LUDUS - The market for SG – A driver for development of the SEE local economies

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1 INTRODUCTION

The "State of the Art" analysis of LUDUS project has been already discussed and approved by the partners of this project and it has the following structure:

- Chapter A – Definition of Serious Games (SG) and Context of Applications
- Chapter B – Technology Issues: Basic Concepts and Tools Analysis
- Chapter C – The Market for Serious Games – A Driver for Development of the SEE Local Economies.

Chapter A has been prepared by the University of Milan-Bicocca and regards the issues of SG definition and the context of applications. METID Centre of the Politecnico di Milano has conducted the research on technology issues tracing the basic concepts and tools analysis. The current report aims to complete the final section (Chapter C) of the "State of the Art" analysis of LUDUS project. With the finish of this chapter, the overall section of the "State of the Art" analysis of LUDUS project will be accomplished.

1.1 Objectives of the Report

The purpose of this report is twofold: a) to examine the potential development of the SG market in the geographical region of South-Eastern Europe (SEE) and b) to explore the prospect of the SG market as a driver for development of the SEE local economies.[1] Towards this aim, the following issues will be extensively addressed:

- What kind of SG products and services are offered worldwide as well as in the geographic region of SEE?
- Are there any specific flagship cases of SG in the region of SEE?
- Which market development stakeholders participate in the value chain of SG?
- What business models constitute the SG market and are responsible for its development?
- What factors affect the demand and supply of SG market in the SEE area? Do these factors constitute drivers or inhibitors as regards the SG market development in the SEE area? What

[1] SEE Area includes: Austria, Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Republic of Macedonia, Greece, Hungary, Republic of Moldova, Montenegro, Romania, Serbia, Slovakia, Slovenia, some regions of Italy and Ukraine.

strengths, weaknesses, opportunities and threats influence the future development of SG market in the SEE area?

- Which are the market dynamics, trends and growth potential in the SG market?
- Which are the implications for public policy and for regional development in the SEE area?

1.2 Structure of the Report

The following report is divided into eleven parts. The first part constitutes the introduction of this report. In part 2, definitions of SG are provided. The third part illuminates SG products and service typologies. In the fourth part, flagship cases are described both around the globe and in the SSE region. The fifth part scans the basic market development stakeholders which compose the SG value chain. The sixth part introduces particular business models contributing to the SG market development. In part 7, an empirical evidence of SG market is being presented both globally and in the SEE area. Part 8 analyzes the market drivers and inhibitors regarding SG market development in the SEE area through the conduct of a detailed SWOT analysis. The ninth part examines the market dynamics, the trends and the growth potential of SG market in the SEE region. Part 10 regards the implications for public policy and for regional development in the SEE area. The final part concludes the whole report (Chapter C).

2 DEFINITIONS AND CONCEPTS

2.1 Definition

There is no single definition to characterize the concept of serious games. One familiar perspective among theoreticians highlights the view that Serious Games (SG) are games that can be used for primary purposes other than entertainment. Many applications of SG have been used for military purposes, political negotiations, healthcare training etc. The common line of these applications is that SG have an educational nature and, for this reason, are related to training and learning. In this report, our concern is on game-based learning (GBL), meaning games that have educational aims and perspectives.[2]

In principle, SG are called "serious" because they refer to serious business purposes. Various profit and non-profit organizations, such as private companies, international organizations, public policy institutes etc., use innovative learning methodologies through SG modeling in order to train their personnel. The basic reason of these learning strategies is to reduce the cost of training courses and seminars. In addition, SG technologies for learning may constitute more efficient training methods due to direct interaction between the object (serious game) and the subject (trainers and/or trainees).

2.2 Serious Games as Educational Tools: Objectives, Advantages and Disadvantages

The primary objective of a serious game is to have an educational effect. As Prensky (2006) signifies, SG denote educational tools that are immersive, engaging, and practical. The main advantage of SG as learning methodologies is that they use the aspects of fun, motivation and engagement in an immediate feedback environment in which participants face challenges of real life. The processes of assessment, repetition and reinforcement as well as the continuous nature of learning of such GBL approaches comprise innovative pedagogical tools which contribute to:

- the enhancement of critical thinking,
- the development of various skills, especially spatial, visual and tactile skills as well as social skills (negotiation, decision-making, cooperation) and

[2] In the next section of this report, a more detailed classification of serious games will be presented.

- innovation and creativity.

There is a common fallacy though stating that such GBL applications are related to high cost for their development and production and, therefore, are too expensive to be used for learning and training purposes. This argument is not substantiated by empirical comparison between more traditional approaches to learning and SG applications. For this reason, we can support the view that, in general, SG applications are not more costly methods regarding learning and training compared to more traditional approaches and methodologies.

However, one significant challenge of SG applications is the lack of research findings regarding their efficiency in pedagogical and learning outcomes. Scientists have not yet concluded whether such GBL approaches are more effective as educational tools in comparison with long-established methodologies of education. For this reason, there is no information which games can be used as learning tools and/or instructional strategies in classrooms. Finally, SG need advanced technological knowledge in order to be developed. This is a serious drawback in times of limited economic resources and diminished expectations for the future.

3 PRODUCTS AND SERVICE TYPOLOGY

Different types and services of serious games are being discerned due to the emergent state of the SG market globally and the strong dynamics that have been developed around this market. In this report, as mentioned also previously, the main concern is on game-based learning (GBL) games which have as their main aim to educate and train. Except for education and training purposes, there are also different types of SG offering numerous services for their trainers and users. A not-exhaustive but indicative list contains the following types of SG:

• **Advergames** are used in the industry of advertizing and their scope is to advertize products for different types of industries through an educational and enjoyable way.

• **Edutainment games** combine education and entertainment and have a more learning-oriented scope.

• **Simulations** or **simulation games** are widely known due to their use e.g. for military purposes. This kind of SG are used for acquisition and/or training of different skills necessary for specific reasons (such as driving, military exercises etc.). The user is acting under particular simulated conditions and being taught how to behave properly as if he/she is in real time situations. Simulation games are being used from the majority of industries and comprise the most recognized and easy usable SG applications.

There are also other kinds of serious games offering, more or less, same services as the aforementioned games:

• **Persuasive games** are used to educate trainers and trainees how to persuade under specific circumstances.

• **Edumarket games** are games combining various characteristics such as advergaming, edutainment and/or persuasive aspects of gaming.

• **Exergaming** are games having mainly as their scope to exercise particular skills and types of behavior.

• **Newsgames** are used mainly by the industry of journalism and aim to inform policy-makers and the public opinion.

• **Art games** basically focus on the promotion of artistic ideas and are used via video game applications.

• **Productivity games** are used to reward users when they act through the most productive/efficient way under particular conditions and for specific purposes and goals.

• **Games for health** are used by health-care industries and pharmaceuticals for psychological therapies, physical rehabilitation purposes and cognitive learning and training. The last two decades, many games have been created by health-care enterprises developing a market in which numerous opportunities have been emerged for innovative and ambitious entrepreneurs.

Table 1

Type of Serious Game	Services to be provided
Game-based learning	**Education and training**
Edutainment Games	**Education and training, entertainment**
Advergames	**Advertizing and entertainment**
Simulation Games	**Education and training, entertainment**
Persuasive Games	**Education and training, persuasion**
Edumarket Games	**Advertizing, Education and training, persuasion, entertainment**
Exergaming	**Education and training**
Newsgames	**Education and information**
Art Games	**Knowledge for Art**
Productivity Games	**Education and information for business purposes**
Games for Health	**Learning and training for health-care issues**

4 FLAGSHIP CASES

Published by the United Nations World Food Programme in 2005, Food Force is a serious game trying to inform people about the hunger around the world and how to learn methods in order to prevent it. Players take on missions to allocate food in a region which has been affected by famine and to help it become self-sufficient again. This serious game can be deemed as a flagship case within the market of SG applications. Similar milestone cases have been developed for different purposes and goals at a worldwide basis.

4.1 USA

In the USA, we can find the most remarkable cases of SG applications. This is understandable because in this country the first GBL applications have been created and big amounts of funds have been invested for the development of SG applications (especially for the US Army). America's Army game is such a flagship case.[3] Through this game, new soldiers can be exercised in existing and new weapons and test different martial strategies and tactics. This game is one of the first person shooter games promoting the US Army. Microsoft Flight Simulator is also a famous home-based video game but with notable SG features. It can be deemed as the most successful use of commercial games for training and, for this reason, is also a striking case of SG application.

Except for army-related serious games, many US companies from different sectors of the economy have developed SG applications. The common objective of such GBL initiatives is personnel's training and education on business-related themes and strategies. Firms develop SG applications to reduce the variable cost of their operations and to maximize the productivity of their workers. In general, it is less costly for a company to purchase (or, if it possible, to develop) a SG application in order to train its workforce than to pay specialists and manager trainers to do this job.

McDonald's, which is the world's largest chain of hamburger fast-food restaurants, has created a SG application to train its personnel regarding diverse processes of production, preparation and promotion of its end-products. Many pharmaceutical companies have also created SG applications to train their workforce, to test and control potential implications of their products and to inform their customers about the effectiveness and validity of their products. Johnson &

[3] For this serious game, look at http://www.americasarmy.com/.

Johnson Pharmaceutical Research is a notable case. Many US software enterprises operating in the field of Internet and computer services have developed varieties of SG applications to inform potential users on diverse themes of interest, from political conflicts around the world to environmental sensitivity. Famous serious games are: A Force More Powerful, CyberCIEGE, Darfur is Dying, Global Conflict: Palestine, Harpoon, IBM CityOne, SimPort, etc. In addition, academic and research institutions have involved to a great extent in the development and enhancement of SG applications regarding learning and teaching. One remarkable example is the establishment of "Serious Games Initiative" by Woodrow Wilson International Center for Scholars in Washington in 2002 to promote the development of serious games that address policy and management issues.

4.2 Europe

As far as Europe is concerned, SG initiatives have mainly emerged in the United Kingdom (UK), Scandinavia, France and Germany. This fact does not entail that European businesses and entrepreneurs are less interested in the development of SG applications. To the contrary, there is a widespread interest from the business sector to develop GBL applications, especially costless training methodologies for their employees. Recently, BNB Paribas developed a SG application for the training of its workforce in the banking-finance sector. L'Oreal is also a noteworthy case which utilizes SG applications for training purposes. PIXELearning, an intermediary of private company "Digital Learning Marketplace", has created in collaboration with Serious Games Institute at Coventry University various business-related serious games in order to teach business dynamics and to introduce management practices to young adults and teens. Serious Games Institute at Coventry University is also a remarkable initiative in the domain of SG which encourages further development and research on game-based applications for education and learning.

Serious Games Interactive is another flagship case in the field of SG. This private company, based at Copenhagen, offers SG products to business, governments and various institutes. Only in a few years, this company has managed to triple its earnings in the SG market. Serious Games Interactive is a striking case of how a private company can excel in a particular field of business in which few enterprises operate and there is strong potential for market development and high profits.

4.3 South-Eastern Europe

Flagship cases of SG applications in the SEE area are less apparent given the embryonic state of SG market in this geographical area of Europe. As we also stated previously, the European

market of SG is basically concentrated in the UK, Scandinavia, Germany and France with the SEE area just to follow slightly the trends of these EU countries. What we can realize in the SEE area is an evident capabilities-expectations gap, namely a lot of willing companies and public and research institutes to operate in the SG market but, at the same time, unable to develop and offer integrated and complete SG products and services.

In essence, only small businesses and research consortia are active in the SG market in the SEE area which rarely develop and produce integrated GBL applications. These formations are mainly research-driven and comprise groups of universities, professors, individual researchers and/or research private companies. More often, these enterprises and research groups comprise smaller parts of bigger consortia and synergies and only partially involve in the development of integrated SG applications. In this respect, we cannot observe specific flagship cases in the SEE area, but only small or bigger consortia which operate in the SG market.

5 MARKET DEVELOPMENT STAKEHOLDERS

The value chain of SG market development is constituted by various links and has a similar form as the value chain of the video games industry. To present the SG value chain, we will divide this analysis into three parts: a) SG supply chain, b) SG demand chain, and c) development facilitators of SG market.

5.1 SG Supply Chain

- **Development tool suppliers**: companies supplying the necessary tools and equipment to potential SG developers for the development of GBL applications (mainly for hardware development).

- **Technology and middleware suppliers**: suppliers of technological tools, devices and software as well as middleware software applications necessary for the software development of SG.

- **Game Designers**: those caring about the rules, spatial and temporal designs, as well as the plot of the game.

- **Content Game Designers**: dealing with the text, the numerous animations, art graphics, video sequences of potential serious games etc.

- **Developers**: mainly individuals, but also whole business departments, which create the software of the game and produce the content of the games.

- **Publishers**: companies which cover the costs regarding marketing and packaging serious games. These companies concern for both physical and electronic sales.

- **Distributors**: companies which distribute the SG products and software applications to retailers or, more rarely, directly to the public. They normally activate as intermediary companies between publishers and retailers in the SG market.

- **Retailers**: enterprises which sell the end-product to potential consumers. Mainly, they are electronic stores or SMEs which specialize on this market sector.

5.2 SG Demand Chain

SG supply meets the demand for SG through diverse ways. The main industries which are interested in consuming SG applications, mainly GBL applications, are the following:

National Governments: various administration departments which need such applications to educate and train their personnel.

Military enterprises: through simulation games to educate and exercise their workforce.

Education: SG demand in education is mainly directed to universities which need such GBL applications to transmit knowledge and research more efficiently and less costly. But, also, primary and secondary educational institutes are users increasing the demand of such GBL applications.

Business / Management Sectors: private enterprises seeking to reduce their cost related to education and training of their employees using these kinds of GBL applications. These enterprises create the main demand for SG applications and constitute the primary investors as regards the development of SG market worldwide.

Advertisement: demand for SG applications is also met from companies operating in the advertisement sector. Advertisement companies use such SG methodologies to inform consumers about the content of their products and services.

Marketing: marketing enterprises apply the technological tools of SG methodologies in order to promote products and services through a more efficient way aiming directly to the consumer audience.

End-user Demand:

Diverse Trainers: demand for vocational training is a necessity of today's business practices which is met from diverse trainers.

Adult and Informal Demand: many business sectors, especially banking and services industries, use SG applications to educate and train their personnel.

5.3 Development Facilitators

By the term "development facilitators" of SG, we basically mean clusters of companies, public and research institutes and/or individuals which promote and facilitate the development of SG services and market in a particular geographical region. These clusters are small groups of such entities which join their forces to promote a service and/or product in a specific market. For example, the Hellenic Gaming Developers Association is such a development facilitator in the geographical region of Greece trying to promote SG applications and video games in the wider business Greek community. GALA Network of Excellence for Serious Games is an EU-funded consortium of private companies, research institutions (mainly universities) and public institutes

trying to link their strengths and connections in order to encourage investments and research initiatives in the field of SG market. In more general respects, the common goal of these SG clusters is twofold:

- to inform the public about the existence of SG applications and their strengths and/or weaknesses and,
- to facilitate the development of SG applications through the emergence of new cooperative schemes and consortiums and via the encouragement of financing of new SG projects.

6 MARKETING STRATEGIES

We can identify three different segments within the SG market industry: B2B, B2C and B2B2C. B2B (business-to-business) describes business activities between companies, such as between a manufacturer and a wholesaler or a wholesaler and a retailer. B2C (business-to-consumer) entails exchanges of products, information and/or services between businesses and consumers. B2B2C (business-to-business-to-consumer) is a combination of B2B and B2C for a complete product or service transaction. Within each segment of SG market, we will describe the features of different marketing strategies (or business models).

6.1 B2B

The order-based model

This model is based on the logic of exclusive partnership. A firm (private company and/or public or private institution) employs a contractor (any type of corporation except a private individual) to develop and design a serious game. Under this agreement, the firm and the contractor sign an exclusive contract which dictates the exclusive use of the game by the client.

The license-based model

A developer or a publisher of a game produce an application which is available in the market for certain fees. The application can be ready for use or constitutes a part of development software to create a serious game. This license under this model is not modifiable and, for this reason, cannot be used for distribution or profit-making. Licenses that can be modified and distributed for profit-making purposes are free licenses which normally fall in the B2C segment.

The education / training model

In this model, on-site training is provided to public or private institution's designers / developers during all the different phases of SG development.

6.2 B2C

The publisher / developer model

In this business model, the publisher or the developer of a serious game designs and creates the SG application and, afterwards, sells it directly to potential consumers. In general, the SG

product or service is ready for use and it can be either a physical product (e.g CD-ROMs, USB keys etc.) or an electronic application (internet, mobile telephone etc.).

6.3 B2B2C

The order-based model

This marketing strategy is very similar to that discussed in the B2B segment. The only difference is that there is no an exclusive agreement between the client and the contractor and, hence, the content of the serious game can be offered to other clients without any restrictions.

The license-based model

This business model is very similar to that discussed in the B2B segment. The difference here is that the license of the SG application could be one that has been reassigned by the particular developer or publisher of the SG application to a private company, individual, organization etc. Moreover, the entity that obtains the license can use this license and distributes it without any exclusive restrictions.

The education / training model

This business model is very similar to that discussed in the B2B segment. The only difference is that the SG applications are not exclusively for internal use, but can be also available for sale.

6.4 Distribution Models

According to the international literature, we can distinguish three different distribution models:

Free-of-charge distribution: distribution models (e.g. webmarketing) which cover all the marketing strategies of distributing serious games without a fee.

Semi-free-of-charge distribution: marketing strategies of distributing serious games with some kind of fees.

Commercial distribution: a) physical sales (SG applications sold in shops in the form of ROM cartridges, diskettes, CD-ROMs etc.), b) electronic sales (SG applications sold online etc.) and c) access of SG applications in restricted areas (such as universities, events, museums etc.).

7 MARKET SIZE EVIDENCE

7.1 Market size evidence of SG in the world

The market of SG can be deemed as a fast-growing market even if we take into account the most conservative predictions. Market size worldwide had been estimated approximately to $1.5 billion in 2008 and there is strong evidence to assume that it has been increased significantly nowadays. Although many empirical reports are biased due to data scarcity and available information, it is reasonable to be expected an estimation close to a $9 billion SG market worldwide for the following reasons[4]:

● The global gaming market was approximately $49 billion in 2011 at a compound annual growth rate of 9,1% during the 5-year period.[5] Hence, given the close dependence of SG market on video games market, strong positive externalities from the video games market to SG market justify to consider larger figures. These numbers are also underpinned by the propensity of video game industry to develop more and more business outside the entertainment segment.

● A big number of corporations has been engaged in an emergent supply chain of Corporate Serious Games accelerating the development of SG market worldwide. Estimations of these contributions in the SG market are ranging from $600 million to $1 billion.[6]

● The healthcare sector can contribute an amount close to $1 billion in the existing SG market due to recent advancements of SG applications for training purposes (e.g. training for surgery, conducting emergency medical responses, management of surgical teams, rehabilitation etc.).[7]

● Europe will join vigorously the SG market further contributing in the growth of SG revenues around the globe.

● According to a rather conservative estimate for the evolution of the number of SG per decade (from 1950 to 2000), the last two decades it is observed an exponential increase in the

[4] Look at "Serious Games – A 10 billion Euro market in 2015", http://seriousgamesmarket.blogspot.com/2010/08/idate-serious-games-10-billion-euro.html, (2010).

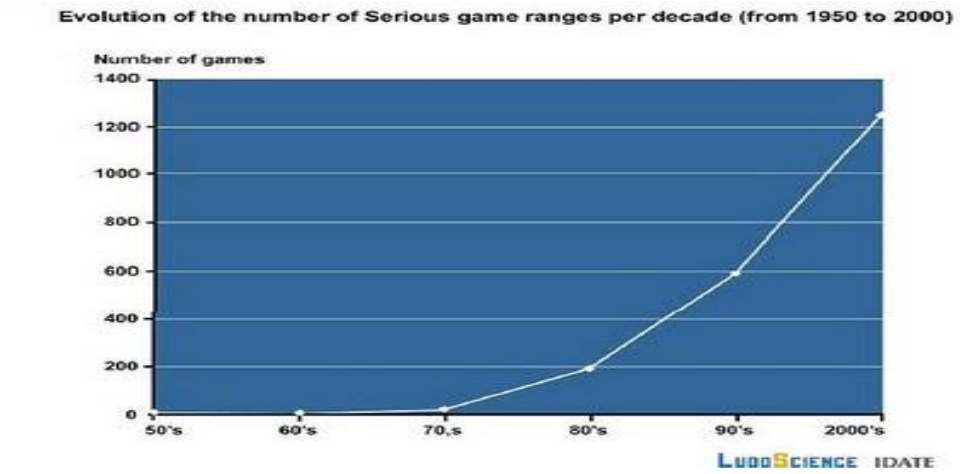
[5]Look at "Serious Games: A Sizeable Market – Update", http://elianealhadeff.blogspot.com/2007/06/serious-games-sizeable-market-update.html, (2007).

[6] Ibid. and IDATE 2008.

[7] IDATE 2008.

number of SG globally. It is expected a similar growth as far as the development of new games is concerned resulting to the growing of the market (Figure 1).

Figure 1[8]

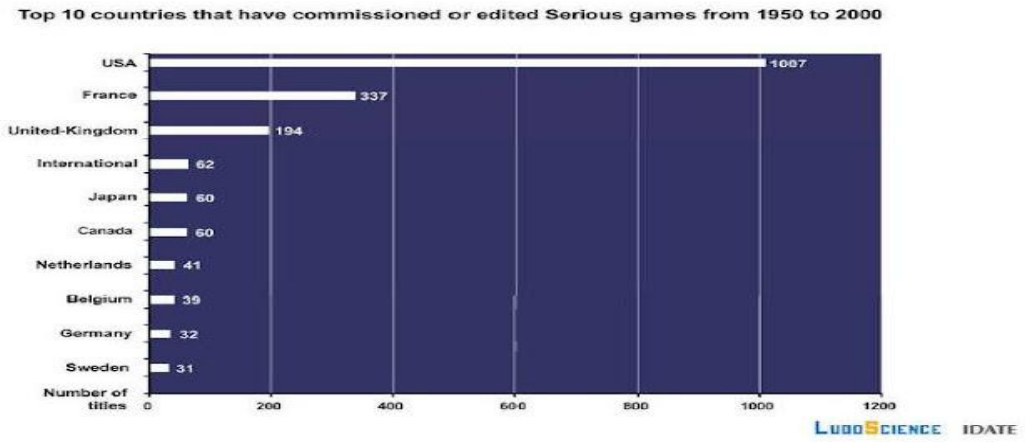


According to IDATE (2008), the sales in the SG market in 2015 will be at least seven times what they were in 2010 with an average annual growth rate of 47% between 2010 and 2015. It is therefore logical to conclude that the SG market will explode in the years to come.

7.2 Market size evidence of SG in the USA

USA is the biggest player in the SG market globally. This trend is not only evident by the development and production of SG in this country, but also through the usage and distribution of such games. As the following graph shows (Figure 2), USA is the largest player around the world:

Figure 2[9]



[8]Look also at "SG Market key metrics", http://seriousgamesmarket.blogspot.com/2011/03/serious-games-market-key-metrics-from.html, (2011).

[9] Ibid.

According to some analysts, US contributions to the SG market were about $400 million in 2008, but this estimate is far from reality due to the above arguments mentioned in section 7.1.[10]

The US market for SG is characterized by the predominance of the military market segment in the development of such GBL approaches. The last years, however, there is a substantial progress for innovative SG applications in many US industries, especially in the sectors of education, health and advertizing. This attempt has been reinforced by the American government subsiding SMEs to identify and enhance innovations. The size of contracts issued to SMEs overcome defence-related operations and reach the whole sphere of the US economy. To this end, private companies also follow the trends of the SG market financing innovative projects, providing opportunities for research in the field and/or commissioning their own SG applications.

7.3 Market size evidence of SG in Europe

The picture of SG market in Europe is fundamentally different compared to the US evidence. The European market of SG is principally concentrated in the UK, Scandinavia, Germany and France. Southern and Eastern Europe contributes significantly less in SG market development.

Europe's lag in SG market development stems from the inadequate political support of European governments to help develop this market. Excluding some encouraging cases like the Cyber-budget in France, EU programmes are barely suitable to support SMEs and / or research institutions to innovate and produce SG applications. In addition, the business community rarely finances such projects creating difficulties to potential synergies to develop the market through cooperation and novelty.

The European market of SG is thus significantly underdeveloped compared to the US. Furthermore, recent increasing trends in video games market in Europe do not confirm similar development in the SG market (Price Waterhouse Coopers 2009-2013), if we assume that the development in video market industry is closely related to the development in SG market. This relative lagging-behind state of development in Europe allows for optimism for a catch-up scenario if we take into account the prerequisites available in Europe: strong content industries, creative talents, skilled programmers, availability of funding etc.

[10] Look at "Serious Games: A Sizeable Market – Update", http://elianealhadeff.blogspot.com/2007/06/serious-games-sizeable-market-update.html, (2007).

7.4 Market size evidence of SG in the SEE area

There are no reliable statistics for SG market size in the SEE area. Firstly, it should be noted that it is a geographical region particularly heterogeneous comprising areas as Austria and northern Italy that are close to the European averages in terms of market size. Other SEE areas are significantly less developed with only scarce noteworthy production entities and research outfits that may spur a growth path but, overall, there is no a viable ecosystem of mature demand coupled with a sufficient number of skilled producers.

Second, the overall market size should be considered at embryonic state. There is no a repeatable and grown-up demand of SG applications except a few pioneer cases that are mostly research based, early adopters and not yet assessed to conclude on their continuation/ replication potential. However, anecdotal evidence feedback from surveys among HR executives, advertisers as well as trainers in the context of LUDUS, but also from similar projects and sources, show that the industries' experts are well aware of the potential opportunities and willing to use SG tools but their expectations are not met with mature and trustworthy SG products and services. On the production side, there are innovative and promising research oriented and skilled programmers, cartoonists, trainers, advertisers that can turn the opportunities and the emerging demand into a small but solid business growth. The lack of private and public funding is a serious inhibitor in this process and perhaps the one that explains the relative development gap. The following sections will analyze more profoundly the market dynamics, the drivers as well as the inhibitors for SG growth potential in the SEE area.

8 FACTORS ANALYSIS

This section of the market report for SG examines the main drivers and inhibitors which influence the development of the SG market in the SEE area. A detailed SWOT analysis is carried out to give emphasis on the strengths, weaknesses, opportunities and threats for this particular market in the SEE area.

8.1 Market Drivers

Market drivers concern the basic factors which affect positively the development of the SG market. According to different theoretical frameworks[11], we need to examine at least the economic, social, regulatory and technological factors of a market in order to identify the key drivers of this market. As regards the SG market in the SEE area, the following crucial market drivers have been identified:

8.1.1 Economic Market Drivers

• Cost reduction and minimization are significant factors for business development and are directly related to the efficiency of firms to maximize profits and promote investments and progress. SG market development can contribute in the reduction of training-related costs because SG applications are cheaper methodologies for workforce's education and training compared to more traditional methods of learning and training (such as specialized trainers and managers). For this reason, many enterprises from various industry sectors of the SEE economy are keen to invest in such small and/or large-scale SG projects. Due to positive externalities effects, cost reduction in one department of a given firm would contribute to cost decline in additional departments of the same firm.

• High expenditures for specialized trainers and managers drive cost upwards leading to downward pressures on the training conducted inside a company. Retaining a competitive and cost-efficient offering in training preserves the overall company competitiveness in the long-term. SG applications enhance the effectiveness of training and, as a consequence, improve its productivity. As a result, more firms are willing to create and test new technological tools in order to reduce the

[11] See, for example, Porter, M. (1998) *Competitive Advantage: Creating and Sustaining Superior Performance*, (New York: The Free Press) and Kotler, P. and G. Armstrong, (2011) *Principles of Marketing*, 14th Edition (New York: Pearson Prentice Hall).

cost of their operations. Thus, corporations can take the first steps for SG market evolution promoting the development of an emergent supply SG chain.

8.1.2 Social Market Drivers

Ex-cathedra vocational training in the workplace is in a crisis. Boredom, absenteeism, reduced impact on skills improvement undermine return of investments in traditional training. People, especially workers, have played thousands of hours of electronic games and they are tuned / accustomed in a learning path shaped by gaming practices (including experiential learning, learning-by-doing, peer-to-peer learning etc.). Companies and employers have the incentives to exploit gaming practices for learning purposes in order to increase the declining effectiveness and to reduce the increasing costs of ex-cathedra workplace training.

8.1.3 Regulatory Market Drivers

In many SEE countries, legislation dictates how specific needs should be addressed, at what levels of service, quality, safety, etc. These regulatory requirements generate substantial new needs in staff training to ensure compliance. In addition, the extended use of internet and digital technology for various purposes has raised the need for the formulation of relevant regulatory frameworks more susceptible regarding these technological uses. Similar progress in legal frames is necessary for investment intentions. Many SEE countries have adopted regulatory frameworks more-friendly for investments in order to attract foreign capital and investors. These advancements in the legal field can promote the development of SG market in the SEE area.

8.1.4 Technological Market Drivers

Information and communication technology (ICT) penetration is a global tendency that is also present in the region of SEE. More and more consumers and firms use the latest applications and tools of technology in order to meet demand and/or operational needs. The need for more advanced tools and knowledge in the field of technology is more acute and offers a great potential for productivity gains in a context of technological lag as the one observed in the countries of the SEE area relative to the more developed Western Europe. Inclination for evolution and differentiation in the competitive domain of technology are characteristics that would extensively influence the development of SG market in the SEE region.

8.2 Market Inhibitors

Diverse inhibitors are evident concerning the development of SG market in the SEE area. For the thorough examination of such indicators, we need to identify the relevant economic, social, political, regulatory and technological factors which have negative implications in the promotion of SG market in the SEE region.

8.2.1 Economic Market Inhibitors

Internal Inhibitors[12]:

• Lack of inventive entrepreneurship perception is a significant disadvantage regarding the improvement of the SG market in the SEE area. Entrepreneurs in countries of the SEE region normally follow traditional systems of business organization without risking to adopt more innovative frameworks of management. SG applications need bright minds and risk-loving entrepreneurs in order to flourish in the SEE area.

• State-funded ineffective innovation diverts creative resources and undermines the forces of effective innovation. In relation to this, inefficient bureaucratic mechanisms of funding produce useless innovation which inhibits the development of modern innovative structures of technology and governance.

External Inhibitors[13]: The region of SEE is one of the many recipients that have been affected by the recent financial crisis. High unemployment, slow rates of economic growth and less investment projects are some of the negative implications having plagued the economic foundations of many countries in the SEE area. These repercussions have harmful effects on the financing of innovative technological projects, such as SG applications. Access to cheap capital is also a basic problem because financial institutions are less willing to lend under circumstances of economic crisis. Hence, many firms in different industry sectors of SEE economies have abandoned their eagerness to finance technological projects due to future uncertainty reinforced by the foggy economic landscape.

[12] Internal inhibitors refer to the micro-environment of a firm, namely company's customers, suppliers, intermediaries and competitors (Kotler and Armstrong 2011).

[13] External inhibitors are the wider forces that affect demand of a firm's products and/or services (Kotler and Armstrong 2011).

8.2.2 Social Market Inhibitors

Population aging in the SEE region may be a serious drawback concerning the development of SG market due to the fact that older people are less able and willing to adopt new technological tools in their daily life. However, the most important social inhibitor of SG market development in the SEE area is the increased numbers of illiteracy observed in this geographical region. Low educational levels do not facilitate the adoption of new technological tools and hamper the development of GBL methodologies in the workplace.

8.2.3 Political Market Inhibitors

As mentioned also at section 7.3, the main problem for the weak development of SG market in the SEE area is the insufficient political support of many European governments to finance such innovative technological projects. Although a big amount of EU budget finances ground-breaking actions in the sphere of technological development, SG applications have not gained the respectfulness of EU policy-makers and, for this reason, small funds have been directed (at least until now) to the financing of SG market. In addition, corruption and clientelism are grave political inhibitors that constraint the smooth technological development in the SEE area. Institutional constraints also do not help the development of SG market in the SEE area. Such institutional barriers are regularly related to: a) the lack of sufficient regulatory frameworks to reinforce the funding of SG market development (see next section) and b) the lack of institutional mechanisms rewarding success and cherry-picking winners.

8.2.4 Regulatory Market Inhibitors

The lack of relevant legal frameworks to support the SG market development is a crucial part of the problem regarding the small financing for SG initiatives. Without clear market rules, investor-friendly tax policies and transparent administration, corporations will not take the risk to finance innovative technological projects in order to reduce the cost of their business operations. More importantly, foreign investors will not invest their funds to initiatives directly related to technological improvements.

8.2.5 Technological Market Inhibitors

Technological lag is a crucial feature in the SEE area compared to other regions of the world. Corporations apply less improved technological tools for their business operations and consumers' use of new technological devices is linearly related to their decreasing purchasing ability due to recent economic crisis. Except for the advanced technological knowledge required for

the development of SG market, SG applications also need improved technological infrastructure in order to be performed in the SEE area. For these reasons, SG market development is expected to be stagnant in the near future.

8.3 SWOT Analysis

The current section serves as a complement analysis for sections 8.1 and 8.2. The following SWOT analysis aims to:

- identify the strengths,
- highlight the weaknesses,
- examine the opportunities and,
- evaluate the threats of SG market development.

8.3.1 Strengths

- Information technology (IT) infrastructure already placed in the region of SEE is a significant factor for the reinforcement of SG market. Existing information and databases are complement features which could develop a sufficient framework for development of SG market in the SEE area.

- Funds provided by the EU are of particular importance concerning the support of SG market in the SEE area. These funds provide the necessary framework for the emergence of synergies among firms and governments to initiate the first steps for the expansion of SG market in the SEE area. Various common EU actions in the field of informational technology and lifelong learning are additional factors which could aid the emergence of SG applications.

- Low requirement of financial capital for the start of a business in the domain of SG is a significant factor for the development of SG market in the SEE area. Given the financial constraints due to global economic depression, business activities that can be labor-intensive than capital-intensive are easier to be built up and flourish. Henceforth, SG applications are able to be developed even under these cloudy economic times since they need less capital than labor to emerge.

8.3.2 Weaknesses

- As mentioned previously, insufficient political support of EU governments in favor of SG investment projects is a dominant variable affecting the development of the SG market, especially in the SEE region. The weakness of EU governments to set off projects and synergies related to SG

applications in the business sector bounds the possibility of SG market improvement in the SEE area. Without strong political support from all the stakeholders participating in the SG industry, the development of this market will not be upgraded shortly. In this problematic situation, illiteracy and low educational levels of SEE population sharpen further the problem.

● A serious flaw for the future development of SG market is the opaque framework of administration functioning in the majority of SEE countries. Corruption, lack of confidence and inappropriate patterns of governance constitute barriers which limit the emergence of new technological industries. In addition, subsidies following patronage criteria normally fund less innovative projects and create subsequent problems in the smooth functioning of the economy. Because of this state, the workforce of SEE administrations is unable and/or reluctant to learn how to use and adopt new technological tools such as SG applications.

● Lack of innovation and modern entrepreneurship is also a fundamental drawback characterizing the economies of the SEE area. SG learning methodologies cannot be produced through traditional business practices. Young entrepreneurs should focus on investments which promote technological advancements and applications.

● Limited experience regarding the production of SG products and services is a noteworthy problem in the SEE area. The majority of corporations, research institutes and governments has never been exposed to such applications and, thus, seem to be hesitant to adopt new learning and educational methodologies.

● Inadequate access to capital for R&D investment is prominent in the SEE area. Without sufficient funds for investments, SG market development is doomed to fail regardless of the strong potential for its success. Also, the sectoral composition of the SEE economies as a whole (mainly investments in agriculture and livestock) presents significantly smaller potential for investment in R&D led training such as SG applications.

8.3.3 Opportunities

● SG are a new field for market development in the SEE region. This perspective shall be taken into consideration from ambitious entrepreneurs who could succeed in a new market with less competition and potential for high profits. Additionally, the challenge of developing new technological tools (such as SG applications) is a complement motivation for pioneer entrepreneurs who want to uncover their creative talents and advanced skills in a new market. Leapfrogging can be more robust and effective.

● SG as cheap substitutes / complements of training may have a higher potential in the SEE area in comparison with bigger training spenders. However, this potential can be materialized only if effective applications and services are on offer.

● The crisis as a creative destruction process and, especially, the collapse of corruption and clientele state are opportunities as they free up researchers and IT companies to focus on market needs instead of competing to collect subsidies.

● Existing cooperation among companies, research institutes, universities and governments in the sector of technology would be a precursor for the development of SG market in the SEE region. In relation to this, the emergence of a new market increases the motivation for the creation of new business networks and synergies.

● One substantial opportunity is the financial support coming from the EU level. Many community-driven subsidies and actions are running every year for the support of innovative projects in the field of technological advancements. Policy-makers and entrepreneurs from the SEE area can take the risk to promote synergies in order to create new technological tools, such as SG application for learning purposes.

● The contemporary technological progress and its internalization through the forces of globalization in all regions of the world are major prospects for the development of SG market in the SEE area. SEE is still a region in which more technological steps should be done, but present technological infrastructure could become the base for the development of new technological tools (e.g. SG applications).

● Consumers' needs for new technological tools and applications constitute major chances for the development of SG market in the SEE area. Firms and governments need new learning tools to train their personnel and consumers require new advanced technology to meet their demand needs. SG applications for learning and training purposes are prospects which could satisfy such diverse expectations.

8.3.4 Threats

● The implications of global economic crisis and the future uncertainty concerning the prosperity of economies around the globe comprise major threats for the development of new markets and business plans. SG market development is straightforwardly affected by global trends and imbalances that have regional repercussions in the SEE area.

● Increased unemployment, higher taxes and economic recession lead undoubtedly to lower income levels and, subsequently, to reduced consumption. Lower purchasing power of consumers therefore is expected as a result of world financial crisis. These trends will affect negatively the perspective for the development of SG market in the SEE area.

● The embryonic nature of the SG market calls for massive entries in the SG industry. Although, the current time, low interest has been expressed for the development of SG market in the SEE area, in the long-term emerging competition would be a substantial problem regarding the expected returns of invested capital in such business activities.

● Expansive competitive gaming as a service business model will turn serious gaming (or key market shares of it) into concentrated closed markets for limited numbers of world players.

● A monopolistic market could be expanded among certain links of the SG value chain which would be destructive for the development of this market.

● Brain-drain: Migration of experts and creative minds to other more stable and prosperous countries.

● Changes in legal frameworks concerning business practices and investment policies are frequent tendencies observed in the majority of SEE countries. This frequency is dangerous for the future development of SG market because entrepreneurs cannot be sure whether their investments are safe and profitable or not.

● Socio-political instability in the SEE area is an additional threat regarding the development of SG market. The unstable international relations of SEE countries cannot compose a safe economic environment for investments and future development of markets.


STRENGTHS
ICT Technology
Existing information and databases
EU funds and actions
Low needs of Capital
WEAKNESSES
Insufficient Political Support
Opaque Administration
Lack of innovative Entrepreneurship
Low experience regarding SG applications
Insufficient capital for investments
SWOT Analysis
OPPORTUNITIES
Development of New Markets
Networks and Synergies
EU subsidies
Technological Progress
Consumers' needs
THREATS
Global Economic Crisis
Lower Purchasing Power
Emerging Competition
Monopoly Stucture of the Market
Brain-Drain

9 MARKET DYNAMICS, TRENDS AND GROWTH POTENTIAL

In the previous section of this market report, a detailed SWOT analysis identified the main factors affecting the development of SG market in the SEE area. This section will continue this analysis specifying the market dynamics, the trends as well as the growth potential of SG market concerning the particular region of SEE. Towards this aim, this section has three parts: a) market dynamics, b) market trends and, c) growth potential in the SEE area.

9.1 Market Dynamics

Market dynamics are defined as the result of the interaction of the factors which affect the demand and supply of products and/or services of entities in a market. The previous section has set up a theoretical framework to trace the key factors which influence the supply and demand of SG in the SEE area. In this section, we will try to remark available quantitative evidence to highlight the market dynamics of the SG market in the SEE area. However, because the SG market is still in an embryonic condition both worldwide and in the SEE area and our knowledge and information about this market is still very limited, appropriate proxy variables to explain factors affecting the development of SG market are very difficult to be identified and, for this reason, data for relevant proxies cannot be easily found.

To trace these market dynamics, we will approximate the determining factors of the SG market dynamics with relevant proxy variables using data particularly from EUROSTAT and the European Commission. Due to data scarcity and the emergent state of SG market, the following quantitative investigation presents unavoidably inherent weaknesses in establishing a comprehensive overview of the SEE area. As a result, by necessity this analysis will only identify some trends and partial estimations as far as the SG market is concerned. Reliable and comprehensive results about causality and/or correlation between variables cannot be claimed and, as a consequence, the analysis has in essence a descriptive nature.

9.1.1 Market Demand Dynamics

Regarding the factors affecting the demand of SG market, we will use data from the following proxy variables which reflect SG market demand dynamics in the SEE area:

- individuals using the internet for training and education,
- individuals having used the internet for formalized training and education purposes,

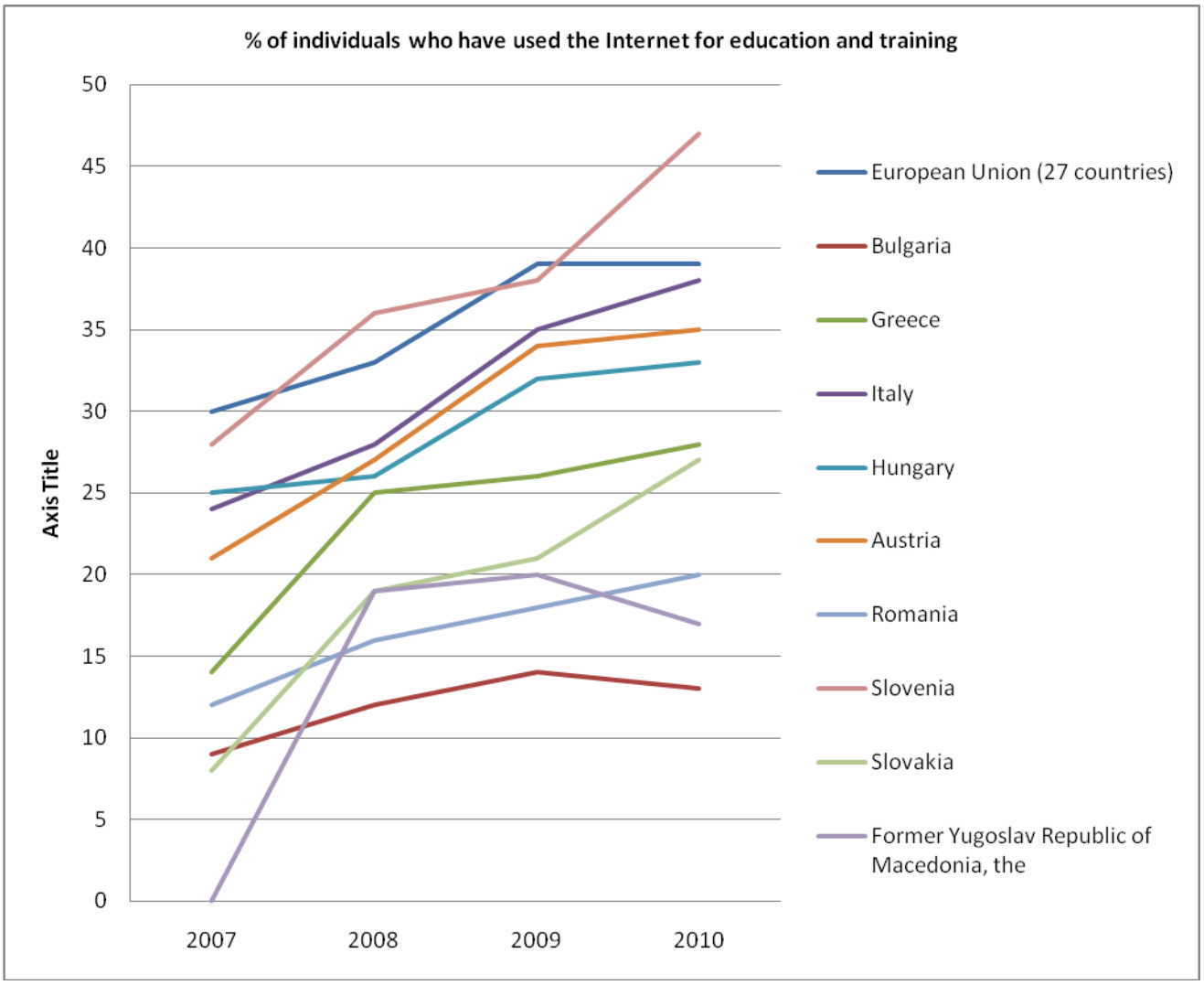
- enterprises using e-learning applications for training and education of employees,
- enterprises providing continuous vocational training (CVT),
- participation of employees in CVT courses.

Individuals using the Internet for training and education

Individuals using the Internet for training and education can be deemed as a good proxy variable to reflect demand dynamics regarding SG market development in the SEE area, because through this variable we can estimate the tendency of individuals to learn via online technological tools (such as SG applications) and the inclination of enterprises to invest in such online technological applications. Although this proxy variable is very weak to explain SG market dynamics in the SEE area, important conclusions can de deduced from this analysis as far as SG market development is concerned.

In Graph 1, we observe that in all SEE countries there is an increased demand in the percentage of individuals who have used the Internet for training and education. The only exception is the Former Yugoslav Republic of Macedonia in which a small decrease can be identified from 2009 to 2010. This trend is very important because data observations run from 2007 to 2010, a period in which the implications of global economic crisis have already affected the world economy. Hence, the global economic crisis does not seem to have any correlation with the demand for e-applications regarding training and education. In addition, as it is obvious from the graph, the inclination of individuals in SEE countries to use the Internet for educational and training purposes follows the general trend in the EU in which we realize an increase in the Internet use for education and training.

Graph 1



Source: EUROSTAT

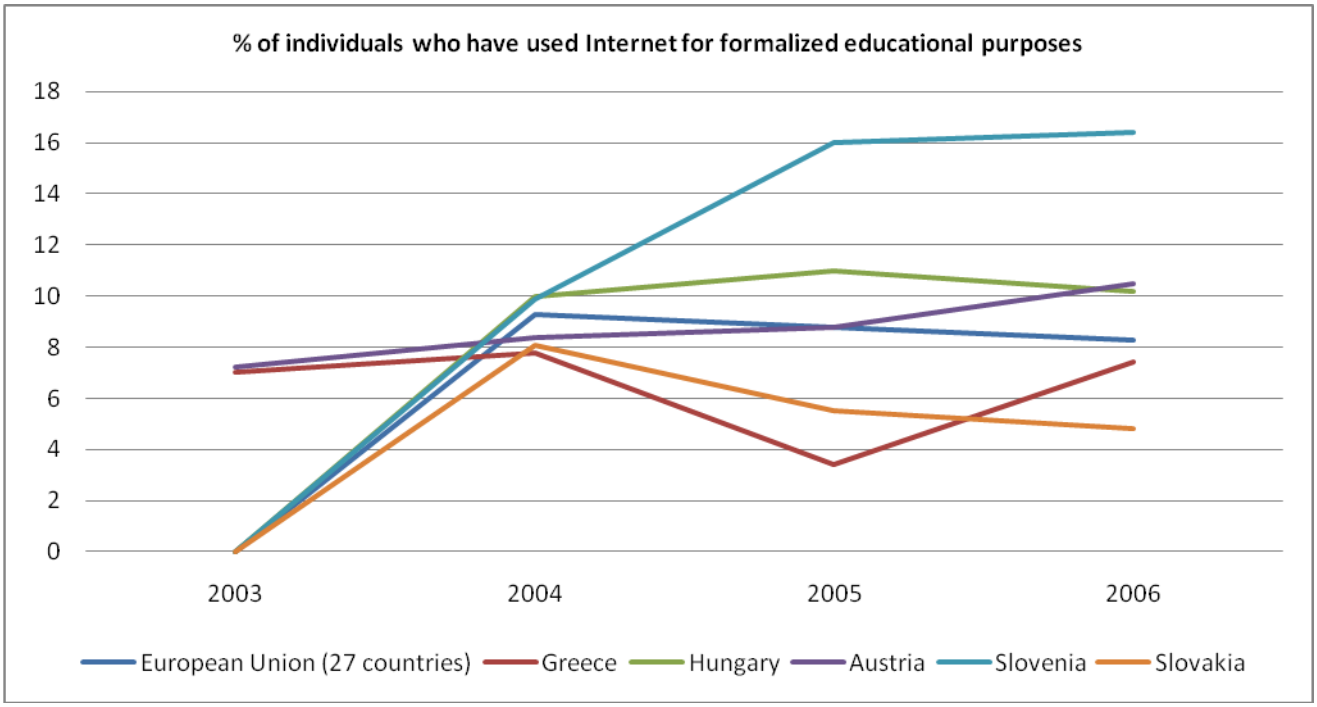
Individuals having used the Internet for formalized training and education purposes

This proxy variable is similar to the previous one and as a result it provides complement evidence concerning the tendency of individuals to use online technological tools for educational purposes as well as the inclination of companies to invest in such Game Based Learning applications.

Graph 2 describes the percentage of individuals who have used the Internet in order to participate in formal education activities. Data observations cover the time period from 2003 to 2006. It is obvious from the graph that, except from Slovakia, there is a steady increase in the use of Internet for formal educational purposes in the SEE area. In Greece, after a considerable decrease in the percentage of individuals using the Internet for formal educational activities from 2004 to 2005,

in 2005 the level of percentage have approached again the 2003 level. An important weakness of this analysis is that the implications of recent economic crisis are not included given that observations are from 2003 to 2006. However, it is evident that the inclination of individuals to follow formal courses and training through the web has a considerable dynamic compared to the general EU level in which we observe a slight but steady decline for this trend.

Graph 2



Source: EUROSTAT

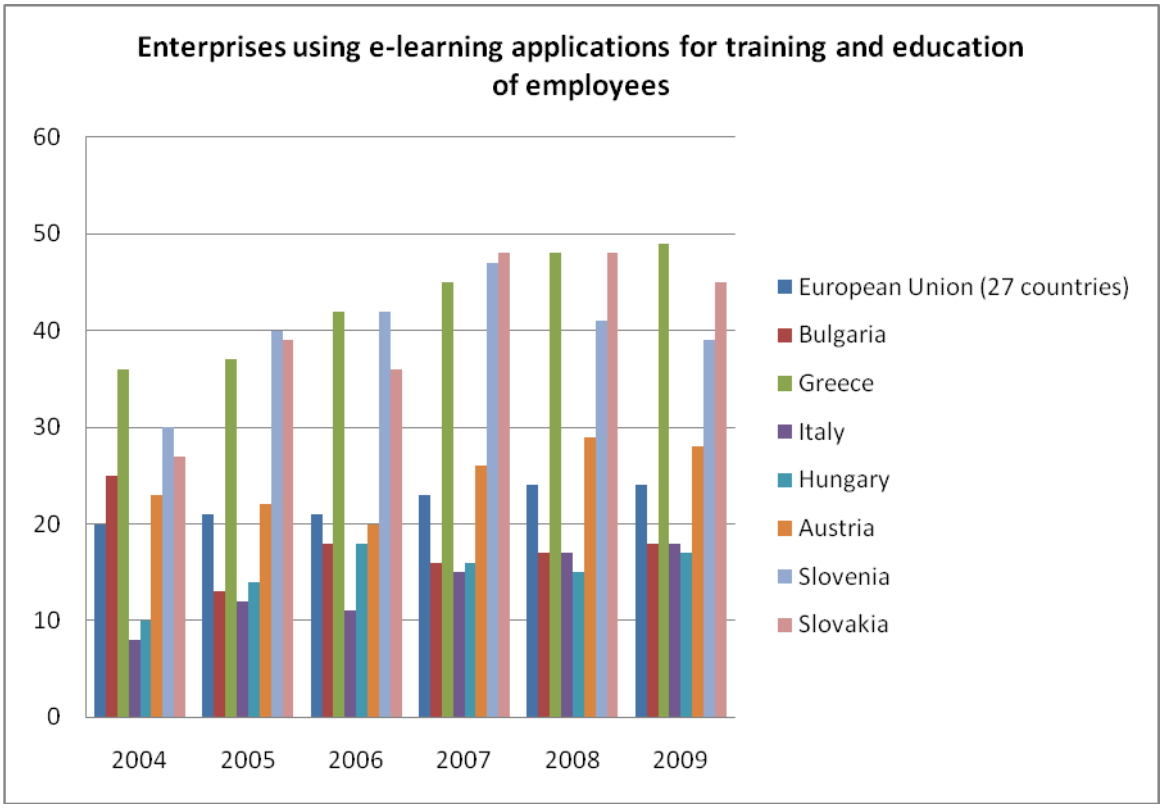
Enterprises using e-learning applications for training and education of employees

In graph 3, data observations have been collected to demonstrate enterprises using e-learning applications for training and education of employees. The findings of this graph reflect up to a considerable degree the market demand dynamics of SG applications and, for this reason, conclusions from this graph are of significant importance regarding the development of the SG market in the SEE area. The main reason this proxy variable is important for SG market development is that it shows the propensity of enterprises to use e-learning applications for training and education of employees, such as SG applications. Although many e-learning applications do not necessarily relate to serious games for training and education purposes, this proxy variable can be a useful sign to indicate the tendency of companies to use and, subsequently, to invest on various e-learning applications including SG applications.

From the observations, it is evident that for the majority of the SEE countries there is a solid increase in the percentage of enterprises using e-learning applications to train and educate their employees. Bulgaria is the only country where a decrease in this percentage can be deduced.

In addition, if we make a comparative analysis between the EU trend and the interest of SEE enterprises to offer e-learning applications for education and training, we can infer that in SEE countries there is a strong dynamic in the percentage of corporations using e-learning applications for educational purposes compared to the EU percentage which has an insignificant dynamic. Hence, there is a good potential for SG market development in the SEE area.

Graph 3



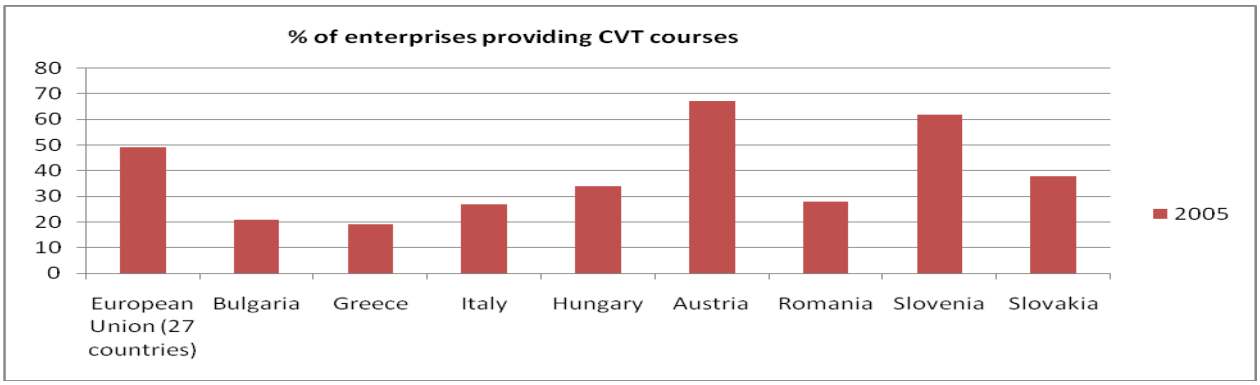
Source: EUROSTAT

Enterprises providing continuous vocational training (CVT) and participation of employees in CVT courses

Graphs 4 and 5 complement the conclusions of Graph 3 because they depict the percentage of enterprises providing continuous vocational training (CVT) courses (Graph 4) as well as the percentage of employees of all enterprises participating in CVT courses (Graph 5). From Graph 4, we can detect that more than half of SEE countries are very close to the EU average percentage of all enterprises offering CVT courses and, more importantly, two countries, Austria and Slovenia are

above of this EU average. Although data observations represent figures only for the year 2005, it is reasonable to expect similar data trends for subsequent years and it is therefore noticeable that a big percentage of enterprises both in the EU and in the SEE area is eager to offer CVT courses to their employees.

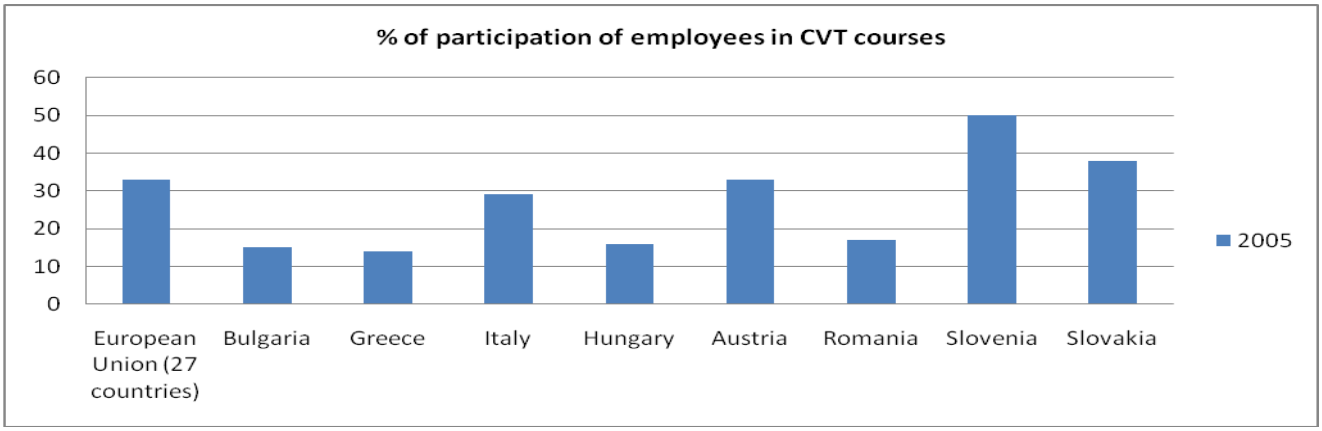
Graph 4



Source: EUROSTAT

In Graph 5, we observe a strong dynamic towards participation of employees in CVT courses in all enterprises of SEE countries compared to the EU level. More specifically, in Italy and Austria the percentage of employees participating in CVT courses is very close or equal to the EU percentage, whereas in Slovakia and Slovenia this percentage is above the EU level. This dynamic depicts a strong tendency of SEE enterprises and their employees to show a preference for continuous adult education and lifelong learning in order to catch up the recent world trends in business and technology. Only half of the SEE countries (Bulgaria, Greece, Hungary and Romania) present percentages below the EU average. Hence, it is clear that the SEE area follows the EU market dynamics and could cover the technological gaps compared to the most advanced western economies.

Graph 5



Source: EUROSTAT

9.1.2 Market Supply Dynamics

SG market supply dynamics in the SEE area are more difficult to be traced relative to market demand dynamics, because available data and variables do not depict so clearly the dependent variable (SG market development in the SEE area). Due to these constraints, we will use data observations from the following proxy variables in order to mark out conclusions for the market supply dynamics of SG in the SEE area:

- Venture capital investments.
- R&D expenditure of businesses in ICT sector as % of total R&D expenditure.
- EU funds available for research and synergies.

Venture capital investments

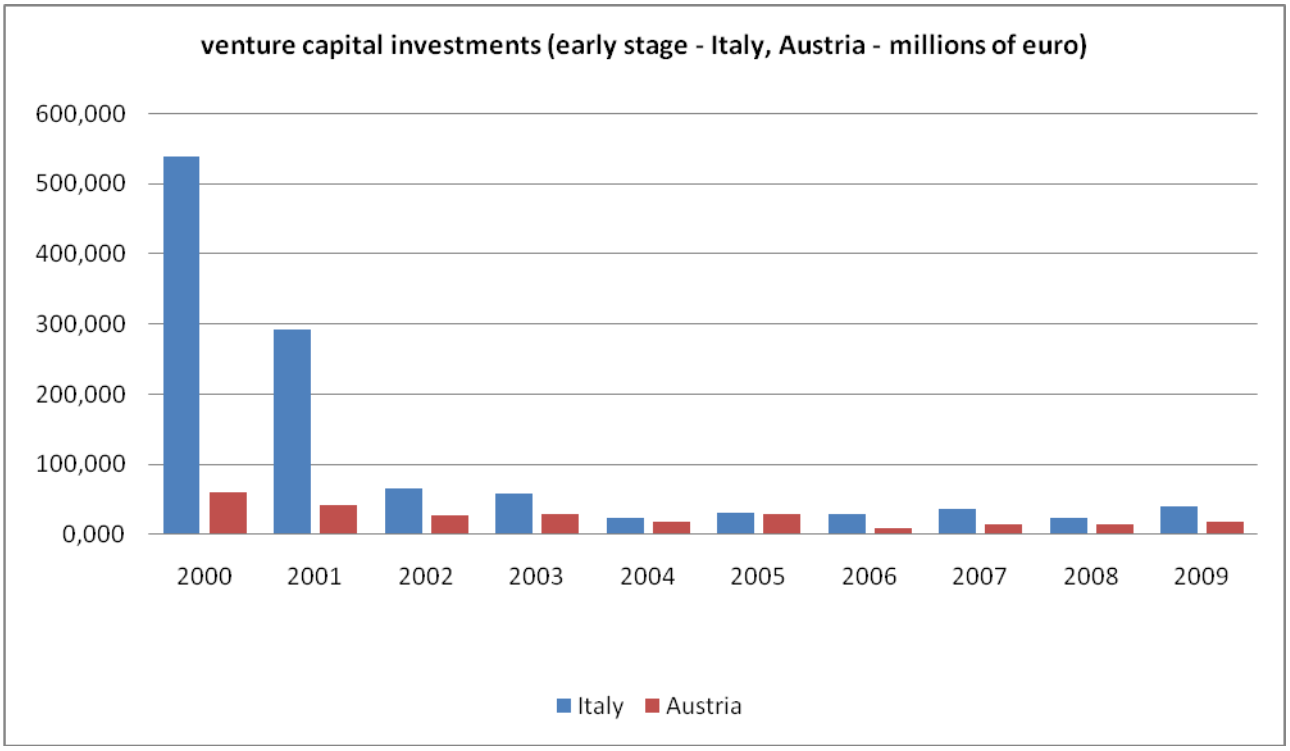
Venture capital investments both at early and later stages in the high-tech industry and knowledge-intensive services are depicted in the following graphs. Through this proxy variable, we will try to approach part of the investments related to SG market development in the SEE area in order to depict supply market dynamics for SG. Although these data observations do not reflect persuasively the dynamics regarding the supply-side potential development of SG market, valuable conclusions can be deduced to estimate more general trends for the supply dynamics of SG market development in the SEE region.

Graph 6 depicts the venture capital investments in early stages of projects for the high-tech and knowledge-intensive sectors in Italy and Austria. The only reason that we have chosen these two countries from the SEE area is the availability of data.[14] After the crisis of the dot-com companies which burst into 2000, there is a general decline in venture capital investments in both countries. However, what is of fundamental importance from this graph is that, during the period from 2007 to 2009, namely when the global economic crisis had started to infect all the world economies, we observe a resilience in the venture capital investments in the high-tech sector. These trends differ substantially relative to the EU level for which we deduce a serious decline of 25%

[14] For other SEE countries, there are no available data for venture capital investments at early stages in the high-tech industry and knowledge-intensive services or the quality of data is very low.

regarding venture capital investments in the high-tech and knowledge-intensive sectors.[15] In this respect, we can make the hypothesis that available funds are still directed to economic sectors that could be related to the development of SG applications.

Graph 6

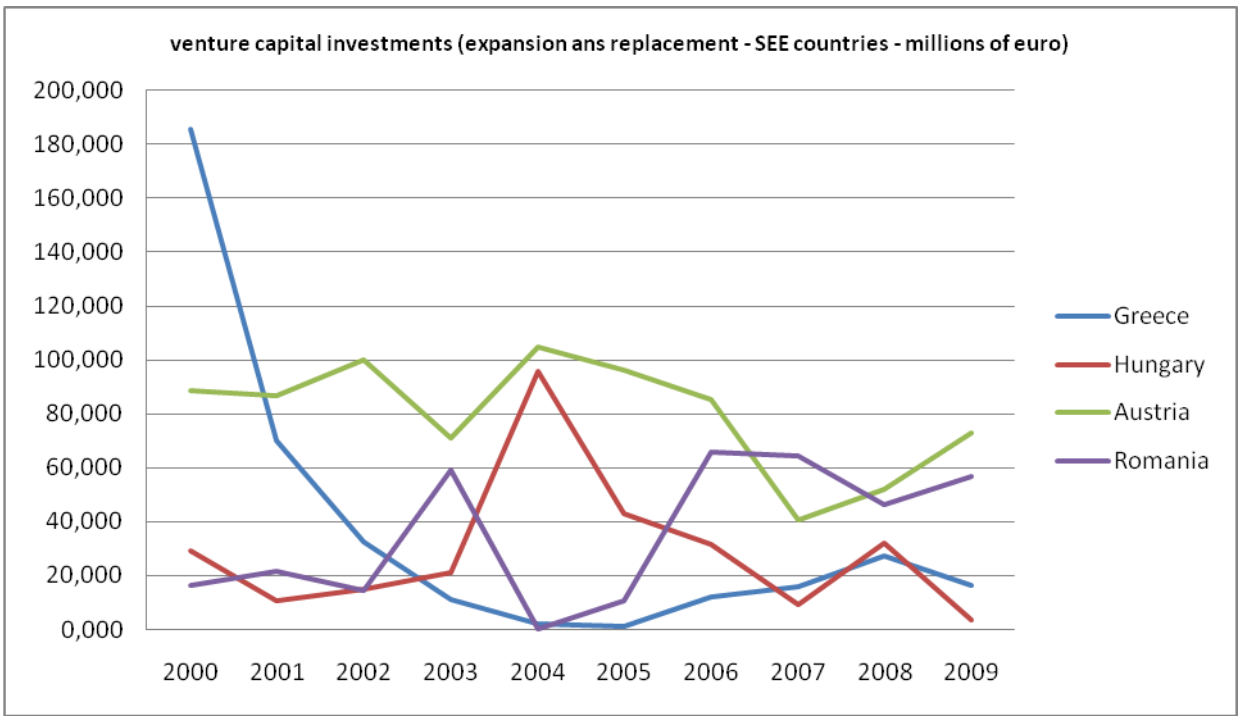


Source: EUROSTAT

In Graph 7, data observations illustrate venture capital investments in the high-tech industry and knowledge-intensive services at later stages of the funding process. For the half of the cases illustrated in the graph, venture capitalists have attempted to support their early-stage investments because a slight decline can be observed in the rate of amounts having been used for investment projects. The exceptions are Greece and Hungary in which we realize a significant reduction of funding close to 90% in the last decade. However, as the case of Romania manifests, in which there is a substantial increase in funding (approximately 400% increase) from 2000 to 2009, venture capitalists finance high-tech and knowledge-intensive projects when such projects pass an initial period of financing and reach a mature phase of development.

[15] EU levels of venture capital investments at early stage of development in high-tech and knowledge-intensive sectors declined from 2047 millions of euro in 2007 to 1890 millions of euro in 2009 (Source: EUROSTAT).

Graph 7



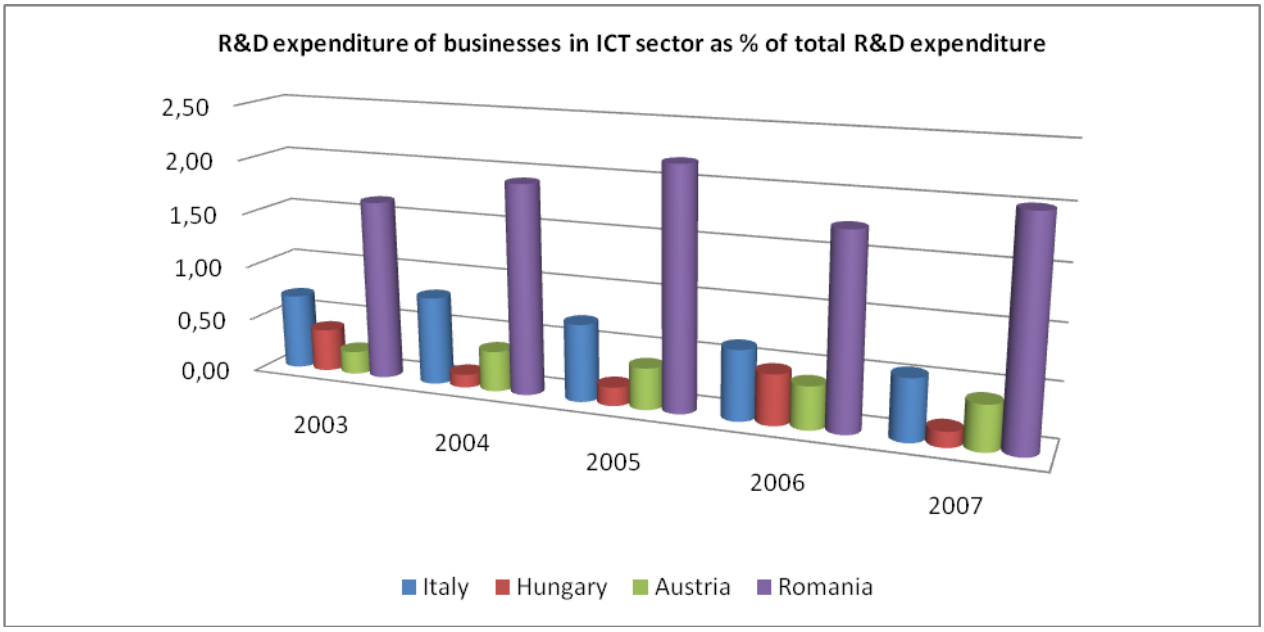
Source: EUROSTAT

R&D expenditure of businesses in ICT sector as % of total R&D expenditure

Graph 8 illustrates the R&D expenditures of businesses in ICT sector as percentage of total R&D expenditure. R&D investment is a good approximation for the estimation of the growth potential in an industry. For this analysis, the indications of R&D expenditures of the ICT sector as percentage of total R&D expenditures are used in order to make conclusions for the growth potential of SG market in the SEE area, if we assume that the ICT sector investments include SG investments.

However, as we can conclude from the graph, the percentage of R&D expenditures of businesses in ICT sector as percentage of total R&D expenditure is very low in all SEE countries. In addition, there is mixed evidence regarding this percentage in the last decade. For example, in Austria and Romania, we deduce that there is small increase in the percentage of R&D expenditures of businesses in ICT sector as percentage of total R&D expenditure, whereas in Italy this percentage has been decreased and in Hungary there are ups and downs. This evidence depicts pessimistic signs for the SG market development in the SEE area.

Graph 8



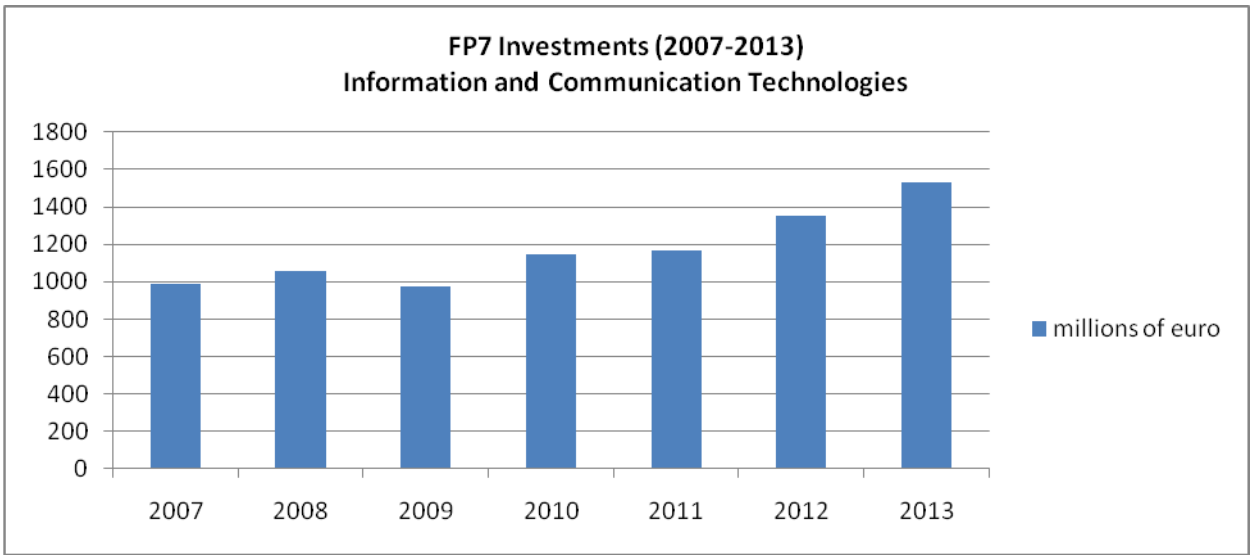
Source: EUROSTAT

EU funds available for research and synergies

SG funding comes often from the ICT sector and, as a result, ICT sector's growth and potential, as reflected by available funds for investments and research, could be a relevant proxy variable as regards SG market development.

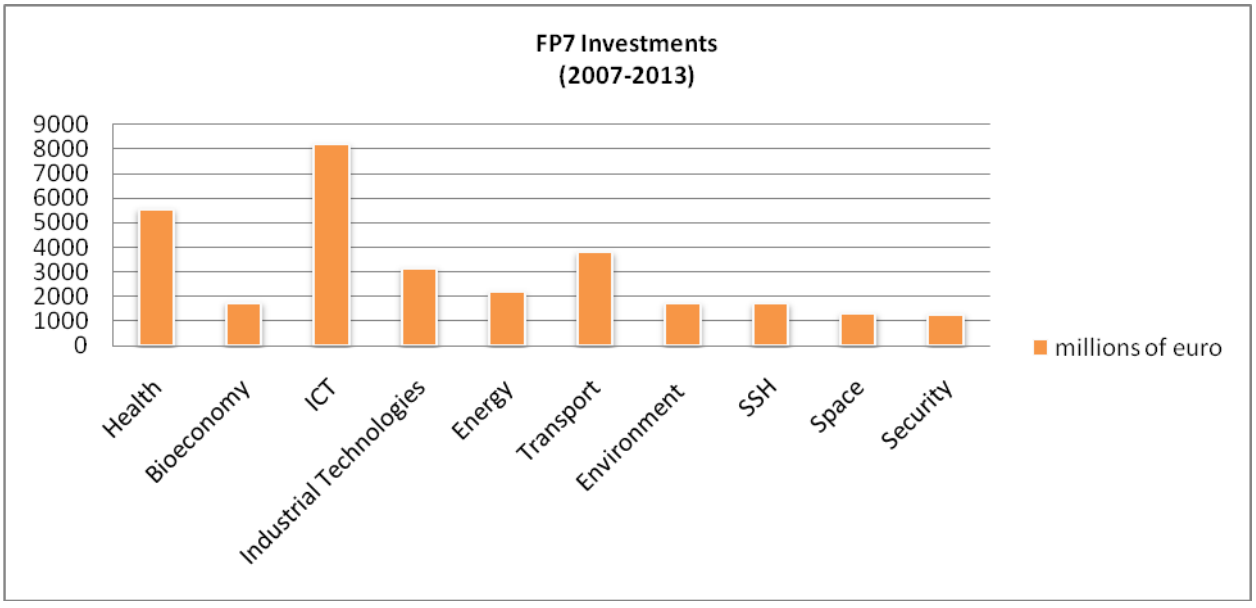
In graphs 9 and 10, data observations describe EU Seventh Framework Programme (FP7) investments in research and innovation for the time period 2007-2013. As it is clear, we can observe an increase in EU expenditures from year to year exclusively for the ICT sector (Graph 9). This evidence supports the view that the EU policy-makers concern about the development of ICT sector in the EU. Graph 10 depicts that the expenditures of EU research funds for the ICT sector are larger relative to all the other sectors of the economy. This indication is considerable because ICT sector seems to be of particular importance for the EU research strategy to promote growth and employment in the wider geographic region of Europe. Drawing on this EU funding policy, SG applications could be developed via synergies and cooperative schemes among various governments, enterprises, and research institutes in the SEE area.

Graph 9



Source: FP7 European Commission Official Website

Graph 10



Source: FP7 European Commission Official Website

9.2 Market Trends

The aforementioned tracing of market dynamics will help us to examine the trends of SG market development in the SEE area. The following analysis will be divided into two parts: a) positive trends and b) negative trends.

9.2.1 Positive Trends

● A large percentage of individuals in the SEE area use the Internet for education and training purposes. Especially, individuals in the SEE area use the web to follow specific formal courses that are offered online. These trends are very important because they depict a propensity towards the development of Game Based Learning (GBL) applications for training and education, such as SG applications.

● Enterprises use to a large extent e-learning applications for training and education in the SEE area. Continuous vocational training (CVT) is a domain which provides many online applications for education and learning. More and more employees participate in such e-learning applications in order to improve their knowledge and skills. Hence, an open ground for development of SG applications has already been set in the SEE area.

● Various attempts are being made from diverse stakeholders to build cooperative networks and synergies through mainly EU funded projects in order to promote the development of GBL methodologies in the SEE area. SG are at the forefront of these attempts reinforcing the development of SG market in the SEE region.

●There is an increasing interest from the business sector to develop GBL methodologies in order to reduce the cost of training and education of employees. SG applications are of fundamental importance as regards the trend of many corporations to develop such alternative methods of learning and training.

● Venture capital managers make considerable efforts to support investments in the high-tech industry and knowledge-intensive sectors in the SEE area. This trend does not concern investments in their early stages, but it is evident for investments that have reached a critical point of their development. In this sense, SG applications and projects could be funded as advanced technological innovations of such mature investments.

● Both personnel and entrepreneurs show a preference to adopt new technological and learning tools, such as SG applications. The knowledge of new technological tools and applications is useful both for personal development as well as for professional improvement and progress.

9.2.2 Negative Trends

● The basic feature of SG market in the SEE area is that, in essence, there is no market for SG in this geographical region. Only small firms operate in this market in the SEE area. These firms do not have the appropriate resources to fund large-scale projects for the development of SG applications in the SEE area. In addition, due to the fact that they operate in a non-defined market without clear supply and demand orientations, these enterprises cannot make substantial improvements in their business strategies in order to develop the SG market in the SEE area.

● There are substantial financial constraints due to world economic crisis and less capital for investments in the field of technology. This trend affects negatively the capital flows towards high-risk investments, such as SG applications, in the SEE area.

● Venture capital managers do not support the development of high-tech investments in the SEE area. This evidence has been confirmed by the previous analysis in part 9.1. In essence, venture capital managers show a preference to support mature investments and do not take the risk to fund projects in their early stages related to high-tech industries and knowledge-intensive activities.

● R&D expenditure is a fundamental variable which reflects the growth of a sector in an economy. Regarding the SG market growth in the SEE area, R&D expenditures of businesses in ICT sector as percentage of total R&D expenditure are very low. This fact suggests that insignificant research is being conducted concerning the development of SG applications in the SEE area.

9.3 Growth Potential

From the above analysis of market dynamics and trends, it is evident that there are many obstacles and constraints which affect negatively the development of SG market in the SEE area. This consequence is even more apparent nowadays due to the world financial crisis which has plagued all the investment projects around the globe. Therefore, it is reasonable to expect a slow development of SG market in the near future especially in the geographic region of SEE.

However, there are powerful reasons allowing us to think positively for the future development of SG market in the SEE area:

● One reason for achieving potential in the SEE area stems from the need of the business sector to reduce costs related to training and education of employees. This expectation is essential because enterprises need to lessen their variable costs to preserve competitiveness and to continue

operating in a very competitive economic environment. SG learning applications can contribute substantially in the reduction of cost related to training and education purposes given that their development and function are costless relative to other methods of learning and training.

● The market for SG in the SEE area is in an embryonic state and, for this reason, many companies seek new business paths and opportunities in this emerging market. These profitable opportunities can create a whole supply and demand chain which would be able to mobilize the development of SG market in the SEE area.

● The development of new business activities in the SG domain in the SEE region gives the possibility to new enterprises to enter the SG market contributing in the further development of this market. As the barriers to entry are still low (especially in comparison for instance with the video gaming industry) and the demand for such game-base learning applications has international dimensions, SEE enterprises can sell their SG products and services in global markets. Therefore, there are strong reasons for enterprises to invest in the development of SG market in the SEE region.

● The SG growth potential in the SEE area will be facilitated by enterprises offering online training game-based methods for their employees worldwide. There is a stable and increasing trend of enterprises providing specialized courses and training through GBL applications and services. These dynamics are also depicted by the increased interest of employees to participate in such game-based training methodologies.

● Finally, the EU as part of its wider economic policy to support and promote the regional development in the SEE area offers various funding opportunities for new entrepreneurs and researchers to develop innovative tools in the field of technology. Hence, new synergies and cooperative schemes can be emerged focusing on the development of SG applications in the SEE area. Venture capital investments also can help towards this development.

● For all the above reasons, there are optimistic signs concerning the growth potential of SG market in the SEE area. SG have the potential to generate growth, stimulate new business demand, improve competitiveness and form a solid niche providing employment and exports in the wider SEE area.

10 IMPLICATIONS FOR PUBLIC POLICY AND FOR REGIONAL DEVELOPMENT IN THE SEE AREA

In the previous analysis and, especially in parts 8 and 9, we examine thoroughly the market dynamics and the growth potential of SG market in the SEE area. Through this analysis, we tried to give persuasive answers in the question of how SG market development in the SEE can be promoted. In this part of the report, we will examine the potential role of the SG market as a driver for development of the SEE local economies.

10.1 Technology as a Driver for Development in the SEE Area

In more general respects, we can presume that technology can be a significant driver in the enhancement of regional development, growth and prosperity in the SEE area. This hypothesis stems from the fact that the geographical region of South-Eastern Europe presents fundamental lags as far as technological advancements are concerned and, for this reason, many opportunities for improvement and amelioration can be sought and pursued in the domain of technology, both from the public and the private sector.

There are at least three direct implications of new technological improvements in the SEE area:

● Technological improvements can reshape and re-organize the productive basis of SEE economies. Many governments and private enterprises invest in new technologies and spend huge amounts of money to make faster their modes of production. In general, advanced technological tools entail more productive workforce which can make more efficient the processes of production and excel in the development of new markets and products. It is a necessary priority for SEE governments to invest in the development of new technologies in order to make more competitive their economies and industries in the international markets.

● On the one hand, technological advancements in the modes of production shrink the demand for labour because available workforce is rendered unnecessary for diverse processes of production. On the other hand, these kinds of improvements create job opportunities because there is demand for specialized and well-informed personnel. In this sense, investments in technology can trigger the creation of new jobs accelerating the growth and prosperity in various sectors of SEE local economies.

● Development in one sector of an economy can prompt the growth and prosperity in other sectors of the economy. Through spillover effects, technological advancements in one industry

emerge positive externalities contributing in the development of related sectors of the industry. To this end, improvements in the technology in the SEE area can accelerate growth and prosperity in various areas of SEE local economies increasing, simultaneously, the possibilities for the creation of new jobs and market development opportunities.

However, there are substantial barriers decreasing the probability of growth and prosperity through technological development in the SEE area. We can state at least three arguments which undermine the technological development in the SEE area:

- There is limited availability of means to finance relevant investments in the field of technology. Less access to capital due to financial constraints creates problems in the financing of innovative projects. For this reason, governments and financial institutions should support the financing of initiatives in the domain of technology in the SEE area.

- Investments in new technologies need specialized workforce and innovative entrepreneurs to run such advanced improvements. In the SEE area, there are limited specialized human resources to support new technological tools and updates. In this respect, SEE governments should invest in the education and training of their people to adopt and treat new technological advancements. SG applications and advanced tools could be the forerunners towards these efforts given their polymorphous advantages to promote education and learning through advanced technological tools.

- Due to clientelism, corruption and bureaucracy, the majority of SEE countries do not promote healthy and profitable investments for their economies but cultivate a client system of exchanges which is harmful and costly for a large percentage of their societies. The technology sector is one of the many sectors of SEE local economies that have suffered a lot from these inefficiencies and unreasonable government and business actions. In addition, the lack of cooperation, consensus and societal vision as strategies for development and transformation reinforce the tendency towards a politico-economic system which is inefficient to support the regional development and prosperity of SEE local economies.

10.2 Serious Games as a Driver for Development in the SEE Local Economies

SG initiatives can act as drivers for development in the SEE local economies due to the following reasons:

- SG are relatively inexpensive Game Based Learning applications having as their primary objective to educate and inform people for various issues of their daily lives. Except from cheap

applications, SG are simple regarding their use and, for this reason, effective to encourage learning and education. Therefore, they can be deemed as valuable tools for the upgrading of the learning process and the technological sector in the SEE local economies reinforcing the whole developmental course in the wider geographical region of South-Eastern Europe.

● Investments and initiatives for SG projects can mobilize the SEE societies to join their forces for the development of this region. Through synergies and cooperative schemes between public and private stakeholders, SG initiatives can flourish and new projects can emerge enhancing the regional economic development of the SEE area.

●SG projects can link different sectors of the SEE economies enhancing the economic development of the wider SEE region through cost-effective strategies, spillover effects and positive externalities. The growth in one sector of the economy prompts the growth in related sectors of the economy reinforcing, in more general respects, the whole developmental process.

● SG projects can urge ambitious entrepreneurs to invest in new technological tools and innovative GBL applications. Such business operations are attractive for foreign investors who could finance a large percentage of SG projects and technological innovations. Foreign direct investments are essential for the economic development of the SEE area.

10.3 LUDUS Project Contribution in the Regional Development of SEE Area

The LUDUS project can contribute in the development of SG market in the SEE area through the following channels:

● LUDUS brings together experts in the particular domain of SG applications and, for this reason, increases synergies and cooperation in this field.

● LUDUS enhances the research and knowledge base as regards SG through innovative research contributions in this field. Hence, it contributes in the awareness of what SG are and which their utility is.

● LUDUS synthesizes links with universities, companies, developers and various stakeholders operating in the field of SG in the SEE area promoting, simultaneously, international networking and collaboration.

● LUDUS identifies priorities and composes achievable objectives regarding SG initiatives and projects. In this sense, it contributes to the development of new GBL applications and technological advancements in the SEE area.

10.4 Implications for Regional Development

• SG applications improve the productivity of personnel through education and training. Productivity is the leading source of economic growth and prosperity in the long-run.

• SG applications reduce the cost of companies necessary for training and education of their employees. Reduced cost entails increased profits and, as a result, more investments which promote regional economic development and growth.

• SG applications stimulate the creation of cooperation and synergies among diverse stakeholders which participate in the development of the SG market in the SEE area. This implication can create positive spillover effects in many areas of SEE economies.

• SG applications contribute in the technological improvement of SEE economies increasing the possibility for further economic development of this geographical region. In addition, a large percentage of SEE population will improve its technological knowledge which is a necessary tool for further personal, social and economic development.

• SG applications accelerate the growth to other sectors of the SEE economies via their positive externalities as advanced technological tools. This fact is significant because SG applications can contribute to a great extent in the wider economic development of the SEE area and the increase of SEE countries' GDP.

10.5 Implications for Public Policy

• SEE governments should promote policies to attract foreign direct investments and cheap capital in order to finance innovative technological projects such as SG applications.

• SEE governments should free their legal frameworks in order to become more investor-friendly.

• SEE governments should stimulate cooperation and synergies in the technology sector through economic policies that attract funds and promote regional cooperation among diverse public and research institutes, companies and innovative entrepreneurs.

• SEE governments should be more transparent and less bureaucratic to absorb attractive EU funds for the development of innovations in the technological domain of the economy. In addition, SEE governments should reduce phenomena of corruption and tactics of clientelism in order to allocate capital in the most productive areas of SEE economies rather than to inefficient innovations which promote more problems than those they try to solve.

• SEE governments should inform businesses, entrepreneurs and the public about the effectiveness of SG applications regarding education, learning and training. Towards this aim, they should finance innovative projects, organize events and exhibitions for informative purposes and cooperate through various ways for the promotion of SG applications.

11 CONCLUSIONS

The aim of this chapter of the report is threefold: a) to present the market characteristics of SG both worldwide and in the SEE area (parts 2,3,4,5, and 6), b) to examine the prospective development of SG market in the geographical region of South-Eastern Europe (parts 7,8 and 9) and c) to explore the potential of SG market as a driver for development of SEE local economies (part 10). This analysis comprises the third and last part of "State of the Art" analysis of LUDUS project.

In part 2 of the report, we explained what SG are by defining these game-based learning applications. We referred to the fact that our concern in this study is exclusively on GBL applications highlighting their characteristics as learning technological tools, their advantages and disadvantages.

Part 3 of the report examined SG products and services that are offered worldwide. SG products and services contain various dimensions and applications and are used by diverse users. In part 4, we presented flagship cases of SG applications regarding training and education both globally and in Western Europe. Concerning the SEE area, we concluded that there are no remarkable flagship cases of SG given the nascent nature of this market in the South-Eastern Europe.

Part 5 presented the basic stakeholders participating in the value chain of SG market. We identified many categories of stakeholders both from the supply and demand side of SG market. In addition, development facilitators were examined that promote the progress and improvement of SG market in the SEE area. In part 6, the marketing strategies affecting the development of SG market in the SEE area were also scrutinized.

Part 7 illustrated market size evidence of SG in the USA, in Europe and in the SEE area. As it is evident from the analysis, USA is the biggest SG market in the world with Europe to follow both in terms of market size and market dynamics. SEE SG market is still at an embryonic state and significantly less developed compared to the US and Europe.

Part 8 examined the main drivers and inhibitors which affect the development of SG market in the SEE area. This part of the report is one of the most important because it composes a theoretical framework through which a detailed SWOT analysis identified the main strengths, weaknesses, opportunities and threats as regards SG market development in the SEE area. Mixed conclusions have been deduced from this analysis concerning the problems and the dynamics of SG market in the SEE area.

Based on the theoretical analysis of part 8, part 9 of the report identified the main factors which affect the demand and supply of SG market in the SEE area. However, due to poor theoretical analysis in the international literature for GBL applications and unavailability of relevant proxy variables and data observations regarding SG research, demand and supply market dynamics present only some trends and partial quantitative estimations as far as the growth potential of SG market development is concerned in the SEE area. Even under these problematic analytical circumstances, a substantial potential for growth has been recognized for the region of SEE.

In part 10, we analyzed the implications for regional development and public policy in the SEE area. The main message of this analysis is that SG potential as a driver for development of SEE local economies presents high merits and could be materialized as a substantial alternative tool for regional development and growth in the SEE area. More information should be transmitted to the public and private domain presenting the nature and utility of SG applications regarding especially the fields of education and training. In addition, except from the political will SEE governments should present towards the promotion of SG applications in the business sector, more capital should be moved to finance synergies, research initiatives and cooperative schemes for the development of SG market in the SEE area.

Taking into consideration all these theoretical viewpoints, future research efforts will be needed to inform the public and the business sector for the utility of SG applications both as cost-effective tools in the business sector and as advanced learning methodologies for training and educational purposes. LUDUS "State of the Art" analysis aims to fill a considerable gap concerning the awareness and information of the public and private domain for the SG applications.

12 APPENDIX

12.1 Bibliography

Aldrich, C. (2004) *Simulations and the future of learning* (San Francisco: Pfeiffer, A Wiley Imprint).

Aldrich, C. (2005) *Learning by doing*, (San Francisco: Pfeiffer, A Wiley Imprint).

Alexander, B. (2008) "Games for higher education: 2008", *EDUCAUSE Review*, July/ August.

Alvarez, J. and Laurent Michaud (2008) *Serious Games: Advergaming, edugaming, training and more* (Montpellier: IDATE Consulting & Research).

Becker, K. (2008) *The Invention of Good Games: Understanding Learning Design in Commercial Video Games*, unpublished Ph.D. Thesis, University of Calgary, Alberta.

Breslin, P., McGowan, C., Pecheux, B., & Sudol, R. (2007) "Disaster preparedness: Serious gaming", *Health Management Technology*, October, 14-17.

Chen, S., & Michael, D. (2005) *Proof of learning: Assessment in serious games*, Gamasutra: CMP Media LLC.

"Corporate Learning Games in Europe: Market Challenges & Opportunities for Serious Games Used in Learning to 2012", APPLY Group: Marketing, Events, PR, Consulting, February 2007.

de Freitas, S. (2007) *Learning in immersive worlds: A review of game-based learning*, Bristol, UK: Joint Information Systems Committee.

Deker, S., Sportsman, S., Puetz, L., & Billings, L. (2008) "The evolution of simulation and its contribution to competency", *The Journal of Continuing Education in Nursing*, 99(2), 74-90.

Gee, J. (2003) *What video games have to teach us about learning and literacy*, (New York: Palgrave MacMillan).

Habgood, M. (2007) *The Effective Integration of Digital Games and Learning Content*, unpublished Ph.D. Thesis, University of Nottingham.

"Harnessing the Power of Video Games for Learning", Federation of American Scientists, Summit on Educational Games, Washington, USA, 2006.

Jackson, M. (2004). Making visible: Using simulations and game environments across disciplines. *On the Horizon*, 12(1), 22-25.

Kotler, P. and G. Armstrong, (2011) *Principles of Marketing*, 14th Edition (New York: Pearson Prentice Hall).

McGonigal, J. (2006) *This Might be a Game: Ubiquitous Play and Performance at the Turn of the Twenty-First Century*, unpublished Ph.D. Thesis, University of California-Berkeley.

Michael, D., & Chen, S. (2006) *Serious games: Games that educate, train, and inform*, (Boston: Thompson Course Technology PTR).

"Future of Serious Games", Stichting Toekomstbeeld der Techniek, Maastricht, September 2011.

Neill, T. (2009) "Serious games: learning for the *i*generation", *Development and Learning in Organizations*, 23(4): 12-15.

Mirshamsi, F. (2011) "Identification and Prioritization of Factors Affecting Digital Entrepreneurship Development (Case Study at Mashhad City – Iran)", *European Journal of Social Sciences*, 26(3): 370-388.

Petrovic, O. and A.Brand eds. (2009) *Serious Game on the Move*, (New York and Wien: Springer).

Porter, M. (1998) *Competitive Advantage: Creating and Sustaining Superior Performance*, (New York: The Free Press).

Prensky, M. (2006) *"Don't bother me Mom—I'm learning!"*, (St. Paul, MN: Paragon House).

Price Waterhouse Coopers Global Entertainment and Media Outlook: 2009-2013.

Rasmussen, B. (2007) "Business Models and the Theory of the Firm", Pharmaceutical Industry Project, Working Paper No: 32, Center for Strategic Economic Studies, Victoria University of Technology.

Reiner, B., & Siegel, E. (2008) "The potential for gaming techniques in radiology education and practice", *Journal of American College of Radiology*, 5, 110-114.

"Serious Games: A Sizeable Market – Update", http://elianealhadeff.blogspot.com/2007/06/serious-games-sizeable-market-update.html, (2007).

"Serious Games Market Dynamics by 2012", http://seriousgamesmarket.blogspot.com/2007_03_01_archive.html, (2007).

"Serious Games – A 10 billion Euro market in 2015", http://seriousgamesmarket.blogspot.com/2010/08/idate-serious-games-10-billion-euro.html, (2010).

"SG Market key metrics", http://seriousgamesmarket.blogspot.com/2011/03/serious-games-market-key-metrics-from.html, (2011).

Susi, T., Johannesson, M. and P.Backlud, (2007) "Serious Games: An Overview", Technical Report HS- IKI -TR-07-001, School of Humanities and Informatics, University of Skövde, Sweden.

"The Games Industry in Europe", prepared for the Department of Trade and Industry, New Economy Development Ltd, London, UK, 2006.

Turbin, J., Royle, K. and A.King, (2008) *An Investigation into the Labour Market and Skills Demands of the Games and Serious Games Industries*, Centre for Developmental and Applied Research in Education, University of Wolverhampton, Walsall, United Kingdom.

"Video Games in Europe – 2008", prepared for the Interactive Software Federation of Europe (ISFE), NIELSEN Games, www.nielsen.com, April 2008.

Zott, C., Amit, R. and L.Massa (2011) "The Business Model: Recent Developments and Future Research", *Journal of Management*, 37:1019-1042.