Identifying Barriers to Financing Knowledge-Based Businesses with Emphasis on the Role of the Banking System

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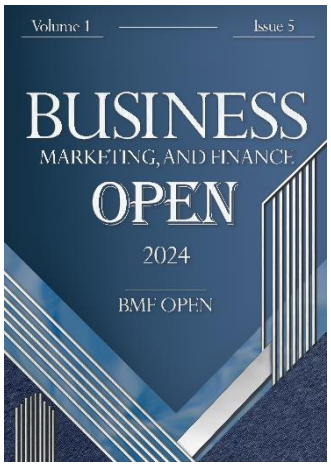

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Abstract: This study aims to identify the barriers to financing knowledge-based businesses, with an emphasis on the role of the banking system. The research method is qualitative and grounded theory-based. The statistical population consists of all banks that provided credit and facilities to knowledge-based companies, including the following banks: Shahr Bank, Bank Melli, Bank Mellat, Bank Resalat, Bank Saderat, Bank of Industry and Mine, and Export Development Bank of Iran. Sampling was conducted purposively and non-randomly. The research instrument was semi-structured interviews conducted with 15 experts and specialists in financing knowledge-based businesses. In addition, document analysis was used to identify dimensions, characteristics, facilitating and inhibiting factors, and appropriate methods for financing knowledge-based businesses. To ensure validity and reliability, the Lincoln and Guba evaluation method was applied. The interviews were reviewed multiple times, and initial concepts were extracted through content analysis. Based on the conducted analyses, the identified barriers to financing knowledge-based businesses, emphasizing the role of the banking system, include causal conditions such as factors influencing financing knowledge-based businesses (laws and regulations, structure and organization, monitoring and evaluation), contextual conditions such as supportive programs, the central phenomenon of collaboration, intervening conditions such as effective management, strategies such as investment, and outcomes including collaboration and networking, attracting investments, market development, increased production capacity, and technological advancement.

Keywords: Financing, Knowledge-Based Businesses, Banking System

1. Introduction

From 3000 BCE until the emergence of banks and financial institutions, wealthy families and rulers provided loans to individuals in society, enabling them to invest in business ventures [1]. Despite this historical precedent, financing entrepreneurial ideas has consistently been a significant barrier for entrepreneurs and business owners. Attracting capital, particularly from external sources, remains challenging for all entrepreneurs [2-4].

Following Iran's comprehensive long-term national development plan, the roadmap known as Vision 2025, Iranians aim to transition from reliance on a natural resource-based economy to a knowledge-based economy. With a decade remaining until the 20-year horizon, foundational infrastructure for fully establishing knowledge-based companies is being developed, though their added value constitutes only a small fraction of the national GDP [5-7]. According to Iran's 20-year

Vision Plan (2025), the qualitative and quantitative status of Iranian knowledge-based businesses remains inadequate. A critical prerequisite for achieving the Vision 2025 goals is the development of companies based on modern technologies. In Iran, these businesses are among the most influential players in the national innovation system due to their ability to create high-skill job opportunities, mitigate brain drain processes, and contribute to economic growth. A vital role of these firms is transferring technology from research laboratories to the productive sectors of the economy [5].

Knowledge-based companies are private or cooperative entities established to synergize science and wealth, develop a knowledge-driven economy, achieve scientific and economic goals, and commercialize the results of research and development in advanced, high-value technologies. Management practices in knowledge-based organizations have undergone significant transformation, moving away from traditional approaches as these organizations center on knowledge, intellectual property, and human capital. This shift demands new management methods and perspectives [8, 9].

Several critical challenges confront these firms, including imbalanced government support policies, conceptual challenges related to knowledge-based businesses, domestic market stagnation, and economic difficulties [10].

In Iran, knowledge-based businesses are primarily private sector organizations (mainly small and medium-sized enterprises) managed by experts to commercialize innovations and inventions, apply research, localize technologies, and focus on research and development as their core activity. The competitive advantage of these firms lies in their technical knowledge and scientific capabilities derived from knowledge and innovation at various levels. These companies grow in dynamic, knowledge-based environments and demonstrate long-term profitability. Governments play multiple roles in financially and non-financially supporting knowledge-based businesses. In some cases, governments directly invest in these firms through the establishment of investment funds or provision of facilities. However, the primary role of governments is indirect, improving the business environment and creating favorable conditions for innovation through economic and legal infrastructure or fostering networks of investors [5, 7, 11].

Policies encouraging innovation development in various countries have shifted from direct to indirect approaches. In this context, governments strengthen market mechanisms rather than directly interacting with diverse, small-scale knowledge-based businesses. The reality is that large knowledge-based companies have grown through diverse, non-governmental financing tools rather than government loans and facilities. Governments' most crucial role is to create suitable environments for private financial organizations, such as venture capital funds, or establish appropriate regulations for crowdfunding activities. Today, investment banks act as professional advisors, assisting and strengthening their clients' financial resources. In cases of limited investment, the establishment of public investment banks provides a mechanism to control demand and address financial constraints. These banks link small pools of public funds in private markets to viable investment projects.

Iranian state banks have failed in financing these businesses. They are unable to identify genuinely profitable projects, lack transparent lending mechanisms, and are often entangled in political interactions. Therefore, given the emphasis on supporting production, banks should prioritize financing knowledge-based companies aligned with enhancing the country's production capacity and economic value chain. This study, with an emphasis on the role of the banking system, investigates the barriers to financing knowledge-based businesses.

2. Methodology

Considering that the purpose of this research is to develop a theory (understanding the factors influencing the financing of knowledge-based companies), a qualitative research approach was adopted to achieve three primary objectives: (1) to uncover the underlying aspects of the less-explored phenomenon and determine what lies behind it, (2) to obtain subtle details about the concept that are difficult to present using quantitative methods, and (3) to interpret the elements related to the subject matter instead of merely explaining cause-and-effect relationships, thereby clearly elucidating its various dimensions.

Among qualitative and interpretive methods, grounded theory offers unique advantages to researchers due to its high capacity for interpreting complex phenomena and providing greater flexibility for exploring the study area and the emergence of concepts. Based on the grounded theory method, semi-structured interviews with experts and specialists in financing knowledge-based businesses, along with document analysis, were employed to identify the dimensions, characteristics, facilitating factors, and appropriate methods for financing these businesses.

The statistical population for this research includes all banks that provide credit and facilities to knowledge-based companies. This population encompasses banks such as Shahr Bank, Bank Melli, Bank Mellat, Bank Resalat, Bank Saderat, Export Development Bank, and the Bank of Industry and Mine. The sampling method was purposive and non-random. It was purposive because the aim was to engage individuals from banks with prior experience in financing knowledge-based businesses, and it was non-random as probabilities were not considered.

The research instrument was interviews, and according to the grounded theory approach (contextual) proposed by Strauss and Corbin, the appropriate sample size is between 10 to 25 participants, with the possibility of increasing this number depending on the stage of theoretical saturation. This process continued until no new information or data emerged from the interviewees. In this study, the snowball sampling method was used to identify the expert population, and interviews were conducted until theoretical saturation was achieved, ultimately collecting the opinions of 15 experts.

During the interviews, all discussed points were recorded, reviewed, and analyzed. To evaluate content validity, the derived concepts were reviewed by several experts to ensure their qualitative validity, which was subsequently confirmed. After transcribing the interviews, the collected data were analyzed through coding and categorized into three stages: open coding, axial coding, and selective coding, as outlined by Strauss and Corbin (2008).

3. Findings

The primary question of this research was: *What factors influence the financing of knowledge-based businesses, with an emphasis on the role of the banking system?* To answer this question, it was necessary to first address the sub-questions: *What environmental factors (such as government policies, laws and regulations, business conditions, IT infrastructure, etc.) act as barriers within the banking system in financing this sector?* and *What policies or strategies can be proposed within the banking system to develop financing and support knowledge-based businesses?*

To address these questions, semi-structured interviews were conducted. During the interviews, participants responded to questions such as: *What factors, in your opinion, encourage greater investment and participation of the banking system in knowledge-based companies? What are the obstacles and challenges preventing increased investment and participation of the banking system in knowledge-based companies?* and *What policies or strategies have been implemented in this regard?*

The recorded interviews were transcribed, analyzed line by line, conceptualized, and categorized. Subsequently, based on similarities, conceptual relationships, and shared characteristics among open codes, the concepts and categories (a classification of concepts) were identified.

In this study, the data were carefully examined, and the primary and secondary categories related to the data were identified. Dimensions and characteristics were determined, and patterns were analyzed. The responses provided by the interviewees were broken down into smaller units, compared iteratively, and new concepts were formed based on shared applications. The analytical methods suggested by Strauss and Corbin (2008) were utilized for this purpose.

During the detailed analysis of the data, concepts were derived through coding, either directly from the interview transcripts (live codes) or based on shared applications. The interview transcripts were systematically reviewed to identify the main categories, subcategories, characteristics, and dimensions of these categories.

Initially, the responses provided by the interviewees were divided into smaller units. This process was conducted at the sentence or paragraph level after reviewing the interview transcripts. Then, the concepts were grouped into larger categories. Subsequently, efforts were made to classify these categories into broader conceptual frameworks.

Since numerous open codes were generated, redundant concepts were eliminated, and similar concepts were merged after each phase of categorization and re-examination of the data. This iterative process continued several times until logical saturation was achieved for the main categories, subcategories, and their characteristics. The boundaries of each main category and subcategory were not definitively established at the beginning of the analysis; instead, they were revised throughout the analytical process. Open coding was discontinued when:

a. A meaningful classification was achieved after repeated reviews of the interview transcripts.

b. Subcategories and characteristics became repetitive.

c. No new relevant or significant data emerged from the interview transcripts. Any new data that surfaced did not align with the existing classifications.

Based on the analysis and coding of the interviews, 12 subcategories and 53 open codes were identified during the data analysis process, which are presented in Table 1.

Table 1. Open Codes Referenced by Participants

No.	Subcategories	Open Codes
1	Monitoring and Evaluation	Challenges in assessing the capacity of young entrepreneurs with innovative knowledge-based ideas, informational gaps about the activities, business models, or capabilities of knowledge-based companies, incompatibility of knowledge-based companies with advanced evaluation processes, the need for advanced evaluation methods for high-risk businesses, lack of trust by banks and the government in knowledge-based companies, reliable guarantees for technology investments.
2	Structure and Organization	Inadequate structuring of companies, diversity of companies, large-scale companies exceeding the financial capacity of banks, small knowledge-based companies lacking access to banking networks, increasing company scale to access facilities, lack of revenue history and youthfulness of these companies, absence of standardized structures aligning with global norms and professional management teams, preference of bank staff for tangible goods as collateral, lack of entrepreneurial perspective within the industry, inexperience of most knowledge-based companies seeking financial support, lack of private sector support.
3	Laws and Regulations	Failure to comply with venture capital investment criteria, long financial returns for knowledge-based projects, company registration required before obtaining knowledge-based certification, outdated regulations for the emerging knowledge-based sector, lengthy processes for registration, application approval, and waiting for financial facilities.
4	Collaboration	Various consulting services to assist emerging knowledge-based and technology-based companies, collaboration policies with research and technology funds, temporary knowledge-based certification for startups to access benefits such as residential accommodation, establishment of funds, governmental organizations, investment entities, and financial facilities to support knowledge-based companies, formation of the Innovation and Prosperity Fund in 2010.
5	Investment	-
6	Support Programs	Targeted planning for knowledge-based supportive loans aimed at expanding these companies, approval processes in the Vice Presidency for Science and Technology, small-scale financial facilities for startups provided by the Innovation and Prosperity Fund, leasing policy facilities, fully electronic processing of financial support applications, interest-free loans for startup deposits.
7	Effective Management	Utilizing legal tools in evaluation and qualification processes, revising evaluation, contracting, and monitoring mechanisms for facilities, planning and transferring experiences to increase stock value of these companies.
8	Technology Development	Investments in research and development, advanced equipment, specialized human resources, technical infrastructure, improving efficiency and technical performance of companies.
9	Increasing Production Capacity	Opportunities for growth and expansion of activities, meeting market needs, fostering strong competition among rivals.
10	Market Development	Investments in marketing, advertising, communications, and market research, showcasing competitive advantages, gaining greater market share, targeted marketing, effective customer communication, understanding customer needs, offering market-aligned products and services.
11	Attracting Investors	High profitability, risk-taking, and increasing the company's value.
12	Collaboration and Networking	Collaboration and joint research with universities, research centers, and other organizations, leveraging external knowledge, experience, and resources, higher returns for research and development, improving innovation processes, accessing knowledge-based networks.

Causal conditions include factors directly related to the main phenomenon of the study. Based on the analysis of the interviews, the conditions facilitating investment and greater participation of the banking system in knowledge-based companies include: resilience against financial challenges and competition with other companies, appropriate investment in research and development, investment in companies with high growth potential and significant profitability, improved presence in competitive markets with innovative products and services, maximizing return on investment, focusing on startups and rapidly growing knowledge-based companies, increased product sales, effective management of financial, human, and technical resources, provision of research and commercial opportunities, analysis of strengths, weaknesses, resources, and capabilities of the company, offering specialized consultation and training, assessing external opportunities and threats such as market trends, competitors, technologies, and policies, engaging venture capital with active management, comprehensive understanding of the company and its environment, meticulous management and monitoring of investments and their outcomes over time, long-term profitability motivation, leveraging external knowledge and experience, strengthening active connections with the academic community, setting clear and strategy-aligned objectives,

adopting a short-term perspective in developing technology and innovation, relatively long planning for higher profitability, and managing the high risk associated with innovation.

Conversely, the conditions hindering investment and participation of the banking system in knowledge-based companies include: challenges in evaluating the capacity of young entrepreneurs with innovative knowledge-based ideas, informational gaps regarding the activities, business models, or capabilities of knowledge-based companies, misalignment of knowledge-based companies with advanced evaluation processes, the need for more sophisticated evaluation methods for high-risk businesses, lack of trust by banks and the government in knowledge-based companies, the absence of reliable guarantees for technological investments, inadequate organizational structuring of companies, diversity among companies, overly large companies exceeding the financial capacity of banks, small knowledge-based companies lacking access to banking networks, increasing the scale of companies to qualify for facilities, lack of revenue history and youthfulness of these companies, absence of standardized structures aligned with global norms and professional management teams, reluctance of bank staff to provide facilities without tangible collateral, lack of entrepreneurial perspective within the industry, the inexperience of many knowledge-based companies seeking facilities, insufficient private sector support, failure to meet venture capital investment criteria, long financial returns for knowledge-based projects, company registration required before obtaining knowledge-based certification, outdated regulations for the emerging knowledge-based sector, and prolonged processes for registration, approval, and disbursement of facilities.

Table 2. Causal Conditions for Facilitating Investment and Participation of the Banking System in Knowledge-Based Companies

Causal Conditions	Open Codes
Economic Factors	Resilience against financial challenges and competition with other companies. Appropriate investment in research and development. Investment in companies with high growth potential and significant profitability. Improved competitive market presence with innovative products and services. Maximizing return on investment. Focusing on startups and rapidly growing knowledge-based companies. Increased product sales.
Human Resource Management	Effective management of financial, human, and technical resources. Provision of research and commercial opportunities. Analysis of strengths, weaknesses, resources, and capabilities of companies. Offering specialized consultation and training. Assessing external opportunities and threats, including markets, competitors, technologies, and policies. Venture capital with active management. Comprehensive understanding of companies and their environments. Precise management and monitoring of investments and their outcomes over time. Long-term profitability motivation.
Planning	Leveraging external knowledge and experience. Strengthening active connections with the academic community. Setting clear and strategy-aligned objectives. Short-term perspective in developing technology and innovation. Relatively long-term planning for profitability. Managing high-risk innovation.

Table 3. Causal Conditions Hindering Investment and Participation of the Banking System in Knowledge-Based Companies

Causal Conditions	Open Codes
Monitoring and Evaluation	Difficulty in evaluating the capacity of young entrepreneurs with innovative knowledge-based ideas. Informational gaps regarding company activities, business models, or capabilities. Misalignment of knowledge-based companies with advanced evaluation processes. The need for more advanced evaluation methods for high-risk businesses. Lack of trust by banks and the government in knowledge-based companies. Absence of reliable guarantees for technological investments.
Structure and Organization	Inadequate organizational structuring. Diversity among companies. Overly large companies exceeding banking resource capabilities. Small knowledge-based companies lacking access to banking networks. Increasing company scale to qualify for facilities. Lack of revenue history and youthfulness of companies. Absence of standardized structures aligned with global norms and professional management teams. Bank staff reluctance to provide facilities without tangible collateral. Lack of entrepreneurial perspective within the industry. Inexperience of most knowledge-based companies seeking facilities. Insufficient private sector support.

Laws and Regulations	Failure to meet venture capital investment criteria. Long financial returns for knowledge-based projects. Company registration required before obtaining knowledge-based certification. Outdated regulations for the emerging knowledge-based sector. Prolonged processes for registration, approval, and disbursement of facilities.

The experiences of the research participants indicated that the central phenomenon in investing in knowledge-based companies is the provision of extensive consultations to assist emerging knowledge-based and technology- and innovation-oriented companies. This phenomenon becomes significant when most participants emphasize the necessity of developing a cohesive program, including needs assessment and indicator development, in collaboration with private companies and non-governmental research and technology funds.

Table 4. Central Phenomenon in Knowledge-Based Company Investment

Central Phenomenon	Open Codes
Collaboration	Extensive consultations for assisting emerging knowledge-based, technology-, and innovation-oriented companies. Collaborative policies with non-governmental research and technology funds.

The strategies identified through the grounded theory approach provide solutions for addressing the phenomenon under study. Based on the interview data, three main strategies for increasing investment and participation in knowledge-based companies were identified. These include granting temporary knowledge-based certification to startups based on their proposed plans to access specific benefits (e.g., using residential properties for office purposes), establishing funds and governmental organizations, and creating financial facilities to support knowledge-based companies. Another key policy highlighted is the formation of the Innovation and Prosperity Fund, established in 2010.

Table 5. Strategies for Increasing Investment and Participation in Knowledge-Based Companies

Strategies	Open Codes
Investment	Granting temporary knowledge-based certification to startups for accessing specific benefits, such as residential property usage for office purposes. Establishing funds, governmental organizations, and financial facilities to support knowledge-based companies. Creating the Innovation and Prosperity Fund (since 2010).

In the banking industry, contexts for promoting greater investment and participation include planning to direct supportive knowledge-based loans toward projects and products that contribute to the development of these companies, approvals from the Vice Presidency for Science and Technology, policies for providing small-scale facilities to small, medium, and startup companies via the Innovation and Prosperity Fund, leasing policies, fully electronic processing of loan applications, and interest-free loans for deposits.

Table 6. Effective Contexts for Greater Investment and Participation in Knowledge-Based Companies

Contexts	Open Codes
Supportive Programs	Planning to direct knowledge-based loans toward projects and products that contribute to development. Approvals from the Vice Presidency for Science and Technology. Small-scale loans for startups and SMEs provided by the Innovation and Prosperity Fund. Leasing policies. Fully electronic processing of loan applications. Interest-free loans for deposits.

The qualitative findings of this study identified three categories of intervening conditions: the use of existing legal tools for evaluating and determining company eligibility, revising evaluation processes, contract drafting, and monitoring of facilities, and planning and transferring expertise to enhance stock value.

Table 7. Effective Intervening Conditions for Greater Investment and Participation in Knowledge-Based Companies

Intervening Conditions	Open Codes
Effective Management	Using existing legal tools for evaluating and determining company eligibility. Revising evaluation, contract drafting, and facility monitoring processes. Planning and transferring expertise to enhance stock value.

Knowledge-based companies, as key drivers of development and innovation in global economies, play a crucial role in advancing industries and societies. These companies, based on deep technical and scientific knowledge, create innovative products and services that contribute to improving societal living standards and economic growth. Investment in these companies enables them to access the necessary financial resources for development and growth, refine their innovative products and services, and strengthen their position in competitive markets.

The outcomes of investment in knowledge-based companies include contributions to research and development, advanced equipment, skilled human resources, and technical infrastructure; increased efficiency and technical performance; opportunities for growth and expansion; meeting market demands; engaging in strong competition; investment in marketing, advertising, communication, and market research activities; showcasing competitive advantages; gaining larger market shares; understanding customer needs and preferences; and aligning products and services with market demands.

Additionally, high profitability, risk-taking, increased company valuation, and collaboration with universities, research centers, and other organizations allow knowledge-based companies to leverage external knowledge, expertise, and resources. This fosters greater returns on research and development, improves innovation processes, and facilitates access to knowledge-based networks.

Table 8. Outcomes of Greater Investment and Participation in Knowledge-Based Companies

Outcomes	Open Codes
Technology Development	Investment in research and development. Advanced equipment. Skilled human resources and technical infrastructure. Increased efficiency and technical performance.
Increased Production Capacity	Opportunities for growth and expansion. Meeting market demands. Strong competition.
Market Development	Investment in marketing, advertising, communication, and market research activities. Showcasing competitive advantages. Gaining larger market shares. Targeted marketing and effective customer communication. Understanding customer needs and preferences. Aligning products and services with market demands.
Attracting Investors	High profitability, risk-taking, and increased company valuation.
Collaboration and Networking	Collaboration and joint research with universities, research centers, and other organizations. Leveraging external knowledge, expertise, and resources. Greater returns on research and development. Improved innovation processes. Access to knowledge-based networks.

Based on the interviews and analyses conducted, several environmental factors (such as government policies, laws and regulations, business conditions, and IT infrastructure) that hindered the banking system's role in financing knowledge-based businesses were identified. These include:

1. **Monitoring and Evaluation**:
    - Difficulty in assessing the capacity of young entrepreneurs with innovative, knowledge-based ideas.
    - Lack of information about the activities, business models, or capabilities of knowledge-based companies.
    - Misalignment between knowledge-based companies and advanced evaluation processes.
    - The need for more sophisticated evaluation methods for high-risk businesses.
    - Lack of trust by banks and the government in knowledge-based companies.
    - Absence of reliable guarantees for technological investment.
2. **Structure and Organization**:
    - Inadequate organizational structuring.
    - Diversity among companies.
    - Large companies that exceed the financial capacity of banks.

- Small knowledge-based companies that lack access to banking networks.
- Increase in company scale to qualify for financial facilities.
- Lack of revenue history and the youthfulness of these companies.
- Absence of standardized structures aligned with global norms and professional management teams.
- Preference of bank staff for tangible assets to grant loans.
- Lack of entrepreneurial perspective within the industry.
- Inexperience of knowledge-based companies seeking financial facilities.
- Insufficient private sector support.

3. **Laws and Regulations**:
   - Failure to comply with venture capital investment standards.
   - Long financial return periods for knowledge-based projects.
   - Requirement for company registration before receiving knowledge-based certification.
   - Outdated regulations for emerging knowledge-based industries.
   - Prolonged processes for registration, approval, and loan disbursement.

Proposed Policies and Strategies for Development

The research identified several policies and strategies for the banking system to enhance financing support for knowledge-based businesses:

1. **Central Phenomenon - Collaboration**:
   - Extensive consultations to support emerging, technology- and innovation-based companies.
   - Collaborative policies with non-governmental research and technology funds.
2. **Strategies - Investment**:
   - Granting temporary knowledge-based certification to startups based on their proposed plans, allowing access to benefits such as office space in residential properties.
   - Establishing governmental funds and organizations, as well as investment and financial facilities, to support knowledge-based companies.
   - The creation of the Innovation and Prosperity Fund in 2010.
3. **Contexts - Supportive Programs**:
   - Planning to direct supportive knowledge-based loans toward projects and products that promote company growth.
   - Approvals through the Vice Presidency for Science and Technology.
   - Small-scale loans for startups and SMEs through the Innovation and Prosperity Fund.
   - Leasing policies.
   - Fully electronic loan processing.
   - Interest-free loans for deposits.
4. **Intervening Conditions - Effective Management**:
   - Use of existing legal tools for evaluation and qualification of companies.
   - Revising evaluation, contracting, and monitoring processes for financial facilities.
   - Planning and transferring expertise to enhance stock values of these companies.

Outcomes of Financing and Participation

The identified outcomes of increased financing and participation in knowledge-based businesses include:

1. **Technology Development**:
   - Investment in research and development.
   - Procurement of advanced equipment.
   - Recruitment of specialized human resources and technical infrastructure.
   - Improved efficiency and technical performance.
2. **Increased Production Capacity**:
   - Opportunities for growth and expansion.

- Meeting market demands.
- Fostering strong competition.

3. **Market Development**:
   - Investment in marketing, advertising, communication, and market research.
   - Demonstrating competitive advantages.
   - Gaining larger market shares.
   - Targeted marketing and effective customer communication.
   - Understanding customer needs and preferences.
   - Offering market-aligned products and services.
4. **Attracting Investors**:
   - High profitability, risk-taking, and increasing company valuation.
5. **Collaboration and Networking**:
   - Collaboration and joint research with universities, research centers, and other organizations.
   - Leveraging external knowledge, expertise, and resources.
   - Greater returns on research and development.
   - Improved innovation processes.
   - Enhanced access to knowledge-based networks.

The conceptual framework for identifying barriers to financing knowledge-based businesses with an emphasis on the role of the banking system integrates these factors, policies, strategies, and outcomes. This framework provides a holistic understanding of the dynamics influencing the banking system's participation in supporting knowledge-based businesses.

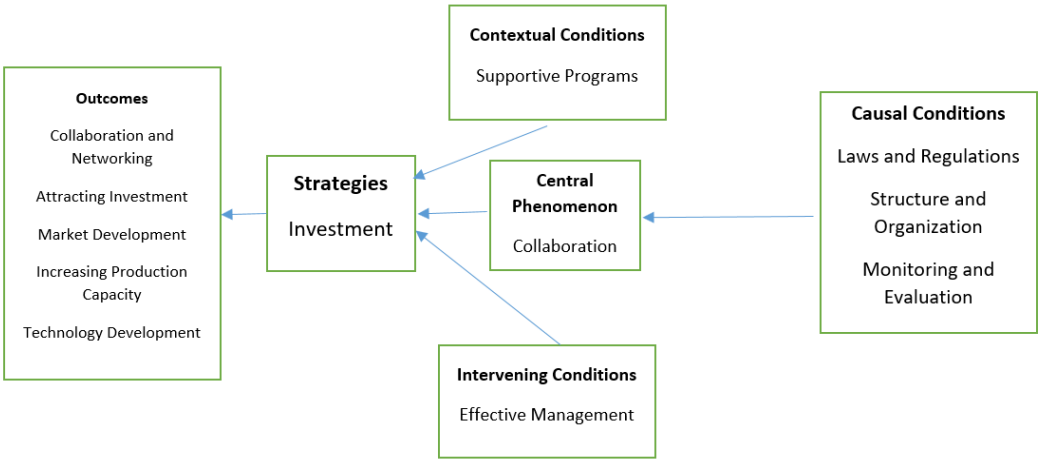

Figure 1. Final Model of the Study

4. Discussion and Conclusion

This study aimed to identify the barriers to financing knowledge-based businesses, emphasizing the role of the banking system. It sought to address the question of which causal conditions hinder greater investment and participation of the banking system in knowledge-based companies.

Based on the conducted interviews, several environmental factors (e.g., government policies, laws and regulations, business conditions, IT infrastructure) were identified as barriers to the banking system's involvement in financing knowledge-based businesses. These included:

1. **Monitoring and Evaluation**: Challenges in assessing the capacity of young entrepreneurs with innovative knowledge-based ideas, lack of information about business activities, business models, or the capabilities of knowledge-based companies, incompatibility of knowledge-based companies with advanced evaluation

processes, the need for sophisticated evaluation methods for high-risk businesses, lack of trust by banks and the government, and the absence of reliable guarantees for technological investments.

2. **Structure and Organization**: Inadequate organizational frameworks, diversity among companies, large-scale companies exceeding the financial capacity of banks, small knowledge-based companies with no access to banking networks, lack of revenue history, lack of globally standardized structures managed by professional teams, and insufficient private sector support.
3. **Laws and Regulations**: Failure to comply with venture capital standards, prolonged financial return periods for knowledge-based projects, outdated regulations, and lengthy processes for registration and approval of financial facilities.

These findings align with previous research [10, 12-15]. One of the most critical challenges in supporting emerging knowledge-based companies is their limited access to sufficient financial resources efficiently and effectively, particularly in alignment with their growth and development stages [16].

The unique characteristics of knowledge-based companies, such as reliance on intellectual assets rather than physical collateral, create barriers to their access to traditional banking systems. Banks tend to prefer financing low-risk, high-scale projects with predictable profitability, which makes them hesitant to invest in high-risk knowledge-based companies. Furthermore, current valuation methodologies fail to accurately assess intellectual and technological assets, further exacerbating the difficulty in securing bank loans.

Despite these challenges, the study identified several strategies and policies that could support knowledge-based businesses. These include:

1. **Collaboration**: Providing extensive consultations to assist emerging knowledge-based companies and fostering partnerships with non-governmental research and technology funds.
2. **Investment Strategies**: Granting temporary knowledge-based certification to startups for accessing benefits, establishing governmental funds and organizations, and creating financial facilities, such as the Innovation and Prosperity Fund established in 2010.
3. **Supportive Programs**: Directing supportive loans toward knowledge-based projects, facilitating approvals from the Vice Presidency for Science and Technology, implementing leasing policies, and fully digitizing financial processes.
4. **Effective Management**: Utilizing existing legal tools for evaluating and qualifying companies, revising evaluation and monitoring processes, and transferring expertise to improve company performance.
5. **Outcomes**: Investing in R&D, improving technical infrastructure, fostering market expansion through targeted marketing and strategic communication, and enhancing collaboration with universities and research centers to improve innovation processes and develop knowledge networks.

These findings align with studies by Fatemi Khorasgani et al. (2022), Taghavi (2022), Amiri (2022), Tajmir Riyahi & Moradi (2022), and Khateeb et al. (2021). The unique economic conditions of Iran, marked by financial crises, sanctions, and economic volatility, have amplified the need for a resilient, innovation-driven economy supported by knowledge-based businesses. Since the enactment of the "Knowledge-Based Companies Act" in 2011, over 6,000 such companies have been established nationwide.

A critical factor for the growth and development of these companies is access to financial resources, especially during early growth stages. However, the financial challenges faced by knowledge-based companies are not exclusive to Iran, as global studies highlight similar issues. The key differentiator lies in the policies and programs that governments develop to address these challenges and facilitate efficient access to financial resources. While some progress has been made in Iran, its scope and impact remain limited compared to other countries.

Policymakers should focus on creating and improving necessary infrastructure, promoting awareness about the economic benefits of knowledge-based businesses, and fostering a supportive ecosystem. The insights from this research can provide comparative perspectives for addressing financial challenges and designing effective policies across different provinces and regions. Addressing these barriers will empower knowledge-based companies to play a significant role in national economic development.

Limitations of this study include potential biases in interview responses and reliance on qualitative methods, which inherently involve subjective judgment. Future research could expand this study's scope by employing mixed-method approaches to provide a more comprehensive understanding of the financial challenges faced by knowledge-based businesses.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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