

Analysis of Variables and Indicators of the E-commerce Business Model Canvas for Knowledge Brokers

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Abstract

The knowledge flow is a key success factor for organizations and institutions. Lack of proper knowledge flow in an organization and among different individuals, organizations, and businesses will cause gaps in information and information access. One such gap is the gap in the innovation system. Mediators, as one of the innovation system variables, can play a role in filling these gaps. One of the mediators is knowledge brokers. On the other hand, every business needs a specific business model for implementation depending on its nature. The present study proposed an e-commerce business model canvas for knowledge brokers to improve knowledge flow. In the present study, meta-synthesis and Delphi methods were used, respectively. The sampling methods used in the Delphi part were homogenous and snowball, based on which the experts were 10. The results showed that 7 variables (out of 48) and 22 indicators (out of 156) were removed. Finally, 134 indicators and 41 variables were classified based on Osterwalder's business model canvas variables and presented within the model.

Keywords: Knowledge Brokers, Business Model Canvas, E-commerce Business Model, Knowledge-Based Business.

Introduction

The knowledge flow is a crucial success factor for organizations and institutions. It causes them to rapidly develop into parts that organizations can take advantage of since it will bring a competitive advantage and added value to the organization (Rafi'e, 2017). Lack of proper knowledge flow in an organization and between different individuals, organizations, and businesses causes a gap in information and information access. One such gap is the gap in the innovation system. Mediators, as one of the innovation system variables, can play a role in filling these gaps (Smits & Kuhlmann, 2004). Mediators fill the information and information

access gap by providing organizations with the information and knowledge required. Knowledge brokers are one of the mediators with fundamental roles in filling such gaps. Indeed, one of the ways to improve the knowledge flow is by using knowledge brokers who fill the gap between producers and knowledge users.

On the other hand, depending on its nature, every business needs a specific business model to be implemented. Counting the variables and indicators of an e-commerce business model canvas in today's fast-paced world for knowledge brokers who contribute to facilitating and speeding up functions can effectively improve the knowledge flow. In this regard, the present study aimed to count the variables and indicators of an e-commerce business model canvas for knowledge brokers to create the grounds for researchers, policy-makers and decision-makers, structures, and governance institutions, as well as the structures and institutions of supply and demand section in the innovation system to take advantage of it and eliminate the gap in information and access. In general, this study aimed to achieve the following goals: 1) Recognizing the variables and indicators of an e-commerce business model canvas by considering the role of knowledge brokers; 2) Determining the level of agreement of experts in approving the presented variables of indicators; 3) Proposing an e-commerce business model canvas for knowledge brokers.

Research Theoretical Foundations

Mediators

The innovation system can be defined as a dynamic combination of soft and hard variables and the relations between them. The system's variables include governance structures and institutions structures of institutions of supply sector, mediating structures and institutions, and knowledge-based structures and institutions (Suurs, 2009). One of the primary problems in the innovation system is the gaps in this system, which are composed of several types of information gaps, gaps in access, the gap in transference, and the converter gap (Smits & Kuhlmann, 2004).

Mediators refer to institutions or organizations that operate in a network of actors of the innovation system and are effective in creating innovation and commercialization of products by strengthening the actors in the system. These institutions or organizations act as mediators between two or more actors and cause facilitation and accelerate collective innovation. Mediators are generally shaped under state support and private sector participation (Howells, 2006). On the other hand, mediators are structures, individuals, and institutions that mediate purchasing and selling of technologies and knowledge products to others. Mediators are the cause of discovering and addressing issues and problems related to incorrect and incomplete information about the market, resulting in resolving knowledge problems related to sources, quality, and efficiency of products and services, as well as timely and accurate identification of clients' needs and requirements of each part for sale (Dalziel, 2010). One of the mediators is facilitating counselors, source suppliers, brokers, etc.

Knowledge Broker

Knowledge plays a vital role in innovation. Knowledge is mainly dependent on the firm and is not simply and spontaneously distributed among firms and is absorbed based on the capabilities that the firm acquires over time. Thus, knowledge brokers create, share, and use knowledge in or among organizations. According to Peter Drucker's theory, future development

and progress will belong to societies with greater knowledge-sharing (Rahimi, 2020). One of the mediators that play a fundamental role in filling the gap of information and information access and knowledge is knowledge brokers. Indeed, one of the ways to improve the knowledge flow is by using knowledge brokers that fill the gap between producers and knowledge users (Lavis, 2006).

Knowledge brokering refers to mediators mediating between the source of knowledge and the recipient of knowledge. This process helps communicate with different individuals, define gaps and needs, and share ideas (Drew, Ritchie & King, 2014). As facilitators of knowledge transfer and actors, knowledge brokers connect the users and researchers. They transfer the elements of a work to others, activate coordination, and create new learning opportunities; in other words, they make the knowledge flow possible in societies. Knowledge brokers facilitate knowledge transfer because they provide the grounds for rendering knowledge in any society through its worldview (Pawłowski & Robey, 2004). In other words, knowledge brokers make knowledge accessible and comprehensible in their target communities by coordinating their messages and goals and reducing the cognitive distance between communities (Cillo, 2005).

Ward, Smith, House and Hamer (2012) found that knowledge brokers actively exchange knowledge among communities through information management (collecting, sharing, and classifying information), connecting (communicating with people and facilitating conversations), and capacity development (learning through the process of knowledge exchange and ensuring sustainability). Therefore, knowledge brokers, as facilitators of knowledge transfer, seek, translate, and disseminate knowledge and create communication channels among communities and the capacity for sharing knowledge in central communities (Ward, Smith, House & Hamer, 2012).

Knowledge transfer requires going beyond borders and recognizing the community to which knowledge should be transferred. To participate in the everyday life of a community, knowledge brokers need to get familiar with the viewpoint of that community, including the information technology experts (Pawłowski & Robey, 2004). Therefore, they can understand the community's viewpoint and align the transferred knowledge to the community's needs. Access to knowledge is problematic because knowledge brokers should gain it in a dynamic social process and specify their positions within and outside the community (Ward, Smith, House & Hamer, 2012).

Business model canvas

A business model is a conceptual tool consisting of elements and their relationship, which represents the logic of an institution (organization, company, and startup) for generating revenue. In principle, the business model represents how to provide value to a group of clients. It represents the architecture of a company for creating, marketing, delivering value, and earning sustainable and profitable revenue. In other words, a business model illustrates the communication and relationships of different variables of a business. The emphasis, in this definition, is on the logic of generating revenue and transferring value (Osterwalder & Pigneur, 2013). There are various patterns to design a business model. Osterwalder's business model canvas is known as the most comprehensive business model canvas. Osterwalder and Pigneur (2013) explain that a business model describes 'the rationale and infrastructure of how an organization creates, delivers, and captures value.' Alternatively, others stress that the most important features of business models are descriptions of the use of resources, capabilities, or

the firm's value proposition. A business model is simply a plan describing how a business intends to make money. It explains who the customer base is and how to deliver value to them and the related details of financing. And the business model canvas lets us define these different components on a single page. The business model canvas is a strategic management tool that lets one visualize and assess a business idea or concept. It's a one-page document containing nine boxes that represent different fundamental elements of a business (Upward & Jones, 2016). In Osterwalder's model, nine variables were explained. They are in proportion to each other, presenting how an organization, company, etc. works. The variables cover the four main areas of a business, i.e., product, intermediary, infrastructure management, and financial aspects. The nine variables include clients, contact with clients, deliverable value, distribution channel, core functions, key partners, cost structure, and flow of revenue. The business model canvas in this study is in line with the proposed definition, and the present study aimed to provide an e-commerce business model canvas for knowledge brokers in the form of the nine variables of Osterwalder's business model canvas.

E-commerce Businesses

E-commerce is the process of selling goods and services over the Internet. Customers come to the website or online marketplace and purchase products using electronic payments. Upon receiving the money, the merchant ships the goods or provides the service. Electronic commerce has been around since the early 1990s when Amazon just sold books, but today, it's a multibillion-dollar industry - and it has gotten even bigger during the pandemic (Fuscaldò, 2023). Graham defined e-commerce businesses as businesses designed for fast development (Graham, Noren & Hutchinson, 2004). With the increasing spread of ICTs, specifically the Internet, the global corporate world pushes rapidly into e-commerce (Business-to-Business). As the Internet enables consumers to enter the global economy, they can compare prices across areas, find out how they vary by request, and become aware of substitution. The buyers obtain a distinct advantage. Thanks to market openness, consumers can conveniently compare e-commerce offerings from different websites. The rivals would immediately be one click away from the customer if the company is electronic. If consumers aren't comfortable with certain e-goods, content pricing, or services, they can adjust even more quickly than in traditional terms. They don't need a physical store from the point of view of the vendors (Jain, Malviya & Arya, 2021).

Research Background

Research Background in the Field of Business

Jalili (2016) used the systems dynamics approach and modeled the success factors of a start-up business to introduce the most effective strategy for the development and success of such businesses through stimulating and scenario building. Mohammadiyan, Maniyan and Khodabermi (2014) designed a business model using the results of interviews with experts and modeling several successful virtual development centers in the world. In this study, Osterwalder's anthology was used to design the business model of the virtual development center. This plan can be regarded as an effective step to start the operation of this national plan and cause efficiency and improvement of organizational performance and profitability.

Bielinska-Dusza (2019) used the review method to investigate the theoretical aspects of a business model for innovation brokers. The results showed that innovation brokers are one

business institutions that act as a catalyst for innovation and entrepreneurship, and help the effective transfer of technology and knowledge commercialization. In this article, the theoretical aspects of the business model of innovation brokering were internal and external factors and the interaction between them. The internal factors included strategy, organizational structure, capabilities and competencies, personnel, systems, and management styles. The external factors included environmental aspects and stakeholders. Other theoretical aspects of the study were the attraction of external knowledge and transforming the knowledge flow, creating networks within the organization, and correcting the cooperation processes.

Research Background in the Field of Mediators and Knowledge Brokers

Nowruzi, Tabatabaeiyan and Ghazinoori (2016) used a function-based approach and classified the problems of the national innovation system (NIS) in Iran into six categories of policy-making, facilitating and directing the activities of research and innovation, performing research and development, entrepreneurship, human resource development, and technology diffusion, and investigated the functions of intermediary institutions to address such problems. Vaziri Gudarzi and Movahedi Sobhani (2014) used the grounded theory and identified the features of knowledge intermediaries to make the process of knowledge-sharing effective. The data were collected with the help of semi-structured interviews with experts and managers of the organization under study and analyzed using open coding, axial coding, and selective coding. The findings of the research revealed four characteristics of extraversion, personality attraction, having organizational position and authority, and leadership ability for knowledge mediators. Some of the studies conducted outside the country included: Boari and Riboldazzi (2014) investigated the role of knowledge brokers in a small Italian publication. The article focused on the behavioral role of knowledge brokers. The company has the role of different brokering at the international level. The results showed that brokers have an important role in the indirect transfer of knowledge. Ye, Kankanhalli and Yang (2012) investigated the literature on open innovation and knowledge brokering and then performed 4 exploratory case studies of innovation. The results of the study can contribute to enriching the literature on the performance of innovation mediators and creating their value for search companies. The study also showed how search companies can make huge profits by using knowledge mediators. Search companies can use innovation mediators and help to resolve the problems of clients and knowledge researchers/scholars rather than employing lots of people to resolve them. Gesualdo, Weber and Yanovitzky (2019) investigated the role of journalists in the flow and exchange of knowledge in society. To this end, 22 journalists of health and treatment were interviewed using semi-structured interviews. The results showed that journalists actively seek for performing the performances of knowledge brokers, including searching, editing, proving, and combining research, as well as using reports prepared to communicate with actors and support decision-making and policy-making. Scarlett, Forsberg, Biermann, Kuchenmuller and El-Khatib (2020) used the comprehensive review method to investigate 176 articles on the issue from 2005 to 2016 on databases of Medline, WHO Library, and Global Health, of which 32 articles were analyzed. The results showed that the evaluation indicators of brokers included identifying the actors such as researchers, universities, and users, making links among them, aligning the research products to the existing priorities in policy-making, publishing the research results, capacity building for policymakers to apply the research results, among others.

The literature indicated that several studies have been conducted in the field of designing a

business model, which used various methods such as review, system dynamics, and the Delphi method to propose business models. Moreover, several studies have been performed outside the country in the fields of brokering, and knowledge brokering. In a general classification, the studies focused on the role and tasks of knowledge brokers, the effect of knowledge mediators on different subjects, and the evaluation of knowledge brokers' performance. While there are limited studies in the country. Most of the studies have focused on the theoretical aspects of knowledge brokers and their features.

Materials and Methods

The method used in this study was the exploratory mixed method which is a mixture of quantitative and qualitative methods. In general, the present study used the meta-synthesis methods, and then it used the Delphi method. The growth of information and the significant scientific increase on the one hand and the ease of access to them have made the research literature about various phenomena to be rich. On the other hand, studying and summarizing all related articles requires a scientific and systematic method. Therefore, a systematic and scientific method for identifying, summarizing, and inferring from the existing theoretical foundations has been expanded more and more. Meta-synthesis is a method that, with specific steps, combines data from other studies to meet the researcher's goal and obtains new results (Nobilt & Hare, 1988). Therefore, in this research, to extract the desired Variables and indicators, the meta-synthesis method has been used. In this study, Sandelowski and Barroso's seven-stage method was used. The seven stages include designing the research questions, a systematic review of texts, searching and selecting appropriate resources, extracting information, analyzing, synthesizing findings, controlling the quality, and presenting the findings (Sandelowski & Barroso, 2007). The population in the meta-synthesis method consisted of 10617 articles, theses, websites, and books related to the field, which were searched in terms of their title, keywords, and abstracts, of which 65 records were selected and analyzed. The Delphi method is a formal, in-depth systematic qualitative methodology that was first studied by a team at the RAND Corporation in 1950, who made multiple practical applications of the method. The goal of the method is to reduce the diversity of opinions within a small group so they tend to converge towards one common opinion. The method applies a cycle made up of various stages of questions, answers, and analysis which are then returned to the experts in the subject. The questionnaires aim to reduce the deviation of the group's opinions from that of the expert by defining the average of the answers obtained (Landeta, 2006). Therefore, in this research, the Delphi method was used to confirm the variables and indicators obtained from the previous stage. The statistical population included Ph.D. graduates and related experts with more than 5 years of working experience in the fields of knowledge management, technology management, business, and policy-making. The sampling methods in the Delphi part were homogenous and snowball methods to determine the participants. In this regard, the number of experts to be used in the study was determined to be 10. The tool to count the variables and indicators was experts' opinions. The Excel software was used to analyze the data.

Results

The first stage: designing the research questions

The present study investigated the identification of indicators and variables of the e-commerce business for knowledge brokers. In this regard, the following research question was

raised:

"What are the variables and indicators of the e-commerce business model canvas, considering the role of knowledge brokers?" To answer the question, the subsequent stages were performed.

The Second stage: Systematic review of the literature

First, the keywords were determined and a search was performed to find the related studies. The databases of the Iranian Research Center for Science and Information Technology (Iran Doc), Sivilika, Magiran, and the database for theses of Islamic Azad University (Sika) were used to search for studies performed inside the country, and the database of Science Direct was used to search for the studies performed outside the country, based on the combination of the research keywords as shown in Table 1. The result of the search showed a considerable list of 10617 documents related to the field under study, which were collected in terms of the relationship between titles and abstracts and the keywords.

Table 1

The Research Search Keywords

Business Model Business Model
E-commerce Business Model
Knowledge-Based Business
Knowledge Brokers

The third stage: Searching and selecting appropriate texts

In this stage, the selected texts were reviewed many times and the documents irrelevant to the subject were removed at any stage. The search result showed a list of 65 documents related to the subject under study (Figure 1). All documents were recorded for further analysis and studied in full text. The results of the analyses showed that these documents contained useful information to find an answer to the research question.

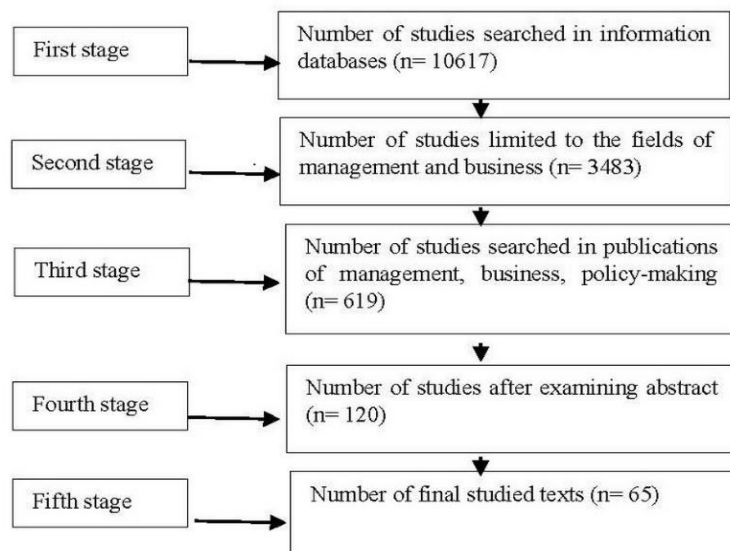


Figure 1: Process of Selecting Document

The fourth stage: Extracting the information

In this stage, a summary of the records selected from the internal and external databases was presented in a table. The information in each column includes: the first column shows general information about the article (author's family name and year of publication); the second column shows the title, and the third column shows the code allocated to each article. An example is presented in Table 2.

Table 2
Coding the Research Resources

Researcher	Title	Code
Nono, V., Garavelli, A. & Gorgoglione, M. (2004)	Albino, V., Garavelli, A. & Gorgoglione, M. (2004). Organization and technology in knowledge transfer. Benchmarking: An International Journal. 584-600	S ₂₂
Gesualdo, N., Weber, M. & Yanovitzky, I. (2019)	Gesualdo, N., Weber, M. & Yanovitzky, I. (2019). Journalists as knowledge brokers. Rutledge Taylor & Francis Group. 1-17	S ₂₃
Ahmadpour Dariyani, M. & Farrokh Hayati, A. (2005)	Ahmadpour Dariyani, M. & Farrokh Hayati, A. (2005). Entrepreneurship in the E-commerce business Tehran: Mehrab-e-ghalam. 261 pages	S ₂₇

The fifth stage: Analysis and synthesis of findings

After coding the extracted records from internal and foreign literature, 156 indicators were identified. Considering the concept of each indicator, they were categorized into 48 variables. Then, the indicators and variables were categorized based on the variables of Osterwalder's business model canvas, part of which is presented in Table 3.

Table 3
Part of the Indicators and Variables of the Research in the Structure of Osterwalder's Business Model Canvas

Model variables	Variables	Indicators
Target clients	a) Knowledge producers	1) Researchers/scholars
		2) Universities
		3) Thematic experts
	b) Users (operators) of knowledge	1) Policymakers and authorities at the macro level
		2) Decision-makers (in organizations, big companies, and investment funds)
		3) Strategic consultants
		4) Organizational suppliers
		5) Occupational and professional service companies
Suggested values	a) Suggested value to knowledge producers and users	1) Filling the gap between knowledge producers and users
		2) Creating, correcting, and improving the knowledge flow
		3) Facilitating the direct and indirect interaction between knowledge producers and users

Model variables	Variables	Indicators
	b) Suggested value to knowledge producers	1) Generating income for knowledge producers through sharing their knowledge
		2) Generating income through attracting ideas and turning them into products and services for researchers/scholars
		3) Facilitating marketing process
	c) Suggested value to users (operators) of knowledge	1) Operating useful, scattered, and hidden knowledge
		2) Motivating the organization to make decisions about functional indicators and functions of advanced development based on observations
		3) Facilitating decision-making and policy-making through acquired knowledge
Distribution channel	a) Main channel (virtual)	1) Websites
		2) Social networks
		3) Electronic mails
	b) Secondary channel (non-virtual)	1) Face-to-face communication
		2) Telephone communication and consultation
		3) Mail correspondence
Communication with the clients	a) How to communicate	1) Holding organized workshops to virtually communicate with clients
		2) Creating an Internet forum
		3) Holding collaborative meetings with clients
		4) Creating an information network (expert network) between researchers and scholars
		5) Holding collaborative training workshops for problem-solving
		6) Holding online knowledge seminars and webinars
Core functions	a) Searching and being aware of the knowledge	1) The broker needs to be aware and has a good understanding of research performed in the field
	b) Acquiring and gathering knowledge	1) The need to study the background, barriers, and processes in acquiring and gathering knowledge
		2) The need to create a collaborative space for cooperation for brokers at the national level
		3) Gathering the information required by users through cookies and related technologies
		4) The effective role of people in acquiring and gathering knowledge
	c) Integrating knowledge	1) The need to study the background, barriers, and processes in integrating knowledge
	d) Interpreting and rendering knowledge	1) The need for broker's skills in interpreting information state
		2) The need for a broker's skills in presenting the research results in simple words

Model variables	Variables	Indicators
		3) They need to recognize the mindset of the target community to align the transferred knowledge to the needs of the community by the broker
	e) Synthesizing researches	1) The need for broker's skills in synthesizing information 2) Applying the results, synthesizing them, and using them in policy-making
	f) Storing knowledge, preparing statistical and knowledge collections	1) The need for broker's skills in creating repositories and databases 2) Transferring and storing information in a secure context
	g) Facilitating knowledge-sharing, transferring, and Exchanging the acquired knowledge	1) Sharing knowledge based on personality traits, assets, and nature of the information source 2) The need to examine the literature, barriers, processes, and social differences in this function 3) The need for broker's skills in networking (using networks to acquire and rebuild knowledge and create new solutions) 4) Identifying the audience based on the needs of society 5) The need for a knowledge broker's awareness of policy-making and government systems
	h) Applying knowledge	1) Applying knowledge to resolve the information needs of knowledge users
	i) creating new knowledge	1) Changing concepts into products and combining them with ideas in the industry 2) Guiding the organization toward learning accompanied by practice 3) Forming a knowledge base
	j) Creating innovation	1) Creating innovation through transferring ideas
	k) Developing human resources skills	1) Holding training courses to update employees' expertise
	l) Physical resources	1) The company's physical environment 2) A collaborative working space 3) Software and hardware infrastructure
	m) Intellectual resources	1) Knowledge resources 2) Innovation 3) Working processes
	n) human resources	1) A network of brokers at the national level 2) Creative and empowered human resources 3) Thematic experts and scholars in different fields
	o) Financial resources	1) Available capital 2) Equipment and facilities
Key partners	a) Influential institutions	1) Influential investors 2) Influential social organizations (state and non-state) 3) Non-profit consulting companies
Cost structure	a) Fixed costs	1) Workplace supply costs 2) Administrative costs

Model variables	Variables	Indicators
	b) Variable costs	3) Equipment supply and depreciation costs
		1) Human force wage
		2) Costs of development and maintenance of technology infrastructure
		3) Costs of marketing, advertisement, and holding events
		4) Remuneration of specialists and researchers in exchange for knowledge-sharing
Income model	a) Types of income model	1) Receiving a commission from establishing communication between knowledge producers and users
		2) Receiving a charge or fee for providing consulting services
		3) Advertising
	b) Pricing mechanism	1) Fixed pricing (considering the basic price for knowledge services)
		2) Dynamic pricing (dynamics of prices based on the type of knowledge resource)

In the following, the resources of each indicator are presented in the form of coding performed in the previous stage to document the indicators. Table 4 presents an example.

Table 4

Documenting the Indicators and Variables of the Research in the form of Coded Resources

Suggested variable	Indicators in the resources understudy	Code of the resource
Knowledge producers	Researchers/scholars	S ₁ , S ₂ , S ₃ , S ₅
	Universities	
	Thematic specialists	
Users (operators) of knowledge	Policy-makers and authorities at the macro level in the country	S ₂ , S ₃ , S ₄ , S ₁₈
	Decision-makers (in organizations, big companies, and investment funds)	
	Strategic consultants	
	Organizational suppliers	
	Occupational and professional service companies	

Regarding the second goal of the research, the Delphi method was used to consider the experts' opinions and formulate the integrated and final indicators and correct them, if necessary. To design the questionnaire, 156 indicators from internal and foreign resources were obtained and classified into 48 variables. Then, all variables and indicators were sent to experts in the form of a questionnaire scoring based on a 5-option Likert scale, according to Osterwalder's business model.

In the first stage of the Delphi method, the experts commented about the questionnaire that 1) some of the indicators should be shorter and more fluent; 2) some of the indicators were merged due to overlap to make the questionnaire implementable, and 3) some indicators were added and some were removed.

In the second stage, the questionnaire was sent to experts and the answers were collected.

To determine the degree of coordination between the comments, the Kendall coefficient was calculated by Excel software. The Kendall coefficient is a non-parametric test and is used to determine the degree of correlation between opinions. This coefficient is denoted by the symbol W and is a value between 0 and 1. If the Kendall coefficient is 0, there is no full correlation, and if it is 1, there is a full correlation. Therefore, the Kendall coefficient in the second stage was calculated as 0.613 in the part of variables, and 0.784 in the part of indicators. A part of the means calculated in this stage is shown in Table 5.

Table 5

A Part of the Means Obtained in the Second Stage of the Delphi Method

Variable	Obtained mean	Indicator	Obtained mean
Knowledge producers	3.4	Researchers/ scholars	4.6
		Universities	4
		Thematic specialists	4
Users (operators) of knowledge	4.7	Policymakers and authorities at the macro level	4
		Decision-makers (in organizations, large companies, investment funds)	4.4
		Strategic consultants	3.6
		Organizational suppliers	3.8
		Occupational and professional service companies	2.4

The sixth stage: quality control

In this stage, the changes based on experts' comments were made on the designed and indicators, and the questionnaire was prepared for the third stage of the Delphi method. The questionnaires were re-distributed among the panel of selected experts participating in the first and second stages, and the changes were explained to each expert. After collecting the questionnaires, the Kendall correlation coefficient was calculated. In the third stage, the Kendall coefficient in the variables part was 0.916 and in the indicators part, it was 0.961 (Table 6).

Table 6

The Results of the Kendall Correlation Coefficient Test

Variable/indicator	Second stage		Third stage	
	Kendall coefficient	Agreement	Kendall coefficient	Agreement
Variable	0.613	Medium	0.916	Very strong
Indicator	0.784	Strong	0.961	Very strong

The results of the Kendall coefficient showed the improvement of agreement among experts; therefore, it can be said that in this stage of the Delphi method, all variables and indicators are valid in experts' opinion and exceeded the medium level.

Discussion

Knowledge has an important role in innovation. Knowledge largely depends on firms, and

is not simply and spontaneously distributed among firms; rather, it is absorbed based on abilities the firm acquires over time. Lack of appropriate knowledge flow in an organization and among individuals, organizations, and businesses will cause a gap in information and information access. Such gaps are a gap in the innovation system. Mediators, as a variable of the innovation system, can play roles in and fill the gaps. One of the mediators is knowledge brokers that fill the information gap and gap in information access by providing information and knowledge for organizations. Indeed, knowledge brokers act as facilitators of knowledge transfer among knowledge producers and operators. In other words, one of the ways to correct and improve the knowledge flow is by using knowledge brokers that fill the gap between knowledge producers and users and improve the knowledge flow. On the other hand, every business, based on its nature, needs a specific business model. Counting the variables and indicators of an e-commerce business model for knowledge brokers, which contributes to the facilitation and speed of work, can help improve the knowledge flow. In response to the research question, the results of analyses show that:

Question 1: what are the variables and indicators of an e-commerce business model canvas, considering the role of knowledge brokers?

the result of examining the full texts of 65 documents was counting 156 indicators of the e-commerce business model canvas, considering the role of knowledge brokers. Then, regarding the concepts of each indicator, they were categorized into 48 variables. Then, the indicators and variables counted based on the variables of Osterwalder's business model canvas were classified in the framework of the model, as shown in Table 6.

Question 2: to what extent do experts agree on the approval of the counted variables and indicators?

To answer the second question of the research, the counted indicators and variables were sent to experts in the form of a questionnaire using the Delphi method. The results showed that 7 variables (out of 48) of the e-commerce business model for knowledge brokers were removed. The variables approved by experts in the form of Osterwalder's business model were as follows: in the part of target clients, the variables of knowledge users (4.6) and knowledge producers (3.8) had the highest mean, respectively; in the part of suggested values, the suggested value to knowledge users (4.8), the suggested value to knowledge producers and users (4.2), and the suggested value to knowledge producers (4) had the highest means, respectively; in the part of distribution channel, the variable of the main channel (virtual) (5), in the part of contact with clients, the variable of how to contact with clients (4.4) was approved. In the part of core functions, exploring and understanding market opportunities and needs (5), creating communication between knowledge producers and end users (4.8), marketing (4.8), facilitating sharing, transferring, and exchanging the acquired knowledge (4.6), networking (4.6), client justification (4.6), interpreting and rendering knowledge (4.4), making knowledge accessible (4.4), identifying the existing conditions (4.4), securing infrastructures (4.4), creating innovation (4.3), creating new knowledge (4.2), searching and being aware of knowledge (4.2), acquiring and collecting (4.2), integrating knowledge (4.2), storing knowledge, preparing statistical and knowledge collections (4.2), developing technical infrastructure (4.2), developing human resources skills (4.2), coordination (4.2), supervision and evaluating knowledge (4), and evaluating the existing conditions (4), concluding an agreement (4), applying knowledge (3.6), providing consulting services (3.6), synthesizing researches (3.4) had the highest means, respectively; in the part of key resources, the variables of human

resources (5), spiritual (intellectual) resources (4.4), financial resources (3.4), and physical resources (3.2) had the highest means, respectively; in the part of key partners, the variable of influential institutions (3.1) had the highest mean; in the part of cost structure, variable costs (4.4) and fixed costs (3.3) had the highest means, respectively; in the part of income model, the variables of different types of income models (4.6), and pricing mechanism (4.4) had the highest means, respectively. Moreover, the results of the analysis showed that 22 indicators (out of 156) considered for the e-commerce business model for knowledge brokers were removed. Reviewing the literature showed that the variables obtained in the part of core functions including searching and being aware of knowledge, integrating knowledge, and synthesizing the research are in line with the results of a study by Gesualdo, Weber and Yanovitzky (2019), in which performance of knowledge brokers, including searching, editing, proving, and synthesizing researches, were identified. Also, the indicators of facilitating decision-making and policy-making through acquired knowledge and helping to increase the application of research in the process of policy-making under the variable of suggested value to knowledge users were in line with the results of Gesualdo, Weber and Yanovitzky (2019) who used the reports prepared to create communication between actors and support of policy-making and decision-making, and the results of the study by Scarlett, Forsberg, Biermann, Kuchenmuller and El-Khatib (2020) who investigated capacity-building for policymakers to apply the results of studies. The results also showed that the indicators of knowledge producers, including researchers and scholars, and universities on the part of target clients are consistent with the results of Scarlett, Forsberg, Biermann, Kuchenmuller and El-Khatib (2020) who considered researchers and universities as the actors of this field. On the other hand, the results of studying the characteristics of real knowledge mediators, including extraversion, personality attraction, having organizational position and authority, by Vaziri Gudarzi and Movahedi Sobhani (2014) are in line with the indicators counted in the present study for legal knowledge brokers, which included the need for influence, popularity and high credibility of the broker among opinion leaders, and the need for broker's skills in establishing political relations.

Question 3: What is the e-commerce business model canvas for knowledge brokers?

to propose the e-commerce business model canvas for knowledge brokers, all 134 indicators were categorized under 41 variables obtained from the Delphi method in the form of Osterwalder's business model, and under the nine variables of the business model including clients, contact with clients, deliverable value, distribution channel, core functions, key partners, main resources, cost structure, and income flow. In general, the e-commerce business model canvas for knowledge brokers, as illustrated in Figure 2, is as follows:

Clients	Client relationship	Suggested value	Core functions	Key partners
- Knowledge producers (researchers, universities, thematic specialists) Knowledge users (policymakers, decision-	How to make a link (holding organized workshops to make virtual relationships with clients, creating an internet forum, holding	To knowledge producers and users Filling the gap of information between producers and users, creating, correcting, and improving the knowledge flow, and Facilitating the direct and indirect interaction	- Searching and being aware of the knowledge ¹ - Acquiring and gathering knowledge ² - Integrating knowledge ³ - Interpreting and rendering knowledge ⁴ - Storing knowledge ⁵ - Facilitating knowledge-sharing, transferring, and exchanging the acquired knowledge ⁶	Influential institutions (state and non-state social influential organizations)

Clients	Client relationship	Suggested value	Core functions	Key partners
makers, strategic consultants, organizational suppliers)	collaborative meetings with clients, creating an information network (expert network) between researchers and scholars, holding collaborative training workshops for problem-solving, holding online knowledge seminars and webinars	between knowledge producers and users To knowledge producers generating income for knowledge producers through sharing their knowledge, generating income through attracting ideas and turning them into products and services for researchers/scholars, facilitating the marketing process To knowledge users operating useful, scattered, and hidden knowledge, Facilitating decision-	<ul style="list-style-type: none"> - Applying knowledge⁷ - Creating new knowledge⁸ - Creating innovation - Making knowledge⁹ accessible¹⁰ - Supervision and evaluating knowledge¹¹ - Coordination¹² - Creating communication between knowledge producers and end users¹³ - Identifying the existing conditions¹⁴ - Evaluating the existing conditions¹⁵ - Networking¹⁶ - Justifying clients¹⁷ - Concluding an agreement¹⁸ - Marketing¹⁹ - Exploring and understanding the market opportunities and needs²⁰ - Providing consulting services²¹ - Developing technical infrastructure²² - Securing infrastructure²³ - Developing human resources skills²⁴ 	
	Distribution channel main channel (websites, social networks)	makings and policy-makings through acquired knowledge, Motivating the organization to make decisions about functional indicators and functions of advanced development based on observations	Main resources Physical resources (software and hardware infrastructure) Spiritual resources (knowledge resources, innovation, working processes) Human resources (a network of brokers at the national level, creative and empowered human resources, researchers, and thematic specialists in a different field) Financial resources (capital available, equipment, and facilities)	
Income model Different types of income models: receiving commission from establishing communication between knowledge producers and users, receiving a charge or fee for providing consulting services Fixed pricing: considering a basic price for knowledge services Dynamic pricing: dynamic price based on the type of knowledge resource			Cost structure Fixed costs (equipment supply and depreciation costs) Variable costs (wage of human force, costs of development and technology infrastructure maintenance, marketing costs, costs of advertising and holding events, remuneration of specialists and researchers in exchange for knowledge-sharing	

Figure 2: E-commerce Business Model Canvas for Knowledge Brokers

Some of the indicators related to each variable counted in the part of core functions include:

1. The need for broker's awareness and a good understanding of the research
2. The need to examine background, barriers, and processes, the need to create a collaborative space of cooperation for brokers at the national level, gathering information needed by brokers through cookies and related technologies, the influence of people in

acquiring and gathering knowledge

3. The need to examine background, barriers, and processes
4. The need for broker's skills in interpreting information and presenting the results of studies in simple language, the need to recognize the mindset of the target community to align the transferred knowledge to the needs of the community
5. The need for broker's skills in synthesizing information, applying the results, synthesizing, and using them in policy-making
6. Knowledge-sharing based on personality traits, assets, and the nature of information resources, the need to examine the background, barriers, and social processes and differences in these functions, the need for broker's skills in networking, recognizing the clients based on the needs of the community, the need for knowledge broker's awareness of policymaking and government systems
7. Applying knowledge to resolve the users' information needs
8. Changing concepts to products and synthesizing them with the existing ideas in the industry
9. Creating innovation through transferring ideas
10. Exposing users to a wide range of valuable knowledge
11. Evaluating research projects to align them based on needs, evaluating reports prepared by the quality control team, evaluating the requests of policymakers and clients from a request-oriented perspective, the need for broker's skills to critically evaluate the existing evidence, the need for broker's skills in finding the researches related to the issues of policymaking, evaluating researches based on policymaking
12. Coordinating responses in educational and research programs and considering thematic priorities in meeting the needs
13. Mutual understanding of each other's goals and culture, the need for influence, popularity and credibility of broker among the opinion leaders, researchers, academics and policymakers, trustworthiness and impartiality of the broker in the eye of opinion leaders...., the need for broker's extensive experiences in different fields, the need for broker's skills in negotiating, communicating and networking, the need for broker's skills in making the research and experiences credible at different levels, the need for broker's skills in marketing and commercializing products, the need for broker's skills in making oral and written communication, the need for broker's skills in innovation and risk-taking, the need for broker's flexibility, the need for broker's skills in motivating others, interaction with individuals and team work, the need for broker's skills in making political relations, the need for broker's skills in holding meetings, the need for effective management and protection of the integrity of researchers and policymakers, the need for purposeful relationships and expressing the desired goals and results, the need for recognizing the role of brokers and their functions to improve relationships, the need for communication among policymakers...
14. Identifying knowledge problems and needs of end-users through cooperating with them, identifying the strengths and weaknesses of end-users to provide services to them, identifying one's strengths to provide knowledge services to end-users, identifying resources, expertise, and thematic specialists through cooperating with policymakers or independently
15. Evaluating end users, whether individuals or organizations, to identify strengths
16. Linking different parts of the industry to transfer experiences and acquiring knowledge about solutions, organization, and gathering researchers and others to communicate and transfer

knowledge, the need for creating a network of brokers, maintaining a network of researchers in line with policy-making, using networks and scientific communities of specialists at the international level, making a strategic connection with policymakers (to identify resources, expertise, and to provide research budget) and universities, the need for creating a collaborative workplace, a network of brokers, resources, and processes

17. Spending a lot of time justifying clients in the process of providing knowledge services to them

18. Agreeing with producers, and using knowledge in a predetermined framework

19. Encouraging economic firms and policy-making institutions to benefit from research findings, encouraging researchers to do more activities to meet the needs of the community

20. Analyzing the behavior of end-users

21. Providing specialized and knowledge counseling

22. Developing hardware and software

23. Securing the infrastructure against electronic attacks and establishing an infrastructure security management system

24. Holding training courses to improve the expertise of employees.

Finally, according to the findings of the present study, some suggestions are provided for future studies:

1. Since the main function of knowledge brokers is making links between policymakers and researchers, it is suggested that such businesses should be supported by policy-making institutions, leading to the development of surface relationships, facilitation, and improvement of decision-making and policy-making as well as resolving the main barriers from the exiting bureaucracy in large and traditional structures.

2. To make the role of brokers effective concerning researchers and policymakers, their business model needs to be clear and precise.

3. Brokers' awareness of policymaking and government systems can be regarded as a key to success in transferring knowledge.

4. Since the research was a qualitative study, the validity of the variables and indicators can be assessed by performing a case study in an institution, organization, or company in charge of knowledge brokering.

Conclusion

In general, this study aimed to achieve the following goals: 1) Recognizing the variables and indicators of an e-commerce business model canvas by considering the role of knowledge brokers; 2) Determining the level of agreement of experts in approving the presented variables of indicators; 3) Proposing an e-commerce business model canvas for knowledge brokers. One of the ways to improve the knowledge flow is the use of knowledge brokers who fill the gap between producers and knowledge users. On the other hand, every business, depending on its nature, needs a specific business model to be implemented. Counting the variables and indicators of an e-commerce business model canvas in today's fast-paced world for knowledge brokers who contribute to facilitating and speeding up functions can be effective in improving the knowledge flow. In this regard, the present study aimed to count the variables and indicators of an e-commerce business model canvas for knowledge brokers to create the grounds for researchers, policy-makers and decision-makers, structures, and governance institutions, as

well as the structures and institutions of supply and demand section in the innovation system to take advantage of it and eliminate the gap in information and access. Among the next steps of this research, based on the obtained results, is to determine the importance of e-commerce business variables and indicators for knowledge brokers from the point of view of brokers active in this field and to present a knowledge e-commerce business model for knowledge brokers.

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