KMANPUB | AI and Tech in Behavioral and Social Sciences Vol. 2 No. 3 (2024): 29-35

Article history:
Received 23 March 2023
Revised 13 June 2024
Accepted 23 June 2024
Published online 01 July 2024

Designing a New Product Development Model Based on Open Innovation Using the Grounded Theory Approach

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A r t i c l e I n f o

Article type:
Original Research

How to cite this article:
Valimohamadi, S., Kalantari, M., & Makizadeh, V. (2024). Designing a New Product Development Model Based on Open Innovation Using the Grounded Theory Approach. *AI and Tech in Behavioral and Social Sciences*, *2*(3), 29-35.
https://doi.org/10.61838/kman.aitech.2.3.4

A B S T R A C T

Developing new products through open innovation as a strategic approach not only aids organizations in discovering new markets but also facilitates the creation of innovative and valuable products and services. This research aims to propose a new product development model based on open innovation in small and medium-sized enterprises (SMEs). This research employed a qualitative-inductive approach utilizing the Strauss-Corbin grounded theory method. The data collection tool was a semi-structured interview. Using the grounded theory method, data obtained from interviews with 16 managers of SMEs were analyzed through three stages of open, axial, and selective coding. The findings revealed a general category in the form of a paradigm model, which includes causal conditions (financial incentives, competitive advantage, core strategy, market orientation, and customer orientation); core phenomenon (opportunism, organizational resources—both tangible and intangible, process capabilities, product commercialization, and organizational ambivalence); underlying conditions (lack of financial resources for new product development, limited access to modern technology for design, testing, and production, insufficient specialized manpower and technical knowledge, and a scarcity of idea centers in the country compared to other nations); intervening conditions (sanctions and governmental bureaucracies); and strategies (strategic foresight, leveraging network capabilities, centralized marketing, and differentiated marketing). The consequences identified include financial-economic, marketing, and structural outcomes. SMEs are often recognized as critical economic and entrepreneurial components in many countries, playing a significant role in job creation and economic growth. Developing new products through open innovation is a strategic approach that fosters the creation of innovative and valuable products and services by leveraging cooperation and interaction with both internal and external stakeholders of SMEs.

Keywords: *new product development, open innovation, small and medium enterprises.*

1. Introduction

For over half a century, the structure of many businesses has transformed due to resource shortages, the shift away from oil-dependent economies, and the adoption of new technologies, inclining towards the establishment of small and medium-sized enterprises (SMEs) (Abhari & McGuckin, 2023). Today, issues such as rapid market changes, population pressures, continuous innovations, increasingly complex managerial and decision-making processes, the necessity for instantaneous decision-making, and rapidly changing customer demands underscore the importance of focusing on SMEs and the inclination towards these companies (Barbosa et al., 2021).

To achieve superior market performance in a highly competitive business environment, organizations must develop new products and leverage organizational resources and capabilities for proper development (Ozdemir et al., 2020). Given that the failure of new products results in significant costs for organizations, planning with a competitive approach has become essential for companies to implement suitable strategies in the competitive landscape (Cooper, 2019). A crucial factor for success in the current turbulent environment is the organization's capability to develop new products (Posch & Garaus, 2020). Companies need to develop their products more rapidly and produce new and innovative products to succeed in this scenario (Wu & Hu, 2018). Moreover, identifying factors influencing the success of new product development is a significant managerial concern. In this environment, factors such as sanctions, government regulations, state-owned company monopolies, traditional businesses, and the instability of economic conditions, especially currency exchange rate fluctuations, are of paramount importance (Ghazi Nouri et al., 2020).

One of the most important factors that can impact the development of new products is open innovation (Sahami et al., 2020). Open innovation involves the beneficial and purposeful use of innovations, ideas, and internal and external knowledge of the organization to accelerate internal innovation and create value for the organization (Sahami et al., 2020). Consequently, every year, companies and organizations allocate significant costs to their research and development units (Pustovrh et al., 2020). Additionally, intra-organizational relationships enhance research and development and the performance of organizational innovation (Ren et al., 2015).

The issue, however, is that innovation in SMEs in Iran does not have an appropriate standing. Iranian SMEs face specific challenges such as resource shortages, lack of strong liquidity, absence of research and development departments, and difficulties in sourcing necessary resources and materials, leading to poor performance (Ahmadi et al., 2018). This article examines the importance and advantages of new product development based on open innovation for SMEs and explores the challenges and solutions for successfully implementing this approach in SMEs. This research plays a crucial role in the sustainable growth and development of these companies in today's competitive markets. Although various models and theories have been proposed in the field of new product development, it appears that the models are often fragmented and developed in other countries, which may not satisfactorily provide the appropriate indigenous components for Iran. Consequently, SMEs lack a model for measuring and operationalizing new product development. The results of this study could offer a suitable model that enables the adaptation and development of new products based on open innovation for the SMEs under study, thereby addressing the research gap. Therefore, the main research question is: How can a model for new product development based on open innovation be developed and explained for SMEs?

2. Methods and Materials

Given that the objective of this research is to design a new product development model based on open innovation using a grounded theory approach, the present study is classified as applied developmental research in terms of its goal. It employs a cross-sectional survey method for data collection and adopts a qualitative approach regarding the nature of the data and research methodology. To address the research questions, library studies and a review of literature and related theoretical backgrounds, along with interviews, were utilized. Descriptive and inferential statistical methods were applied to examine the research questions.

The primary aim of the qualitative research is to discover variables and constructs related to the conceptual model of designing a new product development model based on open innovation and to develop an appropriate model for it. The adequacy of the number of studied samples was achieved through the saturation (adequacy) theory method. In this research, to implement the grounded data strategy, a systematic approach with three techniques of open, axial, and selective coding was used. Data were collected and described using tools such as observation of organizational actions related to the research topic and exploratory interviews with managers of SMEs. The interview sample consisted of 16 individuals, selected using purposive sampling and snowball sampling methods. Semi-structured, in-depth interviews with open-ended questions were conducted with these participants. The data analysis method employed for the interview data was the grounded theory method.

3. Findings and Results

In this study, 37% of the experts were in the age group of 39-45 years, 43.75% were in the age group of 46-50

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E-ISSN: 3041-9433

years, and 18.75% were in the age group of 51-55 years. Regarding educational qualifications, 37.5% of the experts held a doctoral degree, while 62.5% possessed a master's degree. In terms of work experience, 25% of the experts had 15-20 years of experience, 31.25% had 21-25 years of experience, 37.5% had 26-30 years of experience, and 6.25% had over 30 years of experience. Marketing managers constituted 25% of the total experts, factory managers and sales managers each accounted for 18.75%, and other positions each represented 6.25% of the total experts.

To address the research question, "What is the conceptual paradigm for new product development based on open innovation?", open and axial coding for each section of the grounded theory model are presented as follows:

Causal Conditions for New Product Development Based on Open Innovation: Causal conditions are categories that influence the central category. Based on the conducted interviews, the axial codes "financial incentives, gaining competitive advantage, core strategy, market orientation, and customer orientation" were identified. These were then linked to a broader selective code known as causal conditions.

Central Phenomena: Central phenomena refer to the ideas or phenomena that are central processes to which all main categories are related. These include opportunism, organizational resources (both tangible and intangible), process capabilities, product commercialization, and organizational ambidexterity.

Contextual Conditions for the Development of New Products Based on Open Innovation: These conditions refer to the specific characteristics and settings in which events related to the phenomenon occur. These conditions influence the strategies of action and reaction and include the scarcity of financial resources for product development, lack of access to modern technology for design, testing, and production, shortage of specialized human resources and technical knowledge, and the absence of idea-generating centers within the country.

Intervening Conditions for Developing New Products Based on Open Innovation: These structural conditions pertain to the phenomenon and affect the strategies of action and reaction. They either facilitate or constrain the strategies within a specific context. Participants indicated that sanctions and administrative and governmental bureaucracy are the intervening conditions.

Strategies for Developing New Products Based on Open Innovation: Strategies are actions and reactions aimed at controlling, managing, and providing feedback on the phenomenon under study. Strategies are purposeful and carried out for a reason. The strategies in this research include strategic foresight, leveraging network capabilities, using focused marketing, and using segmented marketing.

Outcomes of Developing New Products Based on Open Innovation: The outcomes are the results that emerge from the strategies. Outcomes are the results of actions and reactions. They cannot always be predicted and are not necessarily those intended by individuals. Additionally, what is considered an outcome at one point in time may become part of the conditions and factors at another time. Based on the interviews conducted, the outcomes include financial-economic outcomes, marketing outcomes, and structural outcomes.

Table 1

Final Coding

Axial Codes	Paradigmatic Codes
Causal Factors	Financial Drivers
	Gaining Competitive Advantage
	Core Strategy
	Market Orientation
	Customer Orientation
Central Factors	Opportunity Seeking
	Organizational Resources (Tangible and Intangible)
	Process Capabilities
	Product Commercialization
	Organizational Ambidexterity
Contextual Factors	Lack of Financial Resources for New Product Development
	Lack of Access to Up-to-Date Technology for Design, Testing, and Production
	Shortage of Skilled Human Resources and Necessary Technical Knowledge
	Lack of Idea Centers in the Country Compared to Other Countries

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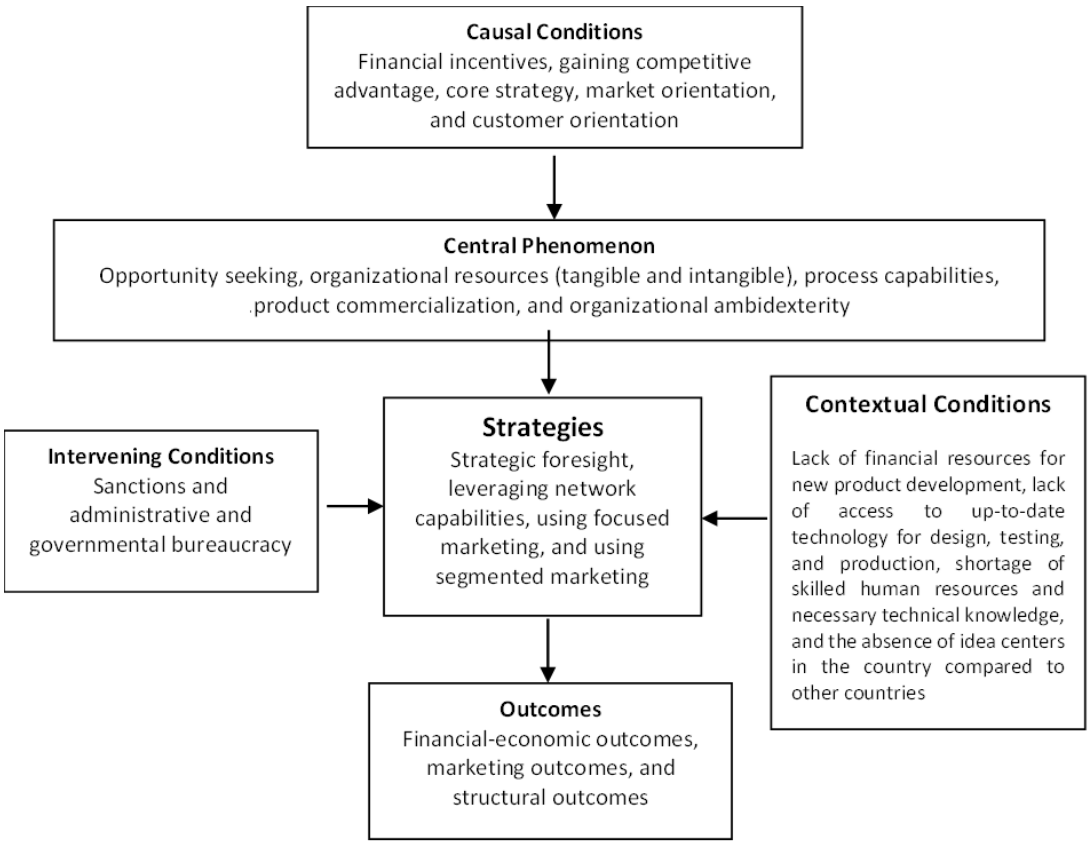
Intervening Factors	Sanctions
	Administrative and Government Bureaucracies
Strategic Factors	Strategic Foresight
	Utilizing Network Capabilities
	Utilizing Concentrated Marketing
	Utilizing Differentiated Marketing
Outcomes	Financial-Economic Outcomes
	Marketing Outcomes
	Structural Outcomes

In the selective coding stage of this research, the relationship of the main category with other categories was determined. In this phase, the main and subcategories were connected to one another to generate theoretical concepts aimed at "designing a model for new product development based on open innovation using the grounded theory approach." These actions enabled the researcher to integrate the concepts obtained during the open and axial coding stages and utilize them to present a comprehensive model. For this purpose, within the framework of qualitative research methodology, and using the paradigm proposed by Corbin and Strauss (2007), the role of the extracted categories was identified within the paradigm model.

As observed, Figure 1 illustrates the coding paradigm, or in other words, the qualitative research process model.

Figure 1

Coding Paradigm



4. Discussion and Conclusion

Small and Medium-sized Enterprises (SMEs) are often recognized as the most crucial components of the economy and entrepreneurship in many countries, playing a vital role in job creation and economic growth. Developing new products based on open innovation is a strategic approach that, through collaboration and interaction with individuals both inside and outside SMEs, leads to the creation of

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E-ISSN: 3041-9433

innovative and valuable products and services. The increasing complexity of products and services, rapid changes in market demands, and growing pressures from various social groups are trends that compel companies to adopt new competitiveness practices. Searching for external information and integrating it into innovation is a method that can lead to greater competitive success. Today, innovative organizations can optimize their effectiveness and efficiency by improving managerial relationships and using innovation strategies to discover and exploit new opportunities. Thus, innovation is regarded as a vital principle for organizations. They must leverage both internal capacities to be more innovative and utilize external technologies in their programs.

Based on the grounded theory research, the identified factors include causal conditions (financial incentives, gaining competitive advantage, core strategy, market orientation, and customer orientation), contextual conditions (lack of financial resources for developing new products, lack of access to up-to-date technology for design, testing, and production, shortage of skilled human resources and necessary technical knowledge, and the absence of idea centers in the country compared to other countries), intervening conditions (sanctions and administrative and governmental bureaucracy), and strategies (strategic foresight, leveraging network capabilities, using focused marketing, and using segmented marketing), and outcomes (financial-economic outcomes, marketing outcomes, and structural outcomes) with the central phenomenon (opportunity seeking, organizational resources (tangible and intangible), process capabilities, product commercialization, and organizational ambidexterity) being identified.

Ultimately, these conditions and strategies result in the formation of new opportunities and the encounter with diverse challenges in developing new products based on open innovation, which requires meticulous and strategic planning for their management. Developing new products based on open innovation is considered a highly significant and effective strategy for SMEs. Due to financial constraints and limited human resources, these companies may face challenges in competing with larger companies. However, utilizing open innovation allows them to access external resources and leverage diverse knowledge and ideas present in various communities. SMEs that are innovative demonstrate higher productivity and growth rates and achieve greater profitability compared to their less innovative counterparts. This innovation model enables SMEs to compete with larger companies by reducing costs and increasing the efficiency of the product development process.

Since innovation is one of the crucial ways to compete in the market, it leads to cost reduction or product differentiation (Lee et al., 2010; Posch & Garaus, 2020; Pustovrh et al., 2020; Sahami et al., 2020; Temel & Vanhaverbeke, 2020). Companies that do not pursue product improvement and the development of new products lag in international competition and become more vulnerable. Despite typically facing resource constraints, SMEs are considered successful innovators. Given that open innovation is crucial for the financial success and survival of SMEs in global markets, the role of open innovation has become a vital topic for new product development and the survival of these companies in the competitive landscape (De Coninck et al., 2023; Maqdliyan & Setiawan, 2023; Remneland Wikhamn et al., 2023).

Moreover, this approach enables them to establish better connections with customers and consider their needs and preferences in the product development process. By engaging customers and various communities, SMEs can incorporate new ideas into their products and conduct more effective marketing and advertising. To implement new product development based on open innovation, companies should pay special attention to creating spaces and tools that encourage participation and collaboration among employees, customers, independent developers, and local communities (De Marco et al., 2020; Ghazi Nouri et al., 2020).

Given that the variability of competitive rules in the business world has become inevitable, the process of introducing new products to the market has gained particular importance, and most organizations today realize more than ever that merely relying on traditional competitive levers such as improving quality, reducing costs, and differentiating in product offerings is not enough. Instead, concepts such as speed and flexibility in competition have become significantly prominent, and the inclination towards introducing new products to the market justifies this change in perspective.

Therefore, these actions can be effective in creating more valuable products and increasing the competitive capability of companies. Developing new products based on open innovation for SMEs can serve as a powerful tool for growth and advancement in the market, placing them on the path to success. The advantages of this model include increased innovation and creativity, encouraging

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collaboration and interaction, enhancing flexibility and speed of action, boosting competitiveness, and establishing close relationships with customers. Based on the results of the present study, the following recommendations are proposed:

Providing a space for internal and external participants from the community to share their ideas, opinions, and suggestions for product development.

- Using various technologies such as online platforms, collaboration software, and management tools for sharing information and collaborating in product development.
- Creating policies and reward programs for active participation and successful idea submission in the product development process.
- Establishing collaborations with startups, universities, and innovative communities for the exchange of ideas, knowledge, and resources.
- Ensuring senior management support in SMEs for the assessment and commitment to open innovation actions.
- Using incentives and diverse educational programs for new product development in SMEs.
- Utilizing existing internal knowledge resources for innovation while simultaneously integrating external knowledge resources in the research and development programs of SMEs.
- Systematically scanning the external environment of companies to analyze up-to-date technology, information, ideas, and new knowledge for product development in SMEs.
- Undertaking technological foresight and utilizing information and technology beyond organizational boundaries for SMEs.
- Commercializing products to create value, gain competitive advantage, and develop new products in SMEs.
- Considering external resources to complement and enhance research and development for product development in SMEs.
- Strategic foresight by managers in SMEs to utilize information beyond organizational boundaries.
- Holding brainstorming sessions to exchange information for new product development in SMEs.

Authors' Contributions

A.T.K. conceptualized the study, designed the research methodology, and supervised the overall project implementation. M.A. conducted the semi-structured interviews, transcribed the recordings, and led the data analysis using the grounded theory method. V.M. assisted with participant recruitment, supported the data collection process, and contributed to the literature review. All authors collaborated on coding the data through open, axial, and selective coding stages, and interpreted the results. They also worked together on drafting and revising the manuscript, discussing the findings, and critically reviewing the content for important intellectual insights. All authors approved the final version of the manuscript for publication.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

Acknowledgments

We would like to express our gratitude to all individuals helped us to do the project.

Declaration of Interest

The authors report no conflict of interest.

Funding

According to the authors, this article has no financial support.

Ethics Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

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