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SUMMARY

DOCTORAL THESIS

**SOFTWARE DEVELOPMENT AND
CUSTOMISATION BASED ON CUSTOMER
REQUIREMENTS**

SCIENTIFIC LEADER:

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1. CONCEPTS, DEFINITIONS, MOTIVATION OF THE THESIS, OBJECTIVES PURSUED

Concepts and definitions

The thesis "*Software development and customization based on customer requirements*" addresses a current topic in the age of technology and digitalization, namely the conceptualization of the idea of customizing software products. Economic theory defines the product as a good or service resulting from economic activity, intended to satisfy directly or indirectly certain needs or problems, being synonymous with the economic good in the broadest sense.

The product is the most important result of a company that leads to profit, regardless of its size, an element under which the company can induce changes in the market.

Services are the result of a production activity that changes the conditions of consumer units (processing services) or that facilitates the exchange of products or financial assets (margin services).

When defining the term **product customization**, it is relevant to include the perspective of the product, which may be a physical good or a service. Thus, the personalized product can be defined as a physical good or a service adapted to the requirements of a certain customer. In this context, customer involvement is an important aspect because customers dictate what the company / companies should produce. The trend of product customization, which can be seen today, is the result of many changes in the business environment, many suppliers being forced to revise their production strategy and management concepts.

The services depend both on the potential level of personalization that the service provider can offer and also on the organisation's ability to provide the personalized service, given the constraints it faces.

The first dimension of the typology described by the authors is **the necessary customization time**, which is closely related to the flexibility in production, as well as the ability of a company to implement production processes. Usually, the authors of the literature use the term "**time pressure**" because studies in the field claim that this is the main factor that differentiates unforeseen behaviours from planned behaviours.

Contrary to popular belief, higher **levels of customization** may not always lead to high performance and customer satisfaction. This is due to the complexity of the customization process that can limit the extent to which customization is beneficial to customers.

Thesis motivation

The motivation of the doctoral thesis is related on the one hand to the need and possibility to develop / adapt software packages to customer requests taking into account the cost and impact of customization in terms of risks and effects specific to this process, and on the other hand to ensure theoretical premises are captured in a methodological tool of best practices in the field, which allows unitary orientation and guidance at the level of an economic operator.

Objectives pursued

The main objectives of the thesis consist of conceptualization and creation of a best practice guide regarding software customization, based on the research conducted in the field. These main objectives are achieved by accomplishing *the derived objectives*, namely: product customization analysis, software customization analysis, customer-supplier relationship analysis in the context of customization.

Derived objectives, in turn, are achieved by accomplishing the following *primary objectives*: defining and conceptualizing software products, defining and

conceptualizing customization, identifying the advantages and disadvantages of customization, identifying customization methods, identifying and analysing risks in customization.

The paper begins with the analysis of the current state in product customization in general, focusing on defining products, which involves their personalization and the advantages and disadvantages of customization in relation to the degree of customization and complexity of products.

The next step in the research focuses on software products, how they are defined, but also on classic and modern methods of customization, distinguishing between configuration and customization and analysing the barriers in customization.

Another important step of the research lies in the analysis of the customer-supplier relationship in the context of personalization, starting from understanding what a personalization requirement entails and continuing with methods for generating ideas for personalization. The advantages of the customer-supplier relationship in the context of customization are studied and researched from the perspective of customization variants of software applications but also in terms of the evolution of revenues from customization activities.

With regards to the software customization impact, I aimed to identify the cost of customization as well as how to decide whether or not to customize a software product. I have also identified the risks of customization during and after customization and quantified the effects of software customization. I have put a special emphasis on how the customer experience can be created, ensuring the necessary premises for the elaboration of a guide of best practices that has been tested and validated on a software product.

The research strategy that formed the basis of the paper aimed at three main directions, respectively:

- The beginning of the thesis that consolidates the theoretical foundation on which the product's personalization, in general, and especially the personalization of software products are based. Thus, following the query of multiple databases with scientific articles, I considered for the realization of this paper a number of 134 consecrated bibliographical references.

- The second dimension of the research consisted in accessing the official data published by IT and telecommunications companies. This data was collected through annual reports published by listed companies, and then through econometrics procedures they were translated into simple linear regressions and interpreted afterwards.

- The last dimension of the research used a new method of gathering information, namely *crowdsourcing*. Through this procedure, which was performed online, I answered a series of questions aimed at identifying the risks in personalization, the effects of personalization and the customer experience offered in a software customization project by a long - standing company versus a start- up.

However, the research undertaken for the purpose of this thesis also has some limitations, given the fact that the cost of personalization is confidential information recorded in service/commercial contracts protected by NDA-s (non-disclosure agreement), so I had to pursue only with the estimations from the published annual reports of the companies analysed in the study. Also, if a longer period of time is allocated to data collection through the *crowdsourcing* method, the sample of contributors can register significant increases, positively influencing the accuracy of the resulted indicators.

2. STRUCTURE AND SYNTHESIS OF THE DOCTORAL THESIS

The structure of the doctoral thesis

From a structural point of view, the thesis contains an introductory chapter with specific topics and 6 content chapters, to which is added a final chapter of Conclusions and personal contributions, as well as Future Directions of Research, totalling 223 pages, of which 190 pages represent the actual thesis and 33 pages are references, that have a number of 134 notes and annexes containing specialized contribution to a better understanding of the thesis and its objectives.

Synthesis of the doctoral thesis

Today more than ever, the development of any economic, financial, or banking activity cannot be imagined without the use of a strong information support to ensure the competitive advantage over other competitors in the market. In this sense, the role of information technology is to acquire knowledge through information, this technology being made up of: hardware, software, communication infrastructure, networks, databases, office automation, and all other equipment and software components necessary for processing information.

The doctoral thesis entitled *Software development and customization based on customer requirements* is structured in 8 chapters.

The **first chapter**, named *Introduction*, presents the general considerations, the main and specific objectives, the motivation of the thesis and a summary of the paper.

Chapter 2, *Analysis of the current state in the field of product customization*, presents a study of the current level of conceptualization in the field of product customization, as well as an analysis of the main applicable customization strategies underlying the established methodological models (Pine and Gilmore Strategies, Duray and Da Silveira).

The Pine and Gilmore [97] model is customer-oriented and, in principle, classifies personalization methods according to its ability to avoid a certain sacrifice. In this regard, Pine and Gilmore introduced the notion of customer sacrifice which is defined as “the difference between what the customer accepts and what they really need.” To respond to customer sacrifice, customization can be done by modifying or not the functionality of the product or by product representation (packaging, description, labels, etc.).

On the other hand, Duray [26] presents a taxonomy of personalization that has two dimensions, namely the moment of customer involvement and the type of modularity. These dimensions are analysed in relation to the production cycle consisting of the following phases: design, manufacture, assembly and use of the product.

Da Silveira [21] and collaborators introduced a classification framework with 8 generic levels, ranging from pure standardization to pure customization.

Chapter 3 is named *Contributions related to software customization products*. This chapter introduces at the beginning various ways of defining the concept of *software product* according to its role, through software applications (programs that end users are directly interested in) and software systems (software support programs). It also presents a critical analysis of traditional and modern methodologies for developing and customizing software products along with research on the time and cost of customizing these products.

The software development cycle is defined as an organized direction that involves multiple stages. The process begins with the determination of the client's needs and user requirements and ends with the maintenance, documentation, and training of staff [22]. Traditional software development methods include the Waterfall method, the Incremental method, the Spiral method, the Prototype method, and the Rapid Development (RAD) method.

The Waterfall method of developing and customizing software applications is a classic method still used today. Its main feature is that each phase is completed before a new phase begins [80].

The Incremental method of developing and customizing software applications further takes the milestone-based method (the Waterfall method), dividing the implementation phase into several stages and going to the point where the entire development process is repeated several times in subsets. Using this method, development and customization become more flexible to changes and modifications that may occur along the way. As the design is now done in stages rather than in one step as in the previous method, there is a greater risk that design and coding made in a previous step, needs to be changed to suit the requirements issued under current stage [93].

In the Spiral method, the emphasis is on risk assessment and minimizing the risk of the software development and implementation project by dividing a project into smaller segments and allowing for greater changes in customization, as well as providing the opportunity to assess risks. Each cycle involves a progression through the same series of steps, for each part of the product [93].

In the Prototype method, the user is involved in the whole customization process, which increases the user's acceptance rate on the final shape of the software product. Small packages of the entire software are developed using the iterative method until the entire prototype reaches the final form requested by the user [93]. While most prototypes are developed and subsequently rejected, there is still a chance that some prototypes will evolve into functional systems.

Agile methodology is a modern process that emphasizes on the simplification of customization processes and the development of software applications by reducing the complexity of planning and redirecting the attention to the customer. The desire to establish a new, simpler and more efficient process was not only manifested in the IT industry but actually appeared in the manufacturing industry where Taylor and Ford's concepts of production were overtaken by the model implemented in Japanese companies such as Toyota.

Scrum method has been introduced by Takeuchi, DeGrace, Schwaber and others around the 90' [93]. This method involves a drastic simplification of project management processes and is reduced to three roles, three documents and three meetings.

The idea for extreme programming was brought by Kent Beck and Ron Jeffries in 1999.

RUP was developed in 1990 by Rational Software under the leadership of Ivar Jacobson, Grady Booth and James Rumbaugh. This process defines 6 good practices observed in the industry [114].

In **Chapter 4** called *Customer-supplier relationship – a study in the context of software customization, with the aim of developing a specialized customization model* I presented main methods of both customization requirements definition and analysis for generating new ideas in personalization. The chapter also highlights the example of a new model for identifying requirements, Crowd- AHP, and at the end of the chapter I documented the results of customization requirements evaluation.

Research and contributions: the costs of software customization are highlighted in **Chapter 5**, which makes an assessment of the cost of software customization from supplier's perspective, as well as the decision to buy or make a software application based on customer analysis.

Under **Chapter 6** entitled **Research and contributions: the impact of software customization**, I have documented both the results of research on the impact of software customization from supplier's perspective but also I have identified specific risks related to software customization and the effects of software personalization.

Chapter 7 - Best practices guide, presents a documented and procedural section for the development and / or personalization of specialized computer applications considering customer requests, applied on an application customization that serves the time booking of employees.

Chapter 8 entitled *Conclusions and personal contributions. Future directions of research* highlighted the contributions to the software development segment and customization based on customer requirements, as well as how to implement and capitalize the results of undertaken research.

3. CAPITALIZATION OF RESEARCH RESULTS

The capitalization of the research results was carried out by supporting and publishing papers, in the proceedings of conferences / symposiums, in ISI or BDI indexed Journals, among which can be listed:

Articole ISI

1. *"The Innovation in Healthcare Private Sector: Financial and Economical Approach"*
By: **Gavrila, L.**; Bran, C., Conference: 6th LUMEN International Conference on Rethinking Social Action Core Values Location: Iasi, ROMANIA Date: APR 16-19, 2015, Sponsor(s): LUMEN RETHINKING SOCIAL ACTION. CORE LUES Pages: 567-571 Published: 2015 ,WOS:000378560300100.
2. *"Software personalization: Crowd-AHP model"* , By: **Gavrila, Larisa**; Ionescu, Sorin; Militaru, Gheorghe, Conference: 7th International Conference of Management and Industrial Engineering (ICMIE 2015) on Management - the Key Driver for Creating Value Location: Univ Politehn Bucharest, Bucharest, ROMANIA Date: OCT 22-23, 2015
Sponsor(s): Univ Politehn Bucharest, Fac Entrepreneurship Business Engn & Management, Management Dept; Editura NICULESCU; WILDMEDIA; Scoala Studii Academice Postuniversitare Management, MANAGEMENT - THE KEY DRIVER FOR CREATING VALUE Book Series: International Conference of Management and Industrial Engineering. Pages: 153-160 Published: 2015 WOS:000448633100014.
3. *"Strategic option"* , By: Ionescu, Sorin; Alessandrini, Sergio; **Gavrila, Larisa**, Conference: 7th International Conference of Management and Industrial Engineerin, (ICMIE 2015) on Management - the Key Driver for Creating Value Location: Univ Politehn Bucharest, Bucharest, ROMANIA Date: OCT 22-23, 2015, Sponsor(s): Univ Politehn Bucharest, Fac Entrepreneurship Business Engn & Management, Management Dept; Editura NICULESCU; WILDMEDIA; Scoala Studii Academice Postuniversitare Management, MANAGEMENT - THE KEY DRIVER FOR CREATING VALUE Book Series: International Conference of Management and Industrial Engineering. Pages: 773-765 Published: 2015 , WOS:000448633100076.
4. *"Main Considerations and Types of International Valuation Standards Used in the Assessment of an Organization "*, By: Bran, C.; **Gavrila, L.**, Conference: 7th LUMEN International Scientific Conference on Multidimensional Education and Professional Development. Ethical Values (MEPDEV) Location: Targoviste, ROMANIA Date: NOV 12-14, 2015, Sponsor(s): LUMEN MULTIDIMENSIONAL EDUCATION & PROFESSIONAL DEVELOPMENT. ETHICAL VALUES Pages: 65-71 Published: 2016 , WOS:000391521600013.
5. *"Building performance in logistics chain"*, By: Guliman, Bianca Maria; **Basica (Gavrila), Larisa**; Ionescu, Sorin Cristian Conference: 9th International Conference of Management and Industrial engineering (ICMIE 2019) Location: Bicharest, ROMANIA

Date: NOV 14-16, 2019, Sponsor(s): Univ Politehnica Bucharest, Fac Entrepreneurship, Business Engn & Management, MANAGEMENT PERSPECTIVES IN THE DIGITAL TRANSFORMATION Book Series: International Conference of Management and Industrial Engineering. Pages: 776-785 Published: 2019 , WOS:000519338200079.

6. *"Creating and measuring logistic value for client"*, By: Guliman, Bianca Maria; **Basica (Gavrila), Larisa**; Ionescu, Sorin Cristian, Conference: 9th International Conference of Management and Industrial engineering (ICMIE 2019) Location: Bicharest, ROMANIA Date: NOV 14-16, 2019, Sponsor(s): Univ Politehnica Bucharest, Fac Entrepreneurship, Business Engn & Management, MANAGEMENT PERSPECTIVES IN THE DIGITAL TRANSFORMATION Book Series: International Conference of Management and Industrial Engineering. Pages: 786-792 Published: 2019, WOS:000519338200080.

Conferinte BDI

7. *"The Cost of Software Personalization"*, **Larisa Gavrila**, Constantin Bran, Sorin Ionescu, Share Empower Awareness – Rethinking Global Space, Culture and Change in Organization 2016 – Braşov.
8. *"The transition from a software solution to a customer's experience"*, **Larisa Gavrila**, Sorin Ionescu, Bogdan Tiganoaia, Bianca Maria Guliman, International Conference of Management and Industrial Engineering 2017 – Bucureşti.
9. *"Project development: the benefits of supplier-customer collaboration in software personalization projects"*, **Larisa Gavrila**, Bianca Maria Guliman, Sorin Ionescu, 5th International Multidisciplinary Scientific Conference on Social Sciences and Arts SGEM 2018 – Viena.

Articole BDI

10. *"Students Scientific Research Capacity In The Technical Universities From Romania – Case Study On The Personalization Of It Products"*, Bogdan Tiganoaia*, **Larisa Gavrila**, Petruta Mihai , Sorin Ionescu , Andrei Niculescu, 7th icCSBs 2018 - The Annual International Conference on Cognitive - Social, and Behavioural Sciences – Moscova.
11. *"The Importance of Business Requirements in Software Personalization Projects"*, **Larisa Gavrila**, Sorin Ionescu, UPB Scientific Buletin Issue 4 2018– Bucureşti.

4. PERSONAL CONTRIBUTIONS. FUTURE DIRECTIONS OF RESEARCH

Personal contributions

-I defined and analysed the personalization requirements starting from the identification of the customer's needs and objectives, then I transposed them in a formal and quantifiable way. Customization requirements must underline "what" is the need not "how" the requirement can be designed and implemented [68] (ISO / IEC / IEEE 29148: 2011). In the age of technology, software applications are vital to everyday business. It is important for a company to determine whether you can use a software product "off- the - shelf"(mass customized and ready for immediate use) or it needs further customization. Once the right direction is set from the start, it can lead to saving money and time. After defining more precisely the scope of the application and market research, next step is to identify the need for customization, so I proposed a questionnaire to be answered by the customers to assess the need for customization.

-I proposed a new model for identifying requirements, in order to customize software through the Crowd -AHP model. The Crowd -AHP model supports companies that want to quickly identify product customization requirements and process improvement

requirements directly from employees involved in the daily production flow. To the same extent, the method offers the possibility to immediately prioritize the most important requirements based on direct feedback received from employees. The method involves the appointment of a project manager who will coordinate the activity of identifying and prioritizing requirements

- I've also proposed, a new model to customize software in order to solve customer's problems so that customer needs are translated into problems that require one or more solutions that can be identified through the 3rd party provider's capacity (through skills and capabilities). Following the definition of a problem and the identification of potential solutions, it is possible to proceed towards the definition of the actual requirements. These requirements can be translated into a new product, a co-design initiative or the adaptation of an existing prototype or product. The model also exemplifies the situation where there is a second supplier but it is never visible to the customer, so the first supplier will go on the idea of using a *white label* product, namely supplier 2 develops a prototype, turns it into a product, the product is transferred to the supplier 1 who applies minimal customization plus a cosmetic touch to reflect their own brand. There may also be situations when supplier 2 creates the prototype, does not progress it to the product phase and transfers the prototype to supplier 1 which continues to develop it to the product stage.

- I developed the notion of software product, as well as the one of software personalization, defining them conceptually in the context of the new directions of perspective and exploratory approach highlighted in the thesis. The software product is a mix of computer components and their associated services that together add value to the user in terms of using the product in question. The core of the product contains the basic functionalities, and these make the application able to work and be independent. At the base of the core may be a prototype. In the literature, this process of making a computer product is known as "productization" and not production.

- At the same time, ***I approached and developed the concept of prototype adaptation (productization)***, which involves repeating several cycles of requirements definition, coding, testing and system development, until the prototype becomes stable, reliable and standardized, so that it can be transferred to the nucleus which is independent and fully functional.

- In a first phase, I conducted a pilot study to identify the properties of a prototype. The study was conducted through the crowdsourcing process described above and was conducted in 2017 (2017/01/24 8:44:43 - 2017/02/17 1:25:51) on a sample of 26 specialists. Following the pilot study (presented in Annex 1), it resulted that the main features of a prototype in order to be customized are: flexibility (32%), generic core (16%), user experience (10%), modularity (10%), custom construction (7%), availability (7%), options / features (6%), documentation (6%), extensibility (3%) and scalability (3%). Vendors in order to stay in the market must align with the new requirements and provide software application customization services. As there are no specific accounts assigned to the software customization activity in the accounting standards, these activities are included in different segments. As the companies registered in Romania did not publish such data, the research I undertook was directed towards companies registered in the United States of America where such information is collected and is public. Thus, in order to carry out the research, I identified three companies that operate in the "Computer software" segment. Analysing these three companies, it turned out that the software customization activity includes a series of sub-activities: configuration, source code modification, integration, implementation, data conversion and migration. Following the data evaluation from the three companies, I have concluded that the customization of software applications is a constantly growing segment.

- Also, in order to study customization requirements, I have conducted a survey that I have configured with a number of 7 questions with open answers, the first two were marked

as mandatory, the remaining questions were optional. The period in which I conducted the questionnaire was September ÷ October 2017 and the execution procedure was crowdsourcing. With regards to the knowledge that the customer brings in the software customization process, non-technical respondents place more emphasis on knowledge related to the company's internal processes and user-related knowledge, while technical respondents believe that the customer brings more knowledge related to industry and / or business segment (there is also a significant gap, so that the answer to knowledge in the industrial sector is found in a proportion of 47% in total answers, while in non-technical respondents in the proportion of 39%). From the analysis of the results obtained, I found that the most important knowledge is the one related to the industry / activity segment, followed by the knowledge related to the user experience and then the knowledge related to internal processes. Thus, in 36% of cases respondents believe that personalization is needed when customers have specific requirements, 8% believe that the need for personalization occurs when there are changes in the organization, 19% believe that the need for personalization is identified when the standard solution is far too generic and does not fully meet customer needs or it does not provide enough functionalities or it provides functionalities that are not needed. At the same time, 8% of respondents believe that software applications need to be customized to internal processes or existing legislation, while 24% believe that personalization is needed all the time, and only 5% of respondents stated other reasons: when automation is needed, when old functionalities are obsolete, etc. The need for personalization is perceived differently from the perspective of technical and non-technical respondents. Technical respondents (45%) consider that the need for personalization occurs when the customer has specific needs and 40% of them consider that personalization is always needed. Non-technical respondents also identified these needs, but to a lesser extent. Instead, non-technical respondents, unlike technical ones, perceive more strongly the need for customization when the standard solution is too generic and when changes occur at the level of the organization. In order to be personalized, in 24% of cases the prototype was considered to be configurable, 9% to be easy to use, 18% to be scalable, 14% to have generic modules, 21% to be flexible and 12% to have a programming interface. accessible. Technical and non-technical respondents also have different perceptions on the added value resulting from collaboration in software customization projects. I could distinguish that non-technical roles perceive as more relevant the added value offered brand exposure, lower customization costs, faster delivery of the solution, building a competitive solution while technical roles focus more on the added value resulting from the transfer of knowledge, creation of new prototypes, meeting customer requirements. By analysing the three software companies, I noticed that software customization activities fall into professional services, training services and other services. While analysing the types of expenses derived from software customization activities, it resulted that they were most often classified as payroll expenses with internal employee or third-party suppliers and training costs.

- The decision to buy or make a software application is identified both among customers and among suppliers. From the customer's perspective, they must decide whether they are able to buy an application or can develop it within the company. ***To exemplify this decision model I proposed the following study:*** a medium-sized company (maximum turnover 500,000 EUR) that does not operate in the IT industry, but has a small department (maximum 5 employees) of IT identified the need to use an accounting software, so, it must make the decision to produce the application or buy it. Following the study, I concluded that in this specific case, in the company's best interest is to buy the application and not to produce / develop it inhouse.

- ***To assess the impact of application customization, I conducted a research study that includes a series of 63 companies listed on the NASDAQ stock exchange.*** Only companies that carry out software customization activities were considered in the analysis. After studying 63 annual reports, only 21 companies were kept for analysis. The other companies analysed,

although they mentioned that they carry out software customization activities, at the level of balance sheet accounts, no differentiation was made in this respect. Thus, the following working hypotheses were validated: *Hypothesis 1: The share of revenues from software customization activities in total revenues is significant; Hypothesis 2: Software customization activities are profitable activities; Hypothesis 3: The costs of software customization activities are extremely important because they occupy a significant share in total costs (over 20%); Hypothesis 4: Staff quality (internal to third parties) is very important for customizing software applications; Hypothesis 5: Costs in innovation positively influence software customization activities.*

- Next, ***I identified the risks that occur during software customization, I analysed the specific software customization related activities and the characteristics of a prototype that make it customizable.*** Regarding the first three risks encountered in software customization projects and viewed from the customer's perspective, these are related to: *personalization requirements* - 21% of respondents identified this risk as a major one; *costs* - 18% of respondents identified costs as one of the three main risks; *the duration, quality and complexity of customizing the software*, each of these risks obtaining a percentage of 9% out of all responses. Regarding the first three risks encountered in software customization projects and viewed from the vendor's perspective, these are related to: *personalization requirements* - 32% of respondents identified this risk as a major one; *duration* - 14% of respondents identified the duration as one of the three main risks; *resources* - 10% of respondents identified this risk. Regarding the duration of software customization perceived as a risk, I identified answers such as: lack of time, aggressive and strict program, making a program too optimistic, not delivering on time, customization efforts require more time compared to initial planning or even more time than how to build the application from scratch. The risk related to resources incorporated answers like team efficiency, specialized resources, their experience, resource allocation, resources involvement and dedication, knowledge concerning the software to be personalized. With regards to the social effects as a results of software customization phenomenon, I underlined that 35% of respondents said they did not know of such effects, 15% admitted that there may be social effects depending on the nature of the software application but could not provide concrete examples, 8% stated that there are no social effects resulting from customizing software applications while 42% of respondents stated that there are social effects resulting from customizing applications.

- ***To study the customer experience offered by a senior company versus a start-up, in a software customization project, I conducted a research with 4 open questions.*** The period in which I applied the elaborated questionnaire was October ÷ November 2018 and the execution procedure was the crowdsourcing method. Respondents identified that the customer experience offered by senior companies consists of field experience and proven expertise of the company in similar customization projects (47%), 14% in shorter customization time, 13% in better quality of the final product and 12% in perceived confidence. On the other hand, in the case of start-up companies, the customer experience is given by the low cost of customization (31%), a new / innovative perspective (21%), flexibility (13%), involvement (9%) and enthusiasm (9%).

- I have also ***developed a best practice guide for software customization projects that are based on customer requirements.*** This guide provides a procedural perspective, it covers the preparatory stage but also the personalization stage. The guide is tested and exemplified on the development and customization of a time booking application. ***For this, I conducted a case study on the development and customization of an application that serves the time booking of employees at the level of economic operator Vodafone - Technology Shared Services Romania subsidiary.*** The risk associated with this project is minimal, specialized personnel had to be allocated, a reasonable period 9 months has been set

as deadline for software development and customization and this was accomplished throughout 9 sprints. I also used the dedicated Jira monitoring application to record work sequences and activities.

Future directions of research

- the research conducted as part of this thesis can be a bibliographic source for future software development and customization projects
- The entire paper can be the basis of a university course dedicated to customizing software products.
- The capitalization of the results can be done through research contracts, cooperation with educational centres or companies.
- Perseverance is much needed in order to accelerate research projects, IT infrastructure development, funding allocation, creating new jobs, upskilling available personnel.