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A Structural Model Of Production Financing Barriers In Small And Medium-Sized Enterprises

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Abstract

Purpose: This study aimed to investigate the barriers hindering production financing in small and medium-sized enterprises (SMEs) and develop a structural model to illustrate the interconnections among these barriers.
Design/methodology/approach: An exploratory sequential mixed methods design was employed. In the qualitative phase, key dimensions and indicators were identified through 15 expert interviews using thematic analysis. In the quantitative phase, a questionnaire based on the qualitative findings was developed and administered to 60 managers and specialists from companies located in industrial parks. Structural equation modeling (SEM) using PLS software was utilized for data analysis.
Findings: The final financing barrier model comprised 66 indicators across ten dimensions. The most critical barriers identified were legal and political factors, credit evaluation and risk perception, and alternative financing options. The study found that addressing multiple barriers, focusing on changes in the legal and institutional framework, creating new approaches to risk and credit analysis, introducing new forms of financing, and developing technological and financial infrastructure could contribute to improving SMEs' access to necessary financial resources.
Originality/value: This study contributes to the literature by developing a comprehensive structural model of production financing barriers for SMEs in the manufacturing sector. The findings provide valuable insights for policymakers, financial institutions, and SMEs to improve access to financial resources and enhance the growth and sustainability of small and medium-sized enterprises. The structural model developed in this study offers a novel perspective on the interrelationships between various financing barriers, enabling more targeted and effective interventions.

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1. Introduction

Small and Medium-Sized Enterprises (SMEs) play a crucial role in the global economy, serving as key drivers of economic growth, innovation, and employment. These enterprises are typically defined as businesses with fewer than 250 employees, although specific definitions may vary by country and organization (Alkhoraif et al., 2019). SMEs contribute significantly to national economies, accounting for more than 90% of businesses in most developed and developing nations, and contributing approximately 50% of the total GDP and 60% of employment (Ramos Cordeiro et al., 2024).

The importance of SMEs in the economy can be attributed to several factors. Firstly, they are major employers, creating diverse job opportunities across various economic sectors. Secondly, SMEs are often at the forefront of innovation in products, processes, and business models, thanks to their flexibility and adaptability in addressing market needs (Wahyuni et al., 2023). The large number of SMEs in the market intensifies competition and broadens the range of goods and services available, benefiting consumers and enhancing the overall quality of the economy. Furthermore, SMEs frequently serve as suppliers, subcontractors, and business partners to larger firms, supporting their value systems. Finally, SMEs are often locally based, contributing to regional employment generation, income creation, and overall economic growth (Endris and Kassegn, 2022). Given these critical functions, the development of SMEs is a key objective for economic policymakers in various countries. However, one of the primary challenges faced by these enterprises is the lack of adequate funding, which is considered their most significant concern. Access to sufficient financial resources is a critical success factor for the development, diversification, and long-term success of SMEs (Godke Veiga and McCahery, 2019).

Financial resources are vital to SMEs from several perspectives. They require capital to create new products and services, expand into new markets, and introduce innovative ideas. Adequate funding allows them to overcome financing barriers, finance growth opportunities, increase production capacity, expand infrastructure, and hire additional personnel to meet growing demand (Durst and Gerstlberger, 2020). Moreover, to maintain competitive advantage and foster innovation, SMEs must engage in research and development activities, which necessitate adequate capital. The ability to maintain sufficient cash flow to meet current expenses such as wages, rent, and other overheads is crucial for SMEs' survival, which can be facilitated by access to financial resources (Serrasqueiro et al., 2021). Additionally, SMEs face various risks, including market, operational, and financial risks. Access to adequate financial resources can help them manage and mitigate these risks (Khan, 2024).

SMEs can access financing through various sources, each with its unique features, strengths, and weaknesses. The most commonly used sources include short-term, medium-term, and long-term bank loans, which are utilized for working capital, fixed capital, and operational expansion. SMEs can also leverage trade credits, including supplier credits, advance payments, and accounts receivable, to enhance their cash flow (Esubalew and Raghurama, 2023). Other forms of financing include joint ventures and venture capital, where outside investors acquire shares in an SME in exchange for capital, sometimes with management rights. Larger SMEs may also access financing through Initial Public Offerings (IPOs) or bond issuances in capital markets (Durst and Gerstlberger, 2020).

Online crowdfunding has emerged as a suitable option for small-scale projects and new ideas. Additionally, many governments have established special programs and funds to provide financial assistance to SMEs. The selection of the most appropriate financing source for each SME depends on factors such as the growth stage, size, industry sector, risk profile, and strategies. It is also possible for SMEs to utilize a combination of these sources to meet their financial needs (Ma and Cheok, 2022).

Despite the critical importance of financing for the development and performance of SMEs, these enterprises often encounter various barriers and difficulties in obtaining funds. These barriers can be attributed to several factors. For instance, many SMEs lack adequate financial reporting systems and proper accounting policies, which hinders the ability of financial institutions to evaluate credit risk and repayment capacity, thus reducing their borrowing capacity and access to financial capital (Mardikaningsih et al., 2022). Furthermore, SMEs often lack sufficient tangible fixed assets and security to guarantee loans, which increases the credit risk for financial institutions and may reduce the availability of funds for SMEs.

In some countries, strict laws and regulations can impede SMEs' access to loans and other sources of finance. Moreover, legal and regulatory constraints on financial institutions can decrease their motivation to provide SMEs with funds (Ortiz-Martínez et al., 2023). Financial institutions often have limited access to SMEs' financial and operational information. This information asymmetry can lead to perceived risk and act as a barrier to financing. Additionally, most SMEs have a short investment and return on capital timeframe, which can deny them access to sustainable long-term funding sources (Bartolacci et al., 2020). Political, economic, and military risks in some countries can increase uncertainty in the business environment, further hindering SMEs' access to finance. These barriers can limit SMEs' ability to obtain adequate financial capital for growth, innovation, and success. Therefore, it is crucial to better understand these barriers and develop ways to address them to promote the growth of SMEs (Rao et al., 2023).

Numerous studies worldwide have examined the barriers to SME financing. For example, Liñares-Zegarra and Wilson (2024) focused on financial capital for social entrepreneurship in Britain, with a particular emphasis on women and ethnic minorities. Their findings indicated that social enterprises are less likely to seek bank overdrafts than traditional SMEs but more likely to seek government support. They also found that although women-led social enterprises seek credit from banks more frequently, they receive less support than male-led enterprises.

Oyewole et al. (2024) conducted a review study on enhancing the global competitiveness of U.S. small and medium-sized enterprises through sustainable financing. They highlighted the increasing relevance of sustainability concerns in finance and the changes in the range of sustainable financial products available for SMEs. Their paper discussed the advantages of sustainability in SME financing, such as improved risk management, enhanced access to funds, and positive environmental and social impacts. They also outlined the challenges and impediments, including low awareness, restricted access to professionals, and perceived expenses.

Martinez-Cillero et al. (2023) examined the relationship between Irish SMEs' investment and their economic characteristics, along with financial constraints following the 2008 crisis. Using survey data for Irish SMEs between 2016 and 2018 and a stochastic frontier model, they found a link between investment and its final output. Additionally, they demonstrated the existence of financing constraints and the impact of internal and external financial resources on the efficiency of small fixed-asset investments. They also noted that greater availability of physical collateral contributed to improved investment efficiency.

Ali (2023) investigated the impact of profitability analysis on SME financing. This conceptual study reviewed relevant literature to develop hypotheses for future research on the role of cost-benefit analysis in improving company performance. The research contributes to advancing the conceptual, methodological, and theoretical justification of the effects of profitability analysis financing for SMEs.

Wattanapruttipaisan (2023) presented four proposals to improve development financing for SMEs in ASEAN member countries. These proposals included more systematic disclosure of financial and governance information, better business planning by companies, greater

reliance on credit information systems, and risk assessment of SMEs.

Sulistianingsih and Santi (2023) focused on financial literacy, risk preference, and bias in SME financing. Their findings showed that risk preference and bias are detrimental to financial decisions, and financial literacy reduces the impact of bias. Thus, this study postulates that financial institutions should enhance SMEs' financial literacy through financial education.

Rajamani et al. (2022) examined the constraints that Micro, Small, and Medium Enterprises (MSMEs) in India experience regarding financial capital acquisition. Their study revealed that company characteristics, financial resources, and company life cycle have a positive relationship with access to financial resources. In contrast, financial barriers have a negative relationship and pose a threat to SME growth and, consequently, the growth of the country's economy.

The study by Oghosanine (2022) focused on the barriers that SMEs experience in their operations to succeed. This work showed that these companies experience many problems in different fields, but the most crucial problem is the search for adequate financing. The study provides information about the financial problems of SMEs and presents techniques that various organizations can use to address investment challenges.

Sharafi et al. (2024) researched the variables influencing project financing risk. They argue that project financing has become an increasingly crucial financial market segment in recent decades. Their findings show that project financing risk is affected by various factors, including financing methods, social risks, contractor risks, construction risks, political risks, design risks, legal risks, financial risks, management risks, customer risks, and subcontracts.

Alijani and Nejad Hosseinian (2024) analyzed the connection between stock liquidity and investment efficiency in firms listed on the Tehran Stock Exchange. Their findings indicate a positive association between stock liquidity and investment efficiency in firms with higher information opaqueness and financial vulnerability in the early stages of their development.

Jamshid and Sarchami (2023) argued that managerial ability and competence are among the most significant factors influencing organizational financing. They examined management capability in investment, capital structure, cash management, and financing constraints, concluding that this factor plays a crucial role in appropriate financing.

Hedayatipour (2023) focused on identifying and ranking the most critical factors affecting startup financing in Iran. The researcher asserts that startups typically face numerous challenges during their lifecycle, including financing and marketing, which can impede their growth.

Ghafourian Shagerdi et al. (2023) investigated the impact of financing mechanisms on supply chain sustainability, considering the mediating role of supply chain efficiency in Iraqi SMEs. Their results indicated that financing mechanisms positively and significantly affect supply chain efficiency, and supply chain efficiency mediates the relationship between financial mechanisms and supply chain sustainability.

Taabe-Matoughi (2022) examined the role of venture capital firms and bank loans on SME performance. Results suggest that venture capital can improve access to bank loans, particularly short-term and unsecured loans, for these companies and has a positive relationship with their performance.

While numerous studies have been conducted on SME financing barriers internationally, there are still gaps and deficiencies in the existing literature and research in Iran that this study aims to address. Firstly, the need for a comprehensive and structural perspective considering the relationships among various barrier factors has received less attention in domestic studies. This research intends to identify and analyze the structural pattern of these barriers in Iran using statistical methods. Secondly, domestic studies have often focused on SMEs active in the service sector or other sectors, while financing barriers in Iran's manufacturing sector have been less examined. This research aims to contribute to filling this

gap by focusing on SMEs in the country's manufacturing sector. Thirdly, some domestic studies have used outdated or limited data, necessitating the collection of new and up-to-date data in Iran. Finally, the lack of domestic research on strategies and policies for overcoming SME financing barriers in Iran is another area that this research aims to address by providing practical findings.

The main research question of this study is: What is the structural pattern of financing barriers for production in small and medium-sized businesses, and what factors determine this model?

This article is structured as follows: Section 2 presents the research methodology, including the qualitative and quantitative phases of the study. Section 3 describes the results and provides a discussion of the findings. Finally, Section 4 offers conclusions, implications, and suggestions for future research.

2. Research Methodology

This study employed an exploratory sequential mixed methods design (Creswell and Plano Clark, 2018). This approach involves first collecting and analyzing qualitative data, followed by a quantitative phase that builds on the qualitative findings (Fetters et al., 2013). The research was conducted in two main phases: a qualitative study (Study 1) and a quantitative study (Study 2).

2.1 Study 1: Qualitative Phase

2.1.1 Sampling and Data Collection

In the qualitative phase, we used a combination of purposive and snowball sampling techniques to select participants (Patton, 2015). Purposive sampling allows researchers to select information-rich cases that can provide in-depth insights into the research question (Palinkas et al., 2013). Snowball sampling, on the other hand, involves asking initial participants to recommend other potential participants, which is particularly useful when studying hard-to-reach populations or specialized topics (Noy, 2008).

The expert panel for this research included managers and specialists in finance, business management, and economic development fields. The inclusion criteria were: a minimum of a master's degree, relevant knowledge and experience, and at least ten years of experience in areas related to financing barriers and SMEs. Initially, several qualified experts were identified and selected using purposive sampling. These experts were then asked to introduce other knowledgeable individuals in this field (snowball method).

Semi-structured interviews were conducted with the selected experts. The interview process continued until theoretical saturation was reached, which is the point at which no new themes or insights emerge from additional data collection (Saunders et al., 2018). Saturation was observed after the 12th interview, but three additional interviews were conducted to ensure completeness, resulting in a total of 15 interviews.

Before each interview, both the researcher and the participant signed a non-disclosure agreement regarding the information to be shared. Permission was obtained to record the interviews. The duration of each interview ranged from 60 to 90 minutes, with an average length of 75 minutes. All interviews were conducted one-on-one, recorded, transcribed verbatim, and prepared for analysis.

2.1.2 Data Analysis

The thematic analysis method, following the six-phase approach outlined by Braun and Clarke (2006, 2019), was used to analyze the interview data. This approach involves:

1. Familiarization with the data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

In the first phase, all interview transcripts were read multiple times to gain a comprehensive understanding of the data. Initial coding was then conducted, with tentative codes assigned to significant phrases and sentences. These temporary codes were discussed and refined to produce final codes. Similar codes were

grouped into sub-themes and then into main themes. Finally, the relationships between the main themes were defined, leading to the development of the initial conceptual model of the research.

2.1.3 Trustworthiness

To ensure the trustworthiness of the qualitative data analysis, several strategies were employed (Nowell et al., 2017):

1. Credibility: Member checking was used to enhance the credibility of the findings (Birt et al., 2016). After the analysis, a summary of the results was provided to the participants to ensure that the researcher had correctly interpreted their perspectives.
2. Dependability: An audit trail was maintained throughout the research process, documenting all decisions and steps taken during data collection and analysis (Cope, 2014).
3. Confirmability: Reflexivity was practiced throughout the research process, with the researcher maintaining a reflective journal to document personal biases, thoughts, and decisions (Berger, 2015).
4. Transferability: Rich, thick descriptions of the context, participants, and findings were provided to allow readers to assess the transferability of the results to other contexts (Korstjens and Moser, 2017).

Additionally, intra-coder reliability was assessed to ensure consistency in the coding process. Two interviews were randomly selected and coded twice by the researcher with a 10-day interval between coding sessions. The percentage agreement between the two coding sessions was calculated using the formula: Reliability = Number of agreements / (Total number of agreements + disagreements). A reliability coefficient of over 90% was achieved, which is considered excellent (Saldaña, 2021).

2.2 Instrumentation

Based on the themes and sub-themes identified in the qualitative phase, a questionnaire was developed for the quantitative phase of the study to assess the importance of various financing barriers. The questionnaire consisted of 71 items, each corresponding to an indicator identified in the qualitative analysis.

The content and face validity of the questionnaire were assessed through expert review (Zamanzadeh et al., 2015). A panel of seven experts in the fields of finance, business management, and survey design reviewed the questionnaire for clarity, relevance, and comprehensiveness. Their feedback was incorporated to refine the instrument.

2.3 Study 2: Quantitative Phase

2.3.1 Sampling and Data Collection

The statistical population for the quantitative phase included experienced managers and experts from companies operating in the country's industrial parks. The inclusion criteria were: at least a bachelor's degree and five years of work experience related to SME financing and its barriers. A convenience sampling method was used to select participants (Etikan et al., 2016).

The final sample consisted of 60 participants who completed the questionnaire. While this sample size is relatively small for complex structural equation modeling, it meets the minimum requirements for PLS-SEM analysis as suggested by Hair et al. (2019), who recommend a sample size of at least ten times the largest number of structural paths directed at a particular construct in the structural model. In this study, we have utilized perceived data and importance rankings as inputs for PLS-SEM modeling. This approach is justified given the perceptual nature of the variables under study in the context of SME financing barriers and the focus of PLS-SEM on predicting dependent variables (Hair et al., 2017). The flexibility of PLS-SEM in working with non-standard data allows for the use of such data types (Hair et al., 2014).

Our model is formative, as the observed variables (indicators) are considered causes of the latent variable, not its manifestations. This choice is based on the nature of relationships between barriers in the context of SME

financing (Diamantopoulos & Winklhofer, 2001). In formative models, the direction of causality is from the indicators to the construct, which aligns with our conceptualization of financing barriers being formed by various obstacles.

The use of perceived data in PLS-SEM, especially in management and social sciences, has been supported by various studies. For instance, Afthanorhan (2014) demonstrated the validity of using perceived data in PLS-SEM for analyzing complex relationships in behavioral studies. This approach allows researchers to better understand the intricate relationships among studied barriers and build models that provide more accurate and relevant predictions of their impact on SME financing.

2.3.2 Data Analysis

The quantitative data were analyzed using structural equation modeling (SEM) with the partial least squares (PLS) method, implemented in SmartPLS software (Ringle et al., 2014). PLS-SEM was chosen due to its ability to handle complex models with a relatively small sample size and its predictive orientation (Hair et al., 2019).

The analysis was conducted in two stages:

1. Assessment of the measurement model:
   - Internal consistency reliability was evaluated using Cronbach's alpha and composite reliability, with values above 0.7 considered acceptable (Hair et al., 2019).
   - Convergent validity was assessed using average variance extracted (AVE), with values above 0.5 considered acceptable (Fornell and Larcker, 1981).
   - Discriminant validity was evaluated using the Fornell-Larcker criterion and the heterotrait-monotrait (HTMT) ratio (Henseler et al., 2015).
2. Assessment of the structural model:
   - Path coefficients and their significance were examined using bootstrapping with 5000 subsamples (Hair et al., 2019).
   - The coefficient of determination (R^2) was used to assess the model's predictive power (Chin, 1998).
   - The model's predictive relevance was evaluated using the Stone-Geisser Q^2 value (Geisser, 1974).
   - The model's overall fit was assessed using the Standardized Root Mean Square Residual (SRMR) (Hu and Bentler, 1999).

All statistical tests were conducted at a 5% significance level.

This comprehensive methodology allowed for a thorough exploration of the financing barriers faced by SMEs, first through in-depth qualitative analysis and then through quantitative validation and structural modeling.

3. Results and Discussion

This section presents the findings from both the qualitative and quantitative phases of the study, followed by an integration of these findings and a discussion of their implications.

3.1 Qualitative Findings

The qualitative phase of this study aimed to identify the key barriers affecting production financing in small and medium-sized enterprises (SMEs) through in-depth interviews with experts.

3.1.1 Identified Themes and Sub-themes

Through the thematic analysis process, we identified ten main themes and 71 sub-themes related to production financing barriers in SMEs. These themes represent the key areas that experts believe hinder SMEs' ability to secure financing for production. Table 1 presents the main themes and sub-themes identified from the qualitative analysis.

3.1.2 Illustrative Quotes

To provide context and depth to our findings, we present illustrative quotes from the interviews for each main theme:

1. Financial Infrastructure and Access Issues:
   "The lack of diverse financial institutions and limited banking services in some regions can severely restrict SMEs' access to financing." (Expert 3)
2. Legal and Political Environment Challenges:
   "Constantly changing regulations and complex bureaucratic procedures often discourage SMEs from seeking formal financing." (Expert 7)
3. Information Asymmetry and Transparency Concerns:
   "Many SMEs struggle with maintaining proper financial records, which makes it difficult for financial institutions to assess their creditworthiness." (Expert 12)
4. Collateral and Asset-Based Financing Difficulties:
   "The high collateral requirements set by banks often exceed the assets available to many SMEs, limiting their ability to secure loans." (Expert 5)
5. Loan Terms and Conditions Complexities:
   "Inflexible repayment terms and high interest rates can make it challenging for SMEs to manage their cash flow while servicing their loans." (Expert 9)
6. Credit Evaluation and Risk Perception Issues:
   "Traditional credit scoring models often fail to capture the unique characteristics and potential of SMEs, leading to higher perceived risk." (Expert 1)
7. Market Dynamics and Competition Challenges:
   "In highly competitive markets, SMEs may struggle to demonstrate the profitability and growth potential necessary to secure financing." (Expert 14)
8. Technological Advancement and Digitalization Gaps:
   "The lack of digital infrastructure and financial technologies can hinder SMEs' ability to access modern financing options and manage their finances efficiently." (Expert 6)
9. Socio-Economic Factors and Regional Inequalities:
   "SMEs in economically disadvantaged regions often face greater challenges in accessing financing due to limited local resources and investment." (Expert 11)
10. Alternative Financing Mechanisms and Innovation Needs:
    "The absence of well-developed alternative financing options, such as venture capital or crowdfunding, limits the choices available to SMEs beyond traditional bank loans." (Expert 8)

3.2 Quantitative Findings

3.2.1 Instrument Development

Based on the themes and sub-themes identified in the qualitative phase, we developed a questionnaire to quantitatively assess the importance of these barriers in SME production financing. The questionnaire consisted of 71 items, each corresponding to a sub-theme identified in the qualitative analysis. Respondents were asked to rate the importance of each factor on a 5-point Likert scale, where 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, and 5 = Extremely important.

The questionnaire was administered online using the Qualtrics platform. A total of 60 experienced managers and experts from companies operating in the country's industrial parks completed the survey.

3.2.2 Descriptive Statistics

Table 2 should present the mean and standard deviation for each of the ten main themes, based on the average ratings of their respective sub-themes.

3.2.3 Factor Analysis

To validate the structure of our questionnaire and ensure that the items were measuring the intended constructs, we conducted a confirmatory factor analysis (CFA) using partial least squares structural equation

modeling (PLS-SEM) with SmartPLS software.

After conducting CFA, 5 indicators with factor loadings below 0.7 were removed from the model. These indicators were FIA3, LTC2, MDC3, SEFRI3, and SEFRI6. After removing these indicators, all remaining factor loadings were above 0.7 and significant (t-value > 1.96). Figure 1 illustrates the measurement model, showing the factor loadings for each item. Items with factor loadings below 0.7 were removed from the model, resulting in a final set of 66 items across the ten main themes.

$$GOF = \sqrt{\overline{AVE} \times \overline{R^2}} \quad (1)$$

3.2.4 Measurement Model Assessment

To evaluate the measurement model, we used reliability and validity criteria:

1. Reliability: Cronbach's Alpha (CA) and Composite Reliability (CR) for all variables were above 0.7 (Table 3), indicating acceptable reliability of the measurement tool (Hair et al., 2019).
2. Convergent Validity: The Average Variance Extracted (AVE) for all model constructs was above 0.5, indicating acceptable convergent validity (Fornell and Larcker, 1981). In all cases, CR was greater than AVE (CR > AVE), confirming convergent validity (Table 3).
3. Discriminant Validity: In the Fornell-Larcker matrix related to discriminant validity, the correlation coefficient of all variables with each other was positive and significant. Since the square root of AVE (numbers on the matrix diagonal) for all variables was greater than their correlation with other variables, the discriminant validity of research variables was also established (Table 4).

3.2.5 Structural Model Assessment

After confirming the measurement model, we proceeded to evaluate the structural model. Figure 2 illustrates the structural model in the state of the standardized coefficient.

1. Path Coefficients and Significance: All significance coefficients of factors were higher than the absolute value of 1.96, indicating that all identified dimensions have been validated (Table 5).
2. Coefficient of Determination (R^2): The R^2 value was calculated for the dependent variable (barriers to production financing in SMEs), indicating the model's predictive power.
3. Predictive Relevance (Q^2): The Stone-Geisser Q^2 value was calculated to assess the model's predictive relevance.
4. Overall Model Fit: The overall fit of the model was assessed using the Goodness of Fit (GOF) index. The GOF index is a global fit measure for PLS path modeling, calculated as the geometric mean of the average communality and the average R^2 (Tenenhaus et al., 2005). It is computed using the following formula:

According to Wetzels et al. (2009), GOF values of 0.1, 0.25, and 0.36 represent small, medium, and large effect sizes, respectively. In our study, the calculated GOF value was 0.8024, indicating a large effect size and suggesting a good overall fit of the model to the data.

3.2.6 Importance Ranking of Financing Barriers

To determine the relative importance of the ten main barriers affecting SME production financing, we used the path coefficients from our SEM. These coefficients indicate the strength and direction of the relationship between each barrier and the overall construct of production financing barriers in SMEs.

Figure 3 presents a bar chart showing the ranking of the ten main factors based on their path coefficients. The factors are ordered from highest to lowest path coefficient, providing a visual representation of their relative importance.

This ranking provides valuable insights into the relative importance of different factors in influencing production financing for SMEs. The Legal Environment and Political Outcomes emerge as the most critical factor, followed by Credit Evaluation and Risk Perception, and Alternative Financing Mechanisms and Innovations. These results highlight areas where interventions or improvements could potentially have the

greatest impact on easing financing barriers for SMEs.

It's important to note that while some factors may have lower path coefficients, they are still significant in the model and contribute to the overall understanding of production financing barriers for SMEs. The interconnected nature of these factors suggests that a holistic approach, addressing multiple areas simultaneously, may be most effective in improving access to finance for SMEs.

3.3 Integration of Qualitative and Quantitative Findings

Our mixed-methods approach allowed for a comprehensive exploration of factors influencing production financing for SMEs. The qualitative phase identified 10 main themes and 71 sub-themes, which were then validated and refined through quantitative analysis. This process resulted in a final model comprising 66 indicators across 10 dimensions.

The integration of qualitative and quantitative findings revealed several key insights:

- Consistency of major themes: The 10 main themes identified in the qualitative phase were largely supported by the quantitative data, indicating the robustness of our initial findings.
- Refinement of indicators: The quantitative analysis led to the removal of 5 indicators that did not meet statistical criteria, resulting in a more focused set of 66 indicators.
- Relative importance of factors: The quantitative phase allowed us to rank the importance of the 10 main factors, providing a clearer picture of which areas may require the most attention in addressing SME financing challenges.
- Conceptual consistency: While our initial qualitative approach focused on identifying barriers, the integration of findings confirmed that all factors identified act as barriers to SME financing.
- Complex interrelationships: The structural equation modeling highlighted the interconnected nature of these factors, suggesting that a holistic approach may be necessary when addressing SME financing issues.

3.4 Discussion of Key Findings

Our integrated findings reveal critical insights into the barriers influencing production financing for SMEs. We will discuss each of the ten identified barriers in relation to existing literature:

- Legal and Political Environment: This emerged as the most significant barrier, highlighting the crucial role of clear, stable, and efficient laws and regulations in SME financing. This aligns with findings by Khan (2022), who emphasized the importance of institutional and legal environments in facilitating SME growth. Similarly, Ortiz-Martínez et al. (2023) found that regulatory constraints can significantly impede SMEs' access to finance. Our study extends these findings by quantifying the relative importance of legal and political factors compared to other barriers.
- Credit Evaluation and Risk Perception: As the second most important barrier, this underscores the need for appropriate risk assessment methods tailored to SMEs. This supports findings by Bellucci et al. (2019) on the importance of risk evaluation in financial decision-making for SMEs. Our study adds to this by highlighting the specific aspects of credit evaluation that pose the most significant barriers, such as the limitations of traditional credit scoring systems for SMEs.
- Alternative Financing Mechanisms: The prominence of this barrier suggests a need for diverse funding options beyond traditional bank loans, consistent with research by Urbinati et al. (2021) on financing innovations. Our findings extend this by identifying specific alternative financing options that SMEs find most challenging to access, such as venture capital and crowdfunding platforms.
- Collateral and Asset-Based Financing: The challenges related to collateral

requirements and asset valuation emerged as significant barriers, echoing findings by Chiappini et al. (2022) on the role of collateral in SME financing. Our study provides a more nuanced understanding of how different types of collateral (e.g., real estate vs. machinery) pose varying levels of difficulty for SMEs.

- Technological Advancement: The importance of digital infrastructure and financial technologies in improving SME financing aligns with research by Telukdarie et al. (2023) on the role of technology in the financial industry. Our findings expand on this by identifying specific technological barriers, such as the lack of integrated digital financial systems and cybersecurity concerns.
- Information Asymmetry and Transparency: This barrier highlights the ongoing challenge of information gaps between SMEs and financial institutions. Mardikaningsih et al. (2022) similarly identified inadequate financial reporting as a key issue. Our study contributes by detailing specific aspects of information asymmetry, such as the lack of standardized financial reporting for SMEs.
- Market Dynamics and Competition: Our findings reveal that market structure and competitive pressures significantly influence SME financing. This aligns with research by Godke Veiga and McCahery (2019), who found that market concentration affects SMEs' access to finance. Our study adds depth by identifying specific market-related barriers, such as the impact of industry concentration on financing options.
- Loan Terms and Conditions: The complexity and inflexibility of loan terms emerged as a significant barrier. This supports findings by Serrasqueiro et al. (2021) on the importance of flexible financing terms for SMEs. Our study extends this by identifying specific aspects of loan terms that pose the greatest challenges, such as repayment schedules and interest rate structures.
- Socio-Economic Factors and Regional Inequalities: Our findings highlight the impact of broader economic conditions and regional disparities on SME financing. This aligns with research by Endris and Kassegn (2022) on the role of socio-economic factors in SME development. Our study contributes by quantifying the relative importance of these factors compared to other financing barriers.
- Financial Infrastructure and Access Issues: The lack of diverse financial institutions and limited banking services emerged as significant barriers. This supports findings by Wattanapruttipaisan (2023) on the importance of financial infrastructure for SME development. Our study adds value by identifying specific infrastructural gaps, such as the limited availability of specialized SME financing institutions.

These findings suggest that improving SME access to production financing requires a multifaceted approach, addressing legal, financial, technological, and socio-economic barriers simultaneously. The interplay between these barriers indicates that isolated interventions may have limited effectiveness. For example, addressing legal barriers without also tackling technological barriers may not yield significant improvements in SME financing.

Our study contributes to the literature by providing a comprehensive, empirically validated framework of barriers influencing SME production financing. By incorporating legal, economic, technological, and social factors, our research highlights the need for an interdisciplinary approach to understanding and addressing SME financing challenges. The successful application of a mixed-methods approach in this study demonstrates its efficacy in capturing the complex nature of SME financing issues.

Moreover, our findings reveal the relative importance of different barriers, which can

guide policymakers and financial institutions in prioritizing their interventions. For instance, the high importance of legal and political factors suggests that regulatory reforms should be a primary focus in efforts to improve SME financing.

This expanded discussion provides a more comprehensive comparison of our findings with existing literature, addressing all ten dimensions identified in our study and offering a more robust interpretation of the results.

4. Conclusion

This study aimed to investigate the barriers influencing production financing in small and medium-sized enterprises (SMEs) using a mixed-methods approach. Our research identified and validated 66 indicators across 10 main dimensions that significantly hinder SME financing. The findings reveal a complex interplay of barriers, with the legal and political environment emerging as the most critical, followed closely by credit evaluation and risk perception, and alternative financing mechanisms. Other significant barriers include collateral and asset-based financing challenges, technological advancement gaps, information asymmetry and transparency concerns, market dynamics and competition, loan terms and conditions complexities, socio-economic factors and regional inequalities, and financial infrastructure and access issues.

Our research contributes to the literature by providing a comprehensive, empirically validated framework of barriers influencing SME production financing. This model challenges the traditional view of financing factors as isolated issues, introducing a more nuanced perspective where barriers are interconnected and mutually reinforcing. By incorporating legal, economic, technological, and social factors, our research highlights the need for an interdisciplinary approach to understanding SME financing challenges. The successful application of a mixed-methods approach in this study demonstrates its efficacy in capturing the complex nature of SME financing issues.

The practical implications of our findings are significant. Policymakers can use our insights to develop more targeted and effective policies to support SME financing, focusing on key areas such as legal environment improvement and alternative financing mechanisms. For instance, streamlining regulatory processes and developing SME-specific legal frameworks could significantly reduce barriers related to the legal and political environment.

Financial institutions can leverage our findings to refine their risk assessment models for SMEs, potentially leading to improved access to finance for these enterprises. This might involve developing more nuanced credit scoring systems that take into account the unique characteristics of SMEs. The importance of technological advancement highlighted in our study can guide SMEs and financial institutions in prioritizing digital transformation to enhance financial access and management. This could include investments in integrated financial management systems and improved cybersecurity measures.

Our findings on socio-economic factors and regional inequalities can inform strategies for more balanced regional economic development and SME support, such as targeted financial inclusion programs for underserved areas.. Additionally, the emphasis on information asymmetry and transparency issues underscores the need for enhanced financial education and standardized reporting practices among SMEs.

While our study provides valuable insights, it is not without limitations. The relatively small sample size in the quantitative phase (n=60) and the focus on SMEs in industrial parks may limit the generalizability of our findings to other contexts or types of SMEs. The study's geographical constraints and cross-sectional nature also present limitations, as financing barriers may vary across different regions and evolve over time. Additionally, the reliance on perceived data from SME managers and experts, while providing valuable insights into their experiences and perceptions, may not fully capture objective measures of financing barriers. This limitation is particularly relevant to the quantitative phase, where the use of perceived importance ratings rather than direct

measurements of barriers could introduce some bias.

These limitations, however, open up numerous avenues for future research. Longitudinal studies could examine how financing barriers evolve over time and in response to economic, technological, and policy changes. Cross-cultural comparisons could provide valuable insights into how cultural, economic, and institutional differences impact SME financing challenges across different countries or regions. In-depth studies focusing on specific industry sectors could reveal unique financing barriers and opportunities within different business contexts.

Further refinement and testing of the structural model with larger, more diverse samples could enhance its robustness and generalizability. Future studies could also consider incorporating objective measures of financing barriers alongside perceived data to provide a more comprehensive understanding of the challenges faced by SMEs. Research evaluating the effectiveness of specific interventions or policies aimed at addressing the identified financing barriers could provide practical guidance for policymakers and practitioners.

Given the rapid pace of technological change, future studies could delve deeper into how emerging technologies are reshaping SME financing landscapes, potentially creating new opportunities while also introducing new challenges. Finally, exploring the intersection of sustainable business practices and SME financing could offer valuable insights in the context of growing emphasis on environmental, social, and governance (ESG) factors.

In conclusion, this study provides a comprehensive framework for understanding the complex barriers influencing SME production financing. While it offers valuable insights for both theory and practice, it also paves the way for future research to further our understanding of this critical area of economic development. As SMEs continue to play a vital role in global economies, enhancing our understanding of their financing challenges and opportunities remains crucial for fostering economic growth and innovation. Addressing these barriers will require coordinated efforts from policymakers, financial institutions, and SMEs themselves, guided by evidence-based research such as this study.

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Table 1. Classification of Barriers Affecting Production Financing in SMEs

Main Themes (Dimensions)	Code	Sub-themes (Indicators)	Concepts
Financial Infrastructure and Access Issues (FIA)	FIA1	Diversity of Financial Institutions	Commercial banks | Credit institutions | Investment funds | Leasing companies
	FIA2	Extent of Banking Services	Physical branches | Online banking | Mobile services | ATMs
	FIA3	Financial Market Development Limitations	Stock market | Bond market | Foreign exchange market | Derivatives market
	FIA4	Government Financial Support Programs	Low-interest loans | Production subsidies | Tax exemptions | Government guarantees
	FIA5	Venture Investment Availability	Business angels | Venture funds | Accelerators | Crowdfunding platforms
	FIA6	Microfinance Services Accessibility	Small loans | Group savings | Micro-insurance | Money transfer services
	FIA7	Cash Flow Management Challenges	Liquidity forecasting | Cost control | Inventory management | Receivables collection
	FIA8	Fixed Capital Financing Options	Long-term loans | Equipment leasing | Participation bonds | Direct investment
	FIA9	Working Capital Financing Availability	Credit lines | Factoring | Short-term loans | Letters of credit

Main Themes (Dimensions)	Code	Sub-themes (Indicators)	Concepts
Legal and Political Environment Challenges (LEPI)	LEPI1	Regulatory Framework Complexity	Clear laws | Executive guidelines | Judicial procedures | Legal interpretations
	LEPI2	Compliance Process Difficulties	Simple processes | Practical guides | Online support | Legal consultation
	LEPI3	Tax Policy Inconsistencies	Tax rates | Exemptions | Investment incentives | Tax agreements
	LEPI4	Government Legal Support Inadequacies	Supportive laws | Executive guarantees | Judicial support | Legal incentives
	LEPI5	Regulatory Instability	Policy sustainability | Predictability of laws | Transition periods | Gradual reforms
	LEPI6	Administrative Process Inefficiencies	One-stop shop | Electronic services | Reduction of bureaucracy | Delegation of authority
Information Asymmetry and Transparency Concerns (IAT)	IAT1	Financial Information Accessibility	Public reports | Databases | Mandatory disclosure | Right to information access
	IAT2	Lending Process Opacity	Loan conditions | Interest rates | Incidental costs | Collateral requirements
	IAT3	Credit Reporting System Inadequacies	Credit score | Payment history | Outstanding debts | Credit limits
	IAT4	Financial Education Resource Scarcity	Training courses | Guidebooks | Financial consultations | Specialized webinars
	IAT5	Risk Assessment Transparency Issues	Assessment criteria | Risk models | Credit ratings | Risk Disclosure
	IAT6	Financial Information Security Concerns	Data encryption | Access control | Privacy protection | Security protocols
	IAT7	Financial Calculation Complexities	Calculation formulas | Cost details | Accounting methods | Detailed reports
Collateral and Asset-Based Financing Difficulties (CRAF)	CRAF1	Collateral Acceptability Limitations	Real estate | Machinery | Stocks | Securities
	CRAF2	Asset Valuation Challenges	Market valuation | Book value | Replacement value | Economic value
	CRAF3	Loan-to-Value Ratio Constraints	LTV | LTD | DSCR | ICR
	CRAF4	Asset and Liability Risk Management Issues	Maturity matching | Diversification | Risk hedging | Liquidity management
	CRAF5	Capital Efficiency Concerns	ROI | ROCE | EVA | Asset turnover
	CRAF6	Unfinished Asset Management Problems	Project completion | Unfinished sale | Participation | Reconstruction
	CRAF7	Collateral Support Policy Shortcomings	Government guarantee | Collateral insurance | Alternative collateral | Easing collateral conditions
	CRAF8	Idle Unit Reactivation Challenges	Capital injection | Structural reconstruction | Merger | Repurposing
Loan Terms and Conditions Complexities (LTC)	LTC1	Interest Rate Structure Issues	Fixed-rate | Variable rate | Combined rate | Stepped rate
	LTC2	Repayment Plan Inflexibility	Monthly installments | Lump sum payment | Initial grace period | Flexible repayment

Main Themes (Dimensions)	Code	Sub-themes (Indicators)	Concepts
	LTC3	Loan Term Rigidity	Term extension | Rate change | Temporary suspension | Restructuring
	LTC4	Prepayment Penalty Concerns	Penalty | Discount | Time limitation | Early repayment terms
	LTC5	Loan Covenant Strictness	Financial ratios | Operational restrictions | Reporting requirements | Negative covenants
	LTC6	Default Management Harshness	Renegotiation | Late payment penalty | Collateral seizure | Legal actions
	LTC7	Loan Guarantee Requirements	Personal guarantee | Corporate guarantee | Bank guarantee | Credit Insurance
	LTC8	Repayment Terms Unsuitability	Cash flow matching | Seasonal periods | Variable payments | Conversion options
	LTC9	Production Cost Management Difficulties	Process optimization | Waste reduction | Energy management | Automation
Credit Evaluation and Risk Perception Issues (CARP)	CARP1	Credit Scoring System Limitations	FICO score | Internal models | Industry ratings | Behavioral score
	CARP2	Financial Situation Analysis Challenges	Financial ratios | Cash flow analysis | Balance sheet review | Profit and loss analysis
	CARP3	Business Sustainability Assessment Difficulties	SWOT analysis | Business model | Competitive analysis | Market forecast
	CARP4	Collateral Risk Assessment Complexities	Market value | Liquidity | Depreciation | Legal limitations
	CARP5	Producer Selection Criteria Inadequacies	Performance history | Production capacity | Innovation | Financial stability
Market Dynamics and Competition Challenges (MDC)	MDC1	Market Structure Pattern Complexities	Perfect competition | Monopoly | Oligopoly | Monopolistic competition
	MDC2	Competitive Situation Analysis Difficulties	Market share | Competitive advantage | Competitors' strategies | Positioning
	MDC3	Industry Concentration Level Impacts	Herfindahl-Hirschman Index | Concentration ratio | number of players | Company size distribution
	MDC4	Market Entry Barrier Heights	Initial capital | Economic scale | Channel access | Legal barriers
	MDC5	Substitute Product Analysis Challenges	Cross elasticity | Added value | Synergy | Product differentiation
	MDC6	Pricing Strategy Complexities	Cost leadership | Differentiation | Focus | Penetration pricing
	MDC7	Technological Innovation Impact Uncertainties	Digital disruption | Automation | Artificial intelligence | Internet of Things
	MDC8	Strategic Production Management Difficulties	Lean production | Total quality management | Agile production | Concurrent engineering
Technological Advancement and Digitalization Gaps (TAD)	TAD1	Digital Infrastructure Inadequacies	5G networks | Cloud computing | Big data | Artificial intelligence
	TAD2	Financial Technology Adoption Lags	Blockchain | Cryptocurrencies | Mobile payment | Open banking

Main Themes (Dimensions)	Code	Sub-themes (Indicators)	Concepts
	TAD3	Digital System Integration Challenges	ERP | CRM | SCM | BI
	TAD4	Cybersecurity Concern Levels	Firewall | Encryption | Two-factor authentication | Intrusion detection
Socio-Economic Factors and Regional Inequalities (SEFRI)	SEFRI1	Economic Development Indicator Disparities	GDP per capita | Employment rate | Inflation | Foreign direct investment
	SEFRI2	Income Distribution Imbalances	Gini coefficient | Decile ratio | Poverty line | Income gap
	SEFRI3	Educational Access Disparities	Literacy rate | Higher education | Technical and vocational education | Lifelong learning
	SEFRI4	Infrastructure Development Gaps	Transportation network | Energy supply | Communications | Water and sewage
	SEFRI5	Regional Economic Difference Magnitudes	Industry distribution | Regional investment | Migration | Unbalanced development
	SEFRI6	Social Support Policy Inadequacies	Unemployment insurance | Targeted subsidies | Healthcare services | Social housing
	SEFRI7	Land Resource Management Challenges	Land use | Territorial planning | Industrial park development | Environmental protection
	SEFRI8	Subsidy Resource Allocation Inefficiencies	Production subsidy | Energy subsidy | Export subsidy | Employment subsidy
Alternative Financing Mechanisms and Innovation Needs (AFMI)	AFMI1	Modern Lending Platform Scarcity	Peer-to-peer lending | Online lending | Micro-lending | Social lending
	AFMI2	Crowdfunding Opportunity Limitations	Equity crowdfunding | Product pre-sale | Donation crowdfunding | Crowdlending
	AFMI3	Supply Chain Financing Inadequacies	Reverse factoring | Inventory financing | Distributor financing | Supplier prepayment
	AFMI4	Factoring Financing Availability Issues	Invoice purchase | Document discounting | Receivables financing | Invoice leasing
	AFMI5	Performance-Based Financing Model Shortages	Revenue sharing | Profit-based loans | Project-based financing | Performance contracts
	AFMI6	Production Resource Redistribution Inefficiencies	Unused land transfer | Rehabilitation of closed units | Resource reallocation | Optimization of production capacities
	AFMI7	Land-Based Investment Incentive Insufficiencies	Free land grants | Land tax exemptions | Special facilities for industrial parks | Long-term usage rights
Note 1: This table presents the main themes and sub-themes identified in the qualitative phase and validated in the quantitative phase. The sub-themes represent factors that can act as either barriers or enablers to SME production financing, depending on their presence, absence, or degree of implementation.			

Table 2. Descriptive statistics for main barrier themes

	Mean Statistic	Std. Deviation Statistic	Variance Statistic
FIA	2.75	1.230	1.513
LEPI	3.08	1.078	1.162

IAT	2.72	1.091	1.190
CRAF	3.52	1.066	1.135
LTC	3.00	.902	.814
CARP	3.20	1.363	1.858
MDC	3.17	1.092	1.192
TAD	3.23	1.110	1.233
SEFRI	3.00	1.025	1.051
AFMI	2.60	1.196	1.431

Table 3. Composite Reliability, Cronbach's Alpha, and Average Variance Extracted for barrier dimensions

Dimensions	CA	CR	AVE
AFMI	0.945	0.955	0.753
CARP	0.901	0.926	0.715
CRAF	0.931	0.939	0.660
FIA	0.950	0.959	0.747
IAT	0.938	0.950	0.732
LEPI	0.933	0.945	0.741
LTC	0.943	0.947	0.691
MDC	0.985	0.986	0.911
SEFRI	0.949	0.959	0.798
TAD	0.921	0.867	0.627

Table 4. Fornell-Larcker Matrix for Discriminant Validity of barrier dimensions

	AFMI	CARP	CRAF	FIA	IAT	LEPI	LTC	MDC	SEFRI	TAD
AFMI	0.867									
CARP	0.166	0.845								
CRAF	0.045	0.344	0.812							
FIA	0.288	0.243	0.218	0.864						
IAT	0.224	0.347	0.408	0.083	0.855					
LEPI	0.425	0.065	0.045	0.150	0.215	0.861				
LTC	0.156	0.047	0.091	0.215	0.217	0.230	0.831			
MDC	0.028	0.147	0.105	0.170	0.018	0.037	0.036	0.954		
SEFRI	0.242	0.155	0.064	0.332	0.017	0.020	0.069	0.041	0.893	
TAD	0.026	0.129	0.030	0.143	0.022	0.218	0.115	0.049	0.159	0.792

Table 5. Results of the Significance Examination of Relationships between barriers and Financing Production in SMEs

Relationships	t-value	p-value	Path Coefficient	Result
Financial Infrastructure and Access Issues → Financing Production in SMEs	2.167	0.031	0.317	Confirmed
Legal and Political Environment Challenges → Financing Production in SMEs	8.066	0.000	0.759	Confirmed
Information Asymmetry and Transparency Concerns → Financing Production in SMEs	5.007	0.000	0.400	Confirmed
Collateral and Asset-Based Financing Difficulties → Financing Production in SMEs	2.102	0.029	0.506	Confirmed
Loan Terms and Conditions Complexities → Financing Production in SMEs	5.453	0.000	0.325	Confirmed

Credit Evaluation and Risk Perception Issues → Financing Production in SMEs	2.128	0.026	0.558	Confirmed
Market Dynamics and Competition Challenges → Financing Production in SMEs	5.033	0.000	0.362	Confirmed
Technological Advancement and Digitalization Gaps → Financing Production in SMEs	5.096	0.000	0.473	Confirmed
Socio-Economic Factors and Regional Inequalities → Financing Production in SMEs	5.997	0.000	0.448	Confirmed
Alternative Financing Mechanisms and Innovation Needs → Financing Production in SMEs	5.670	0.000	0.555	Confirmed

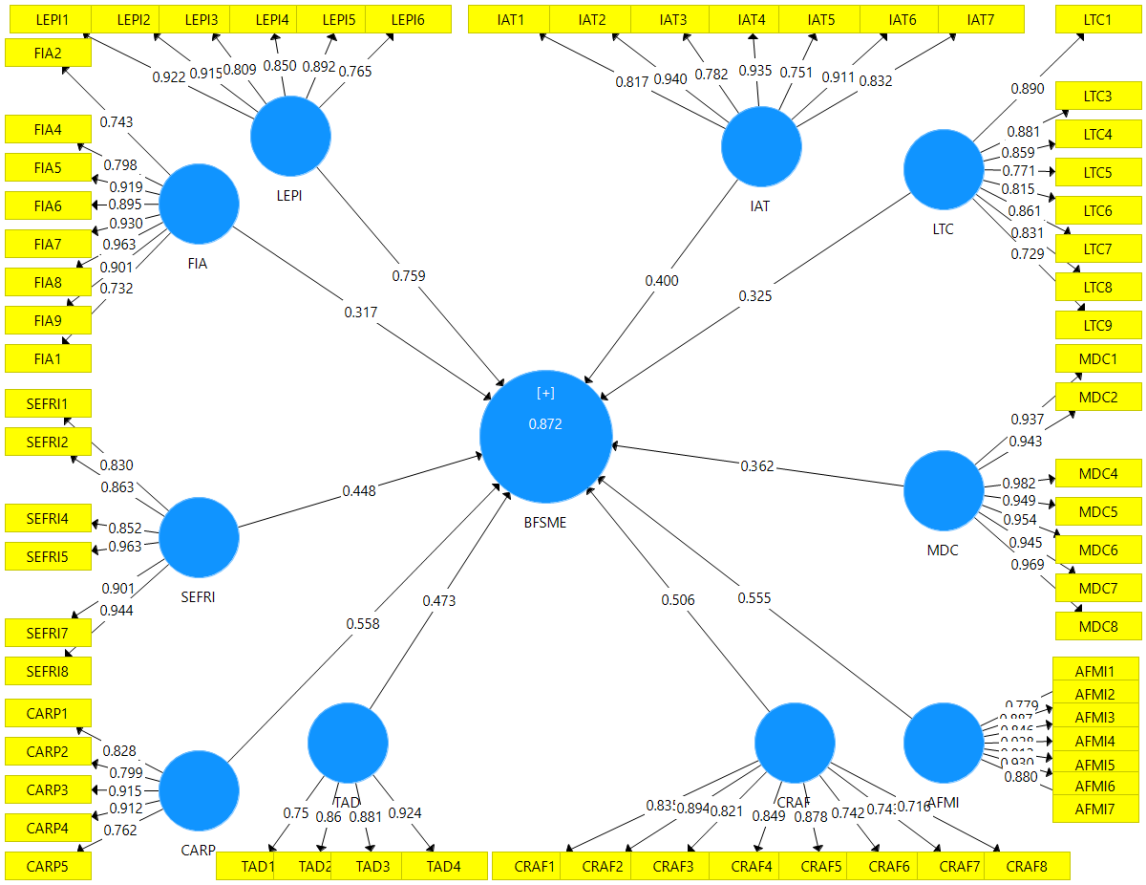

Figure 1: Measurement model of financing barriers in standardized coefficient state

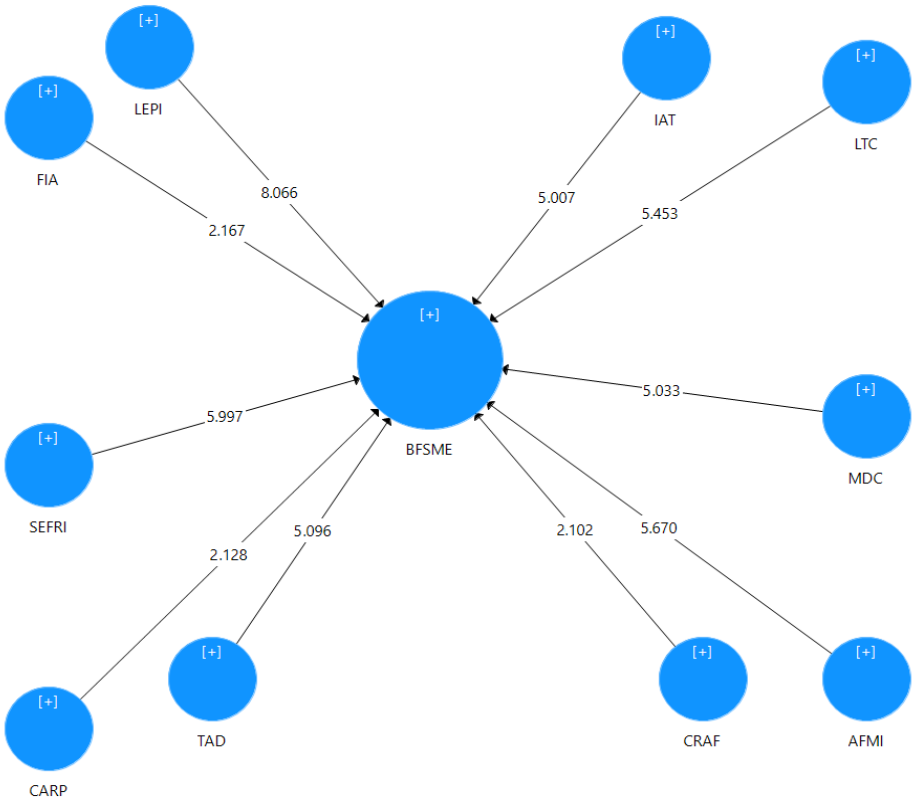

Figure 2. Structural Model of Financing Barriers in the Context of Significant Coefficients

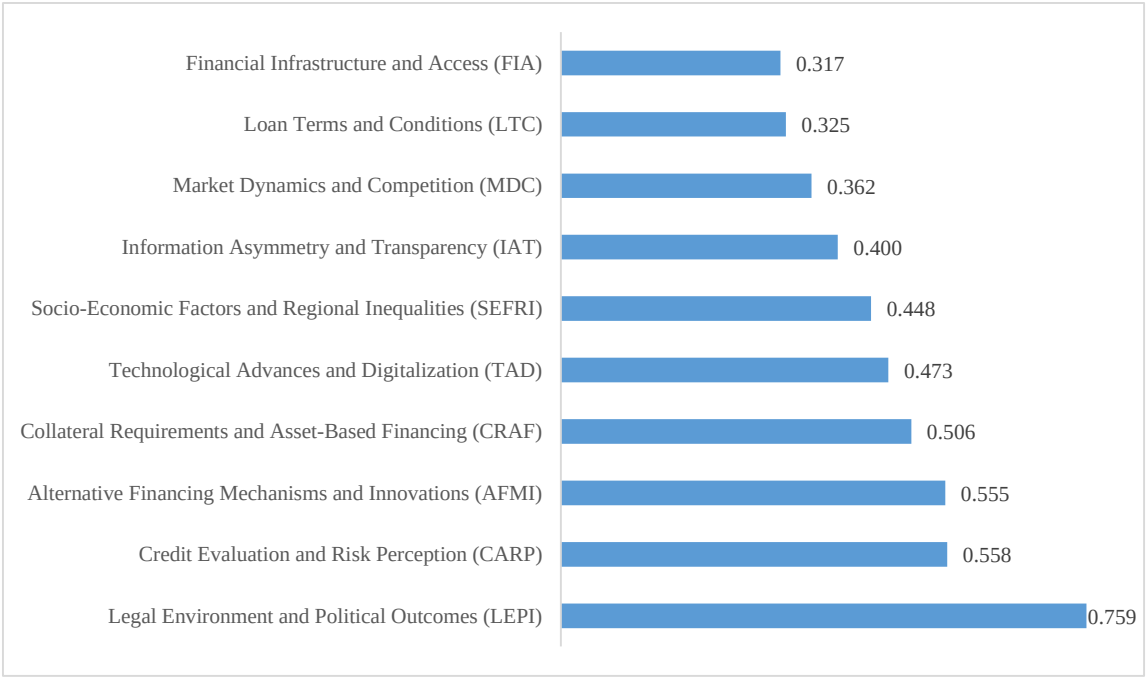

Figure 3: Ranking of Main Barriers Affecting SME Production Financing Based on Path Coefficients

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