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Taking the Future-Oriented Analyzing the Functions of Native Search Engine in the Process of Innovation and Commercialization

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Abstract
This article seeks to explain the functions of the development of the native Search Engine in the process of commercialization of services and the growth of businesses in the country by using the concept of innovation system and using a functional approach. To achieve this goal, a qualitative survey research method was used. The research community included academic and non-academic faculty members working on the native Search Engine project, and 17 of them were selected as a sample. The tool used in this research was a questionnaire, and comparative content analysis was used to analyze the data. To validate the obtained results, the focus group method was used, and for this purpose, 10 experts and specialists in the field of development of local producers were selected in the focus group. The findings of the research showed that the government has played a key role as the main driver in the formation of institutionalization and legalization functions, guiding and direction research and innovation, and providing and allocating resources in the first step of the road map of native search engine development. In the second step, the creation and dissemination of knowledge functions (supply side function), and in the third step, the functions of market formation and entrepreneurship have been activated in the direction of commercialization of native Search Engine (demand side function). The main problem of search engine development is the interaction among different functions.

Keywords: *Commercialization, Native Search Engine, Function Analysis*

Introduction

The concept of an innovation system has been widely used in the field of analysis, problem-solving, and providing policy solutions for technology development and innovation. (Carlsson, Jacobsson, 2014, Lipsey, 2001) This approach was first presented by Carlsson in 1991. (Carlsson, Stankiewicz, 1991) This approach is based on network analysis Organizations and institutions formed in the production, development, dissemination, and exploitation of technology have much more accurate results than the reviews of the national innovation system and sector innovation which have a more general approach. With the above explanation, this approach provides a suitable opportunity to investigate and reveal the relevant factors in each step of technology development, and as a result, it is expected that a more appropriate technological policy will be made.

One of the ways to analyze and understand any innovation system can be to examine its functions or activities, which are based on the knowledge of the main processes of innovation, i.e. creation, dissemination, and exploitation of knowledge, technology, and innovation. (Carlsson, Jacobsson, 2014, Smit

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et al, 2010:45)The research on the development of native Search Engine has been considered as the development of a national innovative plan. There are at least three reasons for using the functional approach in the analysis of the innovation system. First, this approach provides a possibility to compare the performance of different innovation systems that have different institutional structures; Secondly, the functional-oriented approach provides the possibility to use a systematic method to draw and analyze the dimensions of innovation and increases the analytical level of the innovation system; Thirdly, the functional -oriented approach has to providing a clear set of policy goals as well as the necessary policy tools to realize these goals (Lipsey,2001, Carlsson ,Stankiewicz,1991)

At the same time, many kinds of research that have been conducted in the field of the function-oriented approach have lacked the investigation of key factors to achieve that function by focusing on business capabilities and commercialization; Therefore, in this article, firstly, by conducting library studies, the key factors affecting the functions have been extracted. Then, the performance of different stages of the development of native Search Engine as a national innovative plan based on a functional-based approach is investigated, and the sequence of formation of development functions and the conceptual model of creating a market of native Search Engine are presented

Reviewing the background and presenting the theoretical framework

Carlson and his colleagues 1991 defined technological systems as follows: a dynamic network of actors who interact with each other in an economic and industrial context and under a specific institutional framework and play a role in the creation, dissemination, and exploitation of technology. (Carlsson etal, 1991)This concept is usually used to explain how a technology emerges, grows, and spreads in society, and therefore it can be called the innovation system of a specific technology or the technological innovation system.

There are at least two approaches to analyzing the innovation system: the first approach is based on the structural analysis of the innovation system and the recognition of the existing actors and interactions of the system.

The second approach, instead of focusing on the structure, has focused on the activities or functions of the innovation system. As a result, this approach focuses on the performance dynamics of the innovation system and what is realized in this system, not only paying attention to the structural elements of the system. Therefore, this approach provides the conditions to separate the structure from the content and makes it possible to formulate and analyze policy goals and policy issues in functional dimensions (Hekkert et al, 2009, Hekkert et al, 2007).

Among other things, functional analysis is the ability to analyze the dynamics of technological changes and examine the historical course, emerging technologies, and infrastructures necessary for policymaking (Janda et al, 2012). The article of Doulabi; khamseh; Torabi (2020) has Design Technological Innovation Management Model and the purpose of this study is to design and analyze the dynamic model of technological innovation management in petrochemical downstream industries in Iran. A questionnaire was designed by analyzing the research literature and the opinions of the experts; then, the factors were investigated using verification factor analysis and structural equations with Smart PLS; the final 26 indicators were categorized in four domains including firm, industry, national, and international. (Doulabi et al., 2020).

In comparing the two approaches, the study of the structural approach reveals the active presence of people and the system, while the functional studies show how the system works and whether the current operations are sufficient for the current requirements.

In the article of Suurs and Hekkert (2009) regarding the dynamics of emerging technologies, They proposed an approach in which the process of examining the status of the system's functions was investigated (Suurs ,Herkkert,2009) In another research, referring to the research gap in the field of identifying the innovation process, they have taken action to better identify the dynamics of innovative systems by examining the compliance of registered patent trends and functional studies (Kessler,2015:.205)

Based on operational needs and literature review, the most important functions of the capability-oriented approach of the innovation system have been extracted, and only some of these functions have focused on the emerging phase and the formation of technologies. It is for this reason that in the approaches of Hekkert and others (Hekkert et al, 2009, Hekkert et al, 2007) attention is paid to functions such as market formation, institutionalization, and legalization, etc (Table 1).

Table 1.
General functions of the capability-based approach of the innovation system (theoretical framework)

Number	functions of the capability-oriented approach of the innovation system
1	Creation and development of knowledge
2	Dissemination of knowledge
3	Research direction
4	Entrepreneurial activities
5	Formation of the market
6	Provision and allocation of resources
7	Legalization and institutionalization

What has not been addressed in previous research is that each of the functions with a capability-oriented approach has functional mechanisms and a series of key factors are important in regulating these mechanisms. Knowing these key factors will be of great help in evaluating the development of Search Engine.

Each of the functions with a capability-oriented approach has functional mechanisms that a series of key factors are important in setting these mechanisms, below is a list of key internal factors in the form of tables 2 to 5 to develop the function of mechanisms of knowledge function, business and entrepreneurship function, legal-management function and financial and investment function have been presented. It should be noted that the appropriate mechanism of internal key factors will ultimately lead to the proper functioning of the development of the local mining ecosystem. Key factors have been extracted by the library study method and classified as described in Tables 2 to 5:

Table 2.
Key factors related to knowledge mechanisms (creating, disseminating, and directing research)

number	key factors	references
1	commercialization of academic intellectual property	(Truffer et al,2009)
2	Networking in research and knowledge production	(Ansoff et al,1975)
3	Role-playing of the university (level, type, and method of knowledge development)	(Bhamra et al,2011)
4	new types of courses/degrees	
5	competitions for talents (students and professors)	
6	Multidisciplinary education and research	
7	Globalization of knowledge production	(Calantone at al,2002)
8	Market communication and research and development department	(Chakravarthy et al,1982)
9	Increasing the level of access for outside actors to existing knowledge network	(Chakravarthy et al,1982)
10	Increasing the range of coverage activities and different partners	(Chakravarthy et al,1982)
11	Social Networks and Characteristics of Knowledge	(Hatice Cigdem et al,2022)

Table 3.
Key factors related to administrative and legal mechanisms (institutionalization and legalization)

number	key factors	references
1	Appropriate human capital structure	(Hiltunen etal,2006)
2	Encouraging commercialization of potential technology	(Jansen etal,2005)
3	Legal mechanisms to create, support, and market intellectual proper	(Kousa etal 2010)
4	necessary rules and criteria for entrepreneurial activities	(Demmer etal,2011)
5	Development of intellectual property protection systems	(OReilly etal 2011)
6	Institutionalization as a strategy to make policy changes last	(Marco et al,2022)

Table 4.
Key factors related to investment mechanisms (provision and allocation of resources)

number	key factors	reference
1	Evaluation of domestic venture capitalists	(Oner,Seman,2011)
2	Evaluation of foreign venture investors	(Paliokaite,2013)
3	The level of readiness of different sectors in investment for technology development	(Truffer et al,2009)
4	system of providing financial and non-financial resources	(Calantone etal,2002)
5	Financial limitations	(Demmer etal,2011)
6	High the level of turnover	
7	The amount of investment in knowledge production	(OReilly etal 2011
8	provide fiscal incentives, guarantees, insurances, credit enhancements, currency risk protection, and other instruments	(Hatice,202)

Table 5.
Key factors related to business mechanisms (entrepreneurial activities, market formation)

number	key factors	references
1	The penetration rate of businesses in the market	(Durand,2003)
2	financial risks of businesses	
3	approaches (top-down/bottom-up) in creating and developing businesses	
4	business models of companies	
5	types of cooperation (formal/informal) between business units	(Evans,1991)
6	The level of technological and infrastructural readiness	Gibson,Cristina,2004)
7	The role of businesses in creating technological authority	Grim,Terry,2009)
8	threatening the position of small and medium- companies by strong companies	
9	positive effects of cooperation between businesses (acceleration of the product development process, economy of scale, risk reduction)	
10	negative consequences of cooperation between businesses (intellectual property rights, management challenges)	
11	incentives for cooperation between businesses (cost of research and development, short life cycle of products, convergence of technologies)	
12	types of competition between businesses (extreme competition, cooperation, joint competition, monopoly)	
13	business innovation strategies (dominant strategy, incidental innovation, conscious non-acceptance of innovation)	

Methodology of Research

This research is qualitative and exploratory in nature. In order to collect the needed data we have used library (for collecting the information and determining the general foundations of the research) and the non-

library (benefiting from the experts' opinions). The main objective of the research is to analyze the functions of native search engine in the process of innovation and commercialization and hence the statistical population of the research includes those experts who are knowledgeable about the native search engine ecosystem and innovation system. Since the literature on innovation systems in general and the native search engine ecosystem in particular is a new subject, thus the knowledgeable experts with the needed profession and knowledge on the subject are very few.

Thus about the objective of the research, the sampling method has been purposeful; so we selected the samples among those who have enough knowledge or profession in the field of the study. The data collection instrument was the questionnaire. In interviewing the experts in the field of native search engine ecosystem. We asked the interviewees based on the general functions of the innovation system (such as Creation and development of knowledge, Research direction, Formation of the market, etc…) explain each function and state their own opinion in different stages of development of native search engine.

Altogether, 17 interviews were conducted with accessible and acknowledgeable experts in the field of search engines to design the search engine ecosystem. The related details of the interviewed experts are presented in table 6. Each interview lasted between 30 to 60 minutes and the interviews was continued until obtaining theoretical saturation and richness.

Table 6.
Information of the experts who were interviewed.

Expert number	**Role of an expert in the project**	**Experience of knowing the business ecosystem**
1	Member of the Steering Council of Business Development of Native Search engine	3 years
2	Senior expert in the Business Development of Native Search engine	2 years
3	Senior expert in the Business Development of Native Search engine	1 year
4	Executor of plan	3 years
5	Project supervisor	3 years
6	Senior Advisor	8 months
7	Project consultant	3 years
8	Member of the Steering Council of Native Search engine	3 years
9	Member of the Steering Council of Native Search engine	3 years
10	Project consultant	3 years
11	Project supervisor	3 years
12	Senior expert in the Business Development of Native Search engine	6 months
13	Senior expert in the Business Development of Native Search engine	6 months
14	Executor of plan	3 years
15	Senior expert of the Content Platform of Native Search Engine	2 years
16	Senior expert of the Content Platform of Native Search Engine	2 years
17	Senior expert of the Content Platform of Native Search Engine	2 years

To collect data in the first step of the research, a three-question questionnaire was used about the functions of native Search Engine development in the three stages of its development roadmap; Therefore, in each question, the activities that were done in each stage were arranged in a tabular format and then the respondents were asked to specify what function each activity covers (Tables 7-9). The researchers identified the frequency of answers regarding each strategy/measure. Most frequent answer in each

strategy/measure and completed the tables have been done.

In Identifying the Factors Affecting the Selection of B2B Online Market Entry Strategies Using Soft System Methodology aimed to identify the factors influencing the selection of B2B online market entry strategies in IT knowledge-based companies but given the complexity of choosing the right strategy. The results showed that the factors contributing to the selection of B2B online market entry strategies in IT knowledge-based companies included entry time, external beneficiaries' characteristics and needs, corporate resources, corporate control strategy, corporate IT capabilities, external beneficiaries' IT knowledge and motivation, and product.(Karami etal,2020:55)

In Presenting a Conceptual Framework in the Entrepreneurial Strategic Factors of Government Managers The results showed that the investigation of the entrepreneurial enthusiasm of managers of public organizations in Isfahan province showed factors such as organization atmosphere, perspective, and upstream documents, knowledge management in the organization, efficient human resources, and entrepreneurial culture in the organization, organizational learning, and entrepreneurial education. There is a desire for entrepreneurship in this. (Ghasemi, 2023)

In the second step of the research, considering that our goal was to validate the results obtained from the previous step and considering that it was important to reach a consensus among a group of experts and specialists about the issue under study, therefore, from the focal group method were used to check the validity of the obtained results. The focus group method is known as one of the tools that researchers can use to investigate the common opinion of people regarding the phenomenon under study. To conduct a focus group meeting, in the beginning, it is necessary to choose experts and knowledgeable people about the topic and phenomenon in question, usually between 6 and 12 people are suitable for the focus group (Arasti etal, 2014, Bazargan, 2009, Nouri, Mohammadi, 2012). Based on this, the number 10 experts and specialists who had specialized and managerial records in the field of development of native Search Engine were selected; That is, those who were selected as experts and experts who not only had the most information about the development of native Search Engine but also had the necessary management records in this field. These people validated the results in the first step of the research in two 4-hour sessions.

Research Findings

Functionally analyze the development of native search engine based on their development roadmap is done, three steps have been introduced to develop businesses and commercialize services related to native Search Engine (Karami etal, 2020). The purpose of the first step is to support the native Search Engine market and service providers to increase the quality of products and prepare businesses for market maturity and the formation of alliances and consortia. The actions of the Search Engine ecosystem development plan in the second step of the road map are aimed at the formation of strategic alliances among the main actors of the Search Engine project to create and develop Search Engine platforms. At this stage, the demand for new value-added services is formed by combining and synergizing capabilities. The activities of the third step of the road map are focused on the realization of mission-oriented goals to create a powerful consortium of native Search Engine. The goal of this stage is to reach a complete ecosystem for the native Search Engine (UNESCO, 2015)

The executive activities for the development of native Search Engine have been determined based on a three-dimensional model of mapping the qualitative goals of the project, policies, and measures of Search Engine development and the steps of the native Search Engine project roadmap. Based on the steps of the map, the

general measures to develop the native Search Engine business environment are specified as follows (UNESCO, 2015)

- First step: developing the market and creating a competitive environment in the native Search Engine ecosystem development plan, including the development of basic native Search Engine services, infrastructure development, and research and development of the native Search Engine plan;

- The second step: creating an atmosphere of cooperation and forming a strategic alliance between players, including strategic/applied research for the development of native Search Engine platforms (reference platform, map, communication,etc), development of the partnership environment, and evaluation mechanisms of services and businesses related to native Search Engine;

- The third step: is the formation of large investment companies in the direction of creating a capable native Search Engine, including determining the requirements of the consortium ecosystem, creating and developing the consortium, developing value-added services, and developing the children's native Search Engine platform;

To analyze the emergence and formation of the innovative functions of the native Search Engine in Iran, based on the distribution of questionnaires among the experts and key operators of this project and also based on the theoretical framework provided, along a historical path, the formation of each of the functions and activities innovatively specified and shown in Figure 1.

In Tables 9-, in the first column, the strategies and actions of each of the steps of the native Search Engine development roadmap are presented, which are extracted from the operational plan of the native Search Engine plan (UNESCO, 2015)

; In the next seven columns, the generic innovative functions extracted from the theoretical framework (Table 7) are listed. Then, in the form of a questionnaire, the strategies and actions of the development of native Search Engine have been cross-referenced with the functions of innovation to determine the innovative function of each strategy and action in the direction of the development of the native Search Engine, and as described in the section the methodology was explained, frequent answers in each strategy were specified and the tables were completed as follows:

Table 7.
The development functions of native Search Engine in the first step of the road map native Search Engine

strategy	Market promotion	Entrepreneurship	Dissemination of knowledge	knowledge creation	Driving innovation	Institutionalization	Providing resources
Creating a dynamic structure of innovation for the needs of native Search Engine research and development programs							
Promoting the use of local recruiting services (establishing conferences and seminars, cooperating with public media, visiting successful businesses)							
Creating an international native Search Engine cooperation network to develop services and transfer technical knowledge (holding regular meetings with foreign suppliers)							
Establishing the international cooperation network of Search Engine to develop services and transfer technical knowledge (development of international services of Search Engine)							

strategy	Market promotion	Entrepreneurship	Dissemination of knowledge	knowledge creation	Driving innovation	Institutionalization	Providing resources
Creating an international cooperation network of Search Engine to develop services and transfer technical knowledge (holding an international conference on investment opportunities native Search Engine)							
Development of relations between stakeholders to synergize services and businesses (development of communication between government organizations, research institutions, universities and the private sector, creation of communication networks between companies and technology providers, development of service provision and consulting processes)							
Development of relations between stakeholders to synergize services and businesses (providing incentives to attract risky investors, public and private company structure to spread innovation)							
Dissemination of the content and knowledge produced in the field of native Search Engine (freeing the content and knowledge of the field of native Search Engine, agile and transparent information mechanisms and consolidation of procedures)							

After calculating the initial model of the development functions of native Search Engine in the first step of the road map, the researchers sought to validate the obtained model using the focus group method. The method of analyzing the data collected in the focus group meeting was such that after the members of the focus group meeting, all comments on all the questions and components of the primary patterns, their points of view were summarized (Table7)

Table 8.
The development functions of the local mining ecosystem in the second step of the road map

Strategy	Market promotion	Entrepreneurship	Knowledge promotion	knowledge creation	Driving innovation	Institutionalization	Providing resources
Development of the local Engine (market research and analysis)							
Development of the brand name of native Search Engine (compilation of brand development roadmap)							
development of the innovation and project ideas (interacting with stakeholders and gathering information)							
Development of the environment for innovation and project ideas (services and businesses entrepreneurship event)							
Development of innovation environment and ideas project (native search engine compilation research and innovation challenge event)							
Development of innovation environment and ideas plan (business support and consulting and innovative plan)							
Development of the environment of innovation and project ideas (participation structure of entrepreneurs and start-up companies)							

Strategy	Market promotion	Entrepreneurship	Knowledge promotion	knowledge creation	Driving innovation	Institutionalization	Providing resources
Attracting the best native talents and elites (job opportunities for top students, recruiting and training graduates)							
Development of mechanisms of intellectual property rights and franchise rights (considerations for the protection of intellectual property rights, identification of promising intellectual capitals, intellectual capitals valuation framework, development of business exit model)							
Creating an integrated knowledge management system (integrated platform for participation and knowledge sharing, ecosystem communication platform, experience management system, international cooperation agreements for knowledge transfer)							
Creating access to government and public sector databases (public sector information integration framework, access platform to government databases, content needs assessment of native Search Engine)							
Development of searcher's ability to adapt Persian language content (add-ons to convert non-Persian content, messenger software robots)							
Development of content creation platforms by users and related analyzes (users' question and answer system, user opinions and trends analysis system)							

After calculating the initial model of the development functions of native mining ecosystem-factors in the second step of the road map, the researchers sought to validate the obtained model using the focus group method. The method of analyzing the data collected in the focus group meeting was such that after the members of the focus group meeting all comments on all the questions and components of the primary templates, their points of view were summarized and presented again by the focus group manager. After the consensus was reached about the components and indicators of the model, the result was reflected in the model, in general, after sufficient discussion and exchange of opinions about the model were achieved, the focus group meeting ended. Based on this, the correction opinions that were accepted by the majority of specialists and experts were applied in the final version of the model of the development functions of native Search Engine in the second step of the road map, and the theoretical adequacy of the model was confirmed by consensus (Table 8).

Table 9.

The development functions of the local mining ecosystem in the third step of the road map

Supply strategy

Strategy	Market promotion	Entrepreneurship	Knowledge promotion	knowledge creation	Driving innovation	Providing resources
Elaboration of the joint property right structure (business valuation model, legal framework for access to corporate knowledge, follow-up model for non-compliance with obligations, intellectual capital transfer model)						
Development of the cooperation model of the actors of the value network and the formation of the consortium of native						

Strategy	Market promotion	Entrepreneurship	Knowledge promotion	knowledge creation	Driving innovation	Providing resources
Search Engine (expert working group of the consortium, operational plan of the consortium)						
Development of the cooperation model of actors of the value network and the formation of the native Search Engine (executive procedures for the selection of members and the responsibility of partners, the native Search Engine model)						
Designing the legal framework of cooperation and joint venture (value exploitation model for stakeholders, consortium entry and exit model)						
Designing a joint investment model in the native Search Engine project (business plan)						
Designing a joint investment model in the native Search Engine (corporate governance model)						
Designing a joint investment model in the native Search Engine project (investment model of actors, financial processes and profit distribution, liquidation and exit plan)						
Designing a joint investment model in the native Search Engine project (company monitoring and evaluation model)						
Designing a joint investment model in the native Search Engine (separation and creation of a network of specialized companies)						
Development of Persian natural language processing ability (natural language processing basic tool, natural language processing application system)						
Development of local value-added services according to users' needs (business catalog, and rental platform, low-powered search services, internet magazine, tourism platform, customized government information search)						
Development of value-added services for education and learning in schools (school database services, value-added learning services, children's services portal, educational games platform, children's social network and messenger, searcher personalization, cooperation with intellectual development center)						

After calculating the functions of the development of local producers in the third step of the road map, the researchers sought to validate the obtained model using the focus group method. Their points of view of members of the focus group were summarized and presented again by the focus group manager. After the consensus was reached about the components and indicators of the model, the result was reflected in the model, in general, after sufficient discussion and exchange of opinions about the model were achieved, the focus group meeting ended. Based on this, the correction opinions that were accepted by the majority of specialists and experts were applied in the final version of the model of the development functions of native Search Engine in the third step of the road map, and the theoretical adequacy of the model was confirmed by consensus (Table 9).

Discussion and Conclusion

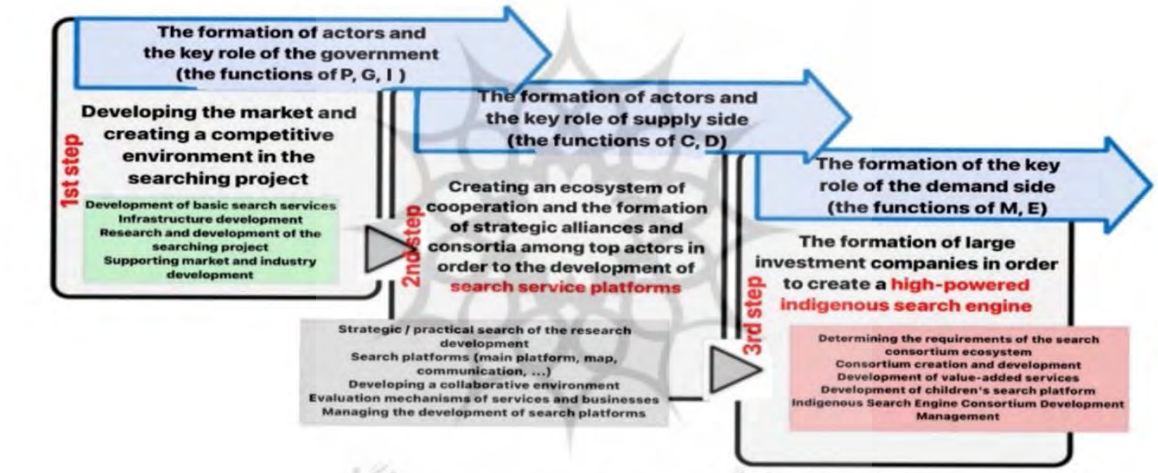
Can be seen from Tables 7-9, based on the roadmap for the development of native Search Engine, in the first phase and the initial years of the formation of native Search Engine, the role of the government was very prominent. In the initial period, it can be seen that the main activities for the development of mining were in the field of three functions: "institutionalization and legalization", "research and innovation direction" and "supply and allocation of resources". In this period, the formation of the steering council and its secretariat in the Research Institute of

Communication and Information Technology, the formulation of a strategic plan, and the allocation of a special budget for the development of native Search Engine have been among the most important activities that have played an important role in the formation of the rest of the functions of the innovation system.

In the second phase of the formation of native Search Engine development in Iran, it can be seen that the previous three functions are continued and the other two functions of the technological innovation system, namely "knowledge creation and development" and "knowledge dissemination" are also strengthened. These two functions were mainly on the supply side. Therefore, it can be seen that in the continuation of the first period, which was mainly the role of the government, in this period, the role of academic and research departments and powerful companies has been highlighted.

These two functions are mainly on the supply side, that is, in the academic and research sectors, and powerful companies have been formed.

In the third phase of the development of the native Search Engine, it can be seen that in addition to the previous five functions, two functions "market formation" and "entrepreneurial activities" have been strengthened. These two functions are mainly formed on the demand side and indicate the formation of another part of the technological innovation system in the field of native Search Engine.



P: Provision and allocation of resources
I: Institutionalization and legalization
G : Guiding (direction) research and innovation
C:Creation and development of knowledge
D: Dissemination of knowledge and formation of external economy
E: Entrepreneurial activities
M: Market formation

Figure 1. *The pattern of the functions of native Search Engine*

The summary of the formation sequence of the functions of the development of the native Search Engine in Iran follows a logical course as shown in Figure 1. Thus, firstly, the function of institutionalization and legalization is formed mainly through the role of the government, and then the government by influencing the functions of direction research and innovation, and providing and allocating resources, provides the basis for the formation of the functions of knowledge creation and development, and the dissemination of knowledge and technology. And it has provided the formation of positive external savings in the research, academic and corporate sectors. After some time, it is observed that the demand side is activated and the functions of market formation and entrepreneurial activities emerge.

A few key points can be obtained from the comparison between the obtained results and the theoretical foundations:

- **The first and key point** is that the use of a functional approach can help in better understanding the path of growth an emerging field. As the results of this research also show, all functions of the innovation system in the formation of the native search engine have been used and the basic issue is to pay more attention to the weaker functions and more important than that, the interactions between the functions.
- **The second point** is that the way of market formation and commercialization can be traced based on the theoretical(functional- oriented) of three paths:

The first path started from the effect of the function of institutionalization and legalization on the direction of research and innovation and the provision and allocation of resources, and then the effect on the creation and development and dissemination of knowledge and the formation of external economies and entrepreneurial activities in fact, it shows the way of formation through activities related to the creation, development, and dissemination of knowledge and mainly to how to strengthen the academic and research sectors from the government (supply-oriented model).(Janssen etal,2021:438)

The second path starts from the effect of the institutionalization function on the direction of research and innovation and the provision and allocation of resources, and then the effect of them on the formation of the entrepreneurial activities market. This path shows the way of formation activities related to entrepreneurship (demand-oriented model).(Janssen etal,2021:438)

The third path, which is the commercialization path, is the combination of two supply- oriented and demand-oriented paths. Historical analysis shows that the three functions of institutionalization and legalization, guiding and directing research and innovation, and providing and allocating resources were at the beginning of the formation of the native Search Engine, and then the functions of development and dissemination of knowledge and finally, the functions of entrepreneurial activities and market formation are strengthened in the path of development (combined model) (Brown, 2021:739).

Based on the analyzes conducted and based on the feedback from the focus group, two paths can be observed in the formation of the functions of the innovation system for the development of native Search Engine, but the remarkable thing about these two paths is the existence of a weak relationship between them. In other words, the activities related to strengthening the supply side in the first path have a weak significant relationship with the activities related to strengthening the demand side in the second path, and this shows that despite the formation of functions related to the demand side and the supply side in this system, The government has not yet been able to establish a good relationship between these two sectors. In other words, the activities of the supply side and the demand side have had little effect on each other, or the knowledge created and published in the development sector of native Search Engine have not been effectively used in the market and entrepreneurial activities of this sector.

- **The third point** is the path of formation and interactions and the influence of the functions of the native Search Engine, which shows the way and the intensity of the effects of the functions on each other under the title of key factors affecting the formation of these systems, it can be pointed out that it includes key factors affecting the creation, dissemination, and guidance of research (Truffer et al,2009,Chakravarthy,Balaji,1982) market formation (Durand,2003:339,Grime,Terry,2009) institutionalization and legalization

(Hiltunen,Elina,2006,OReilly etal 2011,53) and provision and allocation of resources (Oner atal,2011,Paliokaite,Agne,2013) Based on the comparison of the research results with these key factors, it is possible to trace the incomplete formation of the key factors affecting the pressure of science and technology by functions of creating and developing and dissemination of knowledge, and forming positive external exchanges in the second stage of formation. The native Search Engine and also the imperfect formation of the key factors affecting entrepreneurship and the market by strengthening the functions of entrepreneurial activities and market formation in the third stage of the formation of the native Search Engine. Of course, both these sets of factors have been with the government's efforts to create native Search Engine at the beginning of its formation, which seems to be due to the lack of formation of primary capacities in the supply and demand sectors and the lack of effective use of strengthening policies. The interaction between these two sectors has not been able to function properly in the long term.

- **Another important issue** in this regard is that the path of providing and allocating resources has a stronger relationship with the paths of knowledge creation and dissemination and is mainly aimed at strengthening the supply side, and its relationship with market formation and entrepreneurship and the demand side is weak.

The results of the article show that the government has played a key role as the main driver in the formation of institutionalization and legalization functions, directing research and innovation, and providing and allocating resources in the first step of the Search Engine road map. In the second step, the functions of creation and dissemination (function of the supply side), and in the third step, the functions of market formation and entrepreneurship have been activated in the direction of commercialization of native Search Engine (function of the demand side).

The results show that despite the more or less presence of each of the innovative functions of the native Search Engine, all the influence cycles between these functions have not yet been formed. Despite the significant role of the government in shaping these functions, the necessary connections and interactions between supply and demand side functions have not been formed, and reinforcing cycles between them have not been established and will require policy reforms.

In another article, it is suggested that the policies and corrective measures for the development of the local native, taking into account the cause-and-effect relationship between the areas of influence of the proposed policies and the development needs that can be found in the areas Different native Search Engine market should be regulated.

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