International Journal on Emerging Technologies **11**(3): 1140-1146(2020)

ISSN No. (Print): 0975-8364
ISSN No. (Online): 2249-3255

Conceptual Model for Innovation Research

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(Received 25 March 2020, Revised 18 May 2020, Accepted 22 May 2020)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Researches in the field of innovations are valuable nowadays. The solutions are an important step towards the improvement of the innovation performances of the companies. The purpose of the current paper is to present a conceptual model that researchers can use to obtain reliable information and develop appropriate solutions when researching the innovations. The conceptual model is developed based on a detailed literature review and a theoretical analysis of the terms of "innovation" and "innovation commercialization". The conceptual model indicates the key elements of the processes of innovation development and innovation commercialization and gives the structure of research studies that focus on innovations. The presented conceptual model aims to provide an easy understanding of the innovation concept and to guide the conduction of future studies in this field. The conceptual model is successfully applied for the conduction of a research study on the innovations created by the software companies in Bulgaria. The conceptual model for innovation research is validated in the software industry but can also be used for innovation researches in other industries. The challenges of the study are associated with defining the research problem and reaching the respondents. For the data collection process, both in-depth interviews and a survey are used. The results of the study outlines specific problems related to the innovations in the software industry in Bulgaria, which become a basis for searching potential solutions.

Keywords: commercialization; conceptual model; innovation; research study; research variables; software industry.

I. INTRODUCTION

Topics associated with innovations are extremely valuable in today scientific world. World economies are struggling to perform at their best to satisfy the increasing customer needs and expectations. The researchers have the not easy task to investigate and find new and different ways and techniques so that companies could perform better regarding their innovation activities and achieve desired outcomes. The aim of the current paper is to present a conceptual model for innovation research that aims to encourage researchers from both science and business focus on innovations and conduct regular researches that could give answers to different questions related to the companies' innovation performances. Moreover, these researches help companies obtain complete information about changing customer needs and preference towards existing and emerging products and solutions. The developed conceptual model is a part of a dissertation thesis with a topic "Commercialization of the innovations in the software industry". The conceptual model is included in the methodological part of the dissertation. Its goal is to guard the conduction of a study on software companies in Bulgaria that focus on innovations. The results of the study define problems that exist in relation to the innovations in the software industry.

The presented paper starts with a literature review of the terms of "innovation" and "innovation commercialization". It is a starting point to build a clear understanding of the two theoretical concepts and apply this knowledge to formulate and develop a conceptual model for innovation research. The detailed theoretical part leads to the definition of key research variables that represent the nature of the research concepts. The defined research variables determine the empirical indicators used for the conduction of the research study. Both the defined research variables and the suggested empirical indicators are included in the developed conceptual model for innovation research.

The European Commission regularly monitors and measures the innovation performances of the European countries, including Bulgaria. The drawbacks of these research documents are related to the lack of data associated with existing problems and issues in the field of innovations. The results of those researches show the level of the innovation performances of the countries according to certain criteria without searching for the reasons and the actual problems. The advantage of the proposed conceptual model is its ability to search for specific problems. Another advantage of the developed conceptual model is its application in the software industry, which is an industry that suffers from a lack of research studies in Bulgaria. The conceptual model also focuses on product innovations, which are a key to companies' successful development.

The challenges of my research study include the definition of the research problem and the reach of the respondents. To overcome the challenge of the research problem I had to read a large number of literature sources on the topic and to find a theoretical basis that could form the research problem. To overcome the challenge of the study participants I contacted the Bulgarian association of the software companies and asked for their support in the data collection process.

II. LITERATURE REVIEW

A. The term of "innovation

In my literature review of the term of "innovation" I emphasize on one fundamental component of the innovation concept, this is the term of "implementation". Harold Koontz and Heinz Weihrich underscore the importance of the term of implementation for the definition of the term of innovation. The authors say that the implementation phase distinguishes the innovation from the invention" [1]. According to the main European document that deals with innovations, the Oslo Manual, "Innovation is the implementation of a new or significantly improved product or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations"[2]. In most of the definitions of the term of innovation in the scientific literature, the implementation part is essential.

In 2013 Fred Gault [3] suggests a change in this definition by saying that the term of "implementation" should be replaced by the term of "made available for potential customers". There is a significant difference between the terms of "implementation" and "making something available to potential customers". In my opinion, implementation means "product introduction to market" or "product usage and exploitation by the customer". To make a product available for potential customers means that the company takes certain actions to find customers for the innovative product. The product is not just ready to be implemented, the product is introduced to customers that have interest and are ready to buy. In the new edition of the Oslo manual from 2018 [4], I can see that there is such a replacement of the two terms and the innovation is defined as a new or improved product or process that has been made available to potential users (product) or brought into use by the unit (process).

Researching the definitions of the term of innovations in the scientific literature, I can see that there is another interpretation of the term of implementation. In many definitions, "implementation" means "used by customers". Looking back at Joseph Schumpeter's definitions of the term of innovation I can find that the author talks of innovation as "the commercial or industrial application of something new" [5].

Other authors also focus on the implementation stage of the innovations as something that is put into use by either the market or the organization. In his book „Public/private Partnership: Innovation strategies and policy alternatives, Albert Link [6]defines innovation as: „something new that has been brought into use. Robert Mellor [7] also defines innovations as: Invention plus application" or "Creativity plus applications".

Mark Dodgson [8] is another author that emphasizes on the implementation as an essential part of the definition of innovations. He says that innovation is the commercial exploitation of new ideas. The author continues that innovation includes different activities that lead to the commercial introduction of a new or improved product or service. In his book "An integrative model of innovation in organizations", Tang [9] sees innovation as "a process of raising and doing projects with the aim of commercializing or utilizing an innovative product, process or service". These definitions outline the importance of the value. When implemented in the market the innovation must add value to the customers and make them consume and purchase it. To confirm that, Anthony Ulwick [10] says that "innovation is indeed a science – a systematic process for creating products or services that delivers new value to customers. Innovation is the process of creating a product or service solution that delivers new customer value". I can say that the innovation is the creation of a new value. This means that innovations must focus on customer needs and try to satisfy those needs by the value they create.

In the scientific literature, many authors focus on customer needs and the company's ability to understand those needs. Authors present the innovations as company's understanding of customer needs and creating something of a value for them. "To sustain a competitive edge, more focus must be given to meeting users' needs, and not simply those explicitly stated in market research – but rather those latent user needs which can be revealed by alternative analytical methods, and by the users themselves" [11].

Harvard Business School professor David Garvin [12] writes that the main discriminator that distinguises the successful and unsuccessful innovation is the degree to which users' needs are fully understood. According to Abernathy and Utterback [13]innovation is "a new technology or combination of technologies introduced commercially to meet a user or a market need". All those definitions outline the importance of understanding customer needs for innovations.

When developing innovations, companies must properly understand and define customer needs. Anthony Ulwick [10] summarizes this statement and says that "in more practical terms, innovation is simply the process of figuring out what customers want".

The British innovation and entrepreneurship expert Paul Sloane is another author who defines the understanding of customer needs as a key factor for the development of innovations. Eliminate the risk in product innovation – get your customers to choose, Seek unhappy customers", Every problem is an opportunity for innovation" are just few titles that support those findings. In an interview from 1997 Steve Jobs [14] also supports the idea saying You have to start with the customer experience and work backwards to the technology. You can't start with the technology and try to figure out where you are going to sell it. According to the Nordic Council of Ministers [11], the innovation based on customer needs possesses the following characteristics:

1. A strategic focus on consumer.
2. Revenue-enhancing activities.
3. Use of multiple skills and perspectives in the innovation process.
4. Direct involvement of the user/consumer in the innovation process.

My literature findings related to the essential role of the customer needs for innovations lead me to build those findings into the developed conceptual model. However, which customer can the company turn to when developing innovations? Not every customer could be a driver and a source of innovations. There are certain types of customers, whose personal needs are defined as future market needs. These customers are willing to share their ideas and insights for innovation

development. Eric von Hippel [15] develops the concept of the "Lead user". According to the author the user is the one who can commercially realise a product or service, rather than the producers. The author [15] says that "Innovators with stronger "lead user" characteristics develop innovations having higher appeal in the general marketplace".

When developing innovations based on customer needs companies try to properly understand and define those needs. Employees need to be aligned with the criteria used to define customer key needs. In the scientific literature there are many definitions of the term of "customer need". My theoretical research continues with understanding the term of "customer needs".

Going through the scientific literature related to the term of "customer need", I can find different traditional ways of defining customer needs. The term of "customer need" is explained by terms such as solutions, product specifications, need and benefits. Anthony Ulwick [16] explains the traditional method of understanding customer needs that is often used by companies. The author says that companies ask their customers what they want and customers are the ones that offer solutions in the form of products or services. Then, companies deliver these products, and customers just do not buy. Anthony Ulwick continues saying that "Customers should not be trusted to come up with solutions; they aren't expert or informed enough for that part of the innovation process". The author emphasizes that those traditional ways of understanding and defining customer needs lead to useless information and are not useful any more.

I continue my literature review with searching for new methods of properly understanding and defining customer needs. My next literature research is focused on modern methods of understanding customer needs.

There are different modern theories in the scientific literature associated with the term of "customer needs". Some of those popular theories are the "Job to be done" theory, developed by Clayton Christensen, the concept of the "Outcome Driven Innovations", developed by Anthony Ulwick. All those theories describe "customer needs" as something stable over time. I recommend that researchers explore the two theories and try to find other modern theories for defining the term of customer needs which takes a central part in the innovation theory.

Table 1: Key elements of the process of innovation development in the software industry.

Variables	Description
Customers as a source of innovation	Changing customer needs as a source of ideas for innovation development.
Definition of "customer need"	Research ofdifferent theories for defining the "customer need".
Proper understanding and defining customer needs	The proper understanding of customer needs is a key factor for innovation development in the software industry.

The profound literature review on the term of "innovation" helps me to determine the theoretical frame of the term of "innovation" and underline some of its key elements associated with the process of innovation development. Those key elements represent the essentials of the innovation development process. These key elements are presented as "variables" in Table 1.

B. The term of "innovation commercialization"

When researching the innovations in software companies, the term of "innovation commercialization" must also be reviewed and studied. According to Isabelle [17] the innovation and commercialization terms refer to the processes of discovering knowledge, developing it into technologies, and transforming it into new or adapted products, processes and services to be used or sold in the market place. Isabelle [17] define the term of innovation commercialization as "process of translating research knowledge into new or improved products and services, and introducing them into the market to generate economic activities benefits".

In itsMapping Australian Science and Innovation Report, the Australian Government [18] defines commercialization as the process of transforming ideas, into greater wealth for individuals, businesses and society. James Jordan [19] is another author who writes about the process of innovation commercialization. He presents the commercialization as "the process or cycle of introducing a new product or production method to the market. The end result of commercialization is the availability of the innovation to be exploited for profit".

According to Frattini [20] "Commercialization of innovation can be defined as the set of decisions and activities that are necessary to present a new product to its target market and start to generate income from its sale". Frattini outlines some critical dimensions of the commercialization of the innovations, which are the degree of customer acceptance and the financial performance achieved by sales of the innovations. Brice McDaniel [21] is another author who writes about the commercialization stage as a crucial part of the innovations. The author describes the term as "production of a product for sale in the marketplace".

I can summarize that the above definitions and descriptions of the term of "innovation commercialization" in the contexts of business focus on two main components of the commercialization process. These two components are the innovation introduction to market and the generation of sale. The process of innovation commercialization is related to, first, the innovation introduction to market which aims to launch a product that meets customer needs and create desire to buy. The second part of the commercialization process is the sale process. Selling innovations is hard and requires specific and detailed theoretical knowledge and skills.

Based on the literature review, I can suggest five stages to present the process of innovation commercialization. These five stages describe the steps that should be taken to bring the innovation to market, find customers who want to use the innovation and to generate income from innovation sales (Fig. 1).

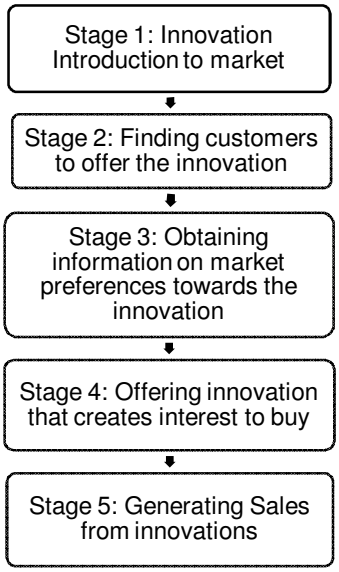

Fig. 1. Stages of the Innovation commercialization process.

My literature research of the term of "innovation commercialization", the defined two components of the commercialization process and the presented five stages of the commercialization process help me to find the essential elements of the commercialization concept and build them into my conceptual model. I can say that the key elements for innovation commercialization follow the determined five stages of the commercialization process and provide different pieces of information needed to complete each of the stages. These key elements are presented as "variables" in Table 2.

Table 2: Key elements of the process of innovation commercialization in the software industry.

Variables	Description
Innovation Introduction to market	Activities for getting customers acquainted with the innovation existence and its characteristics.
Market segmentation	The process of dividing a market of potential customers into groups with similar needs and preferences towards the innovation. Market segmentation helps companies find customers to offer the innovation.
Marketing research on customer preferences	A systematic collection of data regarding customer preferences towards the innovation.
Unique Selling Proposition	A statement that describes how the innovation is different and better than other competitive products.
Innovation Sales	A process in which the company offers innovation that meets the customer's needs and preferences, which make customer accept the developed value proposition and purchase the innovation.

III. METHODOLOGY

I research theoretical and empirical studies in the field of innovations. The theoretical studies represent the literature review of the terms of innovation and innovation commercialization that helps me understand the essentials in the two concepts and define the key elements of the processes of innovation and innovation commercialization.

The empirical studies represent the results of some main studies conducted by the European Commission. For the purposes of building my conceptual model, I make a review of some main European documents related to innovations. These documents represent the innovation performances of the European countries and undertake different spheres for improvement. These documents also include information about the innovation activities of the European countries, barriers for innovation and difficulties that companies experience when dealing with innovations.

Both my theoretical research and my researches of other innovation studies give me the theoretical framework that I need in order to define the key elements of the processes of innovation development and innovation commercialization. For the purposes of the conceptual model, I present the key elements as research variables (Table 1 and 2).

For each of the defined research variables I suggest certain empirical indicators that are used to create a comprehensive measure of innovations (Table 3). Each of the empirical indicators is explained for the purposes of the conduction of the innovation study.

Table 3: Empirical Indicators for measuring innovations.

Empirical Indicators	Description
Market Opportunity	Change in customer needs.
Change in customer needs	Jobs, Desired outcomes and Constraints that a "lead user" customerwants to achieve and overcome.
Lead user	Source of change that is an opportunity for starting innovations.
Innovation types	Innovation types and their share in the software industry..
Innovation sources	Innovation sources and their share in the software industry.
Jobs to be done	A theory developed by prof. Clayton Christensen that describes that people buy products to get jobs done.
Desired Outcomes	Set of outcome statements for the job.
Constraints	Obstacles that customers are trying to overcome and do the job properly.
Solutions; Product specifications; Needs; Benefits	Traditional methods for understanding customer needs.
Importance of understanding customer needs	The importance of understanding customer needs in the software industry.
Modern models for understanding customer needs	Search for modern models for understanding customer needs and their exploitation in the software industry.
Importance of Innovation	The importance of Innovation

introduction to market	introduction to market in the software industry.
Innovation introduction to market as jobs, desired outcomes and constraints	Search for new ways of Innovation introduction to market.
Importance of market segmentations	The importance of market segmentation in the software industry.
Market segmentation criteria	Market segmentation criteria in the software industry.
Nested Approach for market segmentation	The application of the Nested Approach in the software industry.
Conjoint analysis for Marketing research	A statistical method used in marketing researches, where customer evaluates the innovation by predefined combinations of attributes. The application of the method in the software industry.
Importance of customer preferences for the innovation	The importance of customer preferences towards the innovations in the software industry.
Purchasing factors for innovations	Research on different purchasing factors and their application to software innovations.
Ways of Innovation uniqueness	Research on different ways of product uniqueness for creating a Unique selling proposition and its application in the software industry.
Personal Interaction with customers	The importance of the personal interaction with customers in the software industry.
Techniques for Closing the deal	The importance of using different techniques for closing the deal in the software industry.

I use both the research variables and the empirical indicators to develop my conceptual model for innovation research. I put my conceptual model into test by conducting an online questionnaire that I distribute among software companies in Bulgaria. The questions that I formulate follow the essence of the research variables and the defined empirical indicators in the conceptual model. For the purposes of my research study, I use the descriptive research design. I employ the survey method, which are not subject of the current paper.

IV. CONCEPTUAL MODEL FOR INNOVATION RESEARCH

Conceptual models are instruments to clarify research concepts and to support the conduction of studies. Conceptual models should ease the research process and guarantee the successful accomplishment of the study. I think that the conceptual model helps the researcher to develop a research design and formulate questionnaires that provide complete and accurate information. The information is valuable because it helps researchers to develop solutions and suggest appropriate actions.

Based on my main literature findings related to the terms of "innovation" and "innovation commercialization", I develop a conceptual model for innovation research that aims to support the conduction of both scientific and business researches in the field of innovations.

The conceptual model represents the theoretical concepts of the processes of innovation development and innovation commercialization. The conceptual model shows the relationships between the defined research variables and the flow of the researched processes.

The developed conceptual model includes the previously defined key elements related to the innovation development and the commercialization processes, transformed into research variables. The research variables drive the research process. They are the characteristics of the environment that is of an interest in the research study. The variables represents the main literature findings in relation to the two theoretical concepts.

For the purposes of my conceptual model, I use both the defined research variables and the empirical indicators. The developed conceptual model is presented in Fig. 2. The conceptual model is applied for the conduction of a study related to the innovations in the software industry. I strongly suggest that the model support researchers that do innovation studies in other industries too.

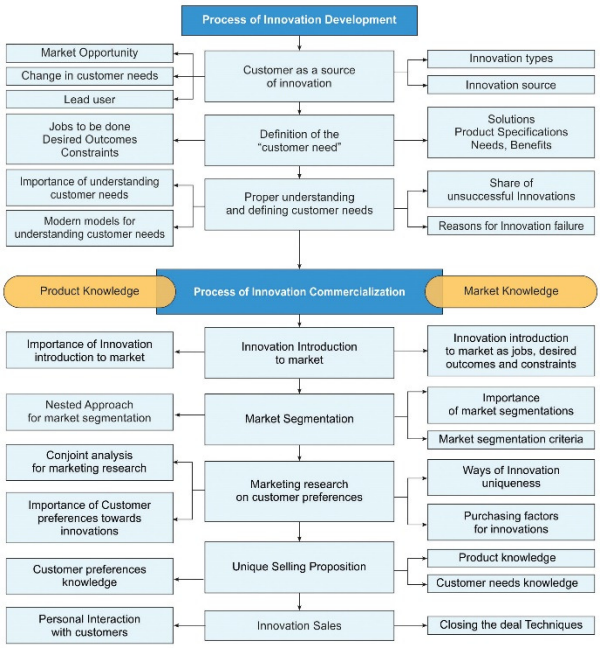

Fig. 2. Conceptual model for innovation research.

V. DISCUSSION AND RESULTS

The European Union has developed policies to support the innovations in Europe. These policies aim to provide a favorable environment for the innovations to happen. The European Commission has developed instruments that measure regularly the innovation activities of the European countries. Despite those efforts, I still think that more innovation researches are needed. Moreover, the focus of the researches should be on the problems, because the problems give the right solutions and the solution – the improvement. In Bulgaria, most of the researches in the field of the innovations are in the

Tourism and Wine Industries. There are still developing industries in Bulgaria that need to have a reliable and helpful information about their innovation performances and the ways for improvement. I think the software industry is responsible for creating innovations and that industry really needs additional knowledge and expertise to develop innovations. This is the reason why innovation researches are essential. However, there is a lack of innovation researches in the software industry in Bulgaria up to 2020. The conceptual model that I present in this paper is a gap-filling model in the software industry in Bulgaria.

The developed conceptual model for innovation research helped me process my research study in the software industry. I strictly followed the empirical indicators included in my conceptual model when I formulated my questionnaire. The questionnaire that I prepared was well structured and focused on innovation activities of the software companies in Bulgaria. The questions were simple and clear to the respondents. I can say that the questionnaire encouraged the respondents to provide accurate and complete information. I did not experience issues related to respondent's refusal to answer or some different kinds of difficulties answering the questions. The results of my study indicated problems that software companies faced when developing innovations. The definition of problems was a starting point of finding solutions that could minimize the existence of the problem and encourage the innovation development in the software industry. The aim of my research study was to develop a model for innovation commercialization in the software industry, which provided a solution to the defined problems. I can say that my conceptual model for innovation research helped me to process successfully my research study and obtain complete results. I strongly recommend other scientific or business researchers use the developed conceptual model when facing the need of conducting a study in the field of innovation.

The contributions of the developed conceptual model for innovation research could be summarized in the following points:

1. The conceptual model helps researchers to identify existing problems related to the definition of customer needs as a key for innovation development.
2. The conceptual model supports the finding of new ways of understanding customer needs for innovation development.
3. The conceptual model suggests five stages of the innovation commercialization process that researchers could use to study the innovations.
4. The conceptual model identifies the key stages of the processes of innovation development and innovation commercialization that researchers can focus on when conducting their studies.
5. The conceptual model provides areas of problems that could cause low innovation performance.

The results of the conducted research study are published in a scientific journal of innovations [22].The results include the following information: Innovation activities of the software companies, Innovation sources; Innovation approaches; Role of the Lead user for innovation development; Reasons for Implementation failure; Models for understanding customer needs; Marketing activities for Innovation Commercialization; Ways of Innovation uniqueness; Market awareness; Difficulties in the Commercialization stages; Challenges of the Commercialization process; Key factors of Innovations.

VI. CONCLUSION

The results of the conducted study on the innovations are presented and communicated with the software companies in Bulgaria. But future researches in this field are required. There are still problems that need their solutions. The presented conceptual model for innovation research is a helpful instrument that encourages and stimulates other researchers do studies in the field of innovations.

I strongly believe that the conceptual model could be used for researching innovations in other industries. I also believe that the conceptual model could be modified and enhanced for the purposes of other research studies.

VII. FUTURE SCOPE

My current research study focuses on the investigation of the key elements of the processes of innovation and innovation commercialization in the software industry. As a future scope of my research studies, I plan to emphasize on the innovation development process in the software industry. I plan to research the terms of creativity and design thinking and to explore their importance in the development of software innovations.

Conflict of Interest. There is no Conflict of interest in this work.

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How to cite this article: Kozludzhova, K. (2020). Conceptual Model for Innovation Research. *International Journal on Emerging Technologies*, *11*(3): 1140–1146.