limited access to finance, skilled workforce shortages, corruption, regulatory barriers, infrastructure gaps, and lack of focus on innovation and technology. Despite some efforts by international donors like United States of America International Development (USAID), such as the Afghanistan Small and Medium Enterprise Development (ASMED) project, SME development was not a priority in national strategies due to other pressing concerns like governance reform and exports. While a SME Directorate was established in the Ministry of Commerce and Industry in 2018, tangible progress remains elusive.

There hasn't been a clear and effective strategy for SME innovation in Afghanistan, neither on the micro nor macro-economic level, yielding satisfactory results. Over the years, the government has implemented various economic initiatives aimed at improving the nation's economy, including the establishment of the Afghanistan Central Business Registry and Intellectual Property in 2008, with the goal of infrastructure development and policy formulation for industrialization. Additionally, the Business Innovation Centre under the Afghanistan Investment Support Agency (AISA) was set up in 2013 to foster business innovation. The American University of Afghanistan also established the Business Innovation Hub, focusing on women's economic empowerment. Despite these efforts and various startup activities in the private sector since 2015, there's uncertainty regarding their impact on SME innovation in Afghanistan. In a 2014 survey of SMEs conducted by the World Bank in Afghanistan, it was found that the majority of these businesses had not introduced any new innovations since their establishment. This marked a significant absence of innovation in the country. Despite the efforts of the Afghan government to promote economic development through a series of agreements, there is still no direct approach to addressing these issues at the policy level.

Furthermore, a thorough review of existing literature highlights a lack of context-specific and methodologically sound research on this topic. Clearly, there is still much work to be done.
The goal of this paper is to provide policy and research implications that can effectively address these issues. Specifically, this study aims to examine the barriers to innovation that SMEs in Afghanistan face. By achieving this objective, the paper offers important policy implications that enhance managerial knowledge about the concept and importance of innovation and the factors that influence it. In addition, the study furthers aims to stimulate academic debates about innovation and open venues for future research. By doing so, it is hoped that policymakers and researchers alike can work together to promote a culture of innovation in Afghanistan and other developing countries that could lead development of SMEs.

## 2. LITERATURE REVIEW

Oslo manual (2018) defines innovation as a new or significantly improved product, process, marketing approach, supply chain management, and support activities. Fagerberg *et al*., (2004) pointed out that innovation has been widely considered in the business and management literature mainly as an essential strategy required for the concrete organization to achieve the enterprise objectives and goals; thus, it can be applied to different contexts and it can also have different connotations. Over the years, several researchers have approached the barriers to innovation as developing issue of SMEs.

A large number of researchers attempted to approach their efforts to the study of innovation by emphasizing the importance of exploring and understanding the potential barriers that may not allow the formulation of innovation strategies and the development of innovation activities in SMEs. Such barriers are an indispensable part for the construction of innovation capabilities that may contribute to settling down the enterprise base and forward guaranteeing its success in the marketplace.

Gu *et al*. (2016) investigated the effect of internal and external sources on innovation in high-tech SMEs from a resource-based perspective; Ruiz-Jimenez and Fuentes-Fuentes (2013) explored the effects of product and process innovation on both the relationships between knowledge combination capability and organizational performance; Ren *et al*. (2015) investigated the effects of search scope along the supply chain on the innovation performance of SMEs in emerging markets.

Arshi *et al*. (2021) developed measures for innovation effectiveness impacting organizational performance outcomes. They found that the synergistic effect of multiple innovation characteristics, such as innovation degree, cost, frequency and speed determine its endogenous effectiveness. Thet further determined the effect of barriers felt by SMEs during the innovation process. The barriers studied were related to markets and institutions, financial, employee behavior, organization, knowledge and cooperation. The result of study shows that barriers related to employee behavior and organization, as well as knowledge and cooperation had a positive and significant relationship to open innovation in depth.

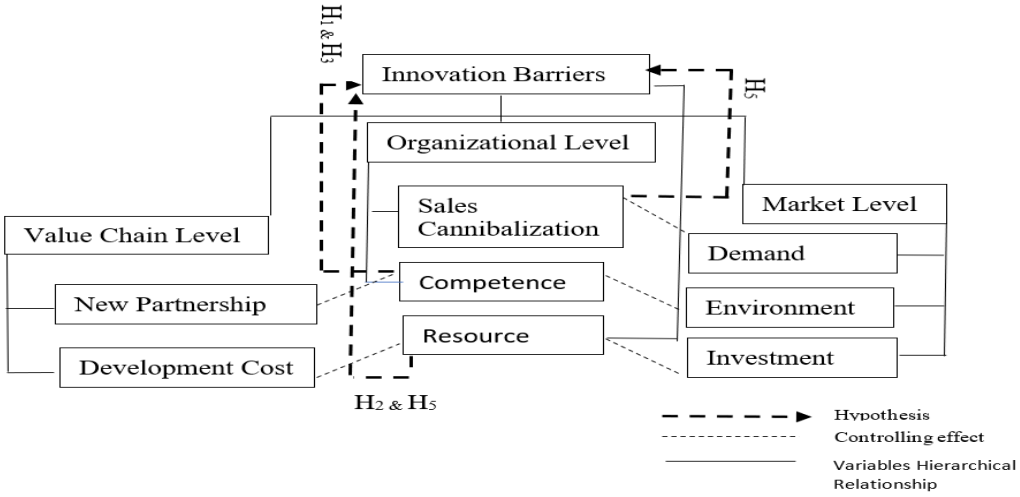
Adegbite and Govender (2022) (op. cit.) investigated the importance and impact of management barriers to innovation within production and manufacturing plants in Nigeria. Results indicate that all five management barriers investigated (i.e., management support, low motivation, resistance to change, risk avoidance behavior, and financial resource) inhibit innovation performance in the sampled organizations. SMEs hold an important role in national economies because of their number and engaged workforce. In this regard, Carayannis et al. (2006) mentioned that SMEs are characterized by their ability to react quickly to changing market conditions as a competitive advantage as well as the growing participation in terms of employability and development of output. Nevertheless, SMEs suffer from a lack of technology adoption despite their greater tendency for applying technological innovation processes to product innovation. Like other countries, in Afghanistan, SMEs play a crucial for the country´s economy however, there is no information on innovation in SMEs in Afghanistan.

For this study, innovation is seen as a progressive and continuous process that deals with internal and external factors such as the so-called innovation barriers which refer to obstacles and constraints that SMEs confront while implementing the product, process, and organizational innovation. According to the Oslo Manual (*op. cit.*), innovation barriers prevent an enterprise from engaging in innovation activities; these are internal and external and they may take place at different levels. External barriers include market (Guldmann & Huulgaard, 2020; Hartono & Kusumawardhani, 2019; Sitek, 2019) which means that an enterprise has no or less control over them. A highly significant barrier is access to finance obtained from financial institutions and lack of venture capital fund (Mirza & Sabah, 2018). Market key innovation barriers are environment and demand. Environmental innovation barriers are difficulties entering a new market, competing with large firms, business location, and lack of public infrastructure.

## 3. METHODOLOGY

We combined finding of the studies above to formulate a research framework. The framework portrays what are hierarchical relationship between factors effecting innovation. This study is supported by the Hierarchical Level Model (HLM) on two levels. Also known as multilevel, the model is used to analyse and understand complex and multilevel relationship between variables that have multiple levels or layers of organization. Meanwhile in such an organization, variables at lower level are nested in upper level and together have a shared effect.

**Figure 1**: Variables hierarchical relationship and their shared effect on innovation




Based on the research framework, the current study suggests that a multilevel relationship exists between variables. For instance, at market level, investment, demand, and environment are factors that adversely influence innovation at organizational level. Similarly, variables such as development cost and inability to new partnerships negatively affect innovation at the same level. Moreover, finally, resource, competency, and sales cannibalization, and organizational resources are barriers at the organizational. Table 1 shows variables in each level.

**Table 1:** Levels of innovation barriers and their associated variables

| Level | Hierarchy | Variables |
|---|---|---|
| Organization | Level 2 | Competency, Sales Cannibalization, and Resources |
| Value chain | Level 1a | Development Cost and New Partnership |
| Market | Level 1b | Environment, Demand, and Investment |

***Source**: Author compilation*

The study proposes following hypothesis to examine the impact of external barriers on SMEs innovation;

**Hypothesis 1**: After controlling for the environment, competency is a significant innovation barrier.

**Hypothesis 2:** After controlling for demand, sales cannibalization is a significant innovation barrier.

Internal barriers are related to organizational and value chain *(*Guldmann & Huulgaard, 2020; Sitek, 2019) which are divided as follows:

a) Organizational barriers include resource, creative competency and cannibalization. Resource refers to the unavailability of physical and technological infrastructure, lack of quality human capital, and technological orientation. Cannibalization refers to an unwillingness to introduce a new product or service due to the lucrativeness of the existing ones. Competency elaborates how enterprise is capable of handling organizational changes, dealing with incomplete and missing information as well as allocation of right talent for sound human resource management.

b) Value chain deficiency involves the creation of unsound value chain activities that may include development costs and new partnership. As the name suggests, development cost means that introducing a new product, process, and innovation is too expensive and unaffordable to the organization. New partnership suggests that the enterprise cannot enter into partnerships with other institutions to implement innovation projects. The later may disallow unlearn/relearn process. To examine the effect of internal barriers on SMEs innovation Study proposes following hypothesis:

**Hypothesis 3:** After controlling for investment, the resource is a significant innovation barrier.
**Hypothesis 4:** After controlling for high development cost, the resource is a significant innovation barrier.
**Hypothesis 5:** After controlling for new partnerships, competency is a significant innovation barrier.

### *3.1 Data Collection*

In existing study, a questionnaire was designed using the thematic areas of business innovation literature (Table 2) and adapted following Oslo's manual's recommendations. The initial step in the validation of the questionnaire involved conducting interviews with a randomly selected group of individuals who held the final decision-making authority in Small and Medium Enterprises (referred to hereafter as SMEs' key person). Out of the twelve SMEs chosen for interviews, six of them did not introduce any innovations (i.e., they did not develop new products) between 2018 and 2020, and were consequently categorized as non-innovative SMEs. Conversely, the other six SMEs introduced new products during the same time frame and were thus classified as innovative SMEs. The insights obtained from interviews were subsequently used to compare various characteristics, such as age, workforce size, and asset value, between innovative and non-innovative SMEs. After adapting the questionnaire based on the interview findings, the next step in the validation process was to distribute it to a randomly selected sample of 70 SMEs located in Kabul, using the SME directory provided by the Afghanistan Ministry of Commerce. To arrive at the final and enhanced version of the questionnaire, we employed factor analysis to identify the underlying factors. The target population for this study comprised the key decision-makers of 420 SMEs located within Kabul city. The rationale behind choosing this particular sector was its substantial contribution to Afghanistan's GDP. On scale of 1-5 we used questions/statements to measure each variable given 1 high disagreement and 5 high agreement. Table 2 shows the measuring process for innovation variables. The questionnaire generates cross-sectional data. The construction of cross-sectional data used for multiple periods will allow future research to examine firm-level innovation changes over different periods.

**Table 2:** Measurement process of innovation variables

| Level | Variable | Measurement Scope | Measuring question/statement | Source |
|---|---|---|---|---|
| | Innovation Barriers | Innovation activities | 1. Unsuccessful innovation<br>2. Abandoned innovation before completion<br>3. Suspended innovation before completion<br>4. Partially successful innovation but abandoned | Oslo Manual (2018) |
| Market | Demand | Barrier | 1. Uncertainty is high<br>2. Risk aversion exists<br>3. Economic turbulence is high<br>4. Disruptive innovation exists | Blind et al (2017); Jiang and Wang (2016) |
| | Environment | Barrier | 1. Tough competition<br>2. The location is not favorable<br>3. Culture is not favorable<br>4. Unsupportive client | |
| | Investment | Barrier | 1. Availability of sound financial system to support innovation<br>2. security market, financial institutions<br>3. venture capital fund<br>4. Company is at startup stage | |
| Organizational | Resource | Barrier | 1. Lack of infrastructure<br>2. Lack of qualified employees<br>3. Lack of orientation to new technology<br>4. Radical innovation | Guldman and Huulgaar(2020); Hartono and Kusumawardhani (2019) |
| | Cannibalization | Barrier | 1. Unwillingness for product diversification | |
| | Competency | Barrier | 1. Ability to change<br>2. Dealing with missing information | |
| Value Chain | New partnership | Barrier | 1. Mistrust and unwillingness to a new partnership or joint ventures | Maital and Seshadri (2012); Ruiz-Jimenez and Fuentes-Fuentes (2013) |
| Value Chain | Development Cost | Barrier | 1. Costliness of innovation | |

### *3.2 Data analysis*

The data is analyzed using the statistical methods properly from the Hierarchical Level Model on two levels. To help better comprehension, the study conceptualizes the lower levels, i.e., market and value chain as a unit, and higher level, i.e., organizational. This approach made the model a two-level hierarchical model, also called within-unit. A generic model representation will be as below:

$$Y_{ij} = \alpha_j + \beta_{hj} X_{ij} + r_{ij} \qquad (1)$$

Where:

- $Y_{ij}$= dependent variable measured for *i*th level one unit nested within the *j*th level two group,
- $X_{ij}$= value on the level one predictor(s) where i=1…n and j=1…n
- $\alpha_j$= intercept for the *j*th level two-unit,
- $\beta_{hj}$= regression coefficient associated with for the *j*th level two unit where h=1…n, and
- $r_{ij}$= random error associated with the *i*th level one unit nested within the *j*th level two unit.
- In the current study:
- $Y_{ij}$= Barrier to innovation measured by ith level one unit (i.e., market and institutional level as well as value chain) nested within level two (i.e., organizational level)
- $X_{ij}$= values on the level one predictor (e.g., regulatory, development, cost, etc.)
- $\alpha_j$= intercept, e.g., innovation performance that has not been affected by innovation barriers
- $\beta_{hj}$= degree of change in innovation as a result of a change in an innovation barrier

In the level two model, the author uses the regression coefficient (i.e., $\beta_{0j}$ $and$ $\beta_{hj}$ ) of level one as outcome variables and are linked with level two predictors. Since this approach describes variability across multiple groups, it is referred to as the unit model (Gill, 2003). The authors have a single level two (organizational) regressor, which is used by the equations (2) and (3):

$$\beta_{0j} = \gamma_{00} + \gamma_{01} G_j + U_{0j} \qquad (2)$$

Where:

- $\beta_{0j}$= intercept for the *j*th level two.
- $\gamma_{00}$= overall mean intercept adjusted for G.
- $\gamma_{01}$= overall mean intercept adjusted for G.
- $G_j$= value on the level one regressors
- $U_{0j}$= random effects of the *j*th level two unit adjusted for G on the intercept.

Whereas in this study, the above parameters hypothetically mean:

- $\beta_{0j}$= intercept for the *j*th organization-level innovation barrier.
- $\gamma_{00}$= overall mean intercept adjusted, e.g., new partnership.
- $\gamma_{01}$= Coefficient in conjunction with the e.g. new partnership relative to level one intercept.
- $G_j$= resource at the organizational i.e. level one, for instance
- $U_{0j}$= random effects of the *j*th organization level unit adjusted for e.g. new partnership on the intercept.

$$\beta_{1j} = \gamma_{10} + \gamma_{11}G_j + U_{1j} \qquad (3)$$

Where:

- $\beta_{1j}$= slope for the *j*th level two.
- $\gamma_{10}$= regression coefficient associated with G relative to level-1 intercept.
- $\gamma_{11}$= coefficient in conjunction with G associated with level two slope.
- $G_j$ = value on the level two regressors
- $U_{1j}$= random effects of the *j*th level two unit adjusted for G on the slope.

For this study the above parameters means:

- $\beta_{1j}$= slope for the *j*th organizational level innovation barrier.
- $\gamma_{10}$= regression coefficient associated with level two variable e.g. new partnership relative to organizational level i.e. level one intercept.
- $\gamma_{11}$= Coefficient in conjunction with e.g. new partnership related to e.g. competency.
- $U_{1j}$= random effects of the *j*th organization level unit adjusted for new partnership on the slope.

A combination of models (2) and (3) will yield the following equation (4) as follow.

$$Y_{ij}=\gamma_{00} + \gamma_{10}X_{ij} + \gamma_{01}G_j + \gamma_{11}X_{ij}G_j + U_{1j}X_{ij} + U_{0j}+r_{ij} \qquad (4)$$

Hofmann (1997) affirms that a two-level hierarchical model contains three parameters in its properties. The first property deals with the fixed effect of independent variables meaning that they will not vary across the group. OLS examines the fixed impact in a model through $\gamma_{00}$, $\gamma_{01}$, $\gamma_{11}$and $\gamma_{10}$. The second type of parameter is the random level one coefficients ( $\beta_{0j}$ and $\beta_{1j}$) that will be to varying across groups (e.g., value chain level or market and institutional level). Besides, econometricians also suggest that if there is a significant correlation between intercept and regressors, regressors' effect is fixed and otherwise random. The third parameter deals with the variance-covariance component. Discussion on the third variance will be more meaningful once we have the data analyzed.

The study formulated 5 research hypotheses to validate the proposed research framework. Given two-level hierarchy model study utilized the equation (4) as bellow to substantiate for instance the hypothesis i.e. after controlling for new partnerships, competency is a significant innovation barrier:

$$Innovation\ Barrier = \gamma_{00} + \gamma_{10}New\ Partnership_{ij} + \gamma_{01}Competency_j + \gamma_{11}\big(Competency_j\big)\big(New\ Partnership_{ij}\big) + U_{1j}New\ Partnership_{ij} + U_{0j} + r_{ij} \qquad (5)$$

## 4. RESULTS AND DISCUSSION

Research suggests firm characteristics can also hinder innovation. Furthermore, SMEs confront innovation barriers at organizational, market, and value chain levels. Findings reveals (Table 3) that the SMEs which did not innovate were smaller in terms of employees and assets. The number of employees in the said SMEs ranged between 5-30. This number ranged between 40-112 in innovative SMEs. Similarly, these SMEs' asset sizes were smaller than innovative SMEs. For instance, the value of equipment and machinery these none-innovative companies employed ranges between USD 18-100K. However, the amongst the interviewed innovative SMEs the value of the said asset valued USD 270k on average. Likewise, the age of non-innovative SMEs was relatively younger. The oldest interviewed SME was nine years (i.e., 2012 was the year of establishment), and the youngest interviewed SME was six years (i.e., 2016 was the year of establishment).

**Table 3:** Characteristics of none-innovative SMEs

| # | Activities | Number of SMEs | Number of Employees | Size of Asset (USD thousands) |
|---|---|---|---|---|
| 1 | Garment and Clothes design | 65 | 5-10 | 18-50 |
| 2 | Metal works and me utensil's producers | 60 | 10-15 | 20 -65 |
| 3 | Fresh & Dry fruit Processing | 53 | 25-30 | 40-100 |
| 4 | Box and Carton production | 51 | 15-20 | 20-55 |
| 5 | Paper Product recycling | 48 | 20-25 | 18-100 |
| 6 | Food and Meat processing | 32 | 15-20 | 18-60 |
| 7 | Packaging production other than box and carton | 27 | 20-25 | 18-30 |
| 8 | Meuble and carpentry | 25 | 25-30 | 18-30 |
| 9 | Filtered water distributers | 19 | 5-10 | 18-20 |
| 10 | Shampoo, Soap and other detergent production | 11 | 15-20 | 40-80 |
| 11 | Pharmaceutical (chemical & herbal) | 10 | 15-20 | 75-100 |
| 12 | Milk derivatives producers | 9 | 15-20 | 35-80 |
| 13 | Solar panel / Energy provider | 5 | 25-30 | 30-60 |
| 14 | Battery producers | 3 | 25-30 | 25-60 |
| 15 | Toy producers | 2 | 5-10 | 18-20 |

Subthemes suggest that organizational level innovation barriers include firm infrastructure, equipment, technology, qualified employees, product lucrativeness, and market knowledge. First, SMEs could not develop a new product due to insufficient infrastructure and setup. Second, SMEs' attitude and lack of information toward technology somewhat remained another innovation barrier. For instance, non-innovative SMEs' over-engagement with existing technology and equipment caused time constraints, and they could not research the availability of updated technology. Furthermore, they did not invest in new technology since its establishment. In addition, they preferred manual work over automatic production. Third, quality of employment was found to be another innovation barrier. Non-innovative SMEs lack technical and qualified employees. Their workers were mainly illiterate, and they did not receive training to develop their working capacity.

Fourth, non-innovative SMEs perceive there is still demand for the existing product due to price competitiveness. They were not engaged in market research and stuck to their existing projects and contracts. Finally, the lucrativeness of existing products disabled non-innovative SMEs from considering new product development.

Subthemes related to market and regulatory level innovation barriers are comprised of finance and investment, demand, and competition. Non-innovative SMEs found it challenging to secure investment for product development, acquisition of machinery, equipment, and other development projects. Lack of finance was a reason for abandoning innovative projects. They were unclear about market demand for a new product and were unwilling to take the risk. In addition, they perceived household income was too limited to demand a new product at a higher cost, and there were limited substitutes for their product. Therefore, demand for their existing product was unsaturated. Environmental factors such as tough competition and corruption demotivated new product development.

Lack of sound public infrastructure and physical capital-constrained distribution and supply chain and thus new product development. Non-innovative SMEs found tax administration, lack of government support for innovation activities, and absence of patent and copyrights obstacles to new product development. Value chain level innovation barriers included unwillingness/inability to explore information, knowledge generation and assimilation, lack of sound human resource management, unwillingness to learn, unlearn and relearn, high value to existing philosophies and beliefs, and unwillingness to establish new partnerships. For instance, non-innovative SMEs never attempted to discover information based on which processes could improve. Similarly, none of them had research and development activities. Human resource management was very traditional. Non-innovative SMEs were highly attached to their beliefs and philosophy and were not ready to compromise how SMEs were managed. And finally, non-innovative SMEs did not trust new partners. Fundamental qualitative analysis of interviews, including themes and subthemes, are shown in Table 4.

**Table 4:** Summary of themes and subthemes of innovation barriers

| **Problem** | **Themes extracts** | **Subtheme's extracts/excerpts** |
|---|---|---|
| Innovation barriers | Firm characteristics as innovation barriers | Younger Age & Smaller Size |
| | Organization-level innovation barriers | Lucrativeness of the existing product, difficulty in acquisition of new machinery & equipment, quality of Employees, poor infrastructure, obsolete technology |
| | Market and regulatory level innovation barriers | Difficulty in finance and investment, unclarity of demand, corruption in tax administration, and absence of copyright protection. |
| | Value chain level innovation barriers | Lack of information, knowledge acquisition and assimilation, poor human resource management, absence of productive partnership due to trust element, inability to compromise philosophies and beliefs. |

### *4.1 Factor Analysis- dimension reduction*

In factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of Sphericity are two commonly used tests to assess whether a dataset is suitable for conducting factor analysis. Furthermore, the KMO measure of sampling adequacy tests the degree to which variables are related to each other and determines whether the correlation matrix is suitable for factor analysis. The KMO value ranges from 0 to 1, and a value of .5 or higher is generally considered acceptable. In the existing study, the KMO measure is .788, which indicates that the correlation matrix is suitable for factor analysis. The Bartlett's test of Sphericity tests the null hypothesis that the correlation matrix is an identity matrix, indicating that the variables are uncorrelated. A significant result indicates that the variables are not independent, and therefore suitable for factor analysis. The test statistic for Bartlett's test is an approximate chi-square distribution, with degrees of freedom (df) equal to the number of variables. In our case, the test statistic is 712.299 with 20 degrees of freedom and a significance level of .001, indicating that the null hypothesis can be rejected and that the correlation matrix is suitable for factor analysis. Therefore, the correlation matrix is suitable for factor analysis, and we can proceed with conducting the factor analysis on the constructed dataset. According to the total variance explained in Table 5, the factors measured by component carrying eigenvalue from 1.24 to 9.99. Extraction of sums of squared loading represents the same values, however, rotation of sums of squared loading results in a value of 1.52 to 5.68, yet significant.

**Table 5:** Principle Component Analysis

| Component | Initial Eigenvalues | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|
| | Total | % of variance | Cumulative % | Total | % of variance | Cumulative % |
| 1 | 9.99 | 26.29 | 26.29 | 5.68 | 14.98 | 14.98 |
| 2 | 3.17 | 8.34 | 34.64 | 4.28 | 11.28 | 26.22 |
| 3 | 2.30 | 6.06 | 40.70 | 2.88 | 7.59 | 33.81 |
| 4 | 2.11 | 5.57 | 46.27 | 2.19 | 5.77 | 39.59 |
| 5 | 1.72 | 4.53 | 50.81 | 2.13 | 5.61 | 45.20 |
| 6 | 1.44 | 3.80 | 54.61 | 2.12 | 50.85 | 50.79 |
| 7 | 1.43 | 3.77 | 58.39 | 2.13 | 50.56 | 56.35 |
| 8 | 1.24 | 3.26 | 61.65 | 1.52 | 3.97 | 60.32 |

Indicators representing innovation barriers and underlying factors were at different levels. Based on rotated component matrix see appendix) these indicators grouped in 8 components as discussed earlier. The first component is environment at market level which includes barriers such as unfavorable culture with the highest extraction value, (i.e., .699) followed by business location with extraction value of .698, difficulty to enter new market (extraction value =.677), difficulty to compete large firm (extraction value = .640) and unavailability of cooperative client (extraction value = 599). Furthermore, at the same level investment remained the second component. Investment includes barriers such absence of security market (extraction value =.774), strict

banking for finance /credit (extraction value = .761), lack of venture capital and public fund (extraction value = .712) and company at start-up stage (extraction value =.653).

Demand was the third component and includes barriers like the uncertainty of demand for a new product (extraction value =.779) and lack of demand for a new product (extraction value =.775), are strong barriers to innovation at the market level.
At the value chain level, factors such as enterprise's inability to enter a joint venture to produce a new product (extraction value = .694), unwillingness to enter a joint venture due to mistrust (extraction value = .660) are essential barriers grouped as a new partnership as fourth component and finally, high cost of new product development (extraction value=.620) remained fifth component.

Rest of the Components were the organizational level such resource, competency, and sales cannibalization. The resource includes indicators such as management's inability to acquire new and necessary information (extraction value =.741), lack of skilled and qualified employees (extraction value=.708), and lack of management orientation to technology (extraction value=.559). On the other hand, competency includes management comfort in working with incomplete or missing information (extraction value=.909) and if the enterprise has implemented any organizational change since its establishment (extraction value=.811). Finally, sales cannibalization was an enterprise's unwillingness to develop a new product due to the lucrativeness of the existing product (extraction value=.684).

### *4.2 Organizational and Market Level Barriers*

The concept of the study suggests that there are hierarchical barriers on innovation at the organizational level. For instance, the mentioned factors pertain to market and value chain levels. In the following table the value of Wald Chi (2) represents the chi-square statistic for the overall model. It suggests that there is a significant relationship between the predictors and the independent variable. The log likelihood is a measure of how well the model fits the data. The value of 136.85 indicates a higher log likelihood indicates a better fit. The value of Prob> Chi is less than critical value of 5% and represents the p-value associated with the chi-square statistic. In this case, the p-value is very low (less than 0.001), indicating strong evidence against the null hypothesis (i.e. there no significant relationship between predicating variable).

Random effect parameter provides estimates for the random effects in the model. It includes the organizational level and market level. The estimates are given for the standard deviation (sd) of the random effects. The LR test vs. linear regression presents the likelihood ratio test comparing the current model to a linear regression model. The chi-square statistic (chi2) and the associated p-value (Prob > chi2) are provided. In this case, the p-value is 0.0304, suggesting that the current model significantly outperform a linear regression model. Finally, residual shows a standard deviation at individual variables. Variance-covariance matrix using the said values estimates a positive correlation between the dependent variable, i.e., inability to innovate, and the dependent variables in both levels.

**Table 6:** Innovation Barriers Hierarchical Linear Relationship at Organization and Market Level

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Wald Chi (2) = 1472.13 | | |
| Log Likelihood =136.85 | | | | Prob>chi .00 | | |
| Inability to Innovate | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | . Interval] |
| Resource | .002 | .017 | .16 | .871 | .031 | .037 |
| Competency | .010 | .013 | .81 | .421 | .036 | .015 |
| Sales Cannibalization | .002 | .011 | .024 | .807 | .024 | .019 |
| Environment | 1.198 | .031 | 38.1 | .00 | 1.136 | 1.26 |
| Investment | .005 | .012 | .43 | .665 | .019 | .030 |
| Demand | .009 | .012 | .72 | .472 | .015 | .034 |
| Cons | .305 | .078 | -3.90 | .000 | .458 | .151 |
| Random effect parameter | | Estimate | | Std. Err. | [95 % Conf. | . Interval] |
| Organizational Level: Identity | | | | | | |
| | sd (_cons) | 4.50e-11 | | - | - | - |
| Market Level: Identity | | | | | | |
| | sd (_cons) | .072 | | .022 | .039 | .130 |
| | sd (Residual) | .099 | | .015 | .073 | .135 |

***Notes:*** *LR test vs. linear regression: chi2(2) = 2.38 Prob > chi2 = 0.0304*

By comparing the log-likelihood, the model tests whether the fixed and random effects are significantly different. The value of Prob> Chi < .05 shows significant difference between models**.** Based on the analysis output, inability to innovate is a function of variables such as resource, competency, and sales cannibalization at the organizational level and a function of environment, investment, and demand at the market level. As described in the methodology, the econometric presentation of such a relationship is:

*Innovation barrier =-.305+1.198Environment+.005Investment+.009 Demand+.002 Resource +.01Competency+.002Salescannibalization+.002(Environment)(Resource)+.0001(Investment)( Resource)+.00018(Demand)(Resource)+ .01(Environment)(Competency )+.0005(Investment)(Competency )+.0009(Demand)(Competency ).002(Environment)(Sales Cannibalization)+.00001(Investment)(Sales Cannibalization )+.000018(Demand)(Sales Cannibalization)+.022*$\alpha_i$*+.015*$\beta_{i,j}$ (6)

The first part, which shows the coefficients of variables, shows the fixed effect, and the second part denoted by α and β that shows the errors and random effect. To validate the model, study proposed 5 hypotheses out of which 3 were tested in the model above. The first hypothesis, i.e., after controlling for the environment, competency is a significant innovation barrier, is rejected. The rejection is because the 95% confidence (1.136 interval is greater than the critical value, i.e., .05). On the other hand, the second hypothesis stating that after controlling for demand, sales cannibalization is a significant innovation barrier is accepted because the 95% confidence interval value (.015) is smaller than the critical value. To validate the model the third hypothesis proposed that after controlling for investment, the resource is a significant innovation barrier is accepted as the 95% confidence interval value (.019) is smaller than the critical value.

### *4.3 Organizational and Value Chain Level*

Similar to the market level, lack of value chain level activity shows to be a significant barrier to innovation at the organizational level (Table 7).

**Table 7:** Innovation Barriers Hierarchical Linear Relationship at Organization and Value Chain Level

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | | Wald Chi2=4.71 | | |
| Log Likelihood =-77.012 | | | | Prob>chi .045 | | |
| Inability to Innovate | Coef. | Std. Err. | z | P>\|z\| | [95% Conf. | . Interval] |
| Resource | .038 | .057 | .68 | .499 | 150 | .073 |
| Competency | .016 | .038 | .42 | .672 | .091 | .058 |
| Sales Cannibalization | .030 | .034 | .88 | .380 | .052 | .096 |
| New Partnership | .018 | .039 | .48 | .631 | .048 | .096 |
| Development Cost | .068 | .037 | 1.84 | .066 | .004 | .041 |
| Cons | 1.874 | .143 | 13.02 | .00 | 1.592 | 2.156 |
| Random effect parameter | | Estimate | Std. Err. | | [95 % Conf. | . Interval] |
| Organizational Level: Identity | | | | | | |
| | sd(_cons) | .039 | .066 | | .001 | 1.078 |
| Value C. Level: Identity | | | | | | |
| | sd(_cons) | .073 | .098 | | .005 | 1.006 |
| | sd(Residual) | .346 | .026 | | .298 | .401 |

***Notes:*** *LR test vs. linear regression: chi2(2) = 0.32 Prob > chi2 = 0.8531*

The value of "Prob" shows the difference in the two models>chi .045, i.e., it is more diminutive than .05. based on the analysis outlined in the table above, a barrier to innovation at the organizational level is a function of resource, competency , and sales cannibalization at the organizational level and development cost and new partnership at value chain level. The model can be presented econometrically as below:

*Innovation barrier =1.874+.038 Resource +.016Competency +.03Sales cannibalization+.018New Partnership +.068 Development Cost+.0007(New Partnership) (Resource)+.0003(New Partnership) (Competency)+ .0005(New Partnership) (Sales Cannibalization) + .0025(Development Cost) (Resource)+ .002(Development Cost) (Competency)+ .002(Development Cost) (Sales Cannibalization) + I.098*$\alpha_i$*+.026*$\beta_{i,j}$

(7)

The above model allowed test of 2 remaining hypothesis. For instance, the fourth hypothesis stated that after controlling for high development costs, resource was a significant innovation barrier. The hypothesis is accepted because the 95% confidence interval, i.e., .004, is lower than the critical value. Finally, the last hypothesis was that after controlling for new partnerships, competency is a significant innovation barrier. The said hypothesis is accepted because the 95% confidence interval (i.e., .048) is lower than the critical value of .05.

### *4.4 Discussion of the Results*

The analysis of the tested hypotheses reveals interesting insights into the significance of various barriers to innovation. The first hypothesis, which proposed that competency is a significant innovation barrier after controlling for the environment, was rejected. This finding suggests that competency, when considered alongside the environment, does not have a substantial influence on inhibiting innovation. This outcome challenges previous literature (Szambelan et al., 2019; Kolade et al., 2019; Fonseca et al., 2019) which often emphasizes the role of competency as a barrier to innovation. Conversely, the second hypothesis, which posited that sales cannibalization is a significant innovation barrier after controlling for demand, was accepted. This finding aligns with prior research (Guldmann & Huulgaard, 2020; Buccieiri et al., 2020) that highlights sales cannibalization as a potential barrier to innovation in highly competitive markets. The third hypothesis, which suggested that resource availability is a significant innovation barrier after controlling for investment, was also accepted and signifies that organizations face challenges in innovating due to limited resources, even when investment levels are considered. This result supports the existing literature (Fonseca et al., 2019; Sitek, 2019) emphasizing the crucial role of resource constraints as barriers to innovation. According to Rasoli and Mirza (2019) in Afghanistan, SMEs face a series of challenges and access to finance is one of them. The fourth hypothesis, which explored the influence of resource availability as an innovation barrier after controlling for high development costs, was accepted. indicating that resource scarcity remains a significant barrier to innovation, particularly in the presence of high development costs. This finding corroborates prior studies (Guldmann & Huulgaard, 2020; Fonseca et al., 2019) that underscore the negative impact of limited resources on innovation performance. Finally, the fifth hypothesis, which examined the significance of competency as an innovation barrier after controlling for new partnerships, was accepted. The presence of competency as barrier to innovation fills a literature gap particularly its significant relationship with new partnerships.

## 5. CONCLUSION

This paper examines the innovation barriers at the SME level in Afghanistan. The study becomes exploratory since first-hand information on innovation barriers factors were discovered. In general, the results show the relationship between innovation barriers for the SME sector. By examining the hierarchical relationship between innovation barriers and their shared effect on innovativeness in Afghanistan SMEs context, this research contributes to the literature of business and management sciences and innovation theory.

A summary of findings suggests that firstly firm characteristics related to size and age are innovation barriers. Secondly, SMEs that did not innovate were smaller in terms of employees and assets that may affect the quality of products or customer services. Thirdly human resource management was very traditional, and employees were more concerned about the enterprise's owner and the critical person creating strong relationships that create favorable working conditions. Non-innovative SMEs lacked technical and qualified employees. Their workers were mostly illiterate, and they did not receive training to develop working capacity. Fourthly, the lack of finance was a reason for abandoning innovative projects. Fifthly, the concept of the study discovers a hierarchical barrier that humper innovation at the organizational level showed high cost of product development and new partnerships at the value chain level can significantly influence the resource and competency to be an innovation factor in the organization process. Similarly, investment and demand at the market level have the same influence over the resource and competency becoming themselves innovation barriers.

The findings of this study have significant implications for managers and policymakers aiming to promote innovation within small and medium-sized enterprises (SMEs). Firstly, it is crucial to address the innovation barriers associated with firm characteristics such as size and age. Policies should focus on providing support and resources to overcome infrastructure limitations, particularly for SMEs, as they often face challenges in developing new products. Additionally, efforts should be made to enhance human resource management practices in non-innovative firms. This involves promoting a culture of innovation, emphasizing the importance of innovation to employees, and involving them in the innovation processes.

Secondly, attention should be given to improving the quality of employment in non-innovative SMEs. Providing training and upskilling opportunities to employees can enhance their technical capabilities and knowledge, enabling them to contribute more effectively to innovative activities. Moreover, policies should address the financing challenges faced by SMEs. Access to finance is a significant obstacle for innovative projects, and bridging the gap between financing opportunities and SMEs' needs should be a priority. Exploring mechanisms to support new product development costs through financing options can facilitate innovation in SMEs.

Furthermore, policymakers should consider the hierarchical barriers that hinder innovation at the organizational level. Encouraging partnerships and collaborations along the value chain can provide SMEs with access to resources and competencies required for innovation. Additionally, efforts should be made to promote the adoption of updated technology and equipment, as non-innovative SMEs often face time constraints and rely on outdated manual processes.

In terms of future research opportunities, an important area to explore is the gap between the demand and availability of financing options for SMEs. Investigating the specific financial challenges faced by SMEs in different regions and sectors can provide insights into designing targeted policies and support mechanisms. Additionally, research can focus on understanding the dynamics of market demand and identifying opportunities for new product development in non-innovative SMEs. Exploring strategies to encourage SMEs to conduct market research, collaborate

with partners, and adopt innovative practices can contribute to their long-term sustainability and growth.

Overall, these policy implications and future research opportunities highlight the need for comprehensive support measures targeting firm characteristics, human resource management, financing, value chain partnerships, market demand, and innovation culture. By addressing these areas, policymakers and researchers can foster a conducive environment for innovation within SMEs, leading to economic growth and competitiveness.

## REFERENCES

Afghanistan Central Business Registry & Intellectual Property (2012). Retrieved from https://www.wipo.int/edocs/mdocs/aspac/ en/WIPO

Afghanistan-Enterprise Survey. (2013). Retrieved from https://microdata.worldbank.org/index.php/catalog/1964

Adegbite, W.M., & Govender, C.M. (2022). Management barriers to innovation performance in Nigerian manufacturing sector *African Journal of Science, Technology, Innovation and Development, 14*(7),1959-

Arshi, T.A., Rao, V., Viswanath, S., & Begum, V. (2021). Measuring innovation effectiveness: a SEM-based cross-lagged analysis. *International Journal of Innovation Science*. 13(4),437-455.

Blind, K., Petersen, S. S., & Riillo, C. A. (2017). The impact of standards and regulation on innovation in uncertain markets. *Research Policy, 46*(1), 249-264.

Buccieri, D., Javalgi, R.G., & Cavusgil, E. (2020). International new venture performance: Role of international entrepreneurial culture, ambidextrous innovation, and dynamic marketing capabilities. *International Business Review, 29*(2), 101639.

Buse, S., Tiwari, R., and Herstatt, C. (2019). Global Innovation: An Answer to Mitigate Barriers to Innovation in Small and Medium-Sized Enterprises? *Managing Innovation: Internationalization of Innovation*, *34*, 241.

Carayannis, E. G., Popescu, D., Sipp, C., and Stewart, M. (2006). Technological learning for entrepreneurial development (TL4ED) in the knowledge economy (KE): Case studies and lessons learned. *Technovation*, *26*(4), 419-443.

Fagerberg, J. (2004). Innovation: A guide to the Literature, in Fagerberg, J., Mowery, D., and Nelson, R (eds.) The Oxford Handbook of Innovation, Oxford University Press, Oxford, 2004, p 1-26.

Fonseca, T., de Faria, P., & Lima, F. (2019). Human capital and innovation: the importance of the optimal organizational task structure. *Research Policy, 48*(3), 616-627.

Ghauri, P., Grønhaug, K., & Strange, R. (2020). *Research methods in business studies*. Cambridge University Press.

Gill, J. (2003). Hierarchical linear models. In Kimberly Kempf-Leonard (Ed.), *Encyclopedia of social measurement.* New York: Academic Press.

Gu, Q., Jiang, W., & Wang, G. G. (2016). Effects of external and internal sources on innovation performance in Chinese high-tech SMEs: A resource-based perspective. *Journal of Engineering and Technology Management, 40*, 76-86.

Guldmann, E., & Huulgaard, R. D. (2020). Barriers to circular business model innovation: A multiple-case study. *Journal of Cleaner Production, 243*(1), 1-13.

Hofmann, D. A. (1997). An overview of the logic and rationale of hierarchical linear models. *Journal of management*, *23(6)*, 723-744.

Hartono, A., & Kusumawardhani, R. (2019). Innovation Barriers and Their Impact on Innovation: Evidence from Indonesian Manufacturing Firms. *Global Business Review, 20*(5), 1196-1213.

Kabul, A. (2008). AISA opens a first-ever business innovation center in Kabul - Afghanistan Times. Retrieved from http://www.afghanistantimes.af/aisa-opens-first-ever-business-innovation-center-in-kabul/

Kolade, O., Obembe, D., & Salia, S. (2019). Technological constraints to firm performance: The moderating effects of firm linkages and cooperation. *Journal of Small Business and Enterprise Development, 26*(1), 85-104.

Maital, S., & Seshadri, D. V. R. (2012). *Innovation management: strategies, concepts and tools for growth and profit*. SAGE Publications India.

Mirza, A., & Sabah, F. (2018). Role of Venture Capital as a Source of Finance for Small and Medium Enterprises in Afghanistan. Available at SSRN 3280251.OECD Publishing. (2018). *Oslo Manual 2018: Guidelines for collecting, reporting and using data on innovation*. Organization for Economic Co-operation and Development OECD.

Rasoli, A. & Mirza, A. (2019). Financing Small and Medium Enterprises in Afghanistan. *Kardan Journal of Economics and Management Sciences, 2*(4) 97–111

Ren, S., He, K., Girshick, R., & Sun, J. (2015). Faster R-CNN: Towards real-time object detection with region proposal networks. Advances in neural information processing system, 28.

Maria Ruiz-Jimenez, J., & del Mar Fuentes-Fuentes, M. (2013). Knowledge combination, innovation, organizational performance in technology firms. *Industrial management & Data Systems, 113(4),523-540.*

Sitek, M. (2019). Barriers of innovation activity as risk factors on the real estate market. *IBIMA Business Review*, 2019, 1-12

Skibiskia, A., & Sipaa, M. (2015). Sources of Innovation of Small Businesses: Polish Perspective. *Procedia Economics and Finance*, 27, 429 – 437

Szambelan, S., Jiang, Y., & Mauer, R. (2020). Breaking through innovation barriers: Linking effectuation orientation to innovation performance. *European Management Journal, 38(3),425-434.*

The economy of Statistics. (2020). Retrieved from https://nsia.gov.af/services