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ABSTRACT

DOCTORAL DISSERTATION

**IMPACT OF DIGITAL ECONOMY ON THE ROMANIAN
SOFTWARE INDUSTRY
A SCENARIO FOR ROMANIA**

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Key words

- Digitalization
- Informational society
- Electronic commerce
- IT&C Industry
- Software Industry
- Digital agenda
- Cluster
- Economic growth
- Economic development

Preamble

Information and communication technology, especially the Internet, have fundamentally changed the economic paradigm, that classical capitalism of the last 300 years was built on. A new economy makes its way at breakneck speed, taking over even the most classic and traditional areas - digital economy. This should hall-mark consumers, businesses and society as a whole.

According to Business Consulting Group (BCG), the number of Internet users is expected to grow at breakneck speed from 1.9 billion in 2010 to over 3 billion in 2016, as much as approximately 45% of the world population. At this point, the digital economy contributes to Gross Domestic Product (GDP) in developed countries (G20) by approximately 4.1%. An increase in value, from 2.3 trillion in 2010 to 4.2 (T USD) in 2016, is thus estimated. The digital economy has grown to surpass traditional sectors in some countries, such as the transport industry, the utilities sector and agriculture.

In this context, unprecedented in human history, consumers are the ones who benefit most from the development of the Internet and the digital economy both directly, through e-commerce activities and as a tool for information on and evaluation of products and services purchased traditionally.

While its history is short, the Internet has evolved and is evolving with dizzying swiftness. If until recently access to internet was a fixed one, in front of a computer, now it shows a ubiquitous character, due to smart phones or other mobile "devices" and it is continuously expanding. If mobile connections in 2010 were about 595 million, while the fixed ones as much as 420 million, it is estimated for 2016 that the mobile ones will increase 4 times to about 2.6 million connections, whereas the fixed ones shall get on by about 100 millions. Thus, the "New Internet" becomes the main shopping channel through the mobile "devices" in every users pocket, smart phones are increasingly used for purchases on the huge global market. Great Britain is currently the world champion in the volume of online purchases, reaching about 13% in the retail and anticipating a 20% growth for 2016. An even more interesting aspect is shown by the *new internet* ascent in economies of the developing countries, experiencing from year to year an exponential growth in users. For example it is expected that in 2016 China will reach a number of users exceeding the entire population of the United States. For the same reference year 2016, developing countries will contribute with about 48% to the digital economy growth.

With all these developments, we are just at the beginning of the digital age, the benefits and potential of the *new internet* shall be further explored and discovered. In this context, visionary companies, countries or communities, are keenly working on what is called the digital advantage, conducive to economic growth, creating jobs and earning a comfortable spot on the spiral of competitiveness and economic growth in coming years. Every company concerned with competitiveness and development, every country concerned with growth and predictability, plans at this time to earn an as good as possible place in the digital era and to make the most of the advantages proliferated by this new digital era. After all, adapting to the era of connectivity is a matter of survival for companies and for countries, and increasingly so for the individual itself.

For Romania too, a European Union member state, the digital era launches unprecedented challenges, requiring both new measures and governmental strategies. These should capitalize on the digital potential for the benefit of citizens, to rapidly and expediently adapt the institutions and legal framework for the new economy to be able to make room and activate the social potential for the digital, to exploit the available competitive advantages. All these measures are useful to benefit of a maximum integration to the flows of the new economy, particularly in exploiting the potential offered by the ICT intelligence that Romania still has, which is the foundation of the software industry.

From this perspective, the author of this thesis aims to identify the basic elements, characteristic for the ICT sector in Romania, with regard to global and especially European developments, to clarify the weaknesses and strengths of the domestic sector, to outline the main European and worldwide trends where Romanian IT should most effectively integrate. Hence the certain competitive avails that Romania has in ICT, our country must develop a strategy to increase contribution of ICT to GDP above the global average of 4.1. At this moment of time the ICT contribution to GDP is only 3.2 percent, below the European and worldwide average, while the Romanian school of software performs, Romanian programmers are among the most celebrated in American, and not only, companies.

As per European statistics, Romania finds itself listed among the lowest positions regarding implementation of the Information Society and adaptation to the digital era, both in terms of infrastructure and access to technology, and from the point of view of the utilization rate of Internet and information technology for economic or

other purposes. While this prospective may seem deterring at first sight, it is yet an excellent opportunity for development, should all agencies involved find the necessary levers and strategies to enhance this digital potential.

This is one of the reasons for the scientific intercession of this work, which is intended to be a document of clarification, analysis and substantiation of some economic decisions in relation to ICT reinforcement in Romania and its transformation into a real vector of economic development.

Research motivation

At the basis of the research motivation, object of this work, lie a few subjective arguments, but also a set of arguments related to an objective prospective on the approached field.

Referring, to begin with, to *the subjective arguments*, they were the following:

- **The would to capitalize scientifically** on the information and the personal contact experiences that I had with the software industry, from the perspective of the entrepreneurship developed into a local "outsourcing" company - Liant Srl -, but also from the head of sales department position of a software company, specializing in developing and configuring e-commerce applications - Jpard Srl -. Both experiences have provided a significant amount of information related to the practical dimension of developing a business in the ICT industry, and provided a sufficiently complex array of useful data to analyze the industry as a whole. Direct contact with the software industry generated an increasing interest for the ICT strategic issues, expressed through specialized lectures, participation in trade fairs and conferences, which have contributed to sedimentation and consolidation of knowledge in Romanian, European and global ICT, and have created the pre-requisites for the present study.

- **The constant pursuit in the field of strategic development** of the Romanian economy and society and the identification of comparative advantages for the local economy - the passion for economic performance. I have cultivated and consolidated this perspective over 11 years of experience in strategic development consulting for both the private (management and development consulting) and the public sectors

(government investment projects development, human resources and implementation of ICT programs).

As an entrepreneur and consultant with the company Business Concept Srl - Cluj Napoca, I have generated and implemented many development projects, gaining valuable information and insights for the present research. The experience gained in working as a consultant has offered to me a pragmatic perspective on strategic development plans and has provided to me the check-tools for any strategy, measure or action proposed in the train of a scientific analysis, be it microeconomic strategic planning or the macroeconomic field. The main activity in consulting was running European funding programs, a fact that offered me a close contact with institutions, methodologies and EU programs, contributing to a better understanding of the levers and tools of strategic development at the EU level, but at the same time a pragmatic perception of the problems and challenges of the grantees.

From the point of view of the **objective motivation**, the present research meets a set of fundamental questions concerning strategic development of the Romanian economy. These dilemmas, even if local and international economists have responded to and have provided valid scenarios in relation to them, in my acceptance, reference to the domain of ICT and mostly to the software industry in particular, and its chance to take a place among the top three strategic directions of development of the Romanian economy remained, in most approaches, suspended between myth and reality, most of them not more than approaches in the field of "airport economics".

Referring to government strategies, we are the more entitled to notice that at least until the completion of the research - in June 2014, we can not speak of decisive action or clear and pragmatic strategies for strengthening the ICT field in Romania and its transformation into a strategic sector. The results of the sector, especially in the context of general economic reporting, speak for themselves, and the few successes that can be identified are usually individual merits of companies, and too little of the government policies. The ICT contribution to GDP (approx. 3%), below the EU average of 4%, is a sufficient indicator to make me feel entitled to endeavor, through the present research, the causes of the gap and to finally propose a set of specific and sustainable measures in order to change the status quo.

Consequently, are the ICT and particularly the software industry a real economic opportunity for Romania? What are the structural elements that have slowed this sector as yet? Does Romania really have trump cards and key advantages to lie on the green

table? What components and through what mechanisms can the software industry in Romania be a vector of development?

These are just a few questions, which this paper will attempt to answer, and to finally provide a set of elements, useful both to the industry and companies, and especially to the policy makers.

Research objectives

The main research objectives were:

- to evaluate the stage of development of the ICT industry and in particular of the Romanian software industry;
- to assess the digitization state of the Romanian economy and the global trends;
- to evaluate European and national programs and strategies on digitization as an opportunity of exponential growth for the Romanian software industry;
- to benchmark, based on Eurostat provided data, the level of digitization in the Romanian economy;
- to assess the development stage of the IT clusters in Romania and the potential they offer in stimulating the ICT industry;
- to define a scenario / strategy for the dynamic Romanian software industry, as the main component of ICT, in order to bring the ICT sector contribution to GDP above the European average.

Alongside these major objectives, several secondary endpoints were targeted, among which we cite: conceptual clarifications on digitization of the economy, digital boon, electronic markets, electronic business; providing an overview of the European Digital Agenda and the Digital Strategy for Romania and their implementation status. I have also resolved to achieve an as clear as possible demarcation between myth and reality on the strengths of the Romanian software industry to establish as one of the best in Europe and worldwide.

Coverage of the study / research

This research aims to address four main fields of analysis: an area of clarifications and conceptual boundaries with regard to the new economy, digitization and the forms of this phenomenon; an area of analysis of the digitization stage and

joining with the information society of the Romanian economy, in a comparative approach; an area of assessing the opportunity generated by European and national programs towards digitization; and an analysis area of the interdependencies of the need for growth and the impact of the ICT field, including the proposal of a set of strategic tactical directions with activation potential.

Alongside these major segments of analysis, and in support of the former, a more detailed analysis of e-commerce activities, the forms of expression and the impact of these innovative economic activities as the main vector of digitizing were focused on. Also, a pragmatic analysis of the status and tendencies in the software products and services industry in Romania was conducted, and not least, an analysis of the stage of clusters evolution in Romania and the positioning of the IT sector in this context.

Delimitations and limits of research

This study was targeted on crystallization of pragmatic arguments in support of the IT sector and in particular the software industry, as one of the main potential economic short, medium and long term development vectors for Romania.

From this perspective, the effort was focused on the immediate causal elements, with insights into the actual size of the industry, and a pragmatic analysis of information. Theoretical approaches were limited to matters within the minimal need of conceptualization and anchoring in specialized literature, focusing on statistical analysis and interpretation, with the belief that they can give pragmatic answers to the fundamental questions that initiated this study.

For this reason, it should be noted that the work has not proposed a comprehensive approach to digitization of the economy, nor in its theoretical dimension, neither as a practical dimension, as it has not propounded any comprehensive analysis of the software industry in its entirety. The study attempted to confine to the relevant information, of first causality, for the relationship ICT domain - economic development.

Research methodology

The research method, as considered by M. Radulescu "is the way forward to carry out a research and research methodology is an integrated system of methods, which represent the entirety of approaches limiting thought, in order to discover and demonstrate an scientific idea, i.e. to produce scientific knowledge and increase knowledge". To achieve the stated purpose, it was necessary that the research methodology be addressed with rigor; scientific approach went off by proceeding sequentially through several stages. In elaboration of this study we identify four stages: the choice of the research topic and definition of objectives, the scientific documentation stage, the phenomena identification and crystallization of primary formulation stage and the stage of the research results and conclusions.

In stage of choosing the research topic, I took into account the need of choosing a relevant topic, the degree of connection with the subject of research, the scientific and practical usefulness of the topic, as well as the potential risk factors that may have raised problems in achieving and sustaining this study.

Thus, based on the scientific basis already accrued and linking with practical experience and contact with the field, both from the perspective of strategic development and digital domain, the factors taken into account were:

- The volume and relevance of knowledge gained during academic studies;
- The volume and quality of information gained during professional development in the two related fields that I have been active in;
- The attraction I had for the field, and the opportunity to continue on a theme already addressed in previous work and publications;
- The theoretical relevance and practical importance of the topic;
- The availability of information and analysis sources on the chosen topic;
- The possibility to complete the research on time
- The topicality, both during and after the research, and the potential for continuity in time.

During the scientific documentation stage, I approached specialized literature (books, articles) and have resorted to statistical analysis (using inclusively the methodology of "benchmarking"), on 4 courses of analysis:

- The occurrence of digitization in economy – history, manifestation aspects, impact, components, terminology, generated models, sizing of phenomena globally and nationwide;
- Progress stage of digitization at national and European level and the degree of Information Society enactment in the autochthon framework, using mostly Eurostat and NSI statistics;
- Stage of development of the ICT industry and especially of the software industry, addressing specialized articles and statistics (NIS and EUROSTAT);
- Identification and evaluation of policies and programs generating economic opportunities for the Romanian ICT industry.

In the stage of phenomena identification and crystallization of primary formulation I turned to:

- Checking up validity of the synthesized elements by multi-criteria evaluations from the perspective of multiple sources;
- Consultation with experts in the field and identify items to be subjected to further analysis;
- Achieving a provisional research architecture and simulation of the logical compliance mechanisms.

In the final drafting stage of the study and the formulation of conclusions, I took into account the need for preserving the scientific framework, resp. of the academic level, but at the same time, I sought a formulation that allows actors in the economy or the generators of public policies to understand and use the information and research findings.

Chapter 1. THE NEW ECONOMY – THE HISTORICAL MEETING BETWEEN INFORMATION AND TECHNOLOGY

The objective of the first chapter is to emphasize theoretical and conceptual aspects regarding the digitalization phenomenon, the digital advantage and maturation, the manifestation forms of the digital transformation, the definition and mechanisms of the digital markets, as well as the impact of digitalization upon economies.

During this chapter we have mainly focused on covering the specialized literature, thus this being an exclusively theoretical chapter, which manages to synthesize definitions, delimitations, concepts, history and evolutions for each analyzed element.

The term “digitalization” is defined, followed by the ones of “new economy” and “digital economy”. Also, the role of the internet and the networks is highlighted, as well as the way in which this shapes businesses. Moreover the four stages of the digital maturation are reviewed from the perspective of the digital advantage:

- Digital Beginners
- Digital Fashionistas
- Digital Conservatives
- Digirati

Moreover, a useful result obtained from the analysis was the differentiation between myth and reality regarding the digital transformation.

As far as the digital markets are concerned, we approached their evolution, the main advantages of using digital markets, as well as their classification. Nonetheless, the study reviews the generation mechanism for the digital economy, as well as the way in which this carries along the classic economy.

Chapter 2. E-BUSINESS. EVOLUTIONS AND PERFORMANCES. THE IMPACT ON THE COMPETITIVENESS OF COMPANIES AND BUSINESS MODELS

The objective of this chapter is to analyze the impact of digitalization on businesses, and, most importantly, on the sector of electronic commerce, as the sector with the biggest share in this process.

In its first part, this chapter continues the conceptual clarifications and proposes an evolutionary perspective of the phenomenon, reviews established definitions and then highlights the motivations behind the going online of businesses, on three dimensions:

- The economic dimension
- The managerial dimension

- The cultural dimension

The analysis continues with the definition of the electronic commerce categories and the main characteristics manifested by each of them:

- Business-to-consumer (B2C)
- Business-to-business (B2B)
- Business processes
- Consumer-to-consumer
- Consumer-to-business (C2B)
- Business-to-government

Moreover, we analyze the evolution of the electronic commerce in Romania, the main stages and the elements that define the native sector.

The “Electronic commerce and the SMEs” is the subchapter that analyses the transformations experienced by the SMEs in regard to the digital transformation, with a special focus in the way this revolutionizes the business model of small companies. Also, we analyze from the same perspective the relationship between on-line commerce and company competitiveness and the way in which technology shapes new flows, new rules, and new objectives. Nonetheless, we draw a comparative analysis between the most important two forms of electronic commerce, respectively B2B and B2C. Also, we propose a prognosis for the global evolution of the two categories until 2017, which estimates a remarkable dynamic.

Chapter 3. PROGRAMS AND VISIONS REGARDING DIGITAL DEVELOPMENT IN THE EU AND ROMANIA. THE PREMISES OF THE DYNAMIC DEVELOPMENT OF THE ROMANIAN SOFTWARE INDUSTRY

The objective of the third chapter was the identification and dimensioning of the vision-programs from the EU and the national levels, and the synthesis of the main development

directions regarding digitalization. Their materialization can transform them into direct opportunities for the Romanian software industry and the IT&C industry in general.

The whole transformation process supported at the European level by ambitious programs, benefiting of substantial resources, becomes a tremendous opportunity for the local industry which must be transformed into a growth driver for the IT&C sector and therefore for the economic development.

As far as the methodology is concerned, we approach the main programs from big to small, thus the first section being focused on The Europe 2020 Strategy, with an analysis of the objectives regarding digitalization and with direct implications on the IT&C industry. We review the main targets in a comparative analysis with the present stage, but we also propose a critical perspective in relation to the risks of accomplishing or slowing the processes, mostly as the experience of the Lisbon Agenda imposes greater vigilance.

However, a greater focus is imposed on the European Digital Agenda, taking into account the spread of the objectives, the number of implicated actors, the ambitious objectives proposed and, nonetheless, the novelty elements launched with this visionary document. Furthermore, Romania is not absent from this analysis, as the chapter presents the Digital Agenda's action sectors for Romania, a strategy that strives to be a continuation of the European agenda, in the same time being complementary to it. In the end of the chapter 3 we draw an analysis of Romania's digital performance and its evolution in relation to the objectives assumed by The Digital Agenda.

Chapter 4. AN ANALYSIS REGARDING THE STAGE OF INFORMATIONAL SOCIETY IMPLEMENTATION IN ROMANIA AND THE EUROPEAN UNION. A COMPARATIVE ANALYSIS

The objective of the chapter regarding the stage of Informational Society implementation in Romania is to analyze as realistically and pragmatic as possible Romania's positioning in relation to the European countries, as well as to the United States, Japan and South Korea.

The data source for this analysis was the statistical database of Eurostat, which we accessed directly and analyzed piece by piece on the most relevant indicators.

Among the most relevant conclusions of this analysis we mention the following:

- Romania substantially recovered the gap from the EU on the B2B segment, reaching the European average of 18% in 2013. Hereby, Romania stands out greatly in the region (Bulgaria has only 3%), and exceeds strong economies like France, Italy or Portugal.
- Even if it experienced a rapid growth during the last 10 years, Romania still occupies the last place in relation to the access of enterprises to fix broadband.
- As far as the Internet connection of households is concerned, even if exponential growth has been reported during the last years, Romania still occupies a laggard position, along with countries as Bulgaria, Greece or Portugal.
- Regarding the knowledge in using the Internet, we observe a good placement of Romania near the European average, getting forward occidental states such as Italy, Denmark or Sweden. This shows Romanians' high appetite for using the Internet and their high adaptability. We believe that the growth potential is still high and we can experience the exceeding of the European average by 2016.
- Regarding the individuals that make internet acquisitions, a great reticence is shown, as Romania occupies the last place among the EU countries with 5%, being overtaken even by Bulgaria, which has 8%.
- Regarding the households' access to the Internet, regardless of the type of band, Romania holds together with Bulgaria laggard places, but we must emphasize the fact that both the two countries and the European average are well above the Lisbon target which forecasted an access percentage of 30% of the population.
- Moreover, regarding the share of IT&C contribution to the GDP we notice a constant downfall between 2001 and 2010, from over 4% to little over 3%. This is mainly due to the general economic dynamic that focused on components such as the industry, construction, services and agriculture, which had a better dynamic than the IT&C sector. However, we can conclude that even if the IT&C sector constantly grew in absolute numbers, it performed under the general economic growth rate.
- The share of IT&C employees among the total work force shows a stagnation or even a depression by 2010. Correlated with the share of IT&C in GDP, this indicator shows a smaller growth of the Romanian IT&C sector in relation to the other sectors. This is a highly negative aspect, mostly as the Romanian IT school continuously produced highly qualified competencies on a global basis. This situation can be determined by two reasons: 1. The "brain drain" phenomenon that caused several IT specialists and

workers to migrate to better paid and more dynamic markets (The US and Western Europe), and, 2. The lack of coherent and crucial government or regional policies which would stimulate investment and occupation in the Romanian IT&C sector and therefore this sector's contribution to the GDP.

- Reanalyzing the data from a territorial point of view, with reference to the way these indicators perform at the level of NUTS 2 regions, regardless if we are talking about households access to the Internet or the individuals using the Internet for transactions, in Romania the Bucharest – Ilfov region holds the top position and is followed at great distance by the North West, West and South West regions. Moreover, the rest of the regions show even more modest figures.

Chapter 5. THE ROMANIAN SOFTWARE INDUSTRY AND THE ELECTRONIC COMMERCE

This chapter's objective is to make a thorough analysis of the IT&C industry in Romania, of the last 10 years' evolutions, its characteristics, the stage of the IT clusters in Romania and their real or potential role in stimulating the industry. Furthermore, based on the data reflected by the entire research, the chapter proposes a series of directions and measures that can stimulate the Romanian IT&C industry in a higher pace than the present growth rate, in order for it to support the economic development as a main growth driver.

In the first section we show a general characterization of the IT&C sector in Romania as far as both the structure and the evolution and dynamics is concerned. Based on the data provided by the National Institute of Statistics, we synthesized the evolution of the main economic indicators (turnover, profit, number of employees) on two different periods: 1998 - 2008 and 2008 – 2013 and we also drew a geographical distribution of the share of IT&C companies.

The study continues with the analysis of growth factors, out of which we emphasize the most important:

- At a national level, Romania has over 95,000 IT&C specialists who have specialized technical education. Moreover, there are 5 top universities with polytechnic focus and 59 universities that offer specific training in technical sectors. Furthermore, starting

2001, the Romanian universities earned some of the first three places by the number of medals in informatics and mathematics obtained at European level.

- The number of engineers per capita is higher in Romania than in the US, India, China or Russia.
- Romania positions itself among the first 10 places globally by the number of certified specialists.
- Almost 90% of the IT specialists are English language speakers.
- Romania occupies the second position in the 2011 Eastern European top regarding entrepreneurial intents, before Poland, Hungary, Croatia and Slovakia.
- The IT sector in Romania is encouraged through fiscal measures such as the remission of the 16% income tax for the IT sector employees who have superior education in the sector.

Furthermore, we make a SWOT analysis of the sector.

Next, the study continues with an analysis of the state of clusters and their role on economic development, with a focus on IT clusters. In this circumstances, Romanian clusters are analyzed, and a not-at-all positive situation of the IT clusters is revealed.

The chapter ends with an analysis regarding the economic growth mechanisms and its relation to the IT sector, and with the proposition of a set of measures or actions that can stimulate the IT&C industry in Romania, among which we mention the following:

- Actions of vitalization and development of clusters;
- Stimulating the companies oriented to the product;
- Supporting the companies with majority national capital;
- Launching a national informatization program;
- Launching a national brain-retention or brain-replenish strategy;
- Maximal absorption of the available European funding from the sector.

Moreover, several measures addressed to the business world decision makers are reviewed, as follows:

- The strategic orientation of the companies towards products and the diminishing of near-shore contracts dependency;

- The enhancement and consolidation of the managerial abilities of the management teams, as well as the maximization of marketing activities;
- Grouping together in alliances and associations with common interests for commercial representation and also the representation of interests in relation with the authorities;
- Developing strategies to enhance the performance period of programmers;
- Developing partnerships with the universities in order to reach more easily to qualified work force and to shorten the learning curve after a new specialist enters the company.

Chapter 6. CONCLUSIONS

Remarks and personal opinions

This PhD thesis is the result of the analysis, synthesis and systematization of the literature, analysis of countless national and European statistics, consultation of experts in the field, analysis of hundreds of articles and publications in order to shed light into a highly topical and interesting field: the digitization of the economy versus the local ICT industry and especially the software industry.

The fundamental concern was to clarify a paradox dominating the Romanian economy for 10-15 years now, namely: although we have specialists, although we are performing in terms of intelligence and know-how at European and even global level, although we have a relatively dynamic industry, with significant increases, the ICT contribution to GDP is however below the European average. Beyond that, this research also aims to highlight the huge opportunity that rises on the horizon, the one deriving from the phenomenon of digitizing and identifying of strategic elements that can capitalize this phenomenon in favor of Romania.

From a theoretical perspective, this paper tried to include and analyze as many sources possible, without preference for a specific theoretical area. The goal was to extract the most important and scientifically relevant information. From this point of view, the author has used gross information sources such as statistical data (NSIs and Eurostat) to directly interpret the phenomena. From a practical perspective, the contact with the software industry and consultancy market has provided me with the tools necessary to process and structure the practical vision proposed at the end of the paper.

The following conclusions can be drawn as regards to the research objectives:

- The paper succeeded in making a global assessment of the development stage of Romanian ICT industry and especially the software industry, which revealed primarily the structural deficits of the industry but also identified and defined a significant latent potential which constitutes a solid argument for a stronger strategic orientation of Romania towards the ICT industry.
- As regards to the assessment of the Romanian economy digitization stage and global trends, the paper conducted an extensive comparative analysis of the indicators provided by Eurostat, managing to shape a clear image of the Romanian situation and provides a theoretical basis for the strategic guidelines.
- The paper has also produced an extremely useful summary of the European and national strategies and programs on the digitization as an opportunity for exponential growth of the Romanian software industry.
- We also believe that a significant contribution to this thesis is the assessment of the development stage of IT clusters in Romania and the potential provided by them in stimulating the ICT industry. The result of the research shows a situation not at all encouraging of the profile clusters from Romania, but also reveals the need for a strategic approach to this direction with an additional support of measures and resources.
- Although it is not the largest component of this paper, the scenario / strategy proposed to stimulate the Romanian software industry, as the main ICT component, in order to bring the ICT sector contribution to GDP above the European average, we consider it to be a very useful and actual section. The substantiation of these measures by the research itself gives legitimacy and credibility.

The paper begins with the **first chapter** which is an insight into the phenomenon of economy digitization, its main levels of manifestation and brings conceptual and terminology clarifications related to the new economy, information society, digital advantage or electronic markets. It also proposes a description of the phenomena and the boundaries between them, making a separation between the economy generated directly by digitization and the economy that is born on the block of the classic one and as a consequence of the digitization.

In **chapter two**, the thesis goes further into the description of the phenomena generated by digitization, particularly dissecting the segment of electronic business (e-business), and more in detail the field of electronic commerce as a main transformation vector and with the most relevant economic consistency.

If the first part emphasizes the theoretical aspects and technical descriptions of manifestation, the second part analyses other interactions of electronic commerce with the micro and macro-economic environment. Thus, after a review of the situation of the Romania online commerce, we analyze its relationship with the small and medium enterprises, and then with competitiveness. At the end of the second chapter we make an analysis between the major types of B2B and B2C e-Commerce.

Chapter 3 aims to identify and describe the main programs and visions in Europe supporting the digitization and which can become exceptional opportunities of development. 2020 Strategy is reviewed with a focus on ICT tangent goals and a critical perspective, the Digital Agenda for Europe and the Digital Agenda for Romania. Finally, an analysis is performed based on statistical data regarding the implementation of the Digital Agenda in Romania. This chapter highlights once again the digitization level worldwide and the fact that Europe took seriously the process. Romania, although it stepped on the path of digitization, still presents timid and inconclusive results.

Chapter 4 is a continuation of the previous chapter and presents an analysis of over thirty parameters of adaption to the Information Society, based on information provided by Eurostat.

This analysis highlights a reality not at all pleasant for Romania, the state of information society in Romania being relatively incipient, except for three indicators, being at the bottom of the list.

The last chapter is dedicated exclusively to the problems of local ICT industry and especially to the software sector (where relevant data are available), shaping an image of the current industry and development of the past 10 years. To get a more complete picture of the sector, the author felt the need for insights into the world of clusters to observe their role and importance for the ICT industry, this area being also recently circulated without concrete results. Starting with a sector analysis and linking to the detailed opportunities in previous chapters, the paper ends with a set of measures and directions required to exponentially stimulate the ICT sector in Romania and turn it into one of the top three vectors of economic development.

The digitization of the global economy happens vertiginously and involves even the most remote and isolated corners of the planet. The figures marking the evolution of this phenomenon are at the borderline of the unbelievable, and they continue to accelerate. This process must, however, be supported by an industry which can provide the technologies, applications, know-how required for the operation in the new digitized world.

Those sitting at the table of solutions will benefit in a manner difficult to quantify. Romania has several advantages which can help her be part of the group of players who will share the global industry. The present research has shown both the overall potential of digitization and the local industry potential to fight for this market. We have also put in light the negative aspects, and structural deficits of the sector but we have given a number of pragmatic and unsophisticated solutions to stimulate this sector. Those responsible can use this study and research for the benefit of the Romanian ICT industry.

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