UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

INTANGIBLE INVESTMENT AS A SOURCE OF COMPETITIVE ADVANTAGE IN COMPARATIVE PERSPECTIVE: THE CASE OF THE EU AND SLOVENIA

Ljubljana, January 2015 NINA ŠPEHAR

AUTHORSHIP STATEMENT

The undersigned Nina Špehar a student at the University of Ljubljana, Faculty of Economics, (hereafter: FELU), declare that I am the author of the master's thesis entitled INTANGIBLE INVESTMENT AS A SOURCE OF COMPETITIVE ADVANTAGE IN COMPARATIVE PERSPECTIVE: THE CASE OF THE EU AND SLOVENIA, written under supervision of prof. dr. Tjaša Redek.

In accordance with the Copyright and Related Rights Act (Official Gazette of the Republic of Slovenia, Nr. 21/1995 with changes and amendments) I allow the text of my master's thesis to be published on the FELU website.

I further declare

- the text of my master's thesis to be based on the results of my own research;
- the text of my master's thesis to be language-edited and technically in adherence with the FELU's Technical Guidelines for Written Works which means that I
    - cited and / or quoted works and opinions of other authors in my master's thesis in accordance with the FELU's Technical Guidelines for Written Works and
    - obtained (and referred to in my master's thesis) all the necessary permits to use the works of other authors which are entirely (in written or graphical form) used in my text;
- to be aware of the fact that plagiarism (in written or graphical form) is a criminal offence and can be prosecuted in accordance with the Copyright and Related Rights Act (Official Gazette of the Republic of Slovenia, Nr. 55/2008 with changes and amendments);
- to be aware of the consequences a proven plagiarism charge based on the submitted master's thesis could have for my status at the FELU in accordance with the relevant FELU Rules on Master's Thesis.

Ljubljana, January 3rd, 2014 Author's signature: _____

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

INTRODUCTION

Recently, the treatment of economic growth and prosperity has been drastically changing, incorporating in the source of growth model formerly unknown or undefined factors. Knowledge has become one of the main growth contributors as well as an indicator of economy's competitive advantages. Its formation is a part of an extensive process of investment in intangible capital. Knowledge and innovation have significantly contributed to the conventionally recognized drivers of growth; labour and fixed capital. Therefore, the concept of the latest has been modified and category of investment has been expanded for intangible capital, which in its broader definition encompasses computerized information, innovative property and economic competencies, being inferred by the widest and most recognized definition of intangible capital made by Corrado, Hulten and Sichel (2006).

Since the world and consequently global economy have become more complex and inter correlated, new ideas based on advanced knowledge have constantly been created. The birth and implementation of new ideas require qualified and skilled labour force which is the result of investment as spending on R&D and other intangibles. The empirical growth studies have demonstrated that growth of the knowledge stock accounts for a large portion of growth in output per worker.

The main purpose of this research study is to identify the role of intangible investment as a source of competitive advantage in comparative perspective, taking a closer look to the case of the EU and Slovenia. The aim of the Master's thesis is to indicate how important the consideration of broader concept of investment is, and how knowledge economy contributed to overall economic growth and productivity growth, as well as overall competitiveness of the economies, with the evidence of empirical data. Moreover, in the Master's thesis, the provided actions and policies will also be described, aimed at encouraging the investments in intangible capital.

The main objectives of the Master's thesis are:

- to define the intangible capital and identify the role and scope of its investment through time across countries
- to summarize the state of intangibles measurement
- to determine its contribution to growth and competitiveness in a comparative manner
- to present a comparative analysis of intangible capital investment in the EU and Slovenia
- to determine the main programmes and industrial policy approaches which favourize and promote knowledge economy and consequently investments in intangible capital

The main **research questions** are:

1. Is intangible capital an important factor of economic and productivity growth, and essential determinant of competitiveness in the EU as well as in other countries?
2. Is intangible capital an important factor of economic growth in European countries, although there are significant cross-country differences when intangible investments are measured as the share of GDP? Do the former transition countries, on average, invest less in intangibles than the old Member States?
3. Do, on average, the EU members invest less in intangible capital than the U.S.? Do countries differentiate also on the basis of sectorial structure, where the development of the manufacturing sector plays a significant role in terms of a long-term country's development?
4. Is the transition towards the knowledge economy happening also in Slovenia even though the country tends to invest less in intangible capital than most of the advanced economies, but more than the former transition countries?
5. Does the level of intangible investment in Slovenia develop insufficiently compared to the most advanced economies in the EU which are keener to participate in all types of innovation activity more intensively?
6. Is the structure of investments in intangible capital in Slovenia similar than in the other EU members?
7. Has the structure of investments in intangible capital changed due to the economic cycle, namely in favour of R&D? Are productivity, growth and competitiveness affected by intangible investments, meaning that this type of investments should be given priority in the EU and national policy strategies?

The content of the Master's thesis is divided into four chapters. In the first chapter, broad definition of intangible capital with the in-depth description of each its category is presented. The chapter also serves as the base for the further understanding of measurements and findings. In the second chapter, contribution of intangibles to the economic growth through the economic theory has been presented, containing description of historical importance and contribution of intangible capital, and development of different source-of-growth models through the economic history. Finally, chapter encompasses some empirical evidences on the structure of tangible and intangible investments among observed countries. In the third chapter, empirical research on investment in intangible capital among the U.S., the EU and Slovenia is outlined, taking a closer look also at the structure of individual categories of intangible capital. The major findings of empirical study concluded the chapter. In the fourth chapter, policies which encourage investment in intangibles and promote knowledge economy as one of the main factor of economic growth and prosperity are presented in the context of broader industrial policy. The chapter includes main findings for the differences in investing in intangible capital among countries and present the role and contribution of the industrial economy in stimulating healthy business environment for investing in knowledge and innovation.

Finally, the chapter summarizes the main activities regarding the discussed issue in Slovenia and its contributions towards the European goals.

In the Master's thesis both qualitative and quantitative approach are being applied. In the first, qualitative part, methods of description, analysis and synthesis are used, which will be in the following, quantitative part, expanded further on.

The exploratory research part of the thesis is based on the literature revision already examined in preceding chapters, and on the analysis of data for intangible investments in Slovenia and some EU Members. The data used in this research was collected through various methods for gathering and assessing new data on intangibles and new estimations of the capacity of intangible capital. Because the research will be conducted on the basis of data of different projects held by the EU, international organizations, national Bureau of Statistics and European statistical office Eurostat, the number of representatives, covered in the survey, is sufficient and reliable. Therefore, the study covers the majority of countries within the addressed framework.

Most of the data will be gathered and addressed by the projects financed and supported by the European Commission; INTAN-INVEST, EUKLEMS, COINVEST and also INNODRIVE Intangibles Database, consisting of the National Intangibles Database and the Company Intangibles Database, and Eurostat data. One of the projects is focused on enhanced, consistent valuations of intangible investment across countries while the other project is focused more on in-depth research and country-specific approaches (Intan-Invest, Corrado et al., 2011, p. 3).

For the analysis of obtained secondary data, Microsoft Excel statistical tools as well as statistical software programme SPSS are used in order to arrange, classify and summarize the data, and furthermore, to consider and review findings on relationships in the obtained data. Thus, organizing and arranging large amount of data, as well as making an overview of the data analysis procedure as a whole was done in a coherent and transparent manner has been. Moreover, patterns and the extracted main findings and information, needed to attain to the main research findings, have been determined.

The main limitations presented data on intangible investment that are not systematically collected among countries for the longer period of time and for all categories of intangible capital. This is mostly due to challenging data collection problems because companies are still confused about the nature of intangibles and these are therefore not recognized on corporate financial statements.

1 DEFINITION OF INTANGIBLE CAPITAL

Under intangibles we understand assets that cannot be regarded like other physical assets, cannot be easily calculated, measured and evaluated (The Work Foundation, 2009, p.6). Unlike tangible capital, intangible capital (or intangible asset) is non-financial, non-physical, sometimes also hardly identifiable assets which bring future benefits. Hence, they are an important source where much of the value lies. Nevertheless, they have characteristics of other type of investments because they yield long-lasting benefits as a result of current consumption on intangible assets but at the same time reduction of spending on other assets in order to enlarge the stock of knowledge, which can increase future output (EIB Papers, 2009 p. 12). It depreciates in value only through obsolescence and not through wear and tear as other capital goods do (Lynch, 2014, p. 1). Intangible assets or capital, intellectual capital and knowledge capital are often used synonymously (WIFO, 2013, p.4). Indeed, nowadays they present different conceptual, methodological and measurement challenges for economists and producers of national accounts.

1.1 Definition by economic and accounting literature

Initially, intangibles have been concentrated mostly on traditional intangible assets, such as R&D, key personnel and software, nevertheless the range of them is considerably broader, including more dynamic elements of business (OECD, 2011, p. 1).

According to Corrado, Hulten and Sichel (hereafter CHS, 2006) study, intangible capital has been grouped into three main categories, further divided on additional 13 individual intangibles (Corrado et al., 2006, p. 17-18; Barnes, P. & McClure, 2009, p. XV).

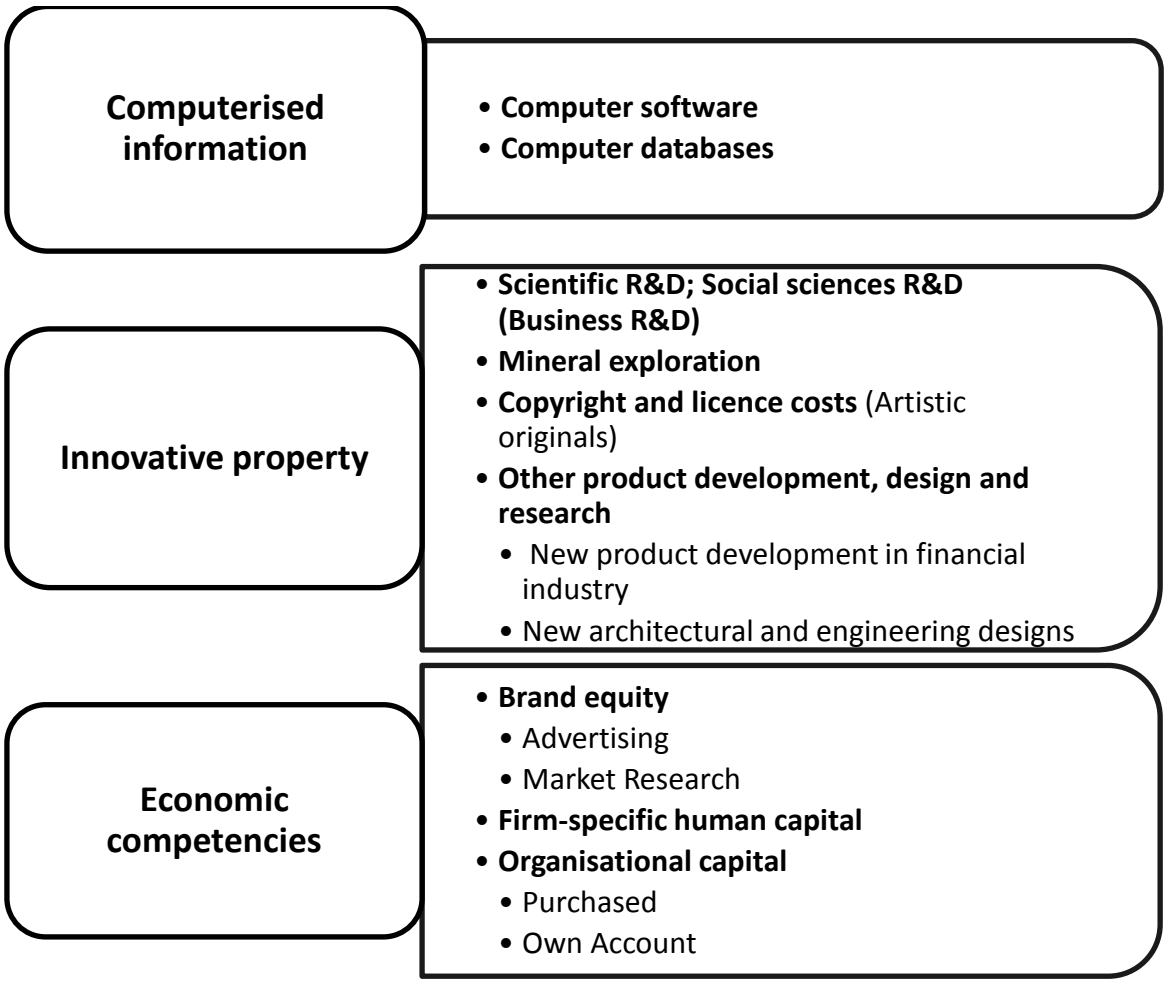
Computerised information is the knowledge enclosed in computer programmes and databases (Barnes et al., 2009, p.XY), which are often still not included in the national accounts today. The main of the category is computer software, already broadly comprised in the national accounts (The Confernce Board, 2009, p. 10).

Innovative property contains scientific R&D (covering scientific knowledge embedded in patents, licences and common know-how) and also non-scientific R&D or creative assets (original, innovative and artistic content in commercial copyrights, licences and designs, spending on new product development by financial services and insurance companies) (Barnes et al., 2009, p.XY; The Conference Board, p.10). Until recently, none of the sub-categories was included in the national account. However, this was changed in 2013 with the implementation of the 2008 System of National Accounts, which upholds incorporation of at least scientific R&D (Piekkola, 2011b, p. 37).

Economic competencies take into account brand equity (investment to gain or retain market share and investment in brand names, outlays on advertising and market research),

firm-specific competencies and human capital (expenses on workers' trainings, external consultants to the management, employee skills building), and organisational capital (expenses on structural organizational changes, and investments in strategic planning, adaptation and reorganisation) (Barnes, P. & McClure, 2009, p. XV & BIS, 2012, p. 9). Figure 1 summarizes the categories of intangible capital.

Figure 1: Type of intangibles



Source: P. Barnes, *Investments in Intangible Assets and Australia's Productivity Growth*, 2010, p. XV; C. Corrado, C. Hulten and D. Sichel., *Intangible Capital and Economic Growth*, 2006, p. 17-18

Table 1 indicates how each category of intangible capital actually influences output growth.

Table 1: Classification of the forms of knowledge-based capital (KBC) and their outcome on output growth

TYPE OF INTANGIBLE ASSET	MECHANISM OF OUTPUT GROWTH FOR THE INVESTOR IN THE ASSET
COMPUTERISED INFORMATION	
Software	Improved process efficiency, ability to spread process innovation more quickly, and improve vertical and horizontal integration
Databases	Better understanding of consumer needs and increased ability to tailor products and services to meet them. Optimised vertical and horizontal integration.
INNOVATIVE PROPERTY	
Research & Development	New products, services and processes, and quality improvements to existing ones. New technologies.
Mineral exploration	Information to locate and access new resource inputs – possibly at lower cost – for future exploitation.
Copyright and creative assets	Artistic originals, designs and other creative assets for future licensing, reproduction or performance. Diffusion of inventions and innovative methods.
New product development in financial services	More accessible capital markets. Reduced information asymmetry and monitoring costs.
New architectural and engineering designs	New designs leading to output in future periods. Product and service quality improvements, novel designs and enhanced processes.
ECONOMIC COMPETENCIES	
Brand-building advertisement	Improved consumer trust, enabling innovation, price premia, increased market share and communication of quality.
Market research	Better understanding of specific consumer needs and ability to tailor products and services.
Worker training	Improved production capability and skill levels.
Management consulting	Externally acquired improvement in decision making and business processes.
Own organisational investment	Internal improvement in decision making and business processes.

Source: OECD, *Supporting Investment in Knowledge Capital, Growth and Innovation*, 2013, p.24, Table 0.1.

Based on OECD Glossary of Statistical Terms (2007, p. 401) definition, intangible assets mainly consist of mineral exploration, computer software, entertainment, literary or artistic originals planned to be used for more than a year.

However, the definition in economic literature still differs from the definition of intangible assets in national accounting literature, which defines it as the components of computer software, patents, copyrights, licenses, franchises, motion picture films, models, design, prototypes, etc., but excludes firm specific human capital (WIFO, 2013, p. 2).

Many categories of intangible assets have by the System of National Accounts 1993 (SNA, 1993) already been suggested to be recorded as capital formation, such as software and databases, mineral exploration, and entertainment, artistic and literary originals. However, its scope stayed relatively narrow. Moreover, revision and extension of SNA 1993 was made by publication of The System of National Accounts 2008 (SNA 2008). In the latest version of the System of National Accounts 2008 (2008 SNA) within the framework of the international statistical standard for the national accounts accepted by the United Nations Statistical Commission (UNSC) also expenditures on research and experimental development (R&D) are for the first time recognized as capital formation (OECD, 2010, p. 3). Until then, expenditures for R&D were treated as intermediate consumption but since they promote productivity through longer growth, they have been classified as gross fixed capital formation and asset in SNA 2008.

The new classification has had an important impact on rise of GDP (Kalin, 2011, p. 9). SNA 2008 renamed the term "intangible fixed assets" to the more descriptive "intellectual property products" (IPP) and addressed it in a more clarified and expanded way (SNA, 2008, p. 586). As SNA 2008 defines, these assets are further on divided into research and development; mineral exploration and evaluation; computer software and databases; entertainment, literary or artistic originals; and other intellectual property product (SNA 2008, p. 589, A3.90).

After SNA 2008 was agreed, revision on European System of Accounts 1995 (ESA 1995) to European System of Accounts 2010 (ESA 2010) started in order to assure consistency of concepts adopted by SNA 2008 (Kalin, 2011, p. 11). However, ESA was adjusted to EU circumstances and collected data and therefore uses a more pragmatic method, adding examples to general SNA concepts for a more unified compilation in EU countries. Adoption was predicted in 2012, but introduction into national accounts of member states was envisaged in 2014 (Kalin, 2011, p. 11-13).

1.2 Characteristics of intangibles

Any kind of resources that cut current consumption in order to increase its value in the future as an investment should be classified (Piekkola, 2011b, p.11). From the viewpoint of consumption, the symmetry principle treats tangible and intangible capital equally. However, this symmetry is less obvious from the production standpoint of the economy (Corrado et al., 2006, p.10). Many characteristics make intangible capital asymmetric to

tangible capital and therefore preclude it from the conventional capital classification. Out of these properties, the most noteworthy are the following ones:

- the lack of verifiability
- the lack of visibility or intangibility
- variability and uncertainty in production
- the non-rivalness
- heterogeneity and specificity
- the lack of appropriability of the returns from some intangibles

First, intangibles lack the verifiability since they are mostly produced within the company and not purchased or acquired through market transactions (Corrado et al., 2006, p.10). They are created outside the monetary system (Adams & Oleksak, 2011, p. 94). That is why transaction data are not available or are hard to determine and identify. Also, it is difficult to define the quantity and price of intangible components separately (Corrado et al., 2006, p.10). An employee learns something new and uses it in his or her work. Thus, value is created, but there is no evident financial transaction that would determine the dollar value of intangibles (Adams & Oleksak, 2011, p. 94). However, not all intangibles have difficulties in identifying them. They are recognized by the outlays on resources, aimed to obtain knowledge-based assets, for instance R&D, licenses, patenting, etc., and also spending on co-investments to R&D and ICT (The Conference Board, 2009, p.7).

Second, the most obvious difference between tangibles and intangibles is in their visibility. Tangibles or physical assets, like machinery and equipment, have physical embodiment (Corrado et al., 2006, p. 11). Unlike tangibles, intangibles *per se* cannot be touched and can sometimes hardly be directly observed and identified. They are often incorporated in the trained and experienced employees within a company and in its organisational structure (EIB Papers, 2009, p. 15). Consequently, their durability is hardly evident and hence definable. Lack of visibility makes it difficult to measure depreciation rates and obtaining stocks (Corrado et al., 2006, p.11). Thus, in growth accounting, their impact to growth was known as the Solow residual. However, as CHS (2006, p.12) advocates, this measurement issue should not represent an obstacle for not capitalising intangibles.

Third, one of the strongest features of intangibles has also been variability and uncertainty in production. Unlike mechanized production, which gives more standardized and reliable outcomes, outputs from intangibles are more variable and uncertain. This is mostly because intangibles refer on intellectual strain which is not standardized and hence also not predictive (Hunter, 2011, p.10).

Another asymmetry concerns non-rivalness of intangible assets. Many intangibles can be applied simultaneously by more than one user without decreasing the quantity accessible to

any individual user or a firm. The characteristic is especially applicable to pure knowledge meaning that additional unit of knowledge is not needed in order to produce the additional unit of output. For this reason, its marginal product amounts to zero. However, this is valid for direct production of output, but the increase in knowledge consequently leads to more efficient production and improved quality of the products, influencing higher production indirectly (Corrado et al., 2006, p.12).

However, many intangibles, such as knowledge, are designed specifically for the firm itself and are therefore heterogeneous. Firm specific assets also differentiate company from rivals. But, on the other hand, heterogeneity indicates higher uncertainty because investment process is not performed in a uniform way (Hunter, 2011, p.10). Though, as already Newton described, "If I have seen further, it is by standing on the shoulders of giants." In the development process of a complex product using intangible capital, many problems need to be resolved, requiring access to knowledge. This also distinguishes a developed country from a developing one, since the gap in knowledge is even more important than a gap in resources (Stiglitz & Greenwald, 2014, p. 54-55).

Finally, non-appropriability of some intangibles also makes them being excluded from the capitalization principle. This refers especially to some intellectual property where, as stated by Hunter et al. (Hunter et al., 2011 p. 10-11), people with appropriability issues affect on the company's likelihood for realizing the benefits from its investment in capital of intangible nature. Furthermore, returns on these investments are not fully appropriable (The Conference Board, 2009, p. 8).

1.3 Measuring intangible capital

Inclusion of intangible capital into source of growth analysis and national accounting methods still remain a major challenge. First, due to its complex nature, there is still no definition or single technique accepted worldwide to measure intangibles (Piekkola, 2011a, p. 223). Second, because business intangible investments are large and are further on increasing on a large scale, harmonized treatment of intangible assets and their measures is crucial for a clearer and more detailed understanding of the sources of growth models (Corrado et al., 2014, p. 2).

Growth accounting, containing only tangible fixed capital, has with the post-industrial revolution become very misleading through the years. Until the 1970s, total corporative value and tangible book value were monitored quite closely because industrial business-era was dependent mostly on what a company owned and that was recorded on the balance sheet. When ICT (information and computer technology) emerged more widened, companies created more knowledge and value which did not meet the criteria to be recorded on the balance sheet (Adams & Oleksak, 2011, p. 96).

Over time, firms have been investing more and more in the intangible capital, therefore information of physical assets and financial statements no more provide complete analyses of knowledge-based companies, which are crucial documents for investors, shareholders, management, accountants and policy-makers (Blaug & Lekhi, 2009, p. 9). How much firms spend on innovation is mostly evident from widely accepted and targeted measure of R&D outlays. But as recent national accounts indicated, many economic sectors or specific industries, based on data collected, apparently do not spend on innovation at all (Haskel, 2008, p. 1). Nevertheless, as mentioned by Adams & Oleksak (2011, p. 95), over the last 30 years, tremendous investments in intangibles have been made in spite of the lack of supportive accounting treatment. Due to noisy and incomplete measures, total corporate value of the firm does not match net book value of the company on the balance sheet (Adams & Oleksak, 2011, p. 96-97). As suggested in Ernst & Young (2009, p. 1) survey of 709 transactions from mergers and acquisitions from 2007, on average 30 percent of the purchase price of the company is attached to intangibles, but the other 70 percent were allocated to intangibles (out of that, 23 percent to intangibles such as brands, customer contracts, technology, and another 47 percent to goodwill) (Adams & Oleksak, 2011, p. 96-97). Information gap due to deficient accounting system is huge and incomplete, and separated analysis of expenditures on intangibles consequently lead to suboptimal managerial decisions (Hunter et al., 2011, p.3).

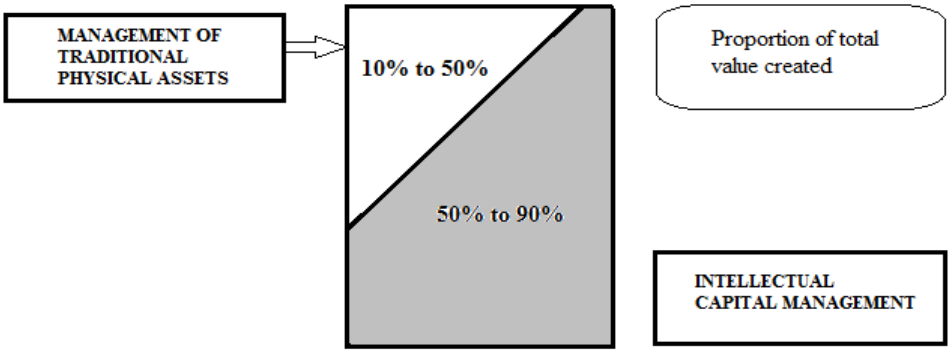
In most countries, investments in tangible assets are classified as a current business expense and not as a fixed investment that is part of GDP even though they increase future production and consumption, and hence bring long lasting benefits (EIB Papers, 2009, p.15 & The Conference Board, 2009, p.5). The only categories of intangibles included in the system of National Accounts (SNA), regarded as fixed investments, are software and R&D expenditures (EIB Papers, 2009, p. 15). Based on the method used, value-added growth is by intangibles detracted rather than increased (The Conference Board, 2009, p.3). The concept of fixed capital has therefore been changed and expanded also to intangible assets since it has contributed a significant part to firm's wealth and incomes (EIB Papers, 2009, p. 15).

Inherently, intangible assets do not fit well the traditional accounting models as tangibles do. Physical capital can be controlled, measured and its future benefits are more certain and probable. Unlike tangibles, future benefits of intangibles are less certain and predictable, they are hardly identifiable, controlled and measured (Blaug & Lekhi, 2009, p.40). Even though knowledge is invisible, the money spent to build, manage and preserve it is real, and so are the outputs yielded from it.

Corrado et al. (2006, p. 3) pointed out that expenditures on intangibles, such as employees' trainings, organizational development, product and market development, are important sources of economic growth (The Conference Board, 2009, p.5). Figure 2 depicts that, the management of traditional physical assets contribute about 10% to 50%, while intellectual

capital management contributes considerably greater proportion, amounting from 50% to 90%.

Figure 2: Proportion of total value created

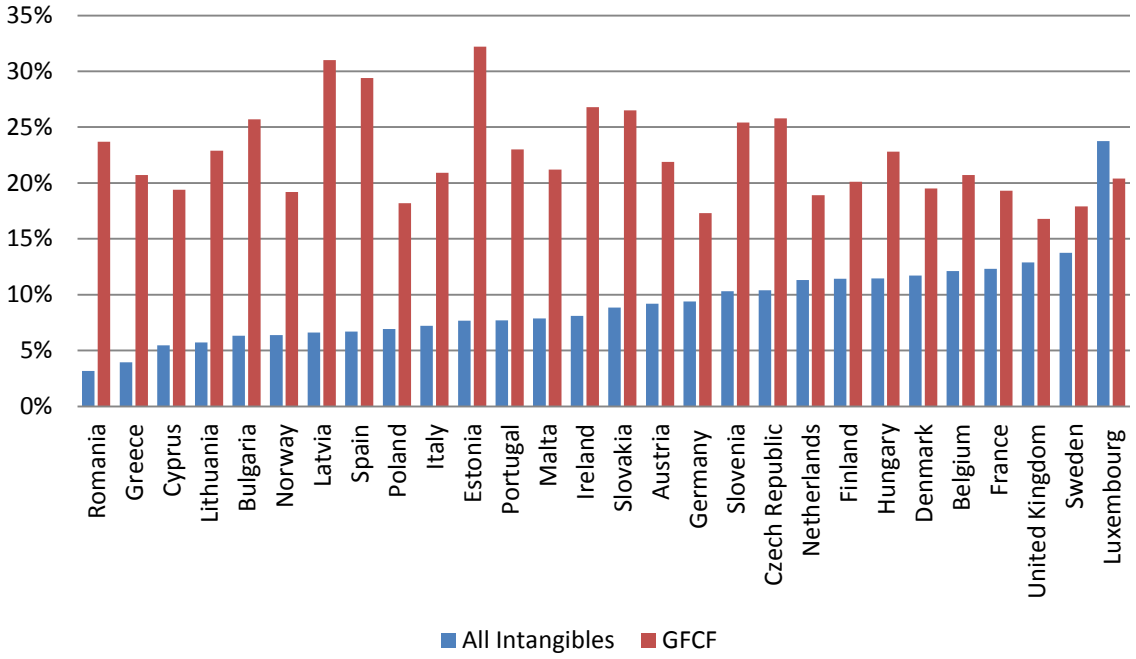


Source: IFAC (International Federation of Accountants), *Policy trends in Intangible Assets*, 1998.

Therefore, study of Corrado et al. (2006) has made a major step toward new national accounting principles, considering intangible capital. To the standard source-of-growth model (SOG), they included and capitalized all intangible assets. Besides conventional intangible capital (software, scientific R&D), CHS methodology also included non-scientific R&D, brand equity and firm-specific resources (Corrado et al., 2006, p. 4). Data on research and development, suggested by the latest SNA standards, are collected for scientific R&D only. However, essential data about the origin of innovation derives also in non-scientific R&D data, such as in areas of financial services, performed by the professionals with scientific degrees (Van Ark & Hulten, 2007, p. 132-133).

Figure 3 depicts investment in all intangibles in comparison to all gross fixed capital formation (GFCF) in 2005 in the EU-27 and Norway, providing a strong argument for the inclusion of intangibles into the System of national account or standardized data collection. Intangible investment represents a substantial proportion of all GFCF in 2005. In 2005, Luxembourg, UK and Sweden have the largest share (23.8%, 13.7% and 12.9%, respectively). Most NMS 2004 and countries within the Mediterranean region invested less or around 8% as share of GDP in all intangible capital. In comparison to the EU countries, Slovenia ranks quite high on the scale, 11th among the 28 countries, considering aggregate investments in all intangibles, accounting for 10.3% of GDP.

Figure 3: Investment in all intangibles and gross fixed capital formation (GFCF) as share of GDP (%) in the EU-27 and Norway, 2005



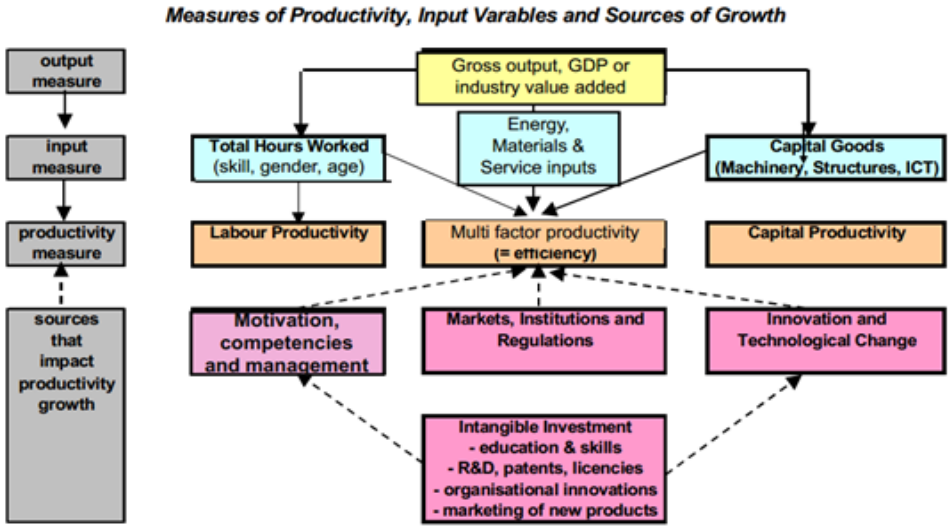
Source: EUROSTAT, *Gross fixed capital formation (investments),* 2014a; In *INNODRIVE*, 2014.

Although exist many problems in the classification of intangibles, data collection (not being standardized) and consequently excessive deviations of estimates, the recent estimates call for an updated growth accounting framework and capitalization of intangible assets (The Conference Board, 2009, p.7-12).

2 CONTRIBUTION OF INTANGIBLES TO THE ECONOMIC GROWTH THROUGH THE ECONOMIC THEORY

As stated by Ben S. Bernanke, U.S. Federal Reserve Chairman, innovative activity will be more likely promoted if its role in economic growth is measured and documented more effectively. The U.S. and EU, classified as especially higher income countries, strive to build a strong knowledge economy and with investments in knowledge creation they continue to build their strongest comparative advantages. Besides creating knowledge, intangible capital also enables firms to develop either superior products or improve their production process. Moreover, such strategic investments are recognized as the key element of the long-term growth and have, therefore, attracted attention of many policy makers (Corrado, Haskel, Lasinio, & Iommi, 2001, p.1-2). Figure 4 summarizes the main channels of impact of intangibles on growth.

Figure 4: Measures of productivity, input variables and sources of growth



Source: B. van Ark., C. Hulten, J. Hao and K. Jaeger, *Intangible Investment and Economic Growth across Countries*, 2010, p. 10.

2.1 Historical aspect of intangible capital in the growth literature

Already in the late 19th century, 'intellectual' capital was by economists acknowledged as fundamental condition for all production processes. Besides physical God-given resources, only our intellect and raw physical labour are considered as another production factors. But, for example, already Adam Smith (1776) recognized the importance of innovation to increase productivity. Innovation was linked to specialization (learning). As the level of knowledge progresses, the higher the output that could be achieved with the same amount of labour and capital invested (Hunter et al., 2011, p. 6-7).

In the majority of the 20th century, tangible capital, such as machines, equipment and buildings, was the main indicator of firm's commercial value and was clearly shown on the balance sheet. However, there was no or little attention paid to intangible assets as a source of firm value contributor since it was not recorded on the balance sheet until then.

The 20th century has been an era of dramatic changes. Countries were developing further and moving from the manufacturing towards the production of services, which characterized especially the phase after the Second World War. At that time, countries went through the deindustrialisation and specialisation process which, consequently, increase the productivity and, subsequently, more and more investment activities in intangible assets (Bournaki &Vecchi, 2010, p. 2). Many countries faced the shift from the industrial to the knowledge era and thus created a knowledge factory within companies and individual economies. Based on many studies, recent transformational change and evolution of knowledge economy have been deepening investments in intangibles and their

share of many companies' total assets have been drastically increasing. Mainly in more advanced countries, investments in intangibles match or even exceed investments in tangibles (OECD Observer, 2011). The raw materials used in production have not changed through the years, but they have become exploited more efficiently through experimentation, scientific investigation and refinement. This has led to dramatic technological change and, consequently, to continuous capital accumulation, resulting in increase in output per hour worked (Romer, 1990, p. S72).

With the evolution in knowledge economy and revolution in information technology (IT), new products that have been offered on the market, have had a dramatic impact on our lives. Consequently, they have contributed drastically to firm's better business operations and, subsequently, also to economic growth and competitiveness (Corrado et al., 2006, p.1-2). Share of investment in intangible to tangible capital has been rising since the 1970 and around 2001, investment in intangibles caught up or overwhelmed investment in tangible assets with continuing growing trend (Blaug & Lekhi, 2009, p. 13). Moreover, the link between application of new technologies and knowledge as a result of R&D, and productivity growth has strengthened, especially in the U.S., since the mid-1990s (EIB, 2009, p.18). But the impact of knowledge and technology acceleration was first seen within the firm as a more efficient organisation on production, and had further on impacted more significantly on economy itself when implemented on a large scale (EIB, 2009, p.18-19). Thus, intangibles have also started to be treated as indispensable contributors to recent economic growth and productivity. Additionally, CHS study indicates that intangible investment and their stock have increased substantially more rapidly than other tangible business investment in recent decades (Corrado et al., 2006, p.4).

2.2 Model-based approach of measuring economic growth with inclusion of intangibles

The standard growth-accounting stemming from the neoclassical equation has been upgraded by the work of Corrado, Hulten, Sichel and others (CHS 2006, 2009), which has become the base study and one of the most citied papers regarding inclusion of intangible investment measurement in both sources of growth analysis and national accounting methods.

The difficulties in measuring knowledge appeared already in the first half of the 20th century. In all these years of debating and struggling to find a way of appropriate and applicable accounting methods for intangibles, 'value paradox' has still remained the main obstacle (EIB, 2009, p.13). The value paradox says that value of such assets is being recognized, but it is at the same time unable to be accounted through conventional accountancy rules (Blaug & Lekhi, 2009, p. 4).

Neoclassical economic growth theory treats technological progress as exogenous – developing from external partners and thus leaving it as an unexplained and automatic

process. Therefore, technological progress as one of the production factors is treated as an unexplained residual in traditional growth accounting measurements (BIS, 2012, p.11). The simple neo-classical growth model made by Robert Solow in the 1950s became the benchmark and was used as a base for recent theoretical and empirical work on economic growth. Key features of the model were that it was meant for a closed economy, and gross output is assumed as a simple function of only two production factors: capital and labour. Thus, medium term growth is defined by induced capital formation. Solow also assumes that each year people save and then invest a fixed amount of their income (Baldwin & Wyploz, 2003, p. 77).

Solow considered a neoclassical production function as it is presented in the equation 1:

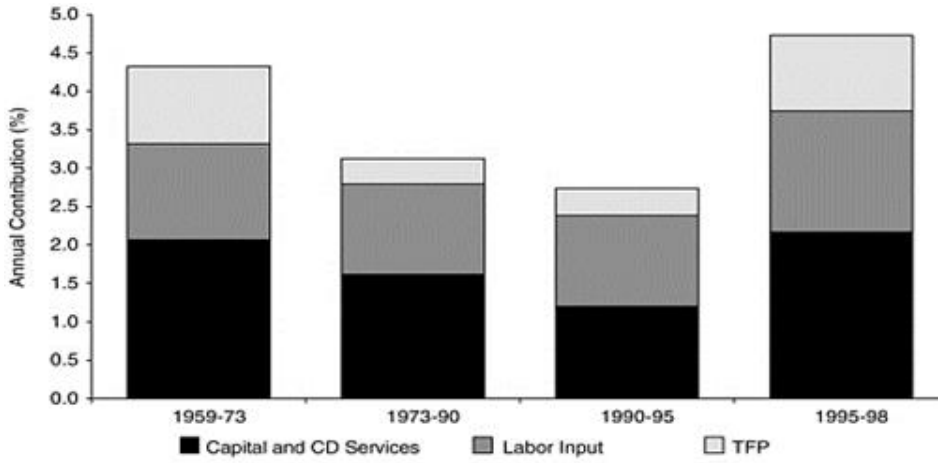
$$Y_t = A_t F(K_t, L_t) \tag{1}$$

where Y_t is aggregate output, K_t is the stock of fixed physical capital, L_t is the workforce and A_t characterizes knowledge or, more broadly defined total factor productivity (TPF).

By raising the amount of labour or fixed capital used in production, aggregate output can be increased. Moreover, it could also be increased by expanding the stock of knowledge which increases the amount produced for any given quantity of capital and labour (EIB Papers, 2009, p. 13). The model indicates that the accumulation of capital stimulates growth up to the certain point and from there on something else, or more specifically, technological progress or stock of knowledge A, encourages growth (Baldwin & Wyploz, 2003, p. 79).

Studies, made by Solow in the case of the U.S. economy, indicated that growth of economy can not be explained only by two inputs, capital and labour; there is also an unexplained growth factor, characterized as the residual A, later also known as the "Solow residual". In later studies, Solow residual was determined as the accumulation of knowledge stock (EIB Papers, 2009, p. 14). Since it relates to the output growth for a given combination of input factors, it is also referred to as "total factor productivity", or TFP. This residual measured technical improvement, product market innovation, changes in returns to scale and mark-ups, measurement errors and the impacts from unmeasured inputs, such as human capital, R&D and other intangible investments (EIB Papers, 2009, p. 14). As Baldwin and Gu (2007, p.7) stated, the difference between growth in output (ΔQ) and the increase in output that would have been expected (ΔQ^e) because of the application of additional units of inputs (ΔI) is determined as multifactor productivity. TFP, sometimes also called 'unexplained' element of productivity growth, loses the importance and relevance with the integration of intangible capital as a separate explanatory variable, which speaks in favour of including intangible capital into the growth accounting model (INNODRIVE, 2013, p. 8). Figure 5 depicts the share of the unexplained growth by the standard growth accounting approach.

Figure 5: Sources of U.S. economic growth, 1959–1998



*CD refers to Consumer Durables

Source: D. Jorgensen, *Raising the speed limit: U.S. economic growth in the information age*, 2002.

Theoretical developments in the endogenous growth theory also supported the inclusion of knowledge as a separate factor. »AK-model« was introduced by Harrod (1939) and Domar (1946) and later on modificated by Frankel (1962). The most influential AK model was created by Romer in 1990, assuming that rate of return to knowledge due to knowledge spillovers can be constant or increasing. Investments of one firm have positive external effects on the rest of economy, therefore long term growth is positive (EIB Papers, 2009, p. 20 -22). The Romer model claimed that technological change in terms of improvements in the instructions for mixing raw materials is the main driver of economic growth, and that technological change arises largely because of intentional reasons that thereby make it an endogenous growth model (EIB Papers, 2009, p. 22-23). Intangible capital inclusion would comprehensively capture the elements of endogenous growth.

Corrado, Hulten and Sichel (2006) made a significant contribution in this aspect. Intangible capital was classified as capital and not as an expense any more; symmetrically, with other capital (OECD, 2013a, p. 181-182). The model considers the production function as it is presented in equation 2:

$$Y_t = A_t F(K_t L_t I_t) \tag{2}$$

where Y_t is aggregate output, K_t is the stock of fixed physical capital, L_t is the workforce, I_t represents the intangible capital, and A_t characterizes total factor productivity (TFP).

To develop this new approach to growth accounting, the data on intangible capital first had to be gathered systematically (Table 2). As Corrado et al. (2011) suggest, it is essential to differentiate current production costs from expenditures that increase forthcoming capacity of production. If the expected service life of the outlay exceeds one year, outlay is already considered as an investment. Most of the intangible investments are not accounted only for

current production, thus only by their cost capitalization, their value added will be correctly measured. The CHS paper encompasses also additional costs of development and launch of new products and services, incorporating market research (normally omitted from conventional R&D), and all costs related to improvement of production practices (such as services delivery systems), which are not considered on conventionally defined ICT and R&D.

Table 2: Business investment in intangibles in the U.S. (in USD billions, annual average for period observed)

	1950-59	**1960-69**	**1970-79**	**1980-89**	**1990-99**	**2000-03**
Total CHS intangibles	19.4	41.9	103.4	349.3	749.8	1,226.2
Computerized information	-	0.8	4.5	23.2	85.3	172.5
Innovative property						
• Scientific R&D	7.7	16.9	34.0	104.6	157.7	230.5
• Non Scientific R&D	0.5	1.7	10.9	58.4	145.2	237.2
Economic competencies						
• Brand Equity	5.3	9.5	18.2	54.4	105.7	160.8
• Firm-specific resources	5.9	13.0	35.7	108.7	255.9	425.1
Related series						
Computer software, NIPAs	-	0.7	4.5	22.7	83.6	169.6
Industrial R&D, NSF	5.2	14.1	25.3	75.8	136.9	196.0
Advertising, Coen report	8.6	15.0	30.6	89.6	165.0	240.3
Business fixed investment, NIPAs	38.2	71.5	188.4	485.7	807.1	1,141.9
• Tangibles	35.6	67.3	171.4	421.1	676.5	893.4
• Intangibles	2.5	4.2	17.0	64.6	130.7	248.8

Source: C. Corrado, C. Hulten and D. Sichel; *Intangible Capital And U.S. Economic Growth*, 2009, p. 671, Table 1.

Table 3 represents value, growth rate of real capital and income share of total income of business intangible capital in the U.S. The inclusion of the CHS (2009) finds that comparing intangible investments in the U.S. during the period 1973–1995 to 1995–2003, they increased from 9.4% to 13.9% of total national income. There were differences in increase between intangible categories; scientific R&D, conventionally treated as the most important contributor to knowledge creation, adds insignificant value of total rise of the U.S. intangible capital in the observed period. It remained constant with its share

increasing from 2.4% to 2.5%, while "non-scientific R&D" increased from 1% to 2.2%. Furthermore, computerised information has made the most contribution to the intangible capital growth, from 0.8% to 2.3%, followed by firm specific resources with increase from 3.5% to 5%, and brand equity increase from 1.7% to 2% (EIB Papers, 2009, p. 16). In the period from 1973–1995 of all new intangible categories, non-scientific R&D grew at the fastest pace, while from 1995-2003 computerized information recorded the highest growth rate of real capital (CHS, 2006, p.25, 41). Nonetheless, scientific R&D is the slowest growing category in both observed periods. Moreover, the average annual growth rate of MFP declined in the period 1995-2003 with the inclusion of intangible investments from 1.42 to 1.08 percentage points (CHS, 2006, p. 29).

Table 3: Value, growth rate of real capital and income share of total income (%) of business intangible capital

	Value, billions of dollars	Growth rate of real capital (percent change)		Share of total income (percent)	
	2003	**1973 - 1995**	**1995 - 2003**	**1973 - 1995**	**1995 - 2003**
Total	3636.1	6.2	6.9	9.4	13.9
Computerized information (incl.software)	511.9	16.0	13.0	0.8	2.3
Innovative property					
*Scientific	922.3	3.6	3.9	2.4	2.5
*Non-scientific	864.4	12.4	7.2	1.0	2.2
Economic competencies					
*Brand equity	271.8	4.2	4.6	1.7	2.0
*Firm-specific resources	1065.6	5.3	6.2	3.5	5.0
New CHS intangibles	3132.9	4.7	4.6	8.6	11.7

Source: C. Corrado et al., *Intangible Capital and Economic Growth*, 2006, p. 41, Table 3.

Measurements for the case of the U.S. indicated that intangible investment by the U.S. businesses amounted on average to USD 1.2 trillion annually in the period 1998–2000, influenced also by the 10% larger GDP. Out of this data, only 13 % of the USD 1.2 trillion increase represented software, and 15% was made up by scientific R&D. The remaining 72% of annual intangible investments was contributed by other, non-capitalized intangibles (Van Ark & Hulten, 2007, p. 138-139; Corrado et al., 2006, p. 32). Moreover, with their researches, they demonstrated that some USD 1 trillion was included to country's GDP in 2000, rising to USD 1.6 trillion in 2007. Already in 2006 the rate of intangible investment

surpassed investments of tangibles, resulting in 11.48% in contrast to 7.20% of GDP (Hulten, Hao & Jaeger, 2010, p.5-6).

CHS methodology was first applied in the U.S. and later on also in the UK by Jonathan Haskel. By implementing the methodology, Haskel (Mackie, 2009, p. 3) acknowledged considerable difference in measured economic activity and growth, even though there have been differences in comparison to the U.S. patterns of intangible investment and sources of productivity growth detected. The results are presented in the table 4.

Table 4: Contribution of intangible capital deepening to the annual change in labour productivity in non-farm business sector (percentage points) in the UK

	1979 - 1995	**1995 - 2003**
Intangible capital deepening	0.47	0.59
Computerized information (incl.software)	0.12	0.18
Innovative property	0.16	0.14
*Scientific	0.06	0.01
*Non-scientific	0.09	0.14
Economic competencies	0.19	0.26
*Brand equity	0.04	0.04
*Firm-specific resources	0.15	0.23

Source: M. Haskel, J. Marrano and G. Wallis, What Happened to the Knowledge Economy?, 2007, p. 31, Table 6.

In their studies, Van Ark, Hao, Corrado, Hulten (EIB, 2009, p. 69) determined the rates of investment of tangible and intangible capital, as well as individual elements of intangible investment in 2006 as a percentage of GDP. Table 5 indicates the rates of investment of tangible and intangible capital, and components of intangible investment in 2006 for four countries; the U.S., Germany, France and the United Kingdom. In the U.S. and the UK, intangible investments exceed investment in tangibles, while in Germany and France tangibles still represent a larger share. The difference among countries is also in the distribution of share for each intangible category. While in the U.S. and the UK economic competencies prevail, in Germany R&D and innovative property are stronger.

Table 5: Level of investment of tangible and intangible capital, and individual components of intangible investment, 2006 (% GDP)

	Tangible Investment	Intangible Investment	R&D	Innovative Property	Software	Economic Competency
United States	8.20	11.48	2.25	4.37	1.61	5.50
Germany	9.24	7.16	1.72	3.59	0.73	2.84
France	8.11	7.90	1.30	3.18	1.42	3.30
United Kingdom	7.04	10.54	1.07	3.16	1.55	5.84

Source: C. Hulten, J. Hao and K. Jaeger, *Macro versus Micro Comparisons of Intangible Capital: The Case of Germany and the U.S.,* 2010, p. 23, Table 1.

As stated by INNODRIVE report (2013, p. 6), the proportion of new intangibles in GDP, increased by around one percentage point in the period from 1995-2005. A 5.5% higher GDP is measured in the EU-27 if certain categories of expenditure, regarded as current costs, are further on categorized as investments in intangibles. Moreover, as researched by Piekkola (2011b, p.2) based on INNODRIVE data, in the EU-27 and Norway, the share of investments in intangible capital represented 6.7% of GDP, though in the System of National Accounts only 1.1% is documented.

When all intangibles are integrated in the accounting process, the contribution of capital deepening and TFP to labour productivity growth modified remarkably; the level of capital deepening increased while the growth of TFP decreased. Therefore, the capital deepening turned out to be the major source of labour productivity growth (INNODRIVE, 2013, p. 8). Piekkola's paper (2011a, p. 228) demonstrates on a measured data in some EU countries from 1995-2005 that deepening of intangible capital has been considerable and that its contribution annually increased from 0.28 to 0.62 percentage points in Finland, from 1.14 to 1.45 percentage points in Sweden and from 0.78 to 1.06 percentage points in Austria. In the manufacturing sector, the contribution of intangible capital deepening to labour productivity growth is comparatively larger than in the service sector (Mackie, 2009, p. 6). Also, intangible capital deepening had from the first observed period 1973-1995 to the second observed period 1995-2003 almost doubled within all intangible capital (sub)categories, defined by CHS methodology (CHS, 2006, p. 44). This is in more detail presented in appendix 1.

3 INVESTMENT IN INTANGIBLE CAPITAL IN SLOVENIA, THE EU AND US AND JAPAN

In continuation, empirical evidence on intangible capital investments in Slovenia and the EU is analysed. For a more comprehensive picture, also some comparison analysis of investment in intangible capital in the U.S. and Japan are presented. The data was prepared within several projects funded by the European Commission. For the EU, Norway and the U.S., INTAN-Invest dataset was published in order to assure comparable figures on the international level. Besides important contribution of INTAN-Invest publication, INNODRIVE, EU KLEMS and COINVEST, all financed by the European Commission, are other projects that contributed notably to measurement of intangible capital on the macro level in Europe, and mostly replicate the CHS methodology (OECD, 2013a, p. 182-187). International harmonisation for categories of intangible capital, such as R&D and software, has been straightforward, however, some other categories, such as economic competencies, have caused some difficulties. Therefore, even more accurate estimates on the internationally comparable level are sought in the process of development.

3.1 Intangible capital at macro level

Data on the macro or national level refer to the expansion of the conventional growth accounting framework by incorporating in capital formation evaluations of the intangible investments which consequently leads to the change in GDP growth, productivity and capital deepening (Piekkola, 2011a, p. 223). Interestingly, knowledge economy is seen all around us but its impact on economic performance on a macro level is incomplete in terms of measures. The ratio of nominal investment to nominal GDP has remained almost equal, therefore, additional investments (especially those in intangibles) have not been reflected as additional profit. There could be only two explanations for such outcome; investments are much lower than assumed, or there is a strong impact of measurement problems, including the lack of inclusion of intangible capital (Marrano et al., 2007, p. 1).

3.1.1 Contribution of intangible capital in the EU

Several papers present the measures of intangible capital stock as a share of GDP. Table 6 indicates the comparison among different countries in contribution of intangible capital on GDP, based on several studies over time carried out by different authors. From the study of Corrado, Hulten and Sichel (2005) it is clearly evident that between 1998 and 2000 the investment in intangibles in the U.S. was 12% of GDP. For the UK, Marrano and Haskel (2006) found that the private sector devoted approximately 11% of GDP on intangibles in 2004. As suggested by Jalava, Aulin-Ahmavaara and Alenen (2007), investments in Finland represent 9.1% of GDP in 2005. For the case of Japan, Fukao, Hamagata, Miyagawa and Tonogi (2007) show that 7.5% of GDP was invested in intangible capital in the period 1998-2002. For the estimates in Germany, France, Italy and Spain, the study of

Hao, Manole and van Ark (2008) was published, indicating that Germany invested 7.1%, France 8.8%, whereas Italy and Spain both invested 5.2% of GDP in intangibles. Furthermore, Edquist (2009) has shown with the similar approach, that Sweden contributed 11% of GDP on intangibles in 2004. Nakamura has devoted its paper to examine the estimates in intangibles in the U.S. from 1959 to 2007 and concluded that both investments (in tangible and intangible capital) are equally important in the examined country.

Table 6: Results of the importance on spending on intangibles

	Year of the measurement	**Countries studied**	**Spending on intangible capital as % of GDP**
Corrado, Hulten, Sichel (2005)	2003	USA	12.1%
Marrano, Haskel (2006)	2004	UK	10.1%
Jalava, Aulin-Ahmavaara, Alanen (2007)	2005	FIN	9.1%
Fukao, Hamagata, Miyagawa, Tonogi (2007)	1995-2002	JAP	7.5%
Hao, Manole, van Ark (2008)	2004	D, FR,I , ES	7.1% in D, 8.8% in FR, 5.2% in I, 5.2% in ES
Van Rooijen-Horsten, van den Bergen, Tanriseven (2008)	2001-2004	NL	10.0%
Edquist (2009)	2004	SE	10.6%
Nakamura (2009)	1959-2007	USA	As important as investment in tangible assets
INNODRIVE data	2005	Slovenia	6.2%

Source: F. Roth and A. Thum, *Does intangible capital affect economic growth?*, 2011, p. 7, Table 1; In *INNODRIVE*, 2014.

Table 7 shows the intangible shares of GDP in the EU-27 countries for the year 1995, 2000 and 2005. There are differences among the countries in the GDP intensities, indicating relative heterogeneous results with Sweden and UK investing the most, and Greece and Romania taking the last places in the observed period. Table 7 also indicates that in many countries, shares of GDP as investment in intangibles have been increasing through the observed years. In 2005, the GDP shares are higher or equal to 7% in Sweden (9.1%), UK (8.9%), Belgium (8%), the Czech Republic and France (7.6%), the Netherlands and Finland (7.5% and 7.3%, respectively). The estimates indicate that intermediate GDP intensity for intangibles is calculated for Germany with 6.4% and Ireland with 5.4% in 2005. The share lower than 5% of GDP has been measured for Italy (4.8%), Spain (4.3%),

Norway (4.4%) and for most of the new member states (NMS 2004). The GDP share in Slovenia, devoted to intangible capital, has been eventually increasing, accounting for 7% in 2005. Thus, Slovenia has been placed within the upper half among all EU countries based on the GDP share, aimed at investment in intangibles.

Table 7: Intangible shares of GDP (in %): EU-27 countries for the year 1995, 2000, 2005

	1995	**2000**	**2005**
Austria	4.5	6.0	6.4
Belgium	6.4	7.6	8.1
Bulgaria	0.0	3.3	4.2
Cyprus	2.7	2.9	3.3
Czech republic	5.4	6.6	7.6
Denmark	5.7	6.8	7.1
Estonia	5.1	4.6	5.2
Finland	5.7	7.0	7.3
France	6.4	7.3	7.6
Germany	5.4	6.6	6.2
Greece	1.7	2.0	2.0
Hungary	5.8	7.0	7.3
Ireland	4.6	4.6	5.4
Italy	4.1	5.2	4.8
Latvia	2.8	3.8	4.7
Lithuania	2.4	3.2	4.0
Malta	4.0	4.2	5.3
Netherlands	6.5	8.4	7.5
Poland	3.0	4.8	4.6
Portugal	3.3	4.2	4.5
Romania		2.0	2.2
Slovakia	3.2	5.8	6.4
Slovenia	6.0	6.8	7.0
Spain	3.6	4.0	4.3
Sweden	7.7	10.1	9.1
United Kingdom	7.5	9.2	8.9
Norway	5.0	4.8	4.4

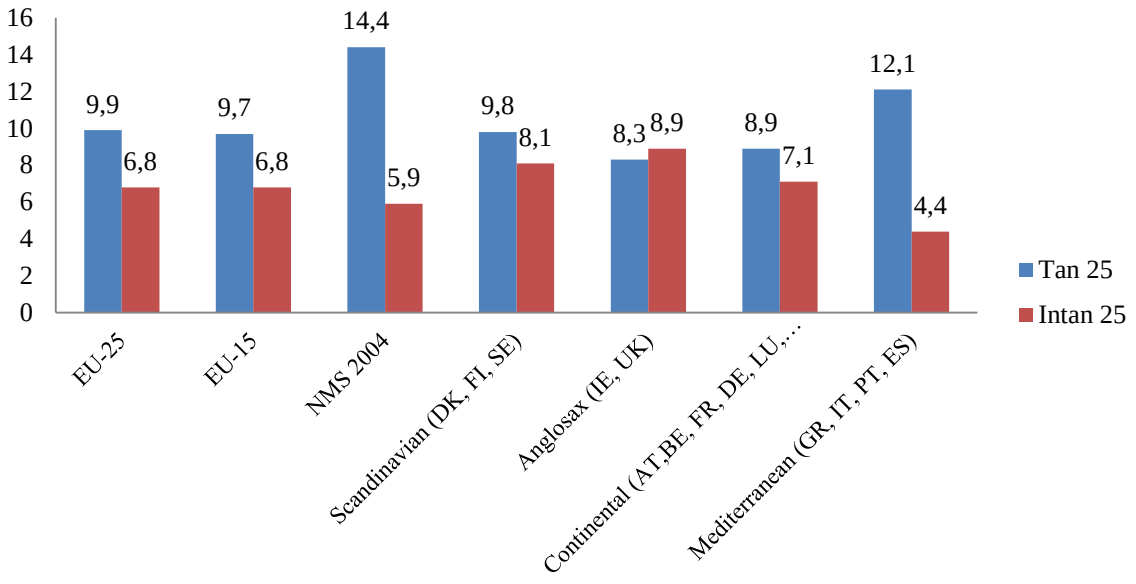
*data for Slovenia in 2005 varies among different database, however measured investment in intangible in all reports amounts approximately 7 – 7.2%.

Source: C. Jona-Lasinio, M. Iommi and S. Manzocchi; *Intangible Capital and Productivity Growth in European Countries*, 2011, p. 10, Table 2.

As studied trends demonstrate, currently included intangibles alone will not result in increasing growth rate of GDP. All the sources of innovation should be included in, contributing to the broad spectrum of capital assets and improvements in productive efficiency which is being measured as a residual. The capitalization of extended definition of intangibles contributes to income as well as to final output, in the form of increased gross operating income emerging from capital (Van Ark & Hulten, 2007, p. 140).

Figure 6 provides evidence on intangibles (new intangibles plus national accounts intangibles) spending as a portion of GDP compared to intangible investments in the EU in 2005. In the EU-25, tangible assets with 9.9% represent higher portion of investments than intangibles, accounting for 6.8%. The results are almost the same when considering EU-15 only. Figure 6 indicates an even greater difference when only new member states from 2004 are considered; they invested 14.4% of GDP to tangible assets, but only 5.9% in intangible assets. Thus, in the EU as a whole, the opposite trend is recorded than in the U.S. where the business sector allocated more resources to intangible than in tangible assets (Jona-Lassino et al., 2011, p.6). However, when considering GDP shares by area, in the Anglosaxon region, intangible investment exceeds tangible investment; accounting for 8.9% and 8.3%, respectively. Moreover, in the Scandinavian and Continental region, investments in tangible assets as a GDP share exceed those in intangibles, but the differences are really minor. However, in the Mediterranean region, much larger share of GDP is devoted to tangible than intangible assets.

Figure 6: Tangible and intangible share of GDP (in %) – EU 2005



Source: C. Jona-Lasinio, M. Iommi and S. Manzocchi, *Intangible capital and productivity growth in European Countries*, 2011, p. 6, Figure 1; In *INNODRIVE*; Innovation Union, 2011, p. 114.

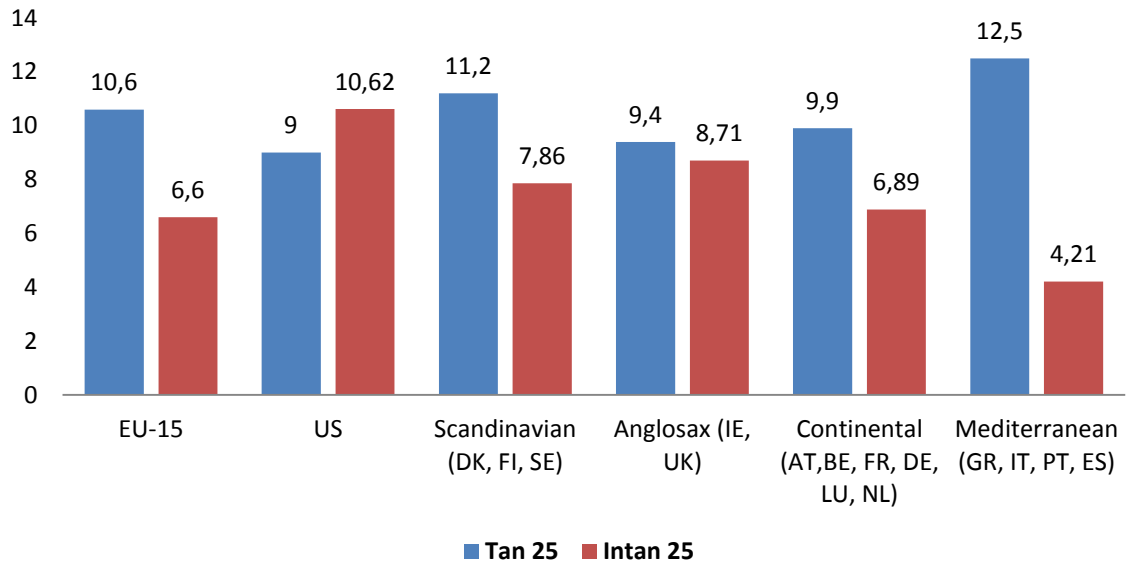
Intangible expenditures represent a substantial share of GDP in the European countries. Ignoring the intangible assets from the macroeconomic measures would present incredible evaluations, since roughly half of the investment of the advanced economy would be missing (Hao & Haskel, 2011, p. 3). As van Ark et al. suggested in their study (2009), richer and advanced countries invest more in intangibles, and are also focused on knowledge intensive sectors where role of the intangible capital is of strategic importance. Another reason for the concentration of intangible capital in these regions could be the

tendency of high income countries toward accumulation of economic valuables within their borders (The Conference Board, 2009, p. 16).

In comparison to all observed regions, in 2005 Slovenia invested 4.4% of its GDP in tangible capital, and 7.2% in intangible capital, ranking it among the countries in which the share of intangibles exceeds the share of tangibles. Slovenia performs above the EU-25 and EU-15 average in intangible capital, as well as above the Continental and Mediterranean region's average. However, it still invested less than the Scandinavian and Anglosaxon region in 2005.

Figure 7 shows the comparison between tangible and intangible GDP shares among the EU-15, US and four European regions; the Scandinavian, Anglosaxon, Continental and the Mediterranean, over the longer period than the previous figure, from 1995–2009.

Figure 7: Tangible vs. intangible as GDP share (in %) in EU-15, US, Scandinavian Anglosaxon, Continental and Mediterranean: 1995 – 2009 (average values)



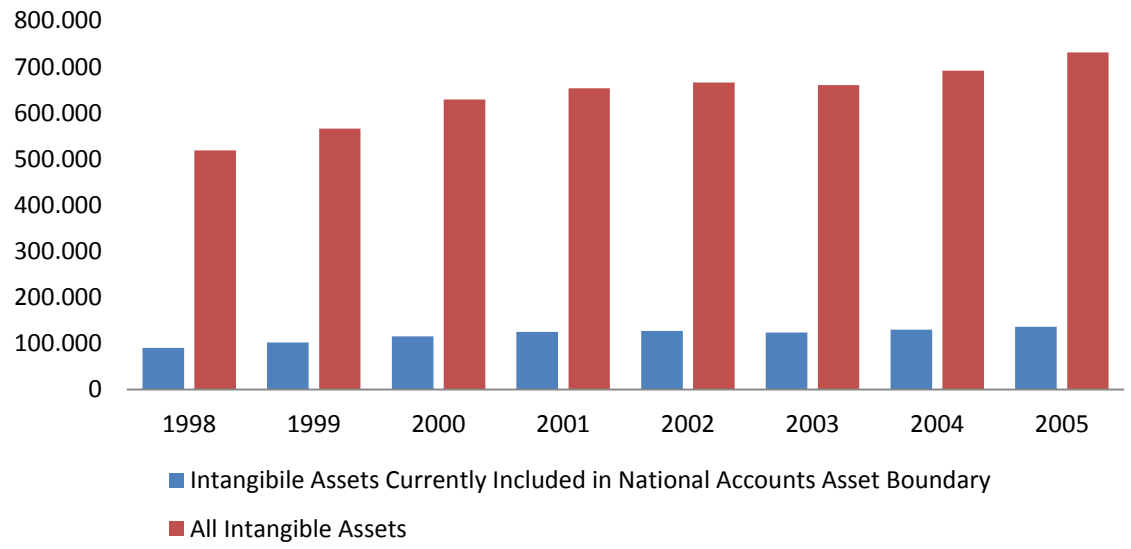
Source: C. Corrado, J. Haskel, C. Jona- Lasinio and M. Iommi, *Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results*, 2011, p. 32, Figure 5.

Figure 7 demonstrates that the EU-15 shows lower tendency to invest in intangible capital than the U.S. The U.S. is the only observed country where, on average, intangible capital exceeds tangible capital in terms of a GDP share, accounting for 10.6%, while tangibles are accounting for 9.0% only. Above the EU-15 average for intangible investments, accounting for 6.8%, the Anglosaxon region with 8.9%, followed by the Scandinavian with 8.1% and the Continental region with 7.1% are classified. The lowest share of intangible capital was estimated for the Mediterranean region (4.21%), following by the Continental

region (6.89%). In any case, physical capital is demonstrated to be significantly complementary to intangible capital (Piekkola, 2011b, p. 15).

Figure 8 shows the nominal value of the investments of national accounts intangibles (R&D data are from Eurostat and software, mineral exploration and spending on the production of artistic originals) and new intangibles (design, advertising and market research, organizational capital and training) in comparison to only national account intangibles in the EU-27 in current prices in millions of euros (Corrado et al., 2014, p. 6). First, it is evident that the inclusion of new intangibles to intangibles already considered in national accounts represents a much larger value than the national account intangibles only. Furthermore, through the observed period, the nominal value of new intangibles and national accounts intangibles together has been increasing, while the value of national account intangibles only remained quite homogeneous.

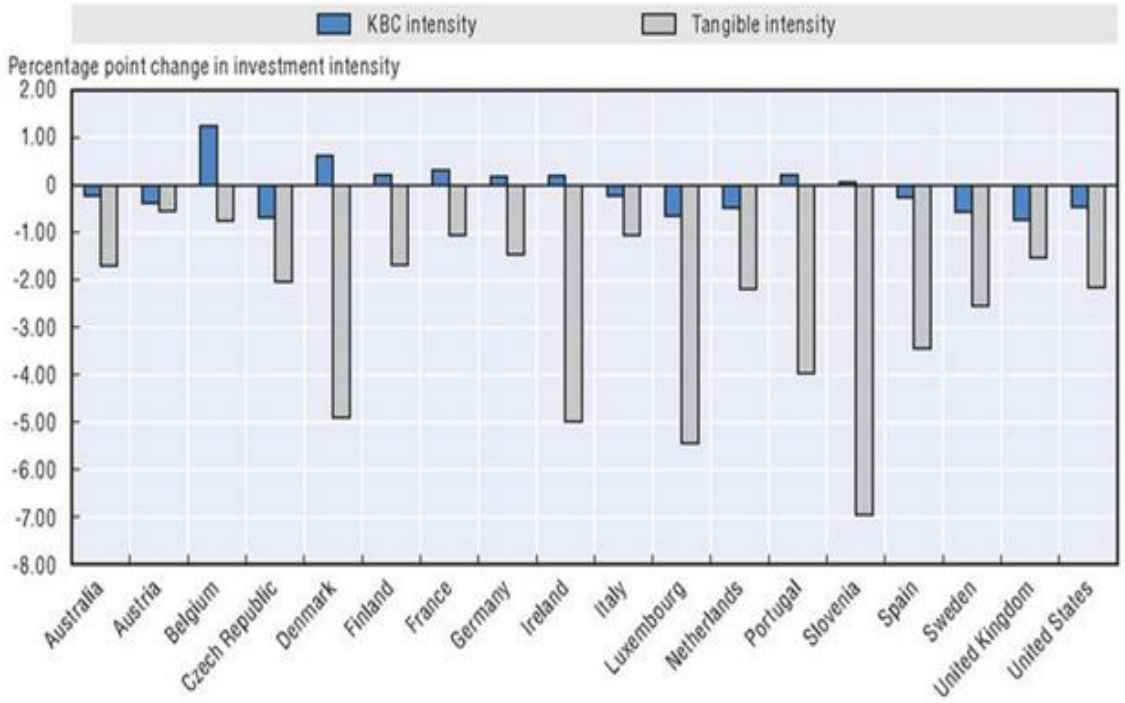
Figure 8: Value of new intangibles and national accounts intangibles in comparison to only national account intangibles in EU-27, current prices in millions of EUR



Source: In *INTAN-INVEST database*, 2014.

The alteration in the intensity of business investment in both tangible and intangible capital during 2008-2010 for observed countries is indicated in figure 9. Among the observed countries, Slovenia performs the worse in investing in tangible capital with approximately -7%, while its share in intangible capital still remains positive in comparison to some other countries (Italy, Spain, Sweden, UK and U.S.) which invested a negative value.

Figure 9: Change in business investment from 2008-2010, in percentage points



Source: OECD, *Supporting Investment in Knowledge Capital, Growth and Innovation*, 2013a, Figure 4.12.

3.1.2 The impact of intangible capital on the growth in the EU

Intangible capital is also closely related to labour productivity growth. Table 8 depicts the contribution to the growth of output per hour from 1995-2007 in different countries, including Slovenia.

Table 8: Contribution to the growth of output per hour, 1995-2007

		CONTRIBUTION OF COMPONENTS				
	LABOUR PRODUCTIVITY GROWTH	**TOTAL CAPITAL DEEPENING**	**TANGIBLES**	**INTANGIBLES**	**LABOUR COMPOSITION**	**MULTIFACTOR PRODUCTIVITY**
	1	**2**	**3**	**4**	**5**	**6**
Austria	2.4	0.8	0.3	0.5	0.2	1.4
Belgium	1.8	0.7	0.2	0.5	0.1	0.9
Czech Republic	4.2	2.4	1.9	0.5	0.3	1.5
Denmark	1.4	1.2	0.7	0.5	0.2	-0.1
Finland	3.8	0.9	0.2	0.7	0.2	2.6
France	1.9	1.0	0.4	0.6	0.4	0.4
Germany	1.7	1.0	0.7	0.3	0.0	0.7
Ireland	3.8	1.4	0.8	0.6	0.1	2.2
Italy	0.6	0.7	0.5	0.2	0.2	-0.4
Netherlands	2.3	0.9	0.4	0.5	0.4	1.0
Slovenia	5.3	1.7	1.2	0.5	0.7	2.8
Spain	0.8	1.0	0.7	0.3	0.5	-0.6
Sweden	3.7	1.9	1.1	0.8	0.3	1.4
United Kingdom	2.9	1.5	0.8	0.7	0.4	1.1
United States	2.7	1.7	0.8	0.9	0.2	0.8
Memos		*Average percent contribution of component*				
EU countries		47.0	27.1	19.9	11.0	42.0
US		64.5	30.8	33.7	6.0	29.5

Source: J. Haskel, *Growth, Innovation and Intangible Investment*, 2012, p. 7, Table 2.3.

Over the period from 1995 to 2007, Slovenia had an average 4% increase in labour productivity per year, which represented the main source of growth of GDP per capita. Future productivity and added value per employee could be increased by strongly encouraging innovation and innovative companies. Currently, Slovenia attains only about 60% of the average added value per employee in the EU, which estimates Slovenia as being 23 years behind the EU-15 in labour productivity (SIP, 2013, p. 33).

Table 9 presents the impact of the capitalization of intangible capital, comparing national account intangible capital and new intangibles for a variety of the European countries.

Table 9: Affect of the capitalization of intangible assets: NA vs New Intangibles

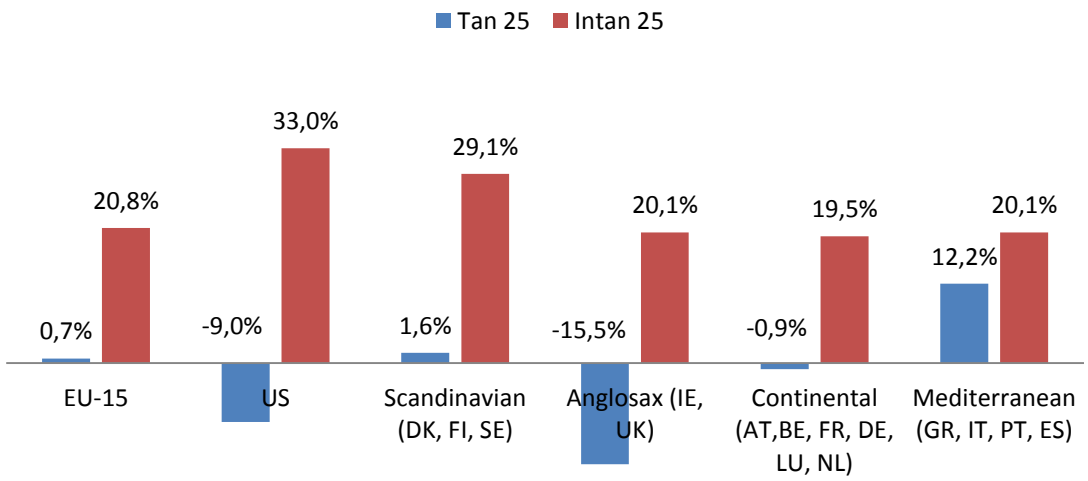
	Current Assets Boundary			Extended Asset Boundayr				Estimated impact		
	Contribution to LPG			Contribution to LPG						
	LPG	CD	TFPG	LPG	NA CD	NI CD	TFPG	LPG	CD	TPFG
Austria	1.87	0.78	1.08	2.05	0.72	0.34	0.97	0.18	0.29	-0.11
Denmark	1.55	0.55	1.00	1.61	0.50	0.27	0.83	0.06	0.22	-0.16
Finland	2.98	0.28	2.69	3.07	0.25	0.37	2.43	0.09	0.34	-0.26
France	2.01	0.39	1.61	2.07	0.36	0.23	1.47	0.06	0.20	-0.14
Germany	1.59	0.80	0.78	1.69	0.74	0.27	0.68	0.11	0.21	-0.11
Italy	0.17	0.55	-0.37	0.26	0.51	0.09	-0.35	0.09	0.06	0.02
Netherlands	2.20	0.69	1.50	2.25	0.62	0.31	1.31	0.05	0.24	-0.20
Portugal	1.81	1.82	-0.01	1.94	1.72	0.24	-0.03	0.13	0.14	-0.02
Spain	0.21	0.53	-0.32	0.24	0.50	0.03	-0.29	0.04	0.01	0.03
Sweden	3.73	1.14	2.56	3.69	1.01	0.44	2.20	-0.04	0.32	-0.37
United Kingdom	2.62	1.06	1.55	2.71	0.95	0.34	1.39	0.09	0.24	-0.15

Source: C. Jona-Lasinio, M. Iommi and S. Manzocchi, *Intangible capital and Productivity Growth in European Countries*, 2011, p. 19, Table 4.

Table 9 determines the crucial role of intangible capital for the growth accounting analysis. Intangibles strongly influence the growth of labour productivity since, with its capitalization, the growth of labour productivity is considerably modified (Jona-Lassino et al., 2011, p. 20). The factors that positively impact on and are certainly associated with labour productivity growth are stocks of inward foreign direct investment (FDI), openness to trade, stock market capitalisation in % of GDP and political stability. What obstructs labour productivity growth, is inflation, government expenditure and social expenditure as a percentage of GDP (Roth & Thum, 2011, p. 31). The role of intangible capital is more remarkable in the Scandinavian countries, while in the slow-growing countries, it still plays an insignificant function. Finally, wages and living standards of the workforce are strongly correlated with labour productivity which, therefore, represents an instrument of growing social welfare.

Figure 10 represents the dynamics of investments in tangible and intangible capital from 1995-2007, which explain the cross country differences in shares of GDP devoted to both sources of capital. The degree of intangible investment in all EU-15 regions increased from 1995 to 2007, particularly in Scandinavia. Exactly the opposite happened with the rate of tangible investments, which remained quite flat or even negative during the observed period, with the exception of the Mediterranean region.

Figure 10: Tangible vs. intangible GDP shares in EU-15, the US, Scandinavian, Anglosaxon, Continental and the Mediterranean region: 1995 – 2007 (percentage change)



Source: C. Corrado, J. Haskel, C. Jona- Lasinio and M. Iommi, *Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results*, 2011, p. 33, Figure 6.

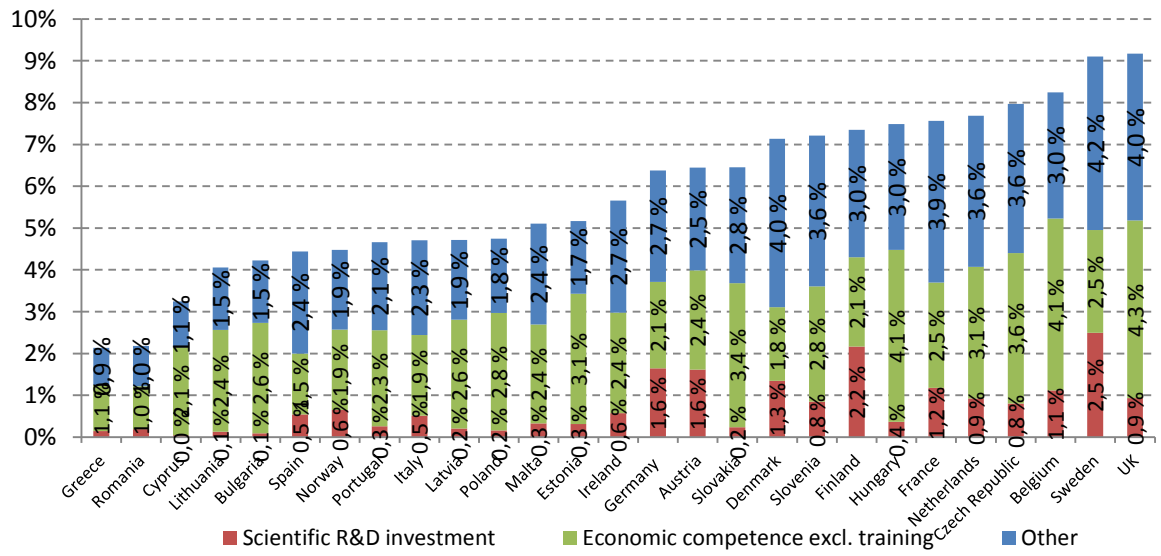
In all EU-15 regions, the degree of intangible investment increased from 1995 to 2007. As figure 10 indicates, there are differences in percentage changes in terms of the share of GDP in tangible and intangible investments among the countries but with no significant deviation. However, the EU investment intensity remained lower in comparison to the U.S. The higher level of investments in intangible capital is correlated with the better economic performance and GDP per capita. Furthermore, the estimates demonstrate that throughout the recent crisis, investment in intangibles has been more resistant to the decline in GDP than investment in tangible capital, resulting in a higher investment rate as a share of GDP (OECD, 2013a, p. 204).

3.1.3 Structure of intangible capital

Figure 11 provides information on investment in intangibles as a share of GDP (%) in 2005 by the structure of intangible capital for the EU-27 and Norway. The graph shows that investments in scientific R&D represent the smallest share of all intangible investments. More important shares are, therefore, made by investments in economic competencies and other intangibles (including training, non-scientific capital, and database and software) which contribute to a higher portion of intangibles as a share of GDP. Figure 12 depicts that the highest ranking country is the UK (with 5.23%) and the lowest Greece (with only 1.14%), while the average amounted to 2.51% of GDP. Compared to all 28 countries included in estimations, Slovenia ranks 15th with 2.45% of GDP.

In 2005, Slovenia invested only 0.8% in scientific R&D, 2.8% in economic competencies (excluding trainings) and the largest share, 3.8%, in all other intangibles, including training, non-scientific capital, and database and software. More specifically, in terms of scientific R&D, Slovenia was on the 11th place from 28 observed countries with 0.84% of GDP. Thus, Slovenia is comparable to the UK (0.93%), the Netherlands (0.92%) and the Czech Republic (0.80%), the average being 0.77% of GDP. In terms of organizational competence (excluding training), among 28 countries Slovenia ranks 15th, investing 2.45% of GDP into organizational competencies. According to measurements, it is placed close to Finland (2.54%), the Netherlands (2.49%) and Poland (2.43%), while the average is 2.51% of GDP. As measurements have shown, in 2005 Slovenia performed above average when comparing its share of scientific R&D in GDP, and just a little below the EU–27 (and Norway) average in the category of organizational competence (excluding training).

Figure 11: Investment in intangibles as a share of GDP (%) 2005: EU-27 countries (and Norway)



Source: In *INNODRIVE*, 2011.

Figure 11 indicates that all countries (Sweden, Finland, Germany, Austria) which are R&D intensive also invest above average in intangibles. However, some countries that are not remarkably R&D-intensive, also rank very high in terms of intangible investments (the Czech Republic 8%; the Netherlands 7.7%; France 7.6%, Hungary 7.5%), mostly because of the investments in organisational competences. The results point to a type of innovation model which underlines organisational competence as one of the main growth drivers (Innovation Union, 2011, p. 112). Moreover, different structures of intangibles across countries depict different innovation models; some are more focused on technological, while others on non-technological innovations.

Table 10 compares the structure of intangible expenditure in 2005 in the EU-27, EU-25, EU-15, NMS 2004 as well as in all its different regions; Scandinavia, Anglosax, Continental, Mediterranean. Comparing the European Union as a whole (EU-27 or EU-25) or only old members (EU-15) with NMS 2004, significant differences in investment in different intangible categories are evident. A noteworthy difference is especially evident in the investment in software and also in innovative property. NMS 2004 together invest a significantlly lower share into R&D (only 5.9%). However, economic competencies represent in NMS a much larger share than in EU-27, EU-25 and EU-15, respectively. Advertising represents a much larger portion of investments in NMS 2004.

Comparing all main regions within the EU, software with 21.6% and innovative property with 42.5% accounts for the largest share in the Scandinavian region, mainly due to the quite high R&D outlay in the Scandinavian economies (25.5%). In all other regions, economic competencies investments vary between 62.2% in the NMS to the lowest share, accounting for 43.6%, in the Continental area. The Anglosaxon region also invested a significant share in economic competencies, devoting to organizational capital 33.7% of all investments in intangibles.

Table 10: Composition of intangible investment: European Union 2005

	EU 27	**EU 25**	**EU 15**	**NMS 2004**	**Scandinavia**	**Anglosax**	**Continental**	**Mediterranean**
Software	17.3	17.3	16.0	6.4	21.6	17.5	14.2	16.9
Innovative property	38.0	38.0	38.3	31.4	42.5	30.2	42.3	36.5
R&D	15.6	15.7	16.1	5.9	25.5	10.1	19.4	10.8
Other national account	2.7	2.7	2.6	5.4	1.8	2.7	2.4	3.3
New financial product	7.3	7.3	7.3	6.4	3.6	6.4	8.5	6.9
Architectural & engineering design	12.4	12.4	12.3	13.7	11.8	11.0	12.0	15.5
Economic Competencies	46.5	46.5	45.7	62.2	35.9	52.3	43.6	46.6
Advertising	9.1	9.1	8.5	20.7	7.2	8.2	7.7	12.1
Market research	4.9	4.8	4.7	6.1	2.2	4.3	4.7	6.8
Firm specific human capital	8.0	8.0	8.0	8.6	9.1	6.1	8.8	7.6
Organizational capital P	24.5	24.6	24.4	26.8	17.5	33.7	22.4	20.2
Organizational capital O								
Total	100	100	100	100	100	100	100	100

Source: C. Jona-Lasinio, M. Iommi and S. Manzocchi, *Intangible Capital and Productivity Growth in European Countries* 2011, p. 8; Table 1; INNODRIVE estimates, 2011.

The study of Jona-Lasinio et al. (2011, p. 13-14) also demonstrates the structure of outlays devoted for intangibles for a sample of countries, represented in table 11. From each region of the EU-25, one representative country is chosen to demonstrate the best possible comparison among the EU-25 countries. Over the observed period, expenditures for software increased from 1995 to 2005 in all countries from the sample, a minor increase was recorded only in the Czech Republic. Within the observed countries, innovative property recorded the most significant growth in Finland, namely for 5.6 percentage points. On the other hand, the largest drop is seen in the Czech Republic, namely for -8.7 percentage points. Within the mentioned category, the main component was R&D expenditure, accounting for the largest portion of the total investment. In the last category, economic competencies, account for the largest in the Czech Republic, Italy and the UK. Within the category, organizational capital represents the fundamental of intangible expenditure.

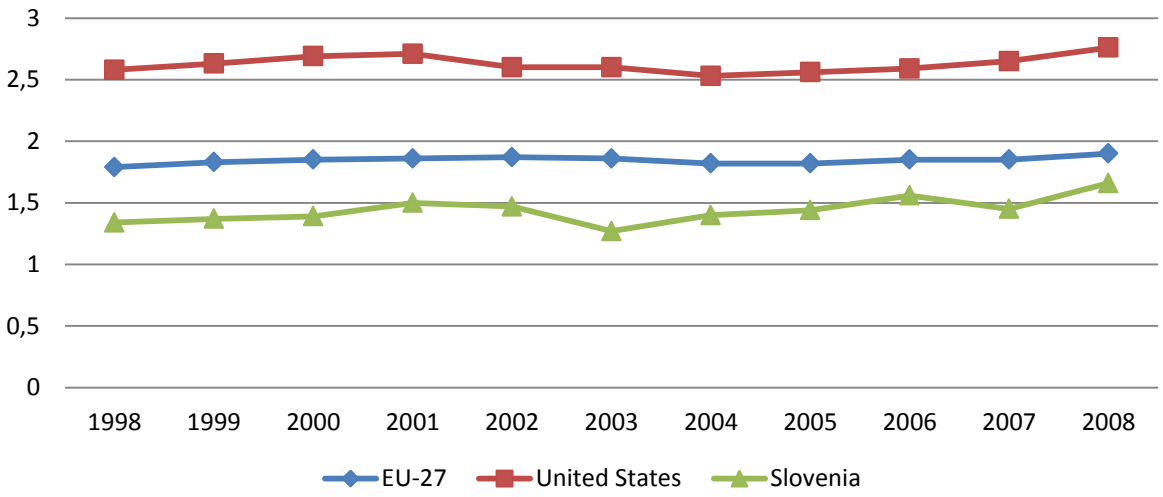
Table 11: Structure of intangible gross fixed capital formation (GFCF) in selected European countries (CZ, FIN, D, I, UK), 1995-2005

	Czech Republic			**Finland**			**Germany**			**Italy**			**UK**		
	1995	2005	D	1995	2005	D	1995	2005	D	1995	2005	D	1995	2005	D
Software	**9.4**	**8.9**	**-0.4**	**14.6**	**17.8**	**3.2**	**10.2**	**11.7**	**1.5**	**13.7**	**13.6**	**-0.1**	**14.5**	**18.7**	**4.2**
Innovative property	**44.6**	**36.0**	**-8.7**	**40.3**	**46.0**	**5.6**	**46.0**	**46.9**	**0.9**	**34.8**	**39.1**	**4.2**	**32.0**	**27.7**	**-4.3**
R&D	11.0	10.4	-0.6	22.4	29.6	7.2	26.4	26.4	0.0	12.1	10.6	-1.5	14.8	10.4	-4.4
Other national account	0.9	0.2	-0.7	3.8	2.4	-1.4	0.1	0.1	0.0	3.5	4.5	1.0	0.1	0.0	-0.1
New financial product	8.6	6.7	-1.9	4.7	2.8	-1.8	5.3	7.9	2.6	5.1	7.7	2.7	6.8	5.8	-1.0
Architectural & engineering design	24.1	18.6	-5.5	9.5	11.1	1.6	14.2	12.4	-1.7	14.2	16.2	2.0	10.2	11.5	1.2
Economic Competencies	**46.0**	**55.1**	**9.1**	**45.1**	**36.3**	**-8.8**	**43.8**	**41.5**	**-2.3**	**51.5**	**47.3**	**-4.1**	**53.5**	**53.6**	**0.1**
Advertising	8.1	15.5	7.4	10.6	8.4	-2.2	12.3	9.6	-2.8	9.2	9.9	0.7	9.7	8.2	-1.6
Market research	2.2	6.8	4.6	1.3	1.7	0.4	2.9	3.7	0.8	9.2	8.1	-1.1	3.8	4.5	0.7
Firm specific human capital	10.5	8.0	-2.5	14.9	7.2	-7.7	9.9	8.0	-1.9	11.7	7.1	-4.6	6.2	6.0	-0.2
Organizational capital P	15.3	17.2	1.9	7.4	6.8	-0.7	8.6	12.5	3.9	11.7	13.7	2.0	8.1	12.0	3.9
Organizational capital O	10.0	7.7	-2.3	10.9	12.3	1.3	10.0	7.7	-2.4	9.7	8.4	-1.2	25.7	23.0	-2.7
Total	**100.0**	**100.0**		**100.0**	**100.0**		**100.0**	**100.0**		**100.0**	**100.0**		**100.0**	**100.0**	

Source: C. Jona-Lasinio, M. Iommi and S. Manzocchi, *Intangible Capital and Productivity Growth in European Countries,* 2011, p. 14, Table 3; In *INNODRIVE* , 2011.

Figure 12 shows the difference as a share of GDP in only one component of intangible capital, in this case R&D, between the EU-27, the U.S. and Slovenia in terms of gross domestic expenditure on R&D (GERD) in the period from 1998 – 2008. As the figure depicts, there is a significant difference in investments in R&D between the U.S. and the EU-27. The EU-27 share of GDP in terms of GERD has been over the observed period pretty constant. The same findings also apply for the U.S., yet with slightly larger fluctuations among the observed years. Furthermore, Slovenia ranks below the EU-27 average over the observed period, with the highest GDP share invested in R&D within the observed period in 2008, accounting for 1.66%. The Innovation Union Competitiveness Report (2011, p. 50) demonstrates that the average annual growth (in %) in 2000-2006 in Slovenia was 1.95%, while in 2006-2009 it accounted for 12.2%.

Figure 12: Gross domestic expenditure on R&D as a share of GDP (in %) in the EU-27, USA and Slovenia from 1998-2008



Source: In *INNODRIVE*, 2011; own calculations.

In the period from 1998-2008, the total R&D investment in the EU in real terms has grown by 50%, nonetheless the recorded rate is much lower than in the rest of the world: 60% in the United States, 75% in advanced Asian economies (Japan, South Korea, Singapore, Taiwan), 855% in China, 145% in BRIS countries (Brazil, Russia, India, South-Africa) and almost 100% in other parts of the world. In the EU Member States, R&D intensity increased faster in 2006–2009 than in 2000–2006, however, the four largest Member States (Germany, France, the United Kingdom and Italy) contributed the largest portion to the overall EU aggregate R&D intensity. Even though the U.S. intensity in R&D is greater than in the EU-27, the stagnation is evident there as well, mainly due to the remarkable increases in R&D intensity observed in the rest of the world, especially in the major Asian research-intensive countries.

R&D intensity gap between Europe and the U.S. has been present since the beginning of the measurement process, indicating a deep and robust structural difference between both countries. Moreover, in comparison to the U.S., the EU, on average, allocates fewer sources of funds for R&D, reflecting in lower R&D intensity. In 2009, R&D intensity accounted for 2.77% in the U.S. and only 2.01% in the EU. Furthermore, the U.S. has a larger and more research-intensive high-tech industry sector which also clarifies a large portion of the R&D gap between the EU and the U.S. in the manufacturing industry. In the U.S., among four types of industry (high-tech, medium high-tech, medium low-tech and low-tech) the high-tech prevails, while the high-tech and medium high-tech sectors represent the same degree to overall manufacturing R&D in Europe. The portion of high-tech sectors in the U.S. manufacturing industry is more than 40% larger than the share of high-tech sectors in manufacturing industry in the EU. Also, there is a difference in research-insensitivity since high-tech sectors are 60% more research-intensive in the U.S. than in the EU (Innovation Union Competitiveness Report, 2011, p. 74-120).

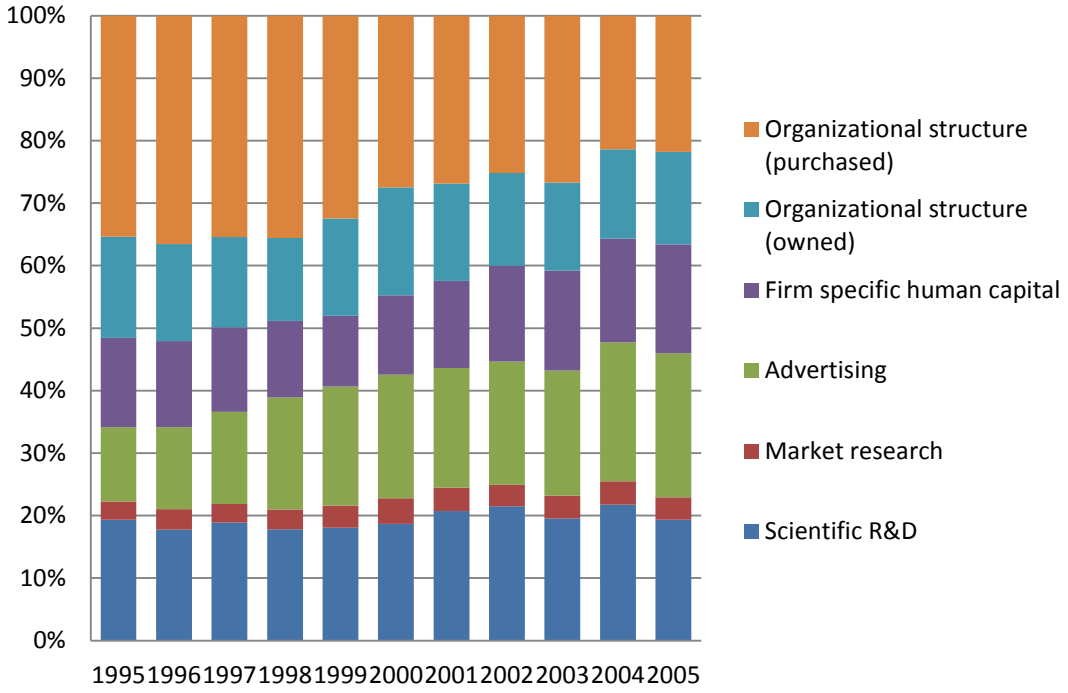
Moreover, the sectorial composition of the EU and the U.S. companies describes the R&D intensity gap between the EU and the U.S. companies. As researches indicate, young companies (founded after 1975) are more concentrated in research-intensive sector, contributing much more to the overall R&D intensity. The share of young companies in the EU is much lower than in the U.S. (17.8% in the EU and 54.4% in the U.S., respectively). While in the EU the R&D intensity of the young companies accounts for 4.4%, in the U.S. it reached 11.8%, a significantly higher share. The cause resides in the EU industrial structure since new firms do not reach the level of playing a significant role in the dynamics of the industry, particularly in high-tech sectors, which is a consequence of the structure of the economy (Innovation Union, 2011, p. 122-123). Furthermore, in many innovation sectors, the U.S. companies have taken a ‘first mover’ advantage, thus maintaining the leading position and leaving the EU behind.

As the latest report on research and innovation (R&I) in the EU indicates (Innovation Union, 2014, p.), R&D intensity in Slovenia improved from 1.38% in 2000 to 1.45% in 2007 and 2.8% in 2012, which demonstrates a good way toward reaching the EU 2020 targets of 3%. Business outlay on R&D as a share of GDP in Slovenia grew from 0.87% in 2007 to 2.16% in 2012, ranking Slovenia among top countries, within the EU outperformed only by Finland and Sweden. The main goals of the Slovenian research and innovation system are to accelerate incentives and mobilize resources from public and private sources (human, financial, infrastructural), improve the policy, and establish a clearer research prioritisation in order to pave the way for more technological innovation for the Slovenian R&I system.

Figure 13 indicates the structure of new intangibles (excluding economic competencies) based on individual categories in Slovenia from 1995-2005 in current prices. Intangible capital constitutes of scientific R&D, market research, advertising, firm-specific human

capital, and organizational structure (own account component and purchased component). The structure of intangible capital in Slovenia indicates the transitional changes of the Slovenian economy during the 1990s (Majcen et al., 2011, p. 20).

Figure 13: National estimates of intangibles based on individual categories in Slovenia, 1995 – 2005

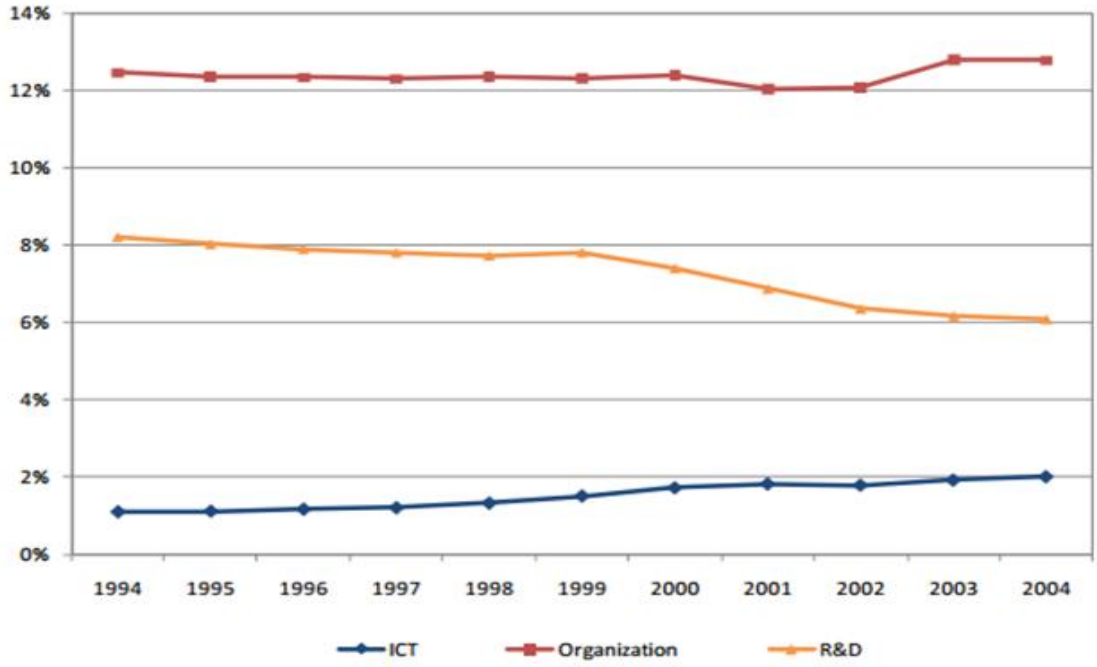


Source: In *INNODRIVE*, 2011.

In the period after the Slovenian independence in 1990, the country confronted hyperinflation, a large foreign debt, the loss of ex-Yugoslavian markets, all of which weakened the Slovenian macroeconomic performance (Mrak et al., 2004). Therefore, the country was forced to achieve economic stability which is further on significant also for forming the knowledge-based economy. As Majcen et al. (2011, p. 22-25) suggest, basing on their study of innovativeness and intangibles in the case of Slovenia, the dynamic of alterations in the new intangibles was progressive during the transition from the past socioeconomic to the new system in Slovenia. This has been most evident in the share of workers in different sectors. In the ICT sector, the share of workers gradually increased, while the share of R&D workers had a decreasing trend from 1994–2004. For the organization workers, there was no clear dynamics shown. Until 2000, the trend was quite constant, followed by a decrease from 2000-2001 and finally an increase from 2002 on. Lastly, the organization workers presented the highest share of private-sector employees and their productivity has been higher than the one from the average worker (Majcen et al., 2011, p. 1). Moreover, within the production sector share of workers were decreasing from 34.8% in 1994 to 30.3% in 2004, but portion of workers within service sector were increasing, showing the transition of the Slovenian economy through the 1990s.

Surprisingly, the level of workers in work related to intangible capital as a whole decreased from 21.8% in 1994 to 20.9% in 2004 (Majcen et al., 2011, p. 6).

Figure 14: Structure of private sector employees engaged in work related to intangible capital in Slovenia, 1994-2004



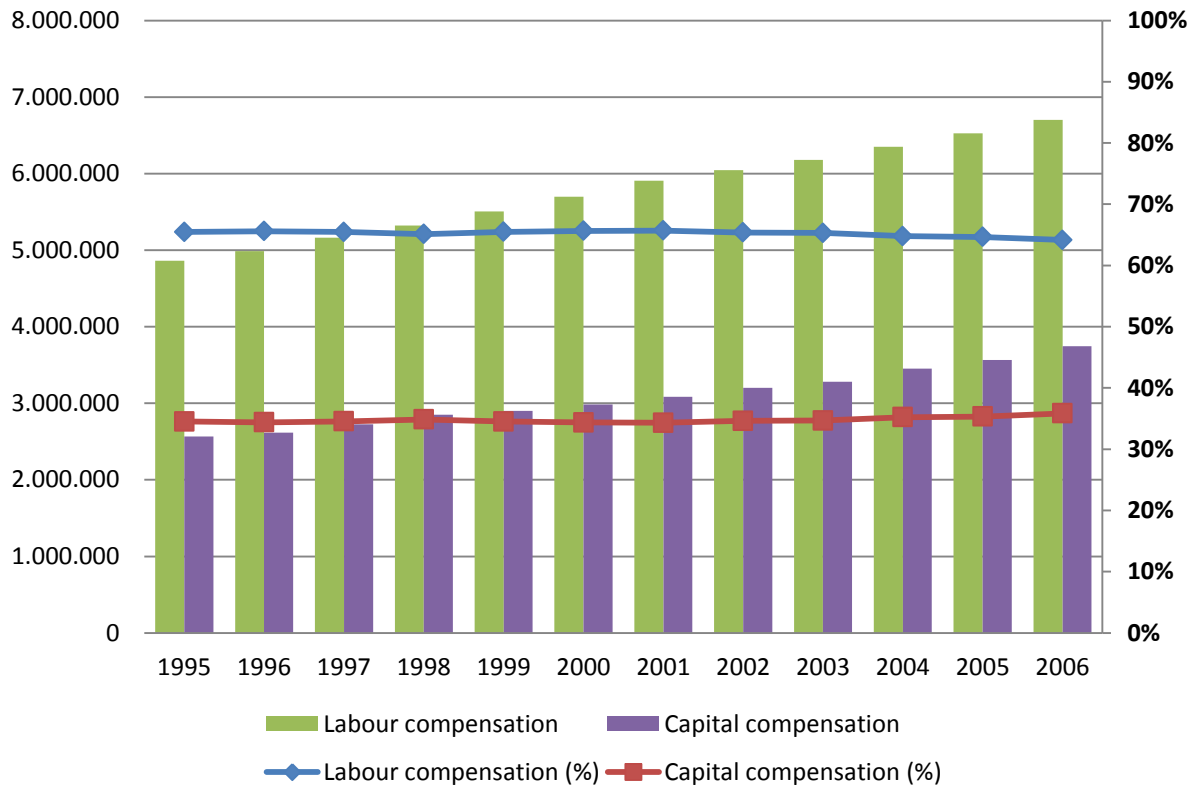
Source: B. Majcen, M. Verbič and S. Polanec, *Innovativeness and Intangibles: The Case of Slovenia*, 2011, p. 9, Figure 2; In *INNODRIVE*, 2014.

Moreover, in that period, hourly and yearly compensation of employees within the private-sector varied. The yearly compensation for work associated with intangible capital varied depending on the category of intangibles. On average, it accounted for 12,949 EUR in the organization sector, 13,801 EUR in the R&D sector, and to 13,919 EUR in the ICT sector. Observing the whole period from 1994-2004, a decreasing trend was recorded in the organizational sector, a relatively constant trend in the R&D sector and, finally, a minor growth in the ICT sector. However, hourly as well as annual compensation reflected high wages compression which was a consequence of the transition of the Slovenian system (Majcen et al., 2011, p. 8).

Figure 15 sets out the comparison between the structure of labour and capital compensation in total value added for the EU-25 in the period from 1995-2006. Through the observed period, the share of capital compensation remained quite stable, amounting on average to 35%. The same also applies to labour compensation, amounting on average to 65%. However, its share remained remarkably higher than the share of capital compensation. Looking at the nominal value, labour compensation represents a significantly higher increase over the period 1995-2006 in comparison to capital

compensation. The labour compensation increased in total for about 1.840.000 (in millions EUR) while the capital compensation increased for roughly 1.180.500 (in millions EUR).

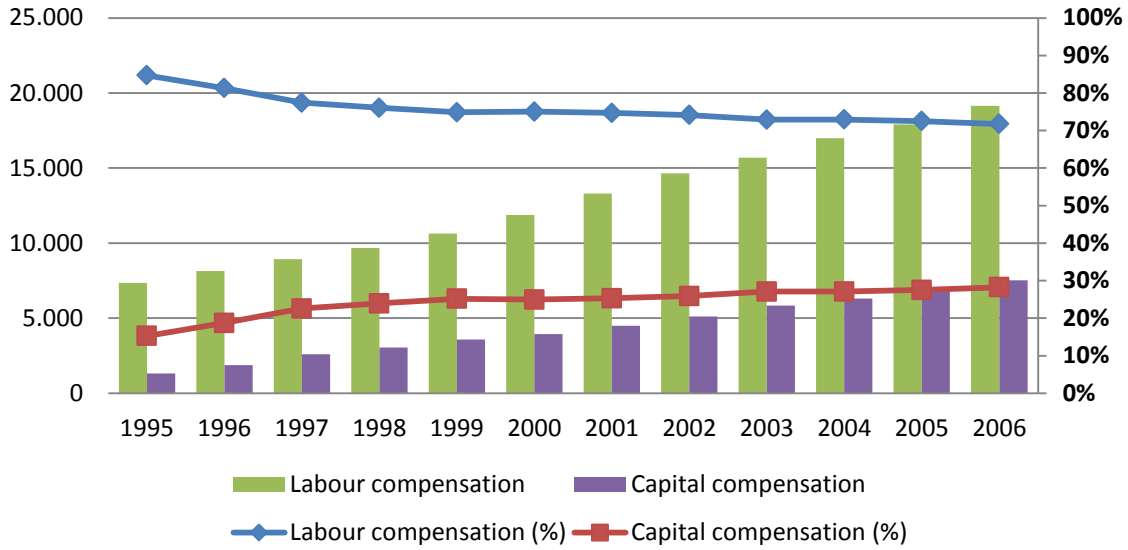
Figure 15: Labour vs. capital compensation in total value added (in millions EUR) from 1995-2006 in the EU-25



Source: In *EUKLEMS*, 2014; own calculations.

Figure 16 shows the structure of labour vs. capital compensation in total value added in the period from 1995-2006 in Slovenia only. As clearly evident, from 1995-2006 labour compensation was constantly decreasing (except from 1999-2000), from 84.7% in 1995 to 71.8% in 2006. On other hand, the share of capital compensation has constantly been increasing; from 15.3% in 1995 to 28.2% in 2006. However, in the nominal value, both components recorded an increasing trend. In particular, the labour compensation grew for a larger amount; from 7.349 in 1995 to 19.143 (in millions EUR) in 2006, while the capital compensation rose from 1.326 to 7.535 (in millions EUR) in 2006.

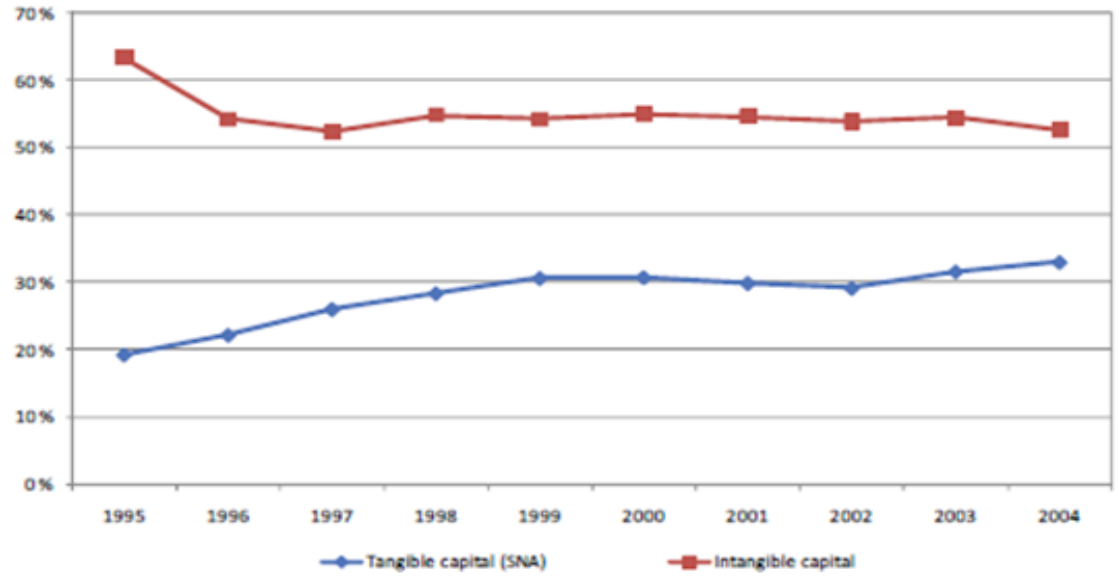
Figure 16: Labour vs. capital compensation in total value added (in millions EUR) from 1995-2006 in Slovenia



Source: In *EUKLEMS*, 2014; own calculations.

The trend of tangible and intangible capital per value added in Slovenia over the period of 1995–2004 is examined in the figure 17.

Figure 17: Tangible and intangible capital share per value added in Slovenia, 1995-2004



Source: B. Majcen, M. Verbič and S. Polanec, *Innovativeness and Intangibles: The Case of Slovenia*, 2011, p. 19, Figure 6; In *INNODRIVE* database, 2014.

Over the period from 1995-2004, the share of intangible asset per value added in the private sector in Slovenia remained quite stable with a major decrease from 1995 to 1997.

On average, it amounted to 54.0% from 1997–2004. On the other hand, tangible capital per value added was increasing over the observed period, from 19.2% in 1995 to 33.0% in 2004. The increase in the ICT capital per value added recompense the fall in the R&D capital per value added, though a substantial convergence between the tangible and the intangible capital per value added in Slovenia in the period from 1995–2004 can be noted (Polanec & Verbic, 2011, p. 14). However, based on the estimates, it can be concluded that there was a substantial convergence between tangibles and intangibles in Slovenia during 1995-2004 (Majcen et al., 2011, p. 18).

Results showed the positive and statistically significant outcomes of net plant, equipment, property, of R&D capital, and of material cost on operating revenue of Slovenian firms for the transitional period. Skilled labour force showed the capability to create value added in the form of intangibles for the overall economic growth. In the period 1994-2005, the share of employees in work associated to intangible capital differ on average from 1.5% in the ICT, 7.3% in the R&D, and the highest contribution, up to 12.4%, in the organization There were moderate improvements in Slovenia from employing and engaging organizational workers in the production process. Therefore, the difference between higher and the average productivity during the transitional period was lower in Slovenia in comparison to other countries (Majcen et al., 2011, p. 25).

The purpose of the chapter was to demonstrate how stock of intangible capital has been expanding in the past decades and thus significantly contributed to the economic growth and competitiveness of the economy. As empirical study depicts:

- Investment increased in absolute numbers as well as in terms of annual growth rates.
- Intangible capital in the U.S. exceeded tangible capital in terms of a GDP share, accounting for 10.6%, while tangibles accounted for 9.0% in 2005.
- In the EU-15, Scandinavia is the most intensive region in investing in intangible capital, following by the Anglosaxon.
- In the EU-27, countries that invest the most in intangible capital are Luxembourg, the UK, Sweden and Belgium.
- The largest share of investment in intangible capital constitutes of training, non-scientific capital, and database and software, followed by economic competencies (excluding training) and scientific R&D, representing the smallest portion of IC investment.
- Slovenia is ranked in the upper half regarding the investments in intangibles as a share of GDP with a little lower share devoted to the R&D (Slovenia ranks below EU-27 average from 1998-2008) and a higher share devoted to other intangibles (including training, non-scientific capital, and database and software).
- There are cross-country differences between the U.S. and the EU, as well among the EU countries, mostly due to the sectorial structure and disparities in countries' development.

- The inclusion of intangible capital investment to other assets in the national accounting framework indicates that the rate of change of output per worker and labour productivity growth rise more rapidly.

Intangible capital is treated as the centre of today's economic activity. Looking from the micro perspective, firms are devoting more and more outlays in order to invest in different kind of knowledge based capital in order to stimulate their economic activity and growth, and thus contribute to stronger comparative advantages. From the macro perspective, steadily increasing resources in intangible assets consequently also result in higher portion of such investments in GDP. It is thus essential to measure and also improve operations and utilization of intangibles. This is why policy measures should be focused on stimulating a better understanding of intangible capital by incorporating them in the GDP measure and stimulating their use with appropriate incentives (Majcen et al., 2011, p. 26). Therefore, the data shows that the research questions can largely be answered positively.

Level of the investment in tangible and intangible capital significantly impacts on the productivity growth and competitiveness of the economy. Thus, economy's performance is strongly influenced by the industrial policy for ensuring the competitive markets and future investment.

4 POLICY MEASURES AIMED AT INCREASING INTANGIBLE CAPITAL MEASURES AND SOLUTIONS

Providing and improving a healthy ecosystem within an economy that would support future innovations and investments in intangible assets requires a broad affiliation and cooperation of stakeholders—academics, industry, entrepreneurs, venture capitalists and the government (Mc Kinsey, 2013 p. 22). Government support in general is very important (Pisano & Shih, 2009, p. 11). For example, in modern economies the shift has been made towards investments in intangible capital which suggests updating the countries' innovation infrastructure. For these reasons, policies and actions that simplify flexible reallocation of tangible and intangible resources across and within firms and that protect all investments in innovation, should be promoted (Mc Kinsey, 2013 p. 22-25).

To motivate the discussion on intangible capital policies, the main findings from the previous chapter will first be recapped, followed by the founded solutions that would reduce the lag of the intangible capital in countries where such lag is present.

4.1 The possible causes of differences in intangible investment

From the empirical research in the previous chapter of the thesis, it is evident that attention which countries devote to intangible capital, greatly varies among the observed economies.

The reasons for the diversity of intangible capital among the countries are various, however different industrial policy approaches are partly responsible for such state.

Firstly, **the emerge due to the different structural and investment policies among the countries**, which have an important impact on the reallocation of rare resources to companies that invest in KBC, ensuring the most cost-effective approach for those kinds of investments (OECD, 2013a, p. 55). The PIGS [1] countries (the Mediterranean region) recorded the lowest share on intangible capital, accounting, in 2005, as a share of GDP for 4.5% in Italy, 4.1% in Spain and Portugal and 2.0% in Greece, all resulting below the EU-27 and Norway average value share of 6.7%. The results are the consequence of the load of financing sovereign debt in those countries. The policies, dealing with investments, are directed more toward tangible capital investments, therefore they had to undergo relatively more from the movement of manufacturing to other continents, especially to Asia (Piekkola, 2011b, p. 5). Moreover, the concentration of intangible capital is observed mainly in urban areas in the private sector; for instance 41% of the UK intangibles are concentrated in the London city-region, and 48% of all intangibles in Finland belong to the greater Helsinki area (Piekkola, 2011b, p. 17). Furthermore, as determined by the Regional Innovation Scoreboard (EC, 2014c, p.5), innovations[2] are concentrated in relatively few areas in Europe; Denmark, Germany, Finland, France, Ireland, the Netherlands, Sweden and the United Kingdom, which support the finding of a higher share of GDP in terms of intangible in the Scandinavian and Anglosaxon region.

Second, **the countries which are an active participant in different innovation activities, proved to invest a larger share of GDP in intangibles**. As examined by Crescenzi & Rodriguez-Pose (2011, p. 39), the EU-15 are leading innovators, while intermediate innovators are classified as all other new members, including Slovenia. The remaining new members belong to the third group, named the latecomers. As the authors have identified, there is a different pattern in the regional innovative activity. Innovation activities, especially of the SMEs, are further on planned to be boosted by clusters, living labs, design centres and innovation clinics (EC, 2014g, p. 79). People's attitude to new things and ideas and, moreover, general conditions that stimulate entrepreneurs toward innovations influence the differences among the countries and regions. Innovative firms invest in a broader range of intangible assets, not only in R&D. Differences among countries in KBC investment are, besides the reason of specialisation differences, also present due to diverging patterns of firms' performance, since some countries allocate resources to innovation-focused and high-growth companies more efficiently than others. The strongest innovation capacity and capability, entrepreneurship and easy access to

1 PIGS refers to Portugal, Italy, Greece and Spain.

2 As suggested by OECD (2010b, p. 1), As suggested by OECD (2010b, p. 1) innovation includes many activities during R&D stage, for instance: changes on the organizational level, staff training, product testing, design and marketing. The definition is also widely applied when a new, considerably enhanced product, service, method or business practice is developed.

finance have been captured in Sweden, the Netherlands, Denmark, Estonia, Ireland and Germany (EC, 2014g, p. 33).

Furthermore, **the level of intangible capital investment is definitely influenced by the provided financial support and difficulty of accessing financial capital**. Indeed, a well-developed system of public financial support enables innovation activities which are the case in regions with high shares of innovative companies. In the regions where there is a lack of private as well as public financing, the results show lower innovation activities (Regional Innovation Scoreboard, 2014, p. 5). The support of the European Structural and Investment Funds (ESIF) provides financial instruments, helping especially the countries where financial conditions stay tight. ESIF should double the financial support, on average, for the period 2014-2020 in comparison to the period 2007-2013 (EC, 2014c, p. 8-9). Finland as one of the most innovation intensive countries within the EU kept the proportion of funds for the public and private sectors quite constant over the last period, thus helping to implement the business and public R&D project for the development (Prašnikar et al., 2014, p. 60). Moreover, the differences in size and the development of financial markets also have an effect on intangible investment. The main problem lies in insufficient collateral for the firms that rely heavily on intangible capital. Market prices can easily be defined for tangible capital that can be used as collateral, while intangible capital is more difficult to define, it is inseparable, non-transferable, uncertain and risky (OECD, 2013a, p. 92-93).

Different taxation systems and direct support measures also contribute to the differences in scope of investment in intangible assets among the countries. Especially, R&D tax incentives distinguish in their targets. Thus, greater responsiveness toward investment in KBC is supported by the generosity of tax incentives. As Westmore (2013) concluded, mitigating tax system for 6% (from the level in the U.S. to the level in Japan in 2008), may increase the level of R&D by approximately 6% in the long term. In Slovenia, tax deduction for investments in equipment and intangible assets has been steadily decreasing from 40% deduction until 2005 to no deductions after 2007 (Prašnikar et al., 2014, p. 200). However, in countries with high R&D alterations, the projected effect of R&D tax incentives on private R&D expenditures is significantly diminishing (OECD, 2013a, p. 83-84). The results of Eurobarometer (2013, p. 41-42) show that 33% of companies that invested in any intangible assets stated unfavourable tax treatment of intangibles as a discouragement to their investment in intangible assets.

As determined by the Eurobarometer (2013, p. 6), **high cost and, additionally, uncertainty regarding the final result** of the investment are also some of the main reasons that discourage countries in investing in intangible assets (out of 30 countries, 45% exposed this reason). In Slovenia, about 30% of firms highlighted high costs of intangible investments as a barrier in expanding its scope (Eurobarometer, 2013, p. 42).

Some countries are also more open to trade than others which consequently generates more innovation through market-size effects, resilient competition in the product market and larger knowledge flows. Also, more innovation driven countries export products with high levels of value added, and successfully participate in knowledge-intensive global value chains (OECD, 2013a, p. 59). Finland is the case of how exports provide incentives for innovation. A successful Finnish firm, Nokia, did not only expand its innovation activity, create new knowledge and cause considerable spillovers by its international trade activities, but it also recorded high sales performance. The domestic sales of Nokia represent only 1% of its global sales and spending for R&D as a share of sales was 11.2%. Thus, by focusing only on domestic market, the company's R&D budget would have to be reduced by 99% (OECD, 2008, p. 35).

The results indicate that future investment will be more in favour of intangible than tangible investments which are indispensable for growth. Therefore, efficiency of resource allocation can be improved by a well-functioning product, qualified labour force markets, venture capital markets and bankruptcy laws, influencing on higher investments in knowledge based capital. Also, lower barriers to international trade and investments for stimulating innovations through greater size of the market and knowledge diffusion beyond domestic borders could help accelerate a healthy environment for more investments in intangibles. Moreover, private investment in KBC has to be encouraged further on with R&D tax incentives and well-defined intellectual property rights (IPP) (OECD, 2013, p. 55). Thus, the national government can establish a framework in order to accelerate innovation activities by creating and implementing structural (education and training policies, entrepreneurship policies, product and labour markets, public research institutions, and policies to help develop networks and markets for knowledge) and pro-growth tax reforms (OECD, 2010b, p. 2-4).

4.2 Policies aimed at increasing intangible investment

Generally, intangible capital comprises three main constituencies: informational, innovation capital and economic competencies. But policy measures and different incentives are usually focused on the innovation capital mainly. Moreover, the measures and initiatives often target one or only a few of the above mentioned causes of differences. The most important elements of increasing intangible capital (innovation in reality, primarily) have been the EU and national level (industrial) policy measures.
The main policy measures are summarized in table 12 and explained in continuation.

Table 12: Main policy measures

Policy name	**Main goal**	**How does it tackle intangibles**
Lisbon Strategy	-to stimulate growth and create more and better jobs, while turning the EU into the most competitive knowledge-based and more greener society	-to support knowledge and innovation in Europe by investing more in young people, education, research and innovation in order to generate wealth and provide security for every citizen; - reforming state aid policy and setting better regulation - opening up markets; - developing the internal market for services -investing in modern infrastructure to help enterprises grow, innovate and create jobs; -developing a skilled entrepreneurial labour force
EU 2020	-to create the conditions for a smart, sustainable and inclusive growth; -to achieve 5 targets until 2020; covering employment; research and development; climate/energy; education; social inclusion and poverty reduction.	- 3% of the EU's GDP should be invested in R&D and fostering innovation activities; -this could be achieved by creating an Innovation Union within the EU by encouraging internal market for innovation, ensuring territorial and social cohesion throughout Europe and pooling resources and access to finance in research and innovation
COSME	-EU programme for the Competitiveness of Enterprises and SMEs for the timeframe 2014–20	-EUR 2.5 billion devoted to encouraging entrepreneurship and improving access to financing SMEs mainly through loan guarantees and risk-capital thus consequently facilitating investment in intangibles
Horizon 2020	-the biggest EU Research and Innovation financial programme ever provided for the timeframe 2014–20 for implementing the Innovation Union	-EUR 80 billion devoted to research, innovation and entrepreneurship, thus strongly contributing to investment in intangible capital
Cohesion Policy	-strongly related to achieving the objectives of the Europe 2020 Strategy for the period 2014-2020	-to strengthen research, technological development and innovation, increase access to ICTs and their use and quality, and to promote the competitiveness of SMEs, thus strongly contributing to investment in intangible capital

Source: CORDIS, *The Lisbon Strategy for growth and jobs*, 2014; Innovation Union – A Europe 2020 initiative, 2014.

4.2.1 Initiatives and policies to enhance knowledge economy within the EU

Lisbon Strategy, drafted in 2000, endeavoured for a stronger, lasting growth by transforming the EU into the most competitive knowledge-based society by 2010. In 2005, the Strategy was refocused on creating growth and jobs, thus improving the conditions of coping better with the challenges of an ageing population, the need to increase productivity and the competitiveness of the EU economy. As stated in the Strategy, the existing resources in Europe needed to be unlocked by different actions, primary by investing more in young people, education, research and innovation to create wealth and assure security for every citizen; opening up markets; reducing red tape; investing in new modern infrastructure to help stimulate the growth of enterprises, innovate and create jobs; evolving a trained and skilful entrepreneurial labour force; establishing and sustaining a society with high levels of employment, social protection and a healthy environment (CORDIS, 2014). Thereby, Europe's gap in productivity growth in comparison to other advanced economies, such as the US and Japan, should be patched up, thus enabling Europe to become the most competitive and productive economy in the world (EIB Papers, 2009, p. 38).

In 2002, the European Commission determined the goal of 3% of GDP allocated to R&D expenditure. But R&D investments in the Lisbon Agenda are determined exclusively as scientific R&D and hence taking into account the narrow classification and excluding many other intangible investments, for instance investments in financial services, which also significantly contribute to productivity growth and value creation (Blaug & Lekhi, 2009, p.11). Furthermore, Europe 2020 also continued with the objective for public and private investments to spend 3% of national the GDP on R&D and innovations.

Within the European Union, many programmes, strategies and incentives concerning investments in intangible capital have been established and adopted. One of the most important is definitely Europe 2020, which is a growth and jobs strategy programme, launched in 2010, and focused primary on a smart, sustainable and inclusive growth in order to improve the EU's competitiveness. Through this framework, the EU and state bodies jointly strengthen their quests and commitments in order to support the Europe 2020 priorities, including innovation, digital economy, employment, youth, industrial policy, poverty, and resource efficiency (EUROPA 2020, 2014). For the last thirty years, the EU has been lagging behind other advanced economies due to its weak and unsteady productivity growth[3]. However, it is closing its innovation gap with the United States and Japan, but the differences within the EU Member States remain and are diminishing very slowly (EC Press release, 2014a, p. 1). One of the key factors of stimulating innovation and thus encouraging productivity is to ensure high quality human capital. Besides, factors,

[3] In 1980, 90% of the US per capita GDP was achieved within Euro area but now amounts to even lower level, standing at around 70% and for several Euro area countries at even less than 60% (EC, 2014b, p.10).

such as performance of research, education and training systems and their volume and capability, influence innovation activities as well (European Commission, 2014, p. 10).

The Europe 2020 strategy introduced new engines to boost growth and jobs, known as the ***7 flagship initiatives*** in order to clarify its objectives and ways of attaining them (EUROPE 2020-Flagship initiatives, 2012). Within these, some of them are also affecting innovations and, consequently, investments in R&D. The first of the flagship initiatives is to achieve *Innovation Union*, aimed to assure implementation of innovative ideas into goods and services that create new jobs and growth. The second, the *Industrial Policy for the globalisation era* aims to provide and sustain a strong, resilient, differentiated and competitive industrial base in Europe, thus providing well-paid jobs and becoming more efficient in terms of resource utilization (EC, 2014d).

Meeting Europe 2020 targets requires coordination of policy actions and instruments between the EU and the national levels. A single market would assure healthy, well-connected markets in order to stimulate business and innovation. Furthermore, the EU should provide regulatory environment for ensuring safe and effective financial markets and create innovative mechanisms and instruments to finance the needed investment-including public-private partnerships. Finally, with external policy instruments, the EU would stimulate international trade and macroeconomic performance which would help promote growth and development (Europe 2020). However, adjustments on priorities for each target and the way of implementation are left to each EU Member individually in order to create its own specific strategies. Nevertheless, the Council supports the Members, providing them with further guidance and incentives (Albu, 2011, p. 5-6).

In order to achieve Europe 2020 targets and monitor the countries' progress toward it, the European Union created a European Semester, aimed at coordinating economic policy throughout the year. It is based on a yearly comprehensive analysis of each EU Member State's plans regarding its budget, macroeconomic and structural reforms, and, besides, it gives the countries recommendations for the next 12-18 months (Europe 2020).

In the scope of long-term financial framework of the EU, the EU has conceived three especially highlighted programmes for the period of 2014-2020: (1) COSME, (2) Horizon 2020 and (3) Cohesion Policy (SIP, 2013, p. 51).

COSME – the Programme for the Competitiveness of Enterprises and SMEs with a EUR 2.5 billion of budget for the period 2014-2020 devotes its financial resources in particular to improving access to financing SMEs, improving access to markets in the EU and globally, and to encouraging entrepreneurship, mainly through loan guarantees and risk-capital. The programme aims to help 39,000 companies per year, which would create or preserve 29,500 jobs annually and introduce 900 new products, services or processes to the market (SIP, 2013, p. 52). SMEs represent the foundation of Europe's economy since they account for

around 99% of all European businesses and assuring two thirds of private sector jobs (EC, 2014f). The COSME programme will further on support the private sector, making it even stronger and more competitive.

Horizon 2020, the new and the biggest EU Research and Innovation programme within the EU operations provided for the timeframe 2014–20, is the financial instrument for supporting and realizing the Innovation Union, a Europe 2020 flagship initiative, in order to assure and protect Europe's global competitiveness. The programme as such devotes EUR 80 billion in research, innovation and entrepreneurship, thus aiming to more substantial developments, discoveries and world-firsts by implementing and presenting outstanding ideas from the laboratories to the market (What is Horizon 2020?, 2014). Out of EUR 80 billion, around 30% is noticeably the centre of the EU's effort to create new growth and work positions in Europe. The programme's main objectives are strengthening Europe's global competitiveness through globally competitive science and technology excellence in Europe and also through European global industrial leadership in research, development and innovation (RDI). Horizon 2020 and the European Innovation Union advocate strategic partnerships of firms, academia, cities, public agencies and people in RDI since strong and effective public–private partnerships in RDI are required in order to guarantee a wide and deep impact. Moreover, this kind of strategic collaboration in resolving social challenges brings opportunities to create new companies, joint ventures, social entrepreneurship and entrepreneurial activities (Open Innovation Yearbook, p. 42-43).

The Cohesion Policy for the period 2014-2020 is strongly related to achieving the objectives of the Europe 2020 Strategy. It has two main priorities: the investment for growth and jobs, and the territorial cooperation within the EU. Consequently, this strengthens research, technological progress and innovation, increases connection to ICTs and their usage and quality, and promotes the competitiveness of SMEs (SIP, 2013, p. 53). Over the period of implementation, the programme disposes with up to EUR 351.8 billion of budget in order to deliver the Europe 2020 goals through the European Regional Development Fund and the European Social Fund. The goal of the Cohesion Policy will mainly be adopted by the common European rules; rules for all European Structural and Investment Funds, more explicit suitability rules, better utilization of digital technology, simpler accounting rules and more targeted reporting demands (EC, 2014f).

By implementing the Regional Policy, Europe gives a special focus to each region, thus fostering innovation with profitable operations and businesses that bring jobs and continuous growth. European Structural and Investment Funds (ESIF) devote over 100 billion euros to investments in research and innovation, as well as digital growth, small and medium sized businesses and to developing green and efficient energy, thus making innovative strategy to build regions' economic strengths (EC Press release, 2014a, p. 1).

The implementation of the Europe 2020 goals is taking place in the 27 Member States and with the help of many regional and local authorities. The Europe 2020 targets have been translated to the national levels in order to pursue an individual approach of the country. The National Progress Indicator (NPI) shows that six countries – the Czech Republic, Denmark, the Netherlands, Lithuania, Sweden and Estonia – have, on average, reached at least 80% of the stated Europe 2020 targets. On the other hand, Spain, Ireland, Malta, Portugal, Cyprus and Greece have scores of less than 60% of the targets. On average, the EU-27 as a whole achieved just over 60% of the path to the targets. Spending on R&D is high in Germany, the UK, Denmark, Sweden and France. Finland and Sweden have the most regions within the top 10 regions in the EU, exceeding the EU target of 3% (Committee of the Region, 2014, p. 31-40). However, the target of 3% of the national GDP spent on R&D and innovations has been missed markedly because the actual spending of the EU Member States is still lagging behind it. In 2012, 2.06% of GDP combined public and private investments were made for R&D investments within the EU Member States. Based on the current trend, investment in R&D is predicted to rise to 2.2% by 2020[4] (European Commission, 2014, p. 12). The EU is actually slowly advancing towards its 3% R & D target, but the widening gap between the EU and its world competitors remains; in 2010, the United States spent 2.8% of its GDP for R&D and 3.4% of GDP was spent in Japan. The highest ranking countries in R&D within the EU remain Finland, Denmark, Austria and Germany. This trend is also predicted for the upcoming years even though R&D expenditures are growing, at the same time globalisation is accelerating as well (Open Innovation Yearbook, p. 42). In 2011, R&D intensity in Slovenia reached 2.47%[5] with an average annual growth of +12.5% throughout the period 2000-2011. Thus, Slovenia is, based on its average rate of progress over the period 2000-2011, on track to reach Europe 2020, however it will still require continual public support (Europe 2020 Targets, p. 5).

The European Structural and Investment Funds (ESIF) will further support innovation and infrastructure with a budget of more than EUR 400 billion in order to enhance growth and jobs at the national and regional levels. Thus, it will support the Europe 2020 strategy and national reforms. Because the programme enables the policy and the funding to go hand in hand, it is determined as a very powerful driver to stimulate the growth and achieve priorities (EC, 2014c, p. 3).

4.2.2 The role of industrial policy at the EU and national level

The productivity gap occurred due to the differences in business structures combined with lower levels of investment in R&D and innovation, inadequate use of information and communication technologies, resistance to accept innovation in some parts of the EU,

[4] Since 2000, public and private investment in R&D have been increased by most of the EU Members (except of Croatia, Luxembourg, the United Kingdom and Sweden) (EC, 2014b, p.12).
[5] This amounted to EUR 894.2 million spent on R&D in all sectors, of which the most was contributed by the business enterprise sector (EUR 660.5 million).

barriers to market entry and a less dynamic business environment. By fostering investments in R&D and innovation, all sectors will benefit, subsequently resulting in reinforcing economic, social and territorial cohesion as well. However, this requires many other factors to be aligned with the strategy; upgrading the education quality, boosting research performance, stimulating innovation and knowledge transfer throughout the EU, making full use of ICT and ensuring the implementation of innovative ideas into new products and services that form sustainable economic growth, quality jobs and help emphasize the communication of European and global societal challenges. Finally, with the combination of finance, well-structured entrepreneurship, and an emphasis on user needs and market opportunities, set goals will be achieved (EC, 2010, p.7-12). Therefore, the EU has been following an integrated industrial policy (IP), which goes hand in hand with the innovation policy, in order to implement growth-enhancing recommendations on the national level to provide future competitiveness and to increase growth potential (EC, 2014a, p. 2).

As stated by Barroso (Enterprise and Industry-Industrial policy, 2014), a resilient and dynamic industrial base is indispensable for a strong European economy. There is a range of national policies that affect the competitiveness and growth of the economy, requiring a high degree of harmonisation of the development objectives and implementation methods of the industrial policy with other structural policies.

However, there are many alternative perspectives on the industrial policy, on the basis of which Stiglitz and Greenwald (2014), Spector et al. (2009), and Aghion et al. (2011) presented the most significant models (alternative industrial policies) (Prašnikar et al., 2014, p. 12-15). Stiglitz and Greenwald (2014) are strong advocates of industrial policies since they stabilize the economy and contribute greatly to sustainable economic growth because markets per se are inefficient. As one of the main drivers of economic growth, they emphasize the importance of learning and knowledge spillovers. Secondly, OECD approach by Spector et al. (2009) support a completely opposite view; markets are efficient per se since rational expectations of market participants guarantee perfect operations of markets. Also, they do not attribute an important role to knowledge spillovers. Finally, Aghion et al. (2011) support the intermediate approach, advocating industrial policy and government intervention in competitive skill-oriented industries to achieve a shift toward high-tech structural transformation of the economy. The approach considers R&D spillovers as a source of the endogenous growth in the competitive economy (Prašnikar et al., 2014, p. 12-15).

Investments, such as spending on R&D, generate internal as well as local and cross-border positive effects, which is important mainly for knowledge accumulation (WIPO, 2011, p. 23). One of the most significant externalities, yet a hardly identified effect of intangibles, partculary of R&D investments, and knowledge economy, is a spillover effect, also strongly emphasized by Stiglitz and Greenwald (2014). Spillovers, concering especially

R&D investments and human capital, represent an issue since they limit the reach of intangible capital estimates. Knowledge spillovers occur when one's own investment in R&D and domestic innovation attempts are passed forward. Thus, knowledge is transmitted and consequently arise without the use of additional resources. Nevertheless, the spillovers' process depends on many factors and is neither automatic nor costless (EIB Papers, 2009, p. 15 - 19). From the society's point of view, knowledge spillovers are beneficial, since they contribute to the spread of new ideas. If knowledge, though, is spread to others immediately as it is formed, appropriability dilemma appears, and trade-off is made by firms and policy makers (WIPO, 2011, p. 95).

Presented economy-wide, spillovers may take many different flows; from technologies to people, from one sector to another, from one product to certain other products, from related to a completely different industry etc. Spillovers include worker skills, organizational learning and institutional developments (Stiglitz et al., 2014, p. 58). They are mostly a consequence of knowledge obtained from foreign direct investments (FDI), licensing, trade, joint venturism, multinationals, labour migration and cooperation with the companies from advanced economies (WIPO, 2011, p. 26).

Because world economy became more integrated, the adoption of some other object or country is easy and plays an important role. The spillovers as positive externalities represent benefits to the well-being of others. Firm's investment in an individual worker's training would, consequently, enhance the firm's overall productivity through interactions between employees, such as imitation, learning-by-doing, social pressure or leading-by-example (BIS, 2012, p. 8). However, positive effects of spillovers do not comply with all the subjects involved in this process. Without a market mechanism (such as higher wage payments), the innovating firm does not consider the external benefits that it transfers to its rivals (BIS, 2012, p. 13). For this reason, the spillover effect leads to underinvestments in technology and knowledge capital, meaning that the social and private interest are not likely to be coherent (Stiglitz & Greenwald, 2014, p. 70). More firms with investments in reasearch, consequently, lead to more knowledge spillover, suggesting a larger discrepancy between private and social returns (Stiglitz & Greenwald, 2014, p. 104). Out of this premise, the questions about real incentives of firms' innovation activities comes up. The firm copes an under-incentive to invest, for instance, in training (especially in general transferable skills), because a trained employee may easily and quickly leave the firm after the training has occurred and use new achievements associated with the training, which indicates on a free-rider problem or poaching externalities. Therefore, a number of authors have proved negative correlation between an increase in regional labour market density and the percentage of trained employees across firms (BIS, 2012, p. 14-15).

Primarily, spillovers of intangible resources are mostly related to mobility of skilled and experienced labour among firms, thus spreading information, typically within and between industries and regions, and between foreign multinational enterprises and domestic firms in

the host countries they operate in (BIS, 2012, p. 15). Also, firms that are intangible-intensive consider labour mobility as a competitive threat. Some companies also avail non-competition agreements to restrain spillovers due to employee mobility (Brown & Kimbrough, 2011, p.9).

Secondly, one of the most important factors that contributed to international spillover has become international trade in intermediate inputs, recording a significant growth in recent decades. The study of Coe and Helpman from 1995 (Coe, Helpman & Hoffmaister, 2008, p.4) indicated on a research of 22 developed countries from 1971 to 1990, that countries, which are more open to trade, positively influence TFP from the foreign R&D stock. Also, the World Bank study of 77 developing countries throughout the 20-year period confirms higher productivity of the countries that are more open to international trade and foreign R&D. This also points to the relationship of productivity with the knowledge spillover (McKinsey, 2013, p. 25).

Furthermore, knowledge spillovers might also be the consequence of foreign direct investment (FDI). This might occur in two different ways; whether domestic firms reach increase in productivity via purchases from foreign-owned multinational subsidiaries, or multinationals intentionally commence operations abroad in order to benefit from the local firm's knowledge in the host countries. Moreover, international knowledge spillovers might also occur through direct learning about foreign technologies, namely through the exchange of blueprints at prices which are lower than the costs originally incurred by the innovator. Finally, interactions between workers are the most common channels through which knowledge is spread over between firms from the same industry; through patents, conferences, informal contacts and knowledge-sharing between workers (BIS, 2012, p. 15 -16).

In addition, investments that are risky and cannot be collateralized, like R&D, are largely exposed to spillovers. Even intellectual property protection laws cannot always protect innovation spillover effect (Stiglitz & Greenwald, 2014, p. 68). Knowledge spillovers from R&D indicate different conclusions on a macro and micro level. Estimates demostrate that countries which are in favour of taking advantage of knowledge spillovers, are more likely to grow rapidly and approach to income convergence. Macroeconomic studies have, in general, identified higher social than private rates of return on R&D, thus indicating positive spillovers on a level of the whole economy. This indicates the probable collective underinvestment in R&D due to the combination of the positive spillover effect from R&D at the national level with international the knowledge spillovers (EIB Papers, 2009, p. 18-19). Therefore, policy makers must consider and stabilize incentives for the knowledge formation against the rapid knowledge dispersion.

Because social benefits of the R&D exceed private return of the firm's research, subsidies can balance the difference. For the sustainable, smart and inclusive growth, the EU

disposes with the European funding opportunities 2014-2020 programme, tackling intangible capital within the knowledge, innovation and digital society priorities. Horizon 2020 is with a disposed budget of EUR 80 billion the world's largest funding programme for research and innovation. The EU stimulates the collaboration of the business community, the academic world and governments within and outside country's borders to join forces in order to boost the European development and innovation (Subpoort, 2014). Moreover, subsidies, collaborations with universities or public labs, and venture capital markets are complementary means to solve the financing problem (Mohnen, b.l., p. 4). In order to mitigate market failures such as spillovers, and, at the same time, support business R&D, governments additinally contribute through tax incentives which were in 2013 implemented in 27 OECD countries. In 2011, Slovenia was beside the Russian Federation, Korea and France, one of the countries which ensured the most combined funding and other support for business R&D as a percentage of GDP (OECD, 2013c). In Slovenia, investments in R&D tolerate companies to claim a 100% tax deduction. Moreover, investments in equipment and intangible assets are 40% tax deductible (DURS, 2014). In under-developed specific regions in Slovenia (the Pomurska region), companies are justified to use tax reliefs up to 70% of the invested expense in new equipment and intangible assets (Prašnikar et al., 2014, p. 225).

Investment in intangible capital varies among countries also due to different programmes of industrial policies. Intangible assets and national policy are strongly related because the share of intangibles in total investment is increasing. Therefore, the policy has to be readjusted and must provide adequate incentives for private investments in intangibles (OECD, 2013a, p.28-29). Countries, identified as intensive investors in intangible capital, are also indicated to have a more favourable industrial policy. This is the case in the U.S. and Finland, which performed significantly better in comparison to the EU and Slovenia.

The EU and the U.S. have similar economic aims regarding knowledge based capital, however there are several differences in their approaches. An environment, supportive for investment and entrepreneurship, is better organized and managed in the U.S. than the EU due to its more dynamic entrepreneurial activity, which tends to be larger in sectors where knowledge based capital is the most intensive (especially within new and high technology sectors) (OECD, 2013a, p. 30). Moreover, the U.S. has a better developed system of financing firms which are intensive in intangible capital investment, resulting in positive, considerable and independent impact on innovation and economic growth (OECD, 2013a, p. 31). The U.S. also has a more flexible and less supervised state aid policy. State aid measures, such as tax cutting instruments and (horizontal and sectoral) spending instruments, have been after 2007 much more significant in the U.S. Tax crisis measures in the period 2008-2010 amounted in the EU -1.2% of GDP, while in the U.S. their share represented -3.2% of GDP. Also, spending crisis measures were in the U.S. almost five times higher than in the EU, accounting for 2.4% of GDP. There have also been considerable differences between the U.S. and the EU crisis sectoral aid for the period after

2008, since the U.S. received much more funds through crisis measures. Across all the presented sectors, the U.S. crisis sectoral measures were significantly higher than in the EU, especially for R&D innovations, amounted to 0.11% of GDP while in the EU, aid presented 0.02% of GDP, resulting in a higher level of intangible investment and innovation activity in the U.S. and a much weaker competitive position of the EU (Prašnikar et al., 2014, p. 23, 24).

Finland is one of the most R&D intensive economies in Europe. Intangible capital accounts for 6.7% of the new value added, thus contributing a substantial part in ranking it as one of the most successful and innovative societies (Piekkola, 2011b, p. 2). The Finnish industrial policy is strongly committed to innovation and R&D, in both public and private sectors, which is one of the main reasons why the country developed a strong reputation for innovation. However, during the first half of the 1990s, Finland experienced a deep economic crisis, which required drastic measures in order to stabilize the situation. Most public expenditures were cut, except the expenditure for R&D, which was increased and so helping to build the ground for a strong recovery of the whole economy. Finally, this helped the Finnish economy to become stronger and one of the most knowledge-intensive economies (OECD, 2009, p. 11). The country achieved a steady growth in government expenditures on R&D in the pre-crisis years with a recorded steady movement along the crisis. The Finnish Funding Agency for Technology and Innovation (TEKES) strived to revive the economy with low-interest loans or grants, thus providing financial support for industrial R&D projects as well as projects in universities and research institutes. Each year from 2006-2013, the Finland's funds for R&D have been increasing; from EUR 1.4 billion in 2013 to EUR 1.98 billion in 2013. Therefore, public funds for R&D in 2006-2012 have in Finland been approximately three times higher than in Slovenia (EUR 317 million per one million habitants in Finland and EUR 113 million per one million habitats in Slovenia). The highest portion of R&D funds is devoted to universities, followed by the government research institutes sector (covering together with universities 70% of government's funds) and business (15% of funds). The well-developed and successful link between universities, research institutes and the real sector has supported an efficient allocation of knowledge, technologies and innovation (Prašnikar et al., 2014, p. 52-56).

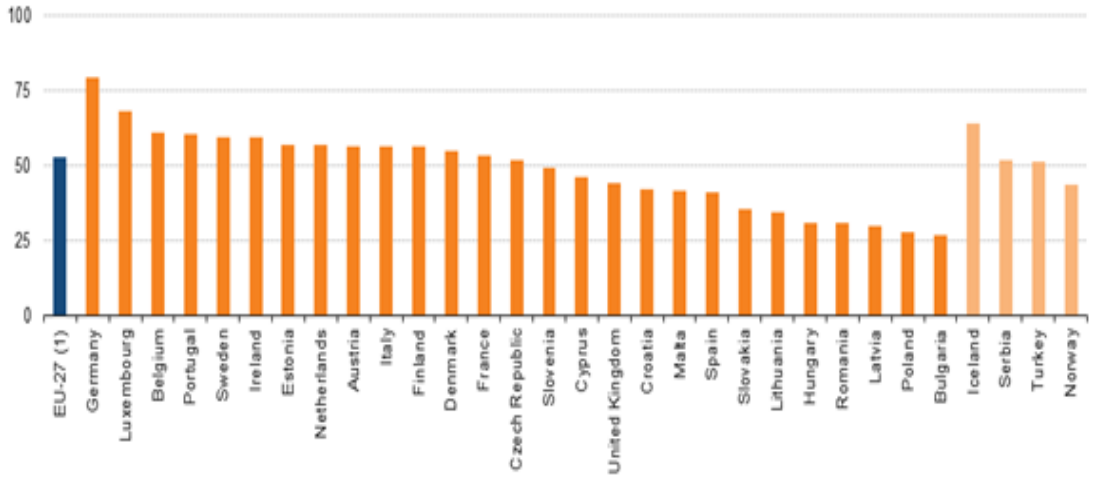
4.2.3 Contributions of industrial policy

One of the main features of the industrial policy is the country's level of innovation since it is an important driver of competitiveness and contributes a great deal to the general European goals (EU2020 objectives and the Innovation Union objectives). Based on Ebersberger, Herstad, Iversen, Kirner and Som's (2011, p. 74) research, open innovation activities jointly define innovation performance substantially. Slovenia has some strong exporting companies, particularly in the industry of packaged medicaments (representing 8.3% of the Slovenian export), cars (8.0%), refined petroleum (3.3%), vehicle parts (2.8%) and electric heaters (1.8%) (Observatory of Economic Complexity, 2014). These producers

are oriented especially to Western markets, which depend heavily on innovation and knowledge, thus relying on the open innovation model (as their main source of competitive advantage). Firms oriented in foreign trade and export have the chance to observe, absorb and familiarize ideas and knowledge available outside the firm to increase their own innovation potential and, besides, also influence other objects within the economy to benefit from their opportunity and gained practices. The research by Prašnikar et al. (2014, p. 244) carried out a sample of 446 Slovenian firms on the status of open innovation, reveals that the majority of investigating firms in Slovenia are not familiar with the term of open innovation (14%) or are not adopting and even do not plan to adopt the approach of open innovation (63%). The remaining firms are planning to adopt it (21%) or are already in the early phase of open innovation adaptation (8%). Moreover, Slovenian firms prefer the traditional practices, such as scanning the external environment for new ideas and trying to obtain new technology through acquisition process with external partners. They are not favourable to new practices of open innovation, which are more uncertain and at higher risk, such as crowdsourcing, start-up competitions, customer and consumer co-relation knowledge and intellectual property activities, in order to adopt new idea and knowledge. However, they benefit from outwardly available ideas on the market or within networks, obtain external technology and are involved with collaborative innovation processes (Prašnikar et al., 2014, p. 248). This is also evident from Eurostat data, confirming that the highest proportions of innovation co-operation among the EU-27 partners were besides Cyprus (62% of all product and process innovative enterprises) and Austria (51%) also found in Slovenia (45%). Moreover, Finland (12%), Sweden (11%) and Slovenia (8%) cooperated the most with partners in the United States regarding innovation activities, and the same countries also had the largest share of innovation co-operation with associates in India or China, amounting in Finland to 9%, Sweden 7%, Luxembourg and Slovenia (both 6%) (Eurostat, 2013).

Figure 18 shows the proportion of innovative enterprises from 2008-2010 as a percentage of all enterprises in the EU-27 (excluding Greece). Among the EU-27 Member States, during the period 2008–10 the highest shares of innovative enterprises were recorded in Germany (79.3% of all enterprises), followed by Luxembourg (68.1%), Belgium (60.9%) and Portugal (60.3%). The lowest level was observed in Bulgaria (27%), Poland (28%), Latvia (30%), Romania and Hungary (both 31%). Slovenia, with a little lower share than 50%, ranks below the EU-27 average, which amounted to 52.9%. In Slovenia, the main objective for the increase of innovation activities was the overall increased range of goods and services (Eurostat, Science, Technology and Innovation in Europe, 2012, p. 70).

Figure 18: The share of innovative enterprises, 2008–10 (% of all enterprises)



*excluding Greece

Source: Eurostat, *Innovation Statistics*, 2014b, Figure 1.

The approach by Stiglitz and Greenwald, which promotes the role of the government as a complementary activity to the market operation, proved to be adequate also in the case of Slovenia in order to stabilize its economy. Based on the SIP (2013, p. 24) programme, the Slovenian strategy should primary be focused on improving the business environment; strengthening entrepreneurship and innovation – focusing support on new, innovative and growing companies; acting responsively to social challenges – focusing support on promising technological and industrial areas; and finally, on activities for the long-term development of the industry. Policy makers should ensure a well-functioning product and labour market and a system of financing which would stimulate investments in intangible capital. The concept of innovation should be expanded by the policy makers since R&D as the most known category is only a portion of all existing intangible capital, which includes also other important elements, such as design, data, organisational capital, etc. The policy should also encourage the development and commercialisation of firms' new ideas by stimulating them to experiment, and lowering the cost of failure. Furthermore, an efficient judicial system with a credible intellectual property rights system plays a significant role in order to increase knowledge-based capital, supporting pro-competition policies and focusing on the patent quality. The competition policy should ensure an effective competition law in order to protect and stimulate innovation. Finally, the tax system should be attractive, impartial and reinforcing for potential growth opportunities (OECD, 2013a, p. 18-19). However, as suggested in my research questions, productivity, growth and competitiveness are affected by intangible investments, and the EU and national policy strategies are giving priority to those types of investments. The industrial policy supports the competitiveness and growth of the economy and stimulates structural change, but the companies as the real agents undertake the last actions of alteration and development.

4.2.4 Slovenia and the industrial policy

Since the independence in 1990, Slovenia has recoursed the Stiglitz and Greenwald (2014) approach, favouring industrial policy in order to increase social welfare. However, their model of industrial policy does not advocate state aid since it forms national champions and rent-seeking subjects. Although they do support the state aid during an economic downturn to, otherwise, economically significant but temporarily unsuccessful and unprofitable companies to restrain their bankruptcy, Slovenia used different forms of state aid over the longer period of time. However, it did not explore all the possibilities of privatization of old companies, the stimulation of SME and the expansion to more external markets, but it did manage to overcome the transitional period and stabilize its economy (Prašnikar et al., 2014, p. 184-189). During the period of 2003–2008, the Slovenian economy recorded a steady macroeconomic growth and favourable international assessments, accompanied by three major events: becoming an EU Member state in 2004 and joining the European Monetary Union and the OECD. As Stiglitz and Greenwald (2014) suggest, macroeconomic stability is crucial for the successful implementation of the industrial policy. In that period, one of the main goals of the Slovenian policy was also to enhance the creation of knowledge, thus resources were aimed at the development of university incubators, involvement in different EU programmes, which strongly influenced innovation and, consequently, greater investment in knowledge-based capital (Prašnikar et al., 2014, p. 193-203; SIP, 2013). Moreover, in that time, the Slovenian model of industrial model also changed from the conventionally used state aid and strong regulation mechanisms to support companies toward the European competitiveness model. Since 2008, the most turbulent period after independence followed (Prašnikar et al., 2014, p. 224). The downturn in 2009 revealed the economy's structural weaknesses. At that time, economical performance of Slovenia drastically changed. Especially the productivity was lagging behind and the performance in terms of the new company establishment and technology transmission was pretty weak, and the number of high-technology firms was relatively small, consequently resulting in a low share of high-technology and service exports as a portion of total exports (OECD, 2012, Science and innovation: Slovenia, p. 2). Also, Slovenia attracted a very low level of FDI, thus ranking as one of the worst countries in Europe, even though it has a highly educated labour force, solid infrastructure, and a location close to the European supply chains. The main reason resides in a high level of state control which restricts entry, competition, efficiency, and encourages moral hazard. Therefore, reforms in the direction of ensuring a more attractive environment for FDI should be performed (IMF, 2014, p. 20). During the recession, state aid grew from 0.87% of GDP in 2008 to 2.9% of GDP in 2012, especially in the increase for horizontal aid (Prašnikar et al., 2014, p. 224) (Ministry of Finance, 2011, 2012, Ministry of Finance Fourteenth Report of State Aid in Slovenia). In that period, the government was concentrated mainly on the banking sector, however, each government intervention in the industry was indicated as the industrial policy, differentiating only on the basis of the approach.

The role of the industrial policy in Slovenia is due to its industry structure essential for the economic development. The manufacturing in Slovenia contributes over 20% of total added value in comparison to the EU average, which amounts approximately to 15%. Moreover, at least a quarter of the service activities are correlated to industry and 80% of total private R&D investment is associated to industry. Thus, the main source of innovation in the country presents the industry (SIP, 2013, p. 54).

However, Slovenia continues to focus on fostering business R&D and innovation, which strongly depends on intangible capital. The country disposes with a mix of instruments, grants, tax incentives and instruments, such as loan guarantees, mezzanine capital and equity which would stimulate and help implement investment in intangible capital. Moreover, the Slovene Enterprise Fund was established in order to grant start-up capital for new companies, focused on innovation activities. Furthermore, mentor, as well as process voucher schemes have also been formed. Slovenian Economy Development Centres, Competence Centres and Centres of Excellence, additionally, help in knowledge flows and commercialisation, dealing with co-operation through partnerships between industrial partners and academia and, thus, linking up important subjects in the process (OECD, 2012, Science and innovation: Slovenia, p. 2). The Development Centres represent the incubation entrepreneurship environment, proposed for the integration, networking and development of young, perspective and technologically advanced companies with large, successful and established companies in key fields (automotive and electrical industry, electronics, energy, pharmaceuticals and biotechnology, information and communication technology, wood processing industry, logistics, new materials). The Competence Centres collaborate with the leading Slovenian companies with the aim of strengthening the competitiveness of Slovenian industry in international markets on the long term. The Centres of Excellence, led and managed by public research organisations, operate with the goal of creating the environment and new knowledge for applied research and further on its development and implementation (SIP, 2013, p. 7). All these instruments and programmes aim to support innovation and longer-lasting elements to achieve values such as intangible capital.

CONCLUSION

In the context of the Master's thesis the impact of intangible capital on the recent economic performance within the EU and Slovenia has been indicated. On the basis of theoretical-empirical research in the Master thesis important conclusions could be drawn.

First of all, the role of intangible capital is gaining attention globally and at the national levels, especially within advanced economies. Thus, economic growth, value added and productivity growth depend on knowledge creation; not just technology and innovation, but intangible capital in general. Competitive advantages of the countries are moving from investments in physical toward investments in intangible capital, such as R&D, design,

brand equity, software, and human and organisational capital. The research points to the importance of intangible capital in a source of growth model on a macroeconomic level and as an essential driver of individual firm's value creation. The researches indicate that intangibles as such increase the productivity growth and lessen TFP (and MFP). However, the findings suggest that macro indicators of economic performance change quite significantly when different approach measurement is applied, consequently strongly indicating the issues that are worth pursuing. Omitting intangible capital in national accounts indicates an underestimated GDP level by 5.5% in the EU-27 area and labour productivity growth of 10-20%. Thus, omitting the intangible capital from the growth analysis outlines a biased picture of the growth process.

The value of intangibles varies among countries, however, in some advanced economies the value of intangibles approaches or even exceeds the value of tangibles (this is the case in the U.S. and the UK) and therefore shows a higher GDP intensity for intangibles than for tangibles. However, in other European countries, the growth contributions derived from intangible capital deepening are smaller or similar to the growth contribution of tangible capital. This is also the case in Slovenia. The structure of investments in different categories of intangible capital varies among countries, however, in the majority of observed countries, R&D, considered as the main element of intangibles, presents only a small portion of the whole share of intangibles, while economic competencies and other innovative property represent a much larger share of total intangible investment.

The measurement of intangibles poses additional challenges, especially due to the incomplete or imperfect data on those business expenditures related to intangibles and unharmonized measurement procedures among countries. Policy makers within the EU with a variety of programmes and a carefully set industrial policy are strongly focused not only on promoting knowledge economy and ensuring healthy and attractive business environment but also on ensuring common guidelines and procedures of measuring intangible assets on the micro and macro level.

Countries should further on focus on investing in intangible capital, creating sustainable knowledge economy, and, at the same time, encourage and improve measurement procedures, which primarily start in people's mind. Intangible capital is proved to be an important and indispensable factor of understanding growth economy, productivity gaps and other disparities among countries.

REFERENCE LIST

1. Adams, M., & Oleksak, M. (2011). *Intangible Capital: Putting Knowledge to Work in the 21st Century Organization.* Praeger, 2011.
2. Albu, N. (2011). Research and Development spending in the EU: 2020 growth strategy perspective. *Working paper FG 1, 2011/ Nr. 08.* Retrieved August 18, 2014, from http://www.swp-berlin.org/fileadmin/contents/products/arbeitspapiere/Research_and_Development_KS.pdf
3. Baldwin, J., Gu, W., & Macdonald, R. (2012). The Canadian Productivity Review. Intangible capital and productivity growth in Canada. Ottawa: Statistics Canada, 2012. Retrieved October 5, 2014, from http://www.statcan.gc.ca/pub/15-206-x/15-206-x2012029-eng.pdf
4. Baldwin, J., & Gu, W. (2007). Multifactor Productivity in Canada: An Evaluation of Alternative Methods of Estimating Capital Services. Ottawa: Statistics Canada, 2007. Retrieved October 5, 2014, from http://www.indexmeasures.com/dc2008/papers/Paper%20on%20captial%20services%20in%20Canada.pdf
5. Baldwin, R., & Wyploz, C. (2003). Manuscript for the Economics of European Integration. Retrieved September 10, 2014, from http://www.cer.ethz.ch/resec/teaching/seminar_aussenwirtschaft_wt_04_05/baldwin_wyplosz_chap_7.pdf
6. Barnes, P. (2010). Investments in Intangible Assets and Australia's Productivity Growth. Melbourn: Australian Government, Productivity Commision. Retrieved August 18, 2014, from http://www.pc.gov.au/__data/assets/pdf_file/0007/99907/intangible-investment-sectoral-estimates.pdf
7. BIS – Department for Business Innovation & Skills. (2012). *The impact of investment in intangible assets on productivity spillovers*. BIS Research Paper Number 74. London: BIS. Retrieved October 26, 2014, from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32323/12-793-investment-intangible-assets-on-productivity-spillovers.pdf
8. Blaug, R., & Lekhi, R. (2009). The Work Fundation. Accounting for intangibles: Financial reporting and value creation in the knowledge economy. Retrieved June 3, 2014, from http://www.theworkfoundation.com/downloadpublication/report/223_223_intangibles_final.pdf
9. Bournaki, I., & Vecchi, M. (2010). Tangible and Intangible Capital and the Pattern of Specialisation in the EU. Review of Economics and Institutions. Retrived November 4, 2014, from https://www.google.si/url?sa=t&rct=j&q=&esrc=s&source=web&cd=10&cad=rja&uact=8&ved=0CF4QFjAJ&url=http%3A%2F%2Fwww.rei.unipg.it%2Frei%2Far

ticle%2Fdownload%2F16%2F20&ei=UhNZVNjHFYKt7Aax9oHwBg&usg=AFQjCNFeyyMxIcFqldUa8hZVYHU-DjOG9g&sig2=BpcBSGO7_nl9C5CkKGwIug&bvm=bv.78677474,d.aWw

10. Brown, N., & Kimbrough, M. (2011). Intangible Investment and the Importance of Firm-Specific Factors in the Determination of Earnings. *Working Paper No. RHS-06-145.* Retrieved October 24, 2014, from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1760140
11. Coe, D., Helpman, E., & Hoffmaister, A. (2008). International R&D Spillovers and Institutions. *IMF Working Paper WP/08/104*. Retrieved October 20, 2014, from https://www.imf.org/external/pubs/ft/wp/2008/wp08104.pdf
12. Coe, D., Helpman,E., & Hoffmaister, A. (2008). International R&D Spillovers and Institutions. *IMF Working paper WP/08/104*. Retrieved October 13, 2014, from https://www.imf.org/external/pubs/ft/wp/2008/wp08104.pdf
13. Hulten,C., Hao, J., & Jaeger, K. (2010). *Macro v.s. Micro Comparisons of Intangible Capital: The Case of Germany and the U.S*. Retrieved October 27, 2014, from http://www.coinvest.org.uk/pub/CoInvest/CoinvestProjects/Slides_TCB_HHJ.pdf
14. Jäger, K., & Tank, A. (2010). *Intangible Investment and Economic Growth across Countries. Main Conclusions.* Retrieved November 17, 2014, from http://www.coinvest.org.uk/pub/CoInvest/CoinvestLondonfinal/TCB_COINVEST_MEETING_LONDON.pdf
15. *COINVEST*. Retrieved September 2, 2014 http://www.coinvest.org.uk/bin/view/CoInvest
16. CORDIS – Community research and development Information Service. (2014). OTH-Lisbon Strategy - The Lisbon Strategy for growth and jobs. Retrieved August 18, 2014, from http://cordis.europa.eu/programme/rcn/843_en.html
17. Corrado, C., Haskel, J., Lasinio, C., & Iommi, M. (2011). Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results. Retrived November 3, 2014, from http://www.coinvest.org.uk/pub/IntanInvest/WebHome/Methods_and_Comparative_Data_-_June_2012-7.pdf
18. Corrado, C., Haskel,J., Jona-Lassinio, C., & Iommi, M. (2011). Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results. Retrieved August 18, 2014, from http://www.coinvest.org.uk/pub/IntanInvest/WebHome/Methods_and_Comparative_Data_-_June_2012-7.pdf
19. Corrado, C., Haskel,J., Jona-Lassinio, C., & Iommi, M. (2014, July). Intangibles and industry productivity growth: Evidence from the EU. INTAN Invest. Retrieved September 5, 2014, from http://www.iariw.org/papers/2014/LasinioPaper.pdf
20. Corrado, C., Hulten, C., & Sichel, H. (2006). Intangible Capital and Economic Growth. *NBER Working paper, No. 11948*.

21. Corrado, C., Hulten, C., & Sichel, H. (2009, September). Intangible Capital and U.S. Economic Growth. Retrived July, 10, 2014, from http://www.conference-board.org/pdf_free/IntangibleCapital_USEconomy.pdf
22. Crescenzi, R., & Rodriguez-Pose, A. (2011). Innovation and Regional Growth in the European Union. Springer: London, 2011. http://books.google.si/books?id=QyWk0OFDH7oC&pg=PA31&lpg=PA31&dq=accumulation+innovation+activities+EU&source=bl&ots=Ng2piizlyw&sig=iBl0_t8_Bny0xRXCSPkxODW4Pvc&hl=en&sa=X&ei=6i1yVNfPLIe4ygOFq4L4Bw&ved=0CDcQ6AEwAw#v=onepage&q=accumulation%20innovation%20activities%20EU&f=false
23. Danthine, J., & Jin, X. (2006). Intangible Capital, Corporate Valuation and Asset Pricing. Swiss Finance institute, *Research Paper Series N.06-18.*
24. DURS. (2014). Splošno mnenje o uveljavljenih dejavnostih v okviru davčnih olajšav za vlaganja v raziskave in razvoj (RR). Retrieved December 27, 2014, from http://www.durs.gov.si/si/davki_predpisi_in_pojasnila/davek_od_dohodkov_pravnih_oseb_pojasnila/davcne_olajsave/splosno_mnenje_o_uveljavljenih_dejavnostih_v_okviru_davcnih_olajsav_za_vlaganja_v_raziskave_in_razvoj_rr/
25. Ebersberger, B., Herstad, S., Iversen, E., Kirner, E., & Som, O. (2011). Open Innovation in Europe: effects, determinants and policy. Retrieved November 25, 2014, from http://www.oi-net.eu/m-oinet-network/m-tools-resources/m-public-library/oi-reports-and-surveys/6-open-innovation-in-europe-effects-determinants-and-policy/file
26. EC - European Commission. (2013). Investing in Intangibles: Economic Assets and Innovation Drivers for Growth. Flash Eurobarometer 369 - TNS Political & Social. Retrieved August 30, 2014, from http://ec.europa.eu/public_opinion/flash/fl_369_en.pdf
27. EC – European Commisssion. (2010). EUROPE 2020 - A strategy for smart, sustainable and inclusive growth). Brussels: European Commission, 2010. Retrieved August 18, 2014, from http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF
28. EC- European Commision. (2011). Innovation Union Competitiveness Report 2011. Retrieved November 25, 2014, from http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/iuc2011-full-report.pdf
29. EC- European Commision. (2014a). Press release. Europe more innovative but regional differences persist. Retrieved December 22, 2014, from http://europa.eu/rapid/press-release_IP-14-198_en.pdf
30. EC- European Commision. (2014b). Taking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth. Retrieved September 20, 2014, from http://ec.europa.eu/europe2020/pdf/europe2020stocktaking_en.pdf
31. EC - European Commision. (2014c). Regional Innovation Scoreboard 2014. Retrieved November 22, 2014, from http://ec.europa.eu/enterprise/policies/innovation/files/ris/ris-2014_en.pdf

32. EC – European Commision. (2014d). Industrial Policy Communication 2014. Retrieved November 24, 2014, from http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/communication-2014/index_en.htm
33. EC – European Commision. (2014e). For a European Industrial Renaissance. Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions. Retrieved November 24, 2014, from http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0014&from=EN
34. EC – European Commision. (2014f). One trillion euro to invest in Europe's future – the EU's budget framework 2014-2020. Retrieved December 22, 2014, from http://europa.eu/rapid/press-release_IP-13-1096_en.htm
35. EC – European Commision. (2014g). Annual Report on European SMEs 2013/2014. A Partial and Fragile Recovery. Retrieved December 22, 2014, from http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/performance-review/files/supporting-documents/2014/annual-report-smes-2014_en.pdf
36. *Economic growth. Labour productivity growth.* Retrieved September 18, 2014, from http://www.sparknotes.com/economics/macro/growth/section1.rhtml
37. *Enterprise and Industry - Industrial policy.* (2014). Retrieved August 18, 2014, from http://ec.europa.eu/enterprise/policies/industrial-competitiveness/industrial-policy/index_en.htm
38. Ernst & Young. (2009). Acquisition Accounting: What's Next For You. Retrieved September 15, 2014, from http://www.ey.com/Publication/vwLUAssets/Allokering_av_merverdier_ved_oppkj%C3%B8p./$FILE/TAS_Acquisition_accounting_Whats_next_for_you.pdf
39. Etzkowitz, H., & Viale, R. (2010). The Capitalization of Knowledge. A triple Helix of University-industry-Government. Cheltenham: Edward Elgar Publishing Limited.
40. EU KLEMS. (2011). Content EU KLEMS database November 2009. Retrieved November 13, 2014, from http://www.euklems.net/data/09i/sources/Contents_09I_release.pdf
41. EU KLEMS-Growth and Productivity Accounts: November 2009 Release, updated March 2011. Retrieved September 2, 2014 http://www.euklems.net/
42. Europe 2020 - Flagship initiatives. (2012). Retrieved August 18, 2014, from http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/flagship-initiatives/index_en.htm
43. *Europe 2020 Targets: Research and Development*. Retrieved December 5, 2014, from http://ec.europa.eu/europe2020/pdf/themes/15_research__development.pdf
44. Europe 2020. (2014). Europe 2020 in a nutshell. Retrieved August 18, 2014, from http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/index_en.htm
45. *Europe 2020. Making it happen: the European Semester*. Retrieved December 10, 2014, from http://ec.europa.eu/europe2020/making-it-happen/index_en.htm

46. *Europe 2020. Other tools for growth and jobs.* Retrieved December 10, 2014, from http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/eu-tools-for-growth-and-jobs/index_en.htm
47. European Investment Bank - EIB Papers. (2009). R&D and the financing of innovation in Europe. Stimulating R&D, innovation and growth. *Volume 14, No. 1.* Retrieved August 29, 2014, from http://www.eib.org/attachments/efs/eibpapers/eibpapers_2009_v14_n01_en.pdf
48. EUROSTAT. (2012). Science, technology and innovation in Europe. 2012 edition. Retrieved November 25, 2014, from http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-GN-12-001/EN/KS-GN-12-001-EN.PDF
49. EUROSTAT. (2013). Seventh Community Innovation Survey. Retrieved November 25, 2014, from http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/9-11012013-AP/EN/9-11012013-AP-EN.PDF
50. EUROSTAT. (2014a). Gross fixed capital formation (investments) – GFCF. Retrieved December 5, 2014, from http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tec00011&language=en
51. EUROSTAT. (2014b). Innovation Statistics. Retrieved November 25, 2014, from http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Innovation_statistics
52. EUROSTAT. (2014c). Investment by institutional sectors. Retrieved October 12, 2014, from http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=TSDEC210
53. EUROSTAT. (2014d). Multiannual enterprise statistics - intangible investment statistics for industry and construction. Retrieved October 12, 2014, from http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=SBS_IS_INV_R2
54. EUROSTAT. (2014e). Multi-yearly enterprise statistics - Intangible investment and subcontracting. Retrieved October 12, 2014, from http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/dataset?p_product_code=SBS_IS_2J_INTAN
55. Falk, M. (2013). New empirical findings for international investment in intangible assets. WIFO. *Working Paper no 30.* Retrieved June 3, 2014, from http://www.wifo.ac.at/jart/prj3/wifo/resources/person_dokument/person_dokument.jart?publikationsid=46891&mime_type=application/pdf
56. Fukao, K., Miyagawa, T., Mukai, K., Shinoda, Y., & Tonogi, K. (2009). Intangible Investment in Japan: Measurement and Contribution to Economic Growth. Review of Income and Wealth. *Series 55, Number 3*. Retrieved October 5, 2014, from http://onlinelibrary.wiley.com/doi/10.1111/j.1475-4991.2009.00345.x/pdf
57. Hao, J., & Haskel, J. (2011). Intangible Investment and Product Market Regulations. Retrieved November 17, 2014, from

http://www.ceriba.org.uk/pub/CERIBA/IntangHaskelHaoXcountry/intangibles_crosscountry_Hao_Haskel_2March2011.pdf
58. Haskel, J. (2008). Briefing: Innovation, the knowledge economy and intangibles. Retrived October 10, 2014, from http://www.coinvest.org.uk/pub/CoInvest/CoinvestInnintag/Intangibles_non-tech_brief-1.pdf
59. Haskel, J., & Westlake, S. (2014). Look to the Intangibles. *The Economist*. Retrived November 2, 2014, from http://www.economist.com/blogs/freeexchange/2014/02/investment
60. Haskel., J. (2012). Growth, Innovation and Intangible Investment. Retrieved September 3, 2014, from http://www.lse.ac.uk/researchAndExpertise/units/growthCommission/documents/pdf/contributions/lseGC_haskel_investment.pdf
61. Pisano, G., & Shih, W. (2009). Restoring American Competitiveness. *HBR-Harvard Business Review. Reprint R0907S.*
62. Pisano, G., & Shih, W. (2012). Does America Really Need Manufacturing? *HBR-Harvard Business Review. Reprint R1203G*.
63. Hulten, C., & Van Ark, B. (2007). Innovation, intangibles and economic growth: Towards a comprehensive accounting of the knowledge economy. Yearbook on Productivity 2007. Retrieved September 16, 2014, from http://econweb.umd.edu/~hulten/webpagefiles/innovation,%20intangibles%20and%20economic%20growth.pdf
64. Hulten,C., Hao, J., & Jaeger, K. (2010). Macro versus Micro Comparisons of Intangible Capital: The Case of Germany and the U.S. Retrieved October 27, 2014, from http://www.coinvest.org.uk/pub/CoInvest/COINVESTHulteninterim/COINVEST_HHJ_FINAL-1.pdf
65. Hunter, L., Webster, E., & Wyatt, A. (2011). Accounting for Expenditure On Intangibles. Retrieved September 1, 2014 http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1987267
66. IFAC-International Federation of Accountants. (b.l.). Policy trends in Intangible Assets. Retrieved November 21, 2014, from http://www.ll-a.fr/intangibles/overview.htm
67. IMF. (2014). Republic of Slovenia. 2013 Article IV Consultation. *IMF Country Report No. 14/11*. Retrieved November 25, 2014, from http://www.imf.org/external/pubs/ft/scr/2014/cr1411.pdf
68. INNODRIVE – National Intangibles Database. Retrieved September 2, 2014 http://innodrive.org/
69. Intangible Capital and Innovations: Drivers of Growth and Location in the EU. (2013). In *INNODRIVE*. Retrieved October 5, 2014, from http://cordis.europa.eu/publication/rcn/14284_en.html
70. *INTAN-Invest*. Retrieved September 2, 2014 http://www.intan-invest.net/

71. *International Accounting Standard 38 – Intangible Assets*. (2010). Retrieved September 3, 2014, from http://ec.europa.eu/internal_market/accounting/docs/consolidated/ias38_en.pdf
72. Jorgensen, D. (2002). Raising the Speed Limit: U.S. Economic Growth in the Information Age.
73. Kalin, J. (2011). Revision of the system of national accounts. Statistical Office of the Republic of Slovenia, National Accounts Sector. Retrieved September 1, 2014, from http://www.stat.si/StatisticniDnevi/Docs/Radenci2011/Kalin-revizija%20sistema%20nacion%20racunov-ppt.pdf
74. Lasinio, C., Iommi, M., & Manzocchi, S. (2011). Intangible Capital and Productivity Growth in European Countries. *Working Paper No. 91*. Retrieved November 6, 2014, from http://static.luiss.it/RePEc/pdf/lleewp/1191.pdf
75. Lynch, R. (2014*). SNA 2008 Implementation Issues with the Capitalisation of Research and Development*. Paper prepared for the IARIW 33rd General Conference. Rotterdam, the Netherlands. Retrieved September 3, 2014, from http://www.iariw.org/papers/2014/LynchPaper.pdf
76. Mackie, C. (2009). *Intangible Assets. Measuring and Enhancing Their Contribution to Corporate Value and Economic Growth*. Washington: National Research Council. Retrieved August 30, 2014, from http://www.nap.edu/catalog.php?record_id=12745&utm_expid=4418042-5.krRTDpXJQISoXLpdo-1Ynw.0&utm_referrer=https%3A%2F%2Fwww.google.si%2F
77. Majcen, B., Verbič, M., & Polanec, S. (2011). Innovativeness and intangibles: the case of Slovenia. *Working Paper No. 55, 2011*. Retrieved November 17, 2014, from http://www.ier.si/files/Working%20paper-55.pdf
78. Marrano, M., Haskel, J., & Wallis, G. (2007). What Happened to the Knowledge Economy? ICT, Intangible Investment and Britain's Productivity Record Revisited. *Working Paper No. 603, Department of Economics*. Retrived September 25, from http://www.economics.qmul.ac.uk/papers/doc/wp603.pdf
79. McKinsey & Company. (2013). *Innovation Matters. Reviving the Growth Engine*. Retrieved September 15, 2014, from http://www.slideshare.net/morellimarc/mckinsey-innovation-matters-2014
80. Mohnen, P. (b.l.).R&D Tax Incentives. *Innovation for Growth – i4g. Policy Brief N°25.* Retrieved December 27, 2014, from http://ec.europa.eu/research/innovation-union/pdf/expert-groups/i4g-reports/i4g_policy_brief__25_-_brief_RD_tax_incentives.pdf
81. Mrak, M., Rojec, M., & Silva-Jauregui. (2004). Slovenia: From Yugoslavia to the European Union. Washington, D.C.: The World Bank.
82. Nakamura, L. (2001). What is the U.S. Gross Investment in Intangibles? (At least) One Trillion Dollars a Year! Reserve Bank of Philadelphia, Working Paper. Retrived September 1, from http://www.phil.frb.org/research-and-data/publications/working-papers/2001/wp01-15.pdf

83. Nakamura, L. (2009). Intangible Assets And National Income Accounting: Measuring A Scientific Revolution. Federal Reserve Bank of Philadelphia, *Working Paper No. 08-23*. Retrieved September 2, 2014, from http://philadelphiafed.org/research-and-data/publications/working-papers/2008/wp08-23.pdf
84. *Observatory of Economic Complexity. Slovenia.* (2014). Retrieved November 25, 2014, from http://atlas.media.mit.edu/profile/country/svn/
85. OECD Observer. (2011). Untangling intangible assets. Retrieved September 2, 2014, from http://www.oecdobserver.org/news/fullstory.php/aid/3556/Untangling_intangible_assets.html
86. *OECD Observer. Untangling intangible assets.* Retrieved September 16, 2014, from http://www.oecdobserver.org/news/fullstory.php/aid/3556/Untangling_intangible_assets.html
87. OECD. (2007, December). Glossary of statistical terms. Retrieved September 2, 2014, from http://stats.oecd.org/glossary/download.asp
88. OECD. (2010a). Handbook On Deriving Capital Measures Of Intellectual Property Products. Paris: OECD.
89. OECD. (2010b). Ministerial report on the OECD Innovation Strategy. Innovation to strengthen growth and address global and social challenges. Key findings. Retrieved November 22, 2014, from http://www.oecd.org/sti/45326349.pdf
90. OECD. (2011). A new OECD project. New sources of growth: Intangible Assets. Retrieved September 3, 2014, from http://www.oecd.org/sti/inno/46349020.pdf
91. OECD. (2012). Science and innovation: Slovenia. Retrieved November 25, 2014, from http://www.oecd.org/slovenia/sti-outlook-2012-slovenia.pdf
92. OECD. (2013a). Supporting Investment in Knowledge Capital, Growth and Innovation. Retrieved October 2, 2014, http://www.keepeek.com/Digital-Asset-Management/oecd/industry-and-services/supporting-investment-in-knowledge-capital-growth-and-innovation_9789264193307-en#page5
93. OECD. (2013b). Trade And Innovation Project. A Synthesis Paper. OECD Trade Policy *Working Paper No. 72*. Retrieved December 22, 2014, from http://www.oecd.org/trade/benefitlib/41105505.pdf
94. OECD. (2013c).Measuring R&D Tax Incentives. Retrieved December 27, 2014, from http://www.oecd.org/sti/rd-tax-stats.htm#business
95. Open Innovation Yearbook. (2014). Retrieved November 22, 2014, from http://ec.europa.eu/digital-agenda/en/news/open-innovation-20-yearbook-2014-giving-you-stimulus-and-ideas
96. Piekkola, H. (2011a). Economic Trends. Intangible Capital: the Key to Growth in Europe. Economic Trends. Retrieved October 5, 2014, from http://www.ceps.eu/system/files/article/2011/07/Intangible%20Capital%20Key%20to%20Growth%20in%20Europe.pdf

97. Piekkola, H. (2011b). Intangible Capital – Driver of Growth in Europe. Vaasa, Finland: University of Vaasa. Retrieved August 30, 2014, from http://www.innodrive.org/attachments/File/Intangible_Capital_Driver_of_Growth_in_Europe_Piekkola(ed).pdf
98. Polanec, S., & Verbic, M. (2011). Innovativeness and intangibles in transition: the case of Slovenia. Retrieved November 15, 2014, from http://mpra.ub.uni-muenchen.de/32127/1/MPRA_paper_32127.pdf
99. Prašnikar, J., Redek, T., & Memaj, F. (2012). *Albania: The Role of Intangible Capital in Future Growth.* Ljubljana: Časnik Finance, 2012
100. Prašnikar., J. (2014). *Industrial policy in retrospective.* Ljubljana : Časnik Finance.
101. Ramirez, P., & Hachiya, T. (2008). Measuring the Contribution of Intangibles to Productivity Growth: A Disaggregate Analysis of Japanese Firms. Review of Pacific Basin Financial Markets and Policies. *Vol. 11, No. 2, 151–186*. Retrived November 4, 2014, from http://www.worldscientific.com/doi/pdf/10.1142/S0219091508001301
102. Romer, P. (1990). Endogenous Technological Change. *Journal of Political Economy, S71-S99.*
103. Roth, F., & A. Thum. (2011). Does intangible capital affect economic growth? *INNODRIVE Working Paper No 3.* Retrieved November 6, 2014, from http://www.innodrive.org/attachments/File/workingpapers/Innodrive_WP_3_Roth2010.pdf
104. Shackleton, R. (2013). Total Factor Productivity Growth in Historical Perspective. *Working Paper 2013–01*. Retrieved August 18, 2014, from http://www.cbo.gov/sites/default/files/cbofiles/attachments/44002_TFP_Growth_03-18-2013.pdf
105. SIP – Slovenian Industrial Policy. (2013). Retrieved November 23, 2014, from http://www.mgrt.gov.si/fileadmin/mgrt.gov.si/pageuploads/DPK/SIP/SIP_-_vladni_dokument_EN.doc
106. Stiglitz, J., & Greenwald, B. (2014). *Creating a Learning Society: A New Approach to Growth, Development, and Social Progress*. New York: Columbia University Press.
107. Subpoort. (2014). European subsides. Retrieved December 27, 2014, from http://www.subpoort.com/en/Europe-International-business/european-subsidies-n.html
108. SURS- Statistical Office of the Republic of Slovenia. *Gross Domestic product, Slovenia, annually.* Retrieved November 17, 2014, from http://pxweb.stat.si/pxweb/Dialog/Saveshow.asp
109. System of National Accounts 1993 - 1993 SNA. Retrieved September 16, 2014, from http://unstats.un.org/unsd/nationalaccount/sna1993.asp
110. System of National Accounts 2008 - 2008 SNA. Retrieved September 16, 2014, from http://unstats.un.org/unsd/nationalaccount/sna2008.asp

111. System of National Accounts 2008. (1993). The System of National Accounts, 1993 (1993 SNA). Retrieved September 16, 2014, from https://unstats.un.org/unsd/nationalaccount/docs/1993sna.pdf
112. System of National Accounts 2008. (2009). The System of National Accounts, 2008 (2008 SNA). Retrieved September 16, 2014, from http://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf
113. The Conference Board. (2009). *Measuring Intangible Capital and Its Contribution to Economic Growth in Europe*. Retrieved August 30, 2014, from http://econweb.umd.edu/~hulten/L5/Measuring%20Intangible%20Capital%20and%20Its%20Contribution%20to%20Economic%20Growth.pdf
114. Timmer, M., Inklaar, R., O'Mahony, M., & van Ark, B. (2010). Economic Growth in Europe. A Comparative Industry Perspective. Cambridge University Press, 2010. Retrieved November 17, 2014, from http://assets.cambridge.org/97805211/98875/frontmatter/9780521198875_frontmatter.pdf
115. WEF – World Economic Forum. (2014). The Global Competitiveness Report 2014–2015. Retrieved November 27, 2014, from http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf
116. *What is Horizon 2020?* (2014). Retrieved November 25, 2014, from http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020
117. WIPO. (2011). World Intellectual Property Report. The Changing Face of Innovation. *WIPO Publication No. 944E/2011*. Retrieved October 24, 2014, from http://www.wipo.int/edocs/pubdocs/en/intproperty/944/wipo_pub_944_2011.pdf

APPENDIX

Table 1: Average annual change in labour productivity in the market sector and contribution of tangible and intangible deepening, labour quality and MFP growth, 1995 - 2006

	Germany 95-06	France 95-06	Italy 95-06	Spain 95-06	Austria 95-06	Denmark 95-06	**Average 95-06**	Czech Rep. 97-06	Slovakia 00-06	Greece 95-06	UK 95-06	USA 95-06
Excluding Intangible Capital												
LPG	1.61	1.83	0.26	0.36	1.99	1.54	**1.18**	4.50	6.30	3.21	2.90	2.75
Contribution												
*ICT-capital deep. (ex.software)	0.23	0.14	0.12	0.21	0.29	0.50	**0.20**	0.38	2.85	0.46	0.74	0.47
*Non-ICT cap.deep.	0.57	0.37	0.31	0.56	-0.08	0.28	**0.39**	1.76		1.52	0.36	0.30
Labour Quality	-0.16	0.44	0.24	0.68	0.24	0.19	**0.23**	0.34	0.49	0.73	0.26	0.20
MFP	0.98	0.88	-0.41	-1.10	1.49	0.57	**0.37**	2.02	2.97	0.51	1.54	1.78
Including Intangible Capital												
LPG	1.79	2.00	0.29	0.47	2.36	2.11	**1.32**	4.60	6.17	3.27	3.06	2.96
Contribution												
*ICT-capital deep. (ex.software)	0.20	0.12	0.11	0.19	0.26	0.44	**0.17**	0.35	2.72	0.45	0.63	0.40
*Non-ICT cap.deep.	0.48	0.31	0.29	0.49	-0.02	0.24	**0.34**	1.62		1.48	0.28	0.24
*Intangible capital deepening	0.38	0.48	0.12	0.12	0.55	0.72	**0.30**	0.68	0.21	0.24	0.69	0.83
Computerized information	0.07	0.15	0.03	0.05	0.13	0.29	**0.08**	0.06	0.04	0.06	0.16	0.18
Innovation Property	0.23	0.18	0.05	0.15	0.29	0.27	**0.16**	0.35	0.07	0.11	0.17	0.35
Economic Competencies	0.07	0.15	0.04	-0.08	0.13	0.17	**0.06**	0.27	0.10	0.07	0.36	0.29
Labour Quality	-0.15	0.40	0.22	0.64	o.22	0.17	**0.21**	0.31	0.46	0.71	0.22	0.18

MFP	0.88	0.69	-0.45	-0.96	1.35	0.53	0.29	1.64	2.78	0.40	1.23	1.33

*LPG=Labour Productivity Growth

Source: B. van Ark, J. Hao, C. Corrado and C. Hulten. *Measuring intangible capital and its contribution to economic growth in Europe*. 2009, p. 76, Table 4.