

Identifying the Components of the Open Innovation Maturity Model in Iran's Defense Industries based on Meta-Synthesis Method

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Abstract

The purpose of this research is to identify the dimensions and components of the maturity model of the open innovation ecosystem in Iran's defense industries based on the purposeful use of knowledge flows, in the form of ideas, science or technology in order to create value that can bring significant benefits to the individuals and organizations, including accelerating the main processes inside the organization (internal innovation) or expanding the market (external innovation) outside the organization. This research is an applied-basic one. In order to do so, 485 papers in the field of open innovation were collected using the meta-synthesis method. Based on the algorithm for selecting the final articles, the data of 80 articles were analyzed, and the maturity model of open innovation ecosystem was designed using the coding method and Maxqda Analytics Pro Software. To check the quality or reliability of the indicators, Kappa coefficient was used in SPSS software, which is equal to 0.86 in the current research, that indicates the appropriate reliability of the indicators. The analysis of the concluding model and the findings of this research showed that the open innovation ecosystem has several components in forms of 13 categories and 23 concepts, including collaborations and joint ventures, investment in ideas and research, and crowdsourcing. Also, the results showed that participating in investment, making mutual contracts with companies active in the field of business, and acquiring small and knowledge-based companies can accelerate the main processes of innovation within the organization.

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Extended Abstract

Introduction

The open innovation approach is a paradigm that assumes, in line with its technological development in sales, a company should also exploit external ideas (including customers, competitors, industry, suppliers and so on) as easily as the internal ideas it uses for its activities. (Podmetina et al, 2019). In recent years, we have seen an increase in the efforts of the defense industries of countries with high military power to improve their innovation process through open innovation, because problems such as reducing the defense budget of countries and increasing the dispersion of knowledge in society for the development of new products, has made research-based innovation domestic development difficult or low productivity. On the other hand, open innovation success factors such as external networking, technological intelligence innovation means, absorption capacity, market business model and human factors such as culture and motivation should be taken into consideration (Spender et al, 2017). By implementing the open innovation plan and creating a dynamic and two-way interaction between the owners of innovation and the country's military organizations, especially the defense industries, employees, owners of the best ideas and innovative entrepreneurs should be placed at the service of solving the problems of the defense industries. The use of open innovation in the defense industry, which is considered one of the sources of innovation, in order to collect pure data from the internal and external environment and transform it into knowledge in order to survive in a very changing environment, is of particular importance. In such a situation, the tools that can help the defense industry in achieving its goals is the use of the innovation ecosystem based on the open innovation approach.

Theoretical Framework

The term ecosystem, which originated from the word ecology, was proposed for the first time by an Italian ecologist named Tanzelli in 1935. It is the basic functional unit of the bio-environment, which is formed by biotic communities interacting with their non-living or unnatural environment. A living community and its environment together represent an ecosystem. Therefore, ecosystem includes living organisms (living community) and non-living environment (non-living community) that are separately related and interact (Granstrand and Holgersson, 2020).

Open innovation is defined as: Targeted use of knowledge inflows and outflows to accelerate internal innovation and then develop markets for external use of innovation. Open innovation is a new approach that states that when seeking to improve technology and knowledge derived from their research, organizations should, in addition to internal ideas, apply external ideas from internal and external paths to the market (Boger et al, 2018).

Research methodology

This research is fundamental in terms of its purpose and exploratory in terms of nature because it is done with the intention of practical application of knowledge and application of findings to answer the questions raised in Iran's defense industry. The qualitative method used in this research is the meta-synthesis of Sandelowski and Barroso (2007). Because in this research, a general sentence is deduced by using detailed information and establishing a relationship between them, and observations are made on specific events in a sample of the industry (Iran's defense industries) and then the inference is made about all the members of the industry based on the observation of incidents or events, the research approach is inductive type (that is, reaching from the part to the whole). The strategy of this research is qualitative. Because this research aims to create a new theory and develop knowledge about

the open innovation ecosystem, the purpose of the research is exploration. Also, meta-composite method is used in this research and the approach of this research is qualitative (data collection, documentary-meta-composite). Kappa coefficient was used in SPSS software to check the quality or reliability of indicators.

Research findings

First step: Setting research questions. Proposing the research questions in meta-composite analysis before starting the next steps of the research determines its general framework: what? According to the background study, what are the main concepts and key categories of the open innovation ecosystem? And what should be the appropriate framework for explaining the open innovation ecosystem? Study community (who)?

Second step: systematic review of texts. In this step, the most relevant studies were identified and the less relevant studies were separated. The articles are taken from several sites, including the Journal of Corporate and Industrial Changes, the Quarterly Journal of Technology Development Management, the Quarterly Journal of Innovation and Value Creation, the California Journal of Management, the MIT University Policy and Innovation Science Lab, the Journal of Information and Management, the Journal of Management Improvement, technology forecasting and social change magazine, innovation management magazine, research and development management magazine, innovation management magazine in defense organizations, international innovation management magazine, government information quarterly, technology development quarterly and so on. The period of extraction of Iranian articles is between 1394 and 1400 (2015 to 2021) and foreign articles between 2006 and 2022. The total number of Iranian articles was 240 and foreign articles were 245, and a total of 485 articles were reviewed.

The third step: searching and choosing suitable articles; Glynn's (2006) tool "Basic Evaluation Skills Program" was used to evaluate the quality of researches (Glynn, 2006). To select suitable articles, various parameters such as title, abstract, content, access, and research method quality have been evaluated.

Fourth step: extracting the results; The information of the articles based on the reference of each article, including the title of the article, the name of the authors, the year of article publication, research method, theoretical concepts, open innovation ecosystem methods, challenges of the open innovation ecosystem, and the application of the open innovation ecosystem in each article was classified.

Fifth step: analysis and consolidation of findings. At this stage, a three-stage coding approach was used through which, all the remaining studies were studied and coded in three stages. Based on the analysis and content analysis of the articles, 80 final articles were selected and a total of 13 categories, 23 concepts and 85 final codes for the components of the open innovation ecosystem were discovered and labeled in this research.

Sixth step: quality control of extracted codes. Reliability of the research focusing on how much the research results can be repeated by other researchers, step-by-step documentation of the stages has been used. In this research, Kappa coefficient was used in SPSS software to check the quality or reliability of indicators.

Seventh step: presentation of findings; By analyzing the content of the final selected articles, thirteen main categories including collaborations and joint investments, investment in ideas and research, utilization of knowledge and crowdsourcing, creating strategic alliances, purchasing new products and services. use of new business models, cooperation with partners and networking, use of domestic and foreign technology, use of new market capacities, establishing relationships with stakeholders, cooperation with research organizations, startups

and competitors, participation in events and holding events, and protection of inventions and intellectual property were presented.

Conclusion

The present article has presented an integrated framework in the field of open innovation ecosystem research by organizing scattered studies in the field of "open innovation ecosystem" in a meta-combination method. Based on the results, the open innovation ecosystem framework is set in thirteen categories and twenty three concepts. The resulting categories of this article are collaborations and joint investments, investment in ideas and research, exploitation of knowledge and crowdsourcing, creation of strategic alliances, purchase of new products and services, use of models New business opportunities, cooperation with partners and networking, use of domestic and foreign technology, use of new market capacities, establishing relationships with stakeholders, cooperation with research organizations, start-ups and Competitors, participating in and holding events, and protecting inventions and intellectual property.

According to the stated contents and the results of this research, suggestions and solutions based on open innovation ecosystem models are presented:

- 1) Providing the license to use the company's brand to other companies in order to carry out activities, and receiving the license to use the brand of other companies in return.
- 2) Participation in investment with active and generally small companies or individuals in the field of business, concluding joint investment contracts with companies active in the field of business, acquisition of small and knowledge-based companies and use their knowledge in the field of business, supporting and using the knowledge of startups that operate in the field of business, and buying the intellectual property of reputable brands.
- 3) Cooperating with suppliers and negotiating payment in the field of business.
- 4) Carrying out research-oriented activities, including: supporting research in the field of business, applying business ideas using the "crowd sourcing" method, cooperating with research centers of universities and science and technology parks to obtain up-to-date knowledge in the field of business, and outsourcing research and development activities to obtain capabilities, skills, and innovation opportunities.
- 5) Carrying out knowledge-oriented activities, including the internal discovery of knowledge through holding an idea contest within the company, exploiting the internal knowledge discovered in the company, and setting up knowledge management systems in the organization with the aim of establishing communication between experts and experienced people of the organization and the combined use of knowledge and experience.
- 6) Use of intermediaries and types of networks in promoting business processes: social networks, internal networks, external networks, customer networks and the like.
- 7) Empowerment and localization of competitors' findings in business areas, such as business model localization, and conducting joint research with competitors in a joint study center.