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Analysis of Content-Structural- Barriers of Knowledge-Based Companies (Case of Study: International Science and Technology Park of Islamic Republic of Iran)

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Abstract

Knowledge-based companies, focusing on knowledge-intensive products and services, create significant leaps in national production and innovation. However, they continually face challenges in achieving their goals that require serious attention. The present study utilized grounded theory and content analysis techniques to identify and analyze the content-structural barriers of knowledge-based companies located in the International Science and Technology Park of the Islamic Republic of Iran. The study population consisted of 23 CEOs, executive managers, and technical specialists of knowledge-based companies, primarily active in the field of medical equipment and similar products. Sampling was performed using a purposive snowball method. Research validation was achieved through the examination of diverse perspectives, with data collection conducted at different times and locations involving experts from various groups. The structural and content challenges were categorized into 10 sub-categories, comprising 114 open codes. Findings revealed that in the structural dimension, "weakness in structure and organization," "deficiencies in human resource management," "ineffective processes, standards, and products," "financial and investment incapability," and "deficiencies in research and development" were among the most critical challenges. In the content dimension, "managerial weaknesses," "human resource shortcomings," "lack of market awareness," "deficiencies in innovation and new product development," and "weak organizational culture" were identified as major barriers faced by the studied companies.

Keywords: Knowledge-based company, Structural barriers, Content barriers, Science and Technology Park, Medical equipment.

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Introduction

Knowledge-based companies, as the driving force of the knowledge-based economy, play a key role in transforming science into wealth, enhancing national competitiveness, and creating an effective bridge between industry and academia. In Iran, these companies have received special attention, relying on laws such as the Knowledge-Based Companies Law (approved in 2010) and the support of upstream documents such as the 2020 Vision Document and the Resistance Economy Policies. However, statistics show that many of these companies are either eliminated from the production cycle or remain small-scale due to numerous challenges. Therefore, it is essential to be aware of the inhibitors of their growth and sustainability.

The present study was conducted with the main aim of identifying and analyzing the content-structural **barriers** of knowledge-based companies active in the field of medical equipment located in the International Science and Technology Park of the Islamic Republic of Iran. This area was selected due to the strategic position of medical equipment in the development of new technologies and the selection of this park due to its unique characteristics as one of the most important supporting institutions of the country's innovation ecosystem. In this study, the **barriers** are divided into two main categories: a) Structural **barriers**: including factors such as bureaucratic and mechanical structures, lack of organizational flexibility, weakness in interdepartmental coordination, lack of effective networking with universities and research institutes, financial and investment constraints, lack or weakness of the Research and Development (R&D) unit, and legal and intellectual property problems. b) Content **barriers**: including lack of skilled and specialized human resources, conservative organizational culture and resistance to change, lack of appropriate reward systems, mismatch of employee skills with technological needs, and weakness in knowledge management. A review of the research background (domestic and foreign) shows that researchers such as Gholipour (2015), Fallah Haghighi (2017), Golalizadeh (2011), Fartash (2012), on the one hand, and Smith (2024), Rodriguez (2024), and Thomson (2024) on the other hand, have confirmed challenges such as economic problems, uneven support policies, weak financing, legal inadequacies, shortage of skilled labor, and barriers to commercialization, respectively. However, few studies have simultaneously and systematically analyzed the interaction of structural and content barriers in knowledge-based companies in the field of medical equipment. The findings of this study can provide a deep and multidimensional understanding of growth barriers and help policymakers, science and technology park managers, and company founders in making strategic decisions, designing facilitating mechanisms, improving innovation processes, and increasing the sustainability and competitiveness of the country's technology .

Research Methodology

The present study is qualitative in its approach and was conducted using grounded theory. This approach allows the researcher to extract theories and concepts directly from the field data, rather than based on prior assumptions. Population and Sample: The study population consisted of 23 CEOs, executive managers, and technical experts of knowledge-based companies active in the field of medical devices and related industries. All of these companies were located in the International Science and Technology Park of the Islamic Republic of Iran. The sampling method was purposeful snowball sampling, meaning that key individuals were first identified and then they introduced other eligible participants. Data Collection Tools and Methods: Data were collected using semi-structured interviews. This type of interview allowed the researcher to have the necessary flexibility to explore the details and in-depth perspectives of the participants, while having a general framework of questions.Data Analysis Method: Data analysis was conducted based on content analysis and in three stages:

1 .Open coding: The interview texts were examined line by line and in detail, and the initial concepts were extracted as open codes.
2 .Axial coding: Open codes that were semantically and conceptually close were categorized into subcategories.
3 .Selective coding: Subcategories were converted into main categories and relationships were established between them .

Research Findings

This study aimed to investigate the barriers to the activities of Iranian knowledge-based companies, through interviews with CEOs, executive managers, and technical experts of 23 knowledge-based companies located in the International Science and Technology Park of the Islamic Republic of Iran. The respondents were mainly male with an average age of 45 years, and most of the companies were active in the field of medical equipment and related industries.

Regarding content (behavioral) barriers, the analysis of the interviews led to the identification of five subcategories with 47 open codes:

1 .Managerial weaknesses (12 codes): including lack of sufficient expertise in management, lack of management knowledge at high levels, lack of leadership, lack of familiarity with legal issues and supporting laws, tasteful behavior, lack of critical thinking, lack of motivation, involvement in unimportant issues, detail-orientedness, weakness in strategic thinking, and inability to retain specialized personnel.
2 .Weakness in human resources (10 codes): Includes lack of attention from employees to processes, limited human resources, lack of specialist staff, departure of elites, lack of teamwork spirit, lack of motivation, young human resources, teams being new, and lack of experienced consultants.
3 .Lack of knowledge of the market (13 codes): Includes weakness in negotiations for the supply of raw materials, ignorance of sales techniques, inability to communicate internationally, weakness in exporting, lack of knowledge of future markets and market rules, negative consumer experiences, and lack of experience in business.
4 .Weakness in innovation and presenting new products (7 codes): Includes inability to define innovative products in line with technological growth, failure to attract sufficient funding for innovative development, weakness in introducing product portfolios, lack of knowledge of communication networks, weakness in advertising, and inappropriate timing of product presentation.
5 .Weakness in organizational culture (5 codes): Includes negative atmosphere and resistance to change, weak organizational culture, lack of confidence in local technology, traditional economic beliefs, and lack of familiarity with professional culture in the market and production.

Structural barriers include five subcategories with 67 open codes:

1 .Weak structure and organization (22 codes): lack of agility and flexibility, bureaucracy, classic and insular structure, ineffective communication, lack of organizational architecture, lack of changes along with growth, lack of transparency in government and insurance support, and small structure.
2 .Weak human resource management (9 codes): weak knowledge management, lack of written guidelines for attracting and retaining experts, lack of incentive and reward system, and lack of access to experts due to being far from the center.
3 .Weak processes, standards, and products (15 codes): lack of identification and standardization of processes, lack of maintenance of production knowledge, lack of specialized software, low quality of products, and low competitiveness of the product portfolio.
4 .Financial and investment inability (13 codes): lack of profitability, high cost of production and prototypes, limited financial resources, lack of facilities, weakness in attracting financial resources, and lack of access to government support.

5. Weakness of research and development (8 codes): Lack of active R&D unit, high laboratory costs, lack of familiarity with R&D outsourcing, lack of technical expertise, and unjustifiable investment in this sector.

Overall, based on the research findings, addressing these structural and content challenges is essential to improve the performance of knowledge-based companies, strengthen the innovation ecosystem, and achieve sustainable development and international competitiveness.

Conclusion

The present study used the fundamental conceptualization theory to examine the structural and content barriers of knowledge-based companies located in the International Science and Technology Park of Iran. Structural barriers include physical and non-human factors of the organization (such as structure, processes, financial resources) and content barriers include behavioral and human factors (such as management skills, organizational culture). The findings showed that knowledge-based companies face 10 subcategories and 114 barrier codes. In the structural dimension, the challenges of weak structure and organization, weak human resource management, weak processes and standards, financial and investment incapacity, and weak research and development were identified. In the content dimension, the challenges of weak managers, weak human resources, lack of market knowledge, weak innovation, and weak organizational culture were identified. These findings are consistent with the results of previous studies (Golalizadeh (2022), Fallah Haghighi (2017), Noorollahi (2024), and others). Informal and flexible structures are more successful in adopting innovation, and lack of financial resources limits the ability of companies to conduct research and development. Weak leadership and inappropriate organizational culture are also major barriers to innovation. The research's recommendations include: improving the organizational structure by designing agile and matrix structures, teaching management skills to founders, facilitating access to financial resources through venture capital funds, strengthening the R&D unit in collaboration with universities, being more market-oriented, and promoting a culture of innovation through training workshops. The government can also play an effective role in removing these barriers by providing tax exemptions, reducing bureaucracy, and facilitating patent registration**.**

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