

# Research Methodology for Studying Innovations in the Software Industry

Katerina Kozludzhova

**Abstract:** The purpose of the current paper is to present a research methodology for studying the innovations in the software industry. The developed methodology helps researchers explore the innovations in the software industry and stimulates them to better define existing problems and build a plan for obtaining reliable information that supports the right solutions. The current paper also aims to stimulate the conduction of future researches of the innovations in the software industry. The paper presents the stages and the critical components of developing a research methodology for studying innovations. The paper explains major definitions related to the term of "research methodology" and gives examples with a conducted research study. Understanding the key components of a research methodology is essential for every research process. The successful accomplishment of a research study depends on the researcher's ability and knowledge to define properly the term of "research methodology" and its critical components. The presented research methodology is validated in the software industry for the conduction of a research study related to the innovations created by the software companies in Bulgaria. The research methodology can also be used for the conduction of innovation researches in other industries and spheres of science and business. There is a need of researches in the field of innovations that could help both scientific and business researchers understand the real problems and find appropriate ways to solve them. The presented research methodology supports the conduction of valuable research studies that find answers to real problems. The presented research methodology guarantees the successful accomplishment of the research process and the obtaining of complete and reliable information, needed for the development of valuable and adequate solutions.

**Index Terms:** innovations, research design, research methodology, research process, research variables, software, software companies

## 1 INTRODUCTION

Innovations are a fundamental driver for economic growth and society wellbeing. Innovations have always played a central role in countries' polices. With no doubt, innovative economies are more productive and adaptable to change.

The purpose of this paper is to present a developed research methodology for studying the innovations in the software industry. The methodology is a part of a dissertation thesis with a topic "Commercialization of innovations in the software industry". The developed methodology is validated for the conduction of a research study on the software companies in Bulgaria. The study is conducted in 2018.

The term of "research methodology" can be defined as the path that the researchers should follow in order to conduct their researches [1]. I develop a path that aims to encourage researchers design and distribute studies that focus on the importance of innovations in business.

I develop and present my research methodology by following the stages of the research process and defining the meaning of its key components. I clarify the meaning of the terms of the research problem, the research design, the research goal and objectives, the research object and the research subjects, the research strategy, the working hypotheses, the research variables, the methods of data collection, the selection of the sample, the measurement and scaling techniques, the methods of data analysis. For each of the research stages and its components, I present examples with my research study. The

presented research methodology is based on both a detailed literature review and the professional experience that I have working in the field of software innovations. The literature review involves a profound knowledge of European policies and programs focused on innovations, a thorough investigation of different European Commission's reports regarding the innovation activities of European enterprises and theoretical knowledge of the innovation concept. Making researches in the field of innovations is extremely important nowadays. The findings of those researches help companies and economies improve their operations and act efficiently.

## 2 RESEARCH PROCESS

First, I focus on the importance of understanding the term of "research process". There are many definitions of the term of "research" in the scientific literature. Some of the definitions are broader, others are more restrictive. One of the most famous definitions of research is the one given by Kerlinger and Lee [2], who define the research as an investigation of phenomena guided by the theory and hypotheses. According to Depoy and Gitlin [3], a research is systematic strategies to generate knowledge in which the thinking and action processes of the researcher are clearly specified so that they are logical, understandable, comfortable and useful.

For the purposes of my research process, I investigate the nature of the innovation concept in the software industry. My research process is guided by a detailed literature review of the terms of innovation, software innovations, sources of innovations in the software industry, factors for innovation development in the software industry. My research process is also guided by some hypotheses that I formulate.

In the scientific literature there are two basic categories of research described – basic research and applied research. The goal of the basic research is to understand how certain

• Dr. Katerina Kozludzhova is a Chief Assistant Professor in Business Innovation in the Faculty of Economics and Social Sciences at Plovdiv University Paisii Hilendarski, Plovdiv, Bulgaria.  
E-mail: kkozludzhova@uni-plovdiv.bg

behavior works. Applied researches focus on questions related to solving real problems [4]. For the purposes of my research study, I apply the basic research. I aim to obtain complete information about the nature of innovations developed by software companies, the companies' attitude towards innovation, the role of the customer in the innovation process, the sources and opportunities for innovations in the software industry, the obstacles that innovative companies face.

### 3 RESEARCH METHODOLOGY

Every research process needs a research methodology that supports the successful accomplishment of the research process. Research is a long and engaging process that requires time and commitment. I think researchers should understand in detail the nature and the importance of building an adequate research methodology for their studies. A research methodology means in what way the research is going to be carried out. Many authors investigate the term of "research methodology" and its importance for the conduction of a study. According to Dr. Dipak Bhattacharyya [5] the research methodology is a systematic way to solve research problems. The methodology is a scientific approach, which is adopted for conducting a research [6]. Sam Daniel and Aroma Sam [7] describe the methodology as "the procedure of research techniques". The authors say that the research methodology is "the logic of scientific investigation" [7]. When developing a research methodology we should also know that there is a significant difference between the terms of "research method" and "research methodology". Rajendar Kumar [8] outlines the difference between the two terms by saying that research methods may be understood as all those methods, techniques that are used for conducting of research. Online research methods, research methodology is a way to solve the research problems. The research methodology can be understood as a science of studying how research is done scientifically. This means that the research methodology consists of not just the methods and techniques for the conduction of a research study, but all the critical steps of one research process that the researcher overcomes in order to obtain the desired outcomes. The research methodology ensures the successful execution of the research process.

In order to build a research methodology certain steps should be considered. According to David Wilkinson "a scientific research could be presented as consisting of the following stages:

1. Choosing a focus for the research.
2. Research design.
3. Data Collection.
4. Data analysis.
5. Writing up the results" [9].

In the current paper, I present my research methodology for studying the innovations in the software industry by following the stages of the research process suggested by David Wilkinson.

#### 3.1 Stage 1: Definition of Research Problem

The first stage is the identification of the focus of the study and the definition of the research problem. A literature review is very important in this first stage. Researchers should focus

on different literature sources related to the research concepts. I find the essential role of the literature review in the research process in the words of Ranjit Kumar [10] who says, "The literature review is an integral part of the research process. It helps you to establish the theoretical roots of the study, clarify your ideas and develop your research methodology". Ranjit Kumar [10] also outlines the main functions of the literature review. The author says that the literature review in researches has the following three functions:

1. It provides a theoretical framework of your study.
2. It helps you to establish the links between what you are proposing to examine and what has already been studied.
3. It enables you to show how your findings contribute to the existing body of knowledge in your profession.

For the purposes of my research study, I select the following sources of literature review in order to construct the theoretical framework of my research:

- Literature review on the terms of "innovation" and "innovation commercialization" in the software industry.
- Literature review on existing studies in the field of innovations.
- Literature review on European documents and reports in relation to the innovations.
- Literature reviews on the European Instruments for measurement of innovations.
- Literature reviews on the software industry in Bulgaria.
- Literature review on the innovation activities of the software companies in Bulgaria.

After the theoretical investigation of the term of innovation, the researcher is ready to formulate a research problem. The importance of a clear problem definition is essential in the research process. Dr. Dipak Bhattacharyya [5] underscores three main areas of research problems:

1. Exploratory for gathering information that may help in defining the problem and suggest hypothesis.
2. Descriptive, which may describe things such as market potential for product or the demographics and attitudes of a customer who buys the product.
3. Casual, to test hypothesis about cause and effect relationships between variables.

The research problem identifies the specific phenomenon to be explored. Defining the right problem has a huge effect on the outcome of the research. I can say that the research problem outlines the boundaries of the conducted study. For my research study, the definition of the research problem is based on secondary data, obtained from European Union's publications and Innovation scoreboards. The research problem of my study is related to the low innovation performance of the European countries, including Bulgaria, and the need of new and appropriate ways to improve it.

#### 3.2 Stage 2: Research Design

The second stage of the research process is the definition of the research design of the study. The research design provides the overall framework for collecting the data. According to Professor David de Vaus [11] "The function of the research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible".

For the purposes of my research study, I use a descriptive research design, which focuses on describing the essence of the innovations in the software industry. According to Mishra and Amok [6] "The descriptive research design consists of survey and fact-finding investigation of different kinds. The purpose of descriptive research is explanation of the set of circumstances as it is present as such". For my study, the descriptive research design requires a precise specification of the research problem, a clear goal and objective statements, the definition of the object and the research subjects. I know exactly what information to collect and who can provide it. Based on my theoretical research, I can also formulate working hypotheses, research variables and a research strategy. My descriptive research design is a fact-finding investigation of the innovations created by the software companies in Bulgaria. The research design is the overall plan of the research. For the purposes of my research study, I define the main components of the research design, which are:

1. Purpose of the research
2. Objectives of the research
3. Object of the research
4. Subjects of the research
5. Working hypotheses
6. Research variables
7. Research strategy
8. Sampling
9. Limitation of the study

Next, I will clarify each of the components of the research design and will provide examples with my research study.

### 3.2.1 Purpose of the Research

Dr. Khan [12] says that the purpose of the research is to search for answers to problems through the application of scientific methodology, which guarantees that the information is reliable and the research is conducted for a specific reason.

The purpose of my research study is to create a model for innovation commercialization in the software industry. The model is developed based on the results of the conducted research. The model for Innovation commercialization in the software industry is an answer to the defined research problem because it can be used as a tool for improving the innovation activities and performances of the software companies.

### 3.2.2 Objectives of the Research

The objectives of the research study present a set of research activities, which need to be executed for achieving the goal of the research. For the conduction of my research study, the following objectives are accomplished:

- Determine the nature of the term of "innovation" in the software industry. Define the types of innovations and the sources of opportunities for developing innovations.
- Discover the essence of the "software product" and the term of "innovation in the software industry".
- Reveal the importance of the "changing customer needs" for developing innovations in the software industry.
- Reveal the characteristics and the importance of the "Lead User" for developing innovations in the software industry.
- Reveal the importance of using a proper model for understanding and defining customer needs for

developing innovations in the software industry.

- Identify key factors for innovations and explore their relevance and applicability in the software industry.
- Determine the term of "Innovation commercialization".
- Reveal the importance of the marketing activities for the commercialization of the innovations in the software industry.
- Identify key factors for the commercialization of innovations and explore their importance and applicability in the software industry.
- Develop a conceptual model of the research study.
- Develop a research methodology.
- Execute the research study.

### 3.2.3 Object of the Research

The object of my research study is presented by the micro, small and medium-sized enterprises (SMEs) in Bulgaria that are members of the Bulgarian Association of the software companies.

### 3.2.4 Subjects of the Research

The subjects of my research study are the processes of innovation development and innovation commercialization in the software industry in Bulgaria.

### 3.2.5 Working Hypotheses

The descriptive research design allows the formulation of research hypotheses. The hypothesis is a statement, a testable proposition to a problem. According to Khan [12] "the hypothesis is an assumption considered in order to study the facts and check the validity of the theory in a problem-oriented researches". Dr. Dipak Bhattacharyya [5] says, "Hypotheses are generally concerned with the cause of a certain phenomenon or a relationship between two or more variables under investigation". I can say that hypothesis brings clarity and focus to a research problem and guides the researcher what information to collect. For the purposes of my research study, I formulate one main and five additional hypotheses. The main hypothesis states that the developed model for innovation commercialization is applicable in innovative companies in the software industry. For confirming the main hypothesis, I suggest five additional hypotheses:

1. Lead users are a source of innovations in the software industry.
  2. Proper understanding and defining the Lead user's needs is a key factor for the development of innovations in the software industry.
  3. Choosing an appropriate model for understanding and defining customer needs is essential for the innovations in the software industry.
  4. Innovations based on customer needs have a potential for a successful commercialization.
  5. Sales techniques are essential for the process of commercialization of innovations in the software industry.
- The formulated hypotheses in my study are theory-driven hypotheses. The theory-driven hypothesis utilizes existing theory to propose a relationship or effect on the variables of interest [13].



### 3.2.6 Research Variables

A variable is the characteristic or attribute of an individual that is of interest in a research study. Variables are those simplified portions of the complex phenomena that the researcher intends to study. According to Denise Polit and Cheryl Bech [14] "Variables are the central building blocks of quantitative studies. A variable, as the name implies, is something that varies". According to Simer Kaur [15] "It is pertinent for a researcher to know as how certain variables within a study are related to each other. It is thus important to define the variables to facilitate accurate explanation of the relationship between the variables". The author also say that there is no limit to the number of variables that can be used in a study. Although the more variables, the more complex the study and the statistical analysis. For the purposes of my research study, I make a profound theoretical review of the terms of "innovation" and "innovation commercialization" in the software industry. I suggest research variables that relate the theory to the actual study, which ensures the collection of the right information. In Table 1, I present research variables that I use in my research study of the software innovations.

**TABLE 1**  
RESEARCH VARIABLES

Variable type:	Research variables:
Demographic variables	Company type Number of personnel
Dichotomous variables	Importance of innovations
Multiple variables	Attitude towards innovations Innovative activities Types of innovations Sources of innovations Importance of customer needs Lead user needs Proper understanding of customer needs Marketing activities for commercialization Market awareness Ways of innovation uniqueness Barriers to innovation commercialization Key factors for innovation commercialization Purchasing factors for innovations Innovation measurements Reasons for innovation failure

### 3.2.7 Research Strategy

For the purposes of my research study, I use a mixed research strategy that involves the application of both the quantitative and the qualitative methods. The qualitative method is oriented towards recording in-depth information about opinions, attitudes and behavior of the units surveyed. The use of the qualitative method aims to reveal and explain the essence of the concepts of "innovation" and "commercialization" in the software industry. The effectiveness of the qualitative research depends on the skills of the researcher. The results also come from the researcher's personal interpretation and judgment. I decide to use a qualitative research because I have a professional experience developing innovations in the software industry. For obtaining qualitative information, I conduct personal interviews with software company's executives and product managers. The quantitative method is oriented towards

searching sustainable, objective and recurring economic relations that help finding new methods and suggest specific tools that companies could use in order to improve their innovation performances. For obtaining a quantitative information, I conduct a survey.

### 3.2.8 Sampling

Sampling is an important aspect of every research. It is another critical component of the research methodology. The first step in selecting the sample is to define the population. The population consists of every individual that possesses the characteristics that are of an interest to the researcher [16]. The sampling involves the selection of a small number of elements from a larger group of elements and expecting that the information gathered from the small group of elements will provide accurate judgment about the larger group [17]. The second step in selecting the sample is to determine the sampling method. There are two basic sample designs explained in the scientific literature: probability and nonprobability sampling design. The probability sampling procedure can be divided into simple random sampling, systematic sampling, stratified sampling and cluster sampling. In simple random sampling, each element of the population is assigned a number and the desired sample is determined by generating random numbers. In systematic random sampling, the sample is chosen by selecting a random starting point and then every n-th element is selected to be in the sample. Stratified sampling is presented by a two-step procedure. In the first step, the entire population is divided into sub-populations, which are called strata. In the second step, a random sample of elements is chosen from each of the strata. In the cluster sampling the population is divided into groups, called clusters. Then a random sample of clusters is selected. The overall sample consists of every element in the selected clusters [17]. For the purposes of my research study, I use both probability and nonprobability sampling methods. The probability sampling design is used for the conduction of a survey. The method used is the stratified sampling. In the first step, the entire population (all the software companies in Bulgaria, members of the Bulgarian Association of the software companies) is divided into three subpopulations, which are "micro companies", "small companies" and "medium companies". In the second step, a random sample of elements is chosen from each of the three subpopulations. For the purposes of my research study, the entire population contains 73 software companies. A sample of 33 software companies is generated. The nonprobability sampling design is used for the conduction of the personal interviews. Qualitative researches focus on relatively small samples selected purposefully. The method of purposive sampling is used to develop a sample for the conduction of the personal interviews. The method involves identifying and selecting individuals that are especially knowledgeable and experienced about the phenomenon of interest. For the purpose of my research study, 10 participants are selected. Table 2 presents the sampling techniques used in my research study.

TABLE 2  
SAMPLING TECHNIQUES

Population	Sampling method	Sample size	Research method
73	Probability sampling design (Stratified sampling)	33	Online survey
73	Nonprobability sampling design (Purposive sampling)	10	Personal Interviews

### 3.2.9 Limitation of Research

Every study has limitations. For the purposes of my research study, I outline the following limitations:

- The research study focuses on the software companies that are members of the Bulgarian Association of the software companies.
- All the studied software companies perform innovative activities.
- The study focuses on product innovations.
- The study is conducted in 2018.

### 3.3 Stage 3: Data Collection

#### 3.3.1 Measurement and Scaling

After determining the sample size, the researchers apply the measurement and scaling techniques that ensure the conversion of the qualitative information into a numerical form for further analysis. This is part of the data collection stage of the research process. Dr. Paurav Shukla [17] defines the terms of measurement as “the assignment of numbers or other symbols to characteristics of objects according to the certain pre-defined criteria”. The author [17] presents the term of scaling as “an extension to the process of measurement” and “the process of assigning a set of descriptors to represent the possible responses to a certain question. Several characteristics should be taken into account when developing quality scales. These characteristics are: 1) understanding of the research problem; 2) establishing data requirements; 3) developing the research constructs; 4) understanding the measurement scales [17]. There are two types of scaling techniques explained in the scientific literature – comparative scaling and non-comparative scaling. Comparative scaling techniques provide a comparison between characteristics of the object. The respondents choose one out of two or many characteristics. In non-comparative scaling, the respondents do not compare objects, they evaluate only one object at a time [17]. In my research study, I measure the responses, employing both the comparative and the non-comparative scaling techniques. I use Rank order scaling as a comparative scaling technique and Likert scale, Stapel scale and Semantic differential as non-comparative scaling techniques. Rank order scaling is about ranking a certain set of objects on a pre-defined criterion. Likert scale focuses on degree of agreement or disagreement. Semantic differential scale includes a seven point bi-polar scale where only the endpoints are clearly defined. Stapel scale consists of one criterion in the middle of a range of values without a neutral point [17]. Table 3 presents the scaling techniques used in my research study.

TABLE 3  
SCALING TECHNIQUES

Scaling Techniques:
<b>1. Comparative scaling (Rank Order Scaling)</b>
Question 1: Please rank (1to 5) the purchasing factors that influence the decision of your customer to buy innovations. (1-least important; 5-most important) Factors: Innovation Functionality Support Capabilities Quality of customer service Innovation Price Brand recognition
Question 2: Please rank the fields of your future investments related to your innovations. (1-least important; 5-most important) Fields of investments: Innovation introduction to market Effective market segmentation approaches Marketing researches on market preferences towards the innovation Development of Unique Selling Proposition Selling Techniques
<b>2. Non-comparative scaling – examples of questions:</b>
Question 1: To what extend do you agree or disagree with the statement that the innovation introduction to market is a key factor for the innovation commercialization process? Strongly agree Somewhat agree Neither agree or disagree Somewhat disagree Strongly disagree
Question 2: What is the degree of importance of the below key factors for the successful commercialization of the software innovations? Key factors: Development of Market pull and Need-Driven Innovation Lead User involvement in the innovation process Innovation introduction to market Selection of a right method of market segmentation Selection of a right method of Marketing research Development of Unique Selling Proposition Customer contact and Meeting arrangements Selection of right techniques for closing the deal
Question 3: Do you think of the below listed statements as a “major problem”, a “minimum problem” or a “no problem” regarding the innovation commercialization process in the software industry? Lack of Financial resources Administrative barriers Lack of Marketing experts Lack of knowledge on market preferences Low demand for the innovative product

#### 3.3.2 Questionnaire Design

The questionnaire design is another critical component in the data collection stage of the research process. The questionnaire design ensures the collection of a complete and reliable information. Questionnaire is characterized by two objectives. First, it converts the information required in a format of questions. Second, questions must be created in a form in which the respondents will understand them. There are still debates as some researchers think of a questionnaire as art, which is based on the experience of the researcher. Some other researchers consider it as a science based on theoretical knowledge [18]. For the purposes of my research study, the questionnaire is designed based on both my professional experience and the theoretical knowledge. The questions are designed in seven groups. Table 4 presents the groups of the research questions related to the innovations in the software

industry.

**TABLE 4**  
GROUPS OF RESEARCH QUESTIONS

Groups of Research Questions:	Questions related to:
Group 1: General questions	Number of personnel Main scope of business
Group 2: Importance of innovation	Attitude of software companies towards innovations.
Group 3: Innovation Development process in the software industry	Types of innovations. Opportunities and sources of innovations. Importance of Lead user in the innovation process. Involvement of Lead users in the innovation process. Change in Lead user's needs as a source of innovations. The importance of properly understanding and defining customer needs for innovation development.
Group 4: Innovation Commercialization process in the software industry	Stages of the commercialization process in the software industry. Definition of "Innovations commercialization" in the software industry. Marketing activities for software innovation commercialization. The importance of innovation introduction stage to the commercialization process. The importance of market segmentation. The importance of customer preferences towards the innovation. Ways of Innovations uniqueness in the software industry. Difficulties in the Innovation commercialization process. Reasons for market failure of the software innovations. Sale stage in the commercialization process in the software industry.
Group 5: Purchasing factors	Purchasing factors for innovations in the software industry.
Group 6: Measurement of Commercialization	Metrics for measurement of the Innovation commercialization in the software industry.
Group 7: Investments in innovations	Evaluation of areas for investments in innovations in the software industry.

### 3.3.3 Research Methods

The construction of research methods is the first practical step in the conduction of a research study. For my data collection stage, I use the survey method. The designed questionnaire is standardized. Sample units are asked precisely the same questions in an identical format and the responses are recorded in a uniform manner. The questions are structured (close-ended). The respondents are asked variety of questions regarding their feelings, opinions, behavior, actions taken related to the innovations they create. The questions are asked via internet. For the purposes of my research study, the survey method is an online questionnaire with 25 closed-ended questions. When selecting the respondents for the online questionnaire, there are three criteria that are taken into account:

1. Respondents are executives or product managers in the software company.

2. Respondents are representatives of the three categories of software companies: micro, small and medium enterprises.

3. All respondents are available and agree to participate in the survey.

The order of the questions strictly follows the defined in Table 4 directions of the questions. The online questionnaire starts with opening questions. The opening questions aims to gain respondents' trust and make them feel comfortable. The opening questions aim to obtain respondents' overall attitudes and feelings about innovations and their importance in the software business. Table 5 presents some examples for opening questions used for the purposes of my research study.

**TABLE 5**  
OPENING QUESTIONS SAMPLE

Opening questions:
Question 1: Do you consider innovations important for your company's success? Yes No
Question 2: Which of the following statements describes your attitude towards the innovations? Innovations are our main priority. Innovations are one of our priority. Innovations are not a priority.
Question 3: Your companies is defined as: Product company Outsourcing company Company with both product and outsourcing activities

The specific information questions come next. They are associated with the research goal and objectives. These questions are complexed in nature. Table 6 presents some examples of specific information questions used for the purposes of my research study.

**TABLE 6**  
SPECIFIC INFORMATION QUESTIONS SAMPLE

Specific information questions:
Question 1: What types of innovations does your company develop? Product innovation Process innovation Marketing innovation Organizational Innovation
Question 2: Regarding your innovation activities, your company: Develops innovations on their own Develops innovations in cooperation with other companies Adopt innovation created by other company
Question 3: What are the sources of innovations in your company? Lead user Non-Lead user Competition Suppliers Personnel New technologies Partners Top Management Educational Institutions

The research questions in the questionnaire are of three types: dichotomous questions, multiple-choice questions and scale questions. Table 7 presents the different types of questions

used in the online questionnaire in my research study.

**TABLE 7**  
TYPES OF QUESTIONS USED IN THE ONLINE QUESTIONNAIRE

<b>1. Dichotomous questions</b>
Example: Do you consider innovations important for your company's long-term success? Yes No
<b>2. Multiple-choice questions</b>
Example: What do you think are the reasons for the innovation commercialization failures? Insufficient staffing Poor organization of the innovation process Unrealistic deadlines Lack of financial resources Incorrect understanding of customer needs
<b>3. Scale questions</b>
Example: To what extent do you agree or disagree with the statement "Change in Lead User's needs is a driver for innovations in the software industry"? Strongly agree Somewhat agree Neither agree or disagree Somewhat disagree Strongly disagree

For the purposes of my research study and the data collection stage, after the online questionnaire I conduct personal interviews. Personal interviews are an effective way to gain trust and cooperation from the respondents. Personal interviews aim to gain insights of important aspects of innovations and seek to foster learning about certain opinions, behavior and attitudes regarding the innovations. Personal interviews are familiar and flexible way of asking people about their opinions and experiences. Structured interviews are used when the researchers know exactly what they want to uncover during the interview and know that the questions will be meaningful to the respondents. The structured interviews are easy to administer and analyse [19]. For my personal interviews, I use 20 structured, open-ended questions. When selecting the respondents for conducting the personal interviews, the following criteria are taken into consideration:

1. Respondents are highly informed and knowledgeable in the field of Innovations.
2. The selected target group is homogeneous - product managers.
3. Respondents are representatives of the three categories of software companies: micro, small and medium enterprises (SMEs).
4. All interviewees are available and agree to participate in the interview.

Table 8 presents a sample of open questions used for studying the innovations in the software industry.

**TABLE 8**  
SAMPLE OF PERSONAL INTERVIEWS QUESTIONS

<b>Sample Questions:</b>
1. Can we say that the development of product innovations in the software industry is driven by changes in customer needs?
2. Do you think that the proper understanding and defining

customer needs is essential for the development of innovations in the software industry?
3. Do innovations in software industry fail due to poor understanding of customer needs?
4. How do you introduce your innovations to the market?
5. How do you find customers for your innovations?
6. Do you conduct marketing researches related to the innovations you develop?

### 3.4 Stage 4: Data Analysis

In data analysis stage researchers use different computer programs that facilitate the successful execution of that stage. For the purposes of my research study, the collected data is processed and analyzed by a software program for Statistical Package for Social Sciences (SPSS), a software program for Qualitative Data Analysis (NVivo) and Microsoft Excel. I use the SPSS for the analysis of the data obtained by the online survey that I conduct. The NVivo program is used for analysis of the qualitative data, which I obtain by conducting the personal interviews. NVivo helps researchers to organize, classify and sort the different types of data. I present my research results using the Microsoft Excel. In my research, the analysis of the quantitative data includes exploring the relation between two variables, which is done using the cross tabulation and chi square methods of data analysis. A significance level of  $\alpha = 0.05$  is assumed to test the formulated hypotheses, which guarantees a 95% probability of the alternative hypothesis. The Cramer's coefficient (V) is also used for estimating the degree of dependence established by the chi square analysis.

## 4 RESULTS AND DISCUSSION

Using the presented research methodology, I can say that I managed to accomplish successfully my research study on the innovations in the software industry in Bulgaria. I obtained a complete and highly reliable information, which I put to analysis. I received certain outcomes that outlined the problem that existed in relations to the innovation created by the software companies in Bulgaria. Those problems needed a solution. I believe that if the researchers manage to get a reliable information from their studies, they are able to provide the right solutions. The results of my research study showed that there were significant problems in relation to the innovations in the software industry in Bulgaria. Some of the main problems were associated with the improper definition of customer needs for creating innovations, lack of knowledge on the innovation sources, lack of knowledge on the innovation commercialization process and its key factors. The well-defined problems lead to clear solutions. My research study achieved its goal and created a model for innovation commercialization in the software industry [20], which gave specific solutions to the defined problems. Moreover, my research methodology helped me to achieve the goal of my research.

## 5 CONCLUSION

By presenting a research methodology for studying the innovations in the software industry, I try to contribute to the efforts of the European countries to search for ways to



improve their innovation performances and scoreboards. The developed research methodology helps software companies collect and analyse information that aim to help management to take adequate decisions and perform certain actions that create a favourable environment for the innovations to happen. Understanding the term of "research methodology" guarantees the successful accomplishment of the research process and the obtaining of the right and reliable information. If I can suggest directions for improvements of the presented research methodology, I would emphasize on the investigation and the application of different methods for accomplishing stage 4 of the research process, which is the data analysis.

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