UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

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IMPROVING TRANSPARENCY IN THE EU FUNDING – THE ROLE OF COST-BENEFIT ANALYSIS

Ljubljana, September 2016 NINA KOLENC

AUTHORSHIP STATEMENT

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INTRODUCTION

In the context of the renewed "Lisbon agenda" European Union's (hereinafter: EU) cohesion policy is targeted to increasing growth, competitiveness and employment and contributing to sustainable development. To this end, the action of the European Union and the Member States were strengthened in four priority areas: unlocking business potential, investing in people and modernizing labour markets, knowledge and innovation and energy-efficiency and combating climate change (European Commission, 2008, p. 10). There are strong and legitimate expectations that cohesion policy will create a positive economic shock that will stimulate investment and help the recipient economies to achieve real convergence and economic take off. Main financial instruments used to promote cohesion policy to reduce socio-economic disparities between levels of development in various regions of the EU are grants out of Structural Funds (hereinafter: SF) and Cohesion Fund (hereinafter: CF)

As grants are made with public money, the European Commission (hereinafter: EC) applied the principle of transparency with Council Regulation (EC, Euratom) No 1605/2002 and Regulation (EU, Euratom) No 966/2012 of the European Parliament and of the Council. Transparency can facilitate better absorption and is one of the most important principles to prevent misuse of public money. Communication and transparency of EU Funds programmes and projects for regional development was put in the spotlight in 2005 within the European Transparency Initiative – this initiative insisted on Europeans having the right to know how and on what their taxes are spent.

Adequate transparency and publicity of EU funded projects are particularly important for effective governance for several reasons. One of them is that main financial source for EU funds are taxpayers and they have the right to know, how it is spent. The second reason is the amount of money. EU Funds constituted one third of the EU budget involving the disbursement of EUR 347.4 billion EUR over 2007–2013 period for projects in the member states, from which 81.9% of EUR were targeted at the least developed areas of the Union (the so-called Convergence regions), 15.6% were allocated to support objective Regional Competitiveness and employment and 2.5% to support objective European Territorial Cooperation. In the so called "recently associated member states" (associated in 2004: Cyprus, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Malta, Poland, Slovakia, Slovenia; associated in 2007: Romania and Bulgaria), estimations were made, that these financial allocations contribute at around 6% increase in their GDP's (Working for the regions, EU regional policy 2007–2013, 2008, p. 27). This represents the biggest transfer of resources to promote growth and convergence in Europe since the Marshall Plan (European recovery programme) that, established in June 1947, represented basis for allocation of USD 13 billion in the form of grants and loans to 17 European countries. Slovenia received EUR 4.2 billion via five financial instruments: European Regional

Development Fund (hereinafter: ERDF), European Social Fund (hereinafter: ESF), CF, European Territorial Cooperation and technical assistance (financed from ERDF). It was estimated that this financial support contributes 0.75% of annual increase in GDP and 1.7% increase in the employment rate.

To maintain transparency of the money allocation Council Regulation (EC) No 1083/2006 stipulates (article 40) the requirement for the member state or the managing authority to provide the Commission with list of information on major projects financing of regional programmes and projects including "a cost-benefit analysis, including a risk assessment and the foreseeable impact on the sector concerned and on the socio-economic situation of the Member State and/or the region and, when possible and where appropriate, of other regions of the Community".

Consequently cost-benefit analysis (hereinafter: CBA) became one of the most important analytical tools for economic and financial evaluation of regional development projects in the structural and CF implementation. It became the focus point of the decision-making process for EU cohesion policy as it provides a protocol for assessing the efficiency impacts of proposed policies with objective to evaluate the welfare change attributable to it. Florio (2007b) describes how the purpose for requiring CBA prior to the adoption of any public commitment to an EU-funded project (ex-ante CBA) is twofold: on the one hand, the financial analysis is used for assessing whether the project needs Community assistance, on the other hand, the results of the economic analysis have to show that the project is worthwhile and likely to contribute to the goals of EU cohesion policy. To set guidelines for transparent appraisal of the project's contribution to the welfare (benefits of the project) is one of the main goals of this thesis.

According to the EU Regulation No 1080/2006 on the "convergence" objective, ERDF focused its assistance in the 2007–2013 financing perspective on research, technological development, innovation and entrepreneurship. Article 4 contains description of the focus of ERDF assistance (supporting sustainable integrated regional and local economic development and employment), which should be achieved through research and technological development (hereinafter: R&TD), innovation and entrepreneurship, including strengthening research and technological development capacities, and their integration into the European Research Area, including infrastructures, aid to R&TD, notably in SMEs, and to technology transfer.

More detailed description of possible beneficiaries and main activities are described in the key national implementation document the Operational Programme for Strengthening Regional Development Potentials for the Period 2007–2013 (hereinafter: OP SRDP), mutually adopted by Slovenia and EC, the second development priority "Economic Development infrastructure", domain priority orientation "Development of education-

research infrastructure". Accordingly, EUR 128,782,285 was set aside in the beginning of the financial perspective (2007) in the national budget and additional EUR 3,552,021 in the second half of the year 2015 (additional resources were redistributed from other axis of the OP SRDP).

Purpose and goals of the Thesis. The main purpose of this thesis is to help policy-makers involved in public investment decision-making processes by critically reviewing the role of CBA in the framework of EU cohesion policy in the field of Research, Development and Innovation (hereinafter: RDI)[1], and to determine whether the role meets its goal – improving transparency in the EU funding. To meet this purpose, the thesis analyses processes and results of several existing analysis in the 2007–2013 EU financial perspective and draw lessons from this CBA experience.

To narrow down the research area, the thesis focuses on two types of public RDI projects: higher education institution (hereinafter: HEI) projects and research infrastructure (hereinafter: RI) projects. To further narrow down the research area, the thesis focuses on the quality and quantification processes of input data (primary elements of CBA), describing socio-economic benefits of the project.

Goals of the thesis are:

1. To analyse the role of the quality and quantification processes of input data in economic analysis and consequently the use of the CBA in the above defined research area,
2. To determine whether CBA really is a useful evaluation tool for decision-makers to make rationale choices regarding public fund allocation or is it only a tool that has to be used, but at the end has no real influence on the project choice,
3. To evaluate, to which extent CBA is (ab)used by beneficiaries to obtain EU grants for their projects and consequently to confirm (or deny) CBA's role in improving transparency in the EU funding and
4. To set guidelines for transparent appraisal of the project's contribution to the welfare (benefits of the project).

The main research question is: "can quality and quantification processes of input data estimating socio-economic benefits of the HEI and RI projects improve quality of economic analysis (as a part of CBA) and consequently its transparency (and efficiency)?".

In order to answer this question, it is necessary to answer several other questions:

1 For a deeper insight in a research of the publicly financed R&D projects, see also Link & Scott (2011), Weber & Bergan (2005).

1. How experts, preparing economic analysis, collect and use the data received by the beneficiaries? Are they independent or influenced by the beneficiaries, who are trying to receive EU grants? Is the quality of data sources high or low? Are expert's assumptions about macroeconomic, institutional, financial, behavioural, technical, and environmental variables, including assumptions about government implementation capacity, macroeconomic performance, and availability of local cost financing trustworthy?
2. How often benefit double-counting occurs?
3. Are (consequently) economic performance indicators Economic Net Present Value (hereinafter: ENPV), Economic Rate of Return (hereinafter: ERR) and benefit/cost ratio (hereinafter: B/C**)** of the projects analysed in this thesis real or are tailor made to satisfy the EU guidelines?

Methodology. To be able to reach purpose and goals and to answer research questions of the thesis, several different research methods are used. Firstly, a review (and analysis) of relevant literature, theoretical findings and regulatory rules to set theoretical and legal framework of the thesis are gathered and analysed. Secondly, a study of a best practice case, where CBA (prepared by the beneficiary, guided by the experts from the Joint Assistance to Support Projects in European Regions (hereinafter: JASPERS), and included in the documentation for direct application to European Union Commission for EU grant approval for major investment project) in the programming period 2007-2013 is analysed through:

1. Review of the quality of sources,
2. Evaluation of quality and reality of data used (as input for the CBA) and
3. Critical assessment of results of CBA.

Thirdly, data for three CBA prepared by the beneficiaries and used in the application documentation for EU grant for investment projects in the field of public higher education and science are gathered, analysed and compared with the findings from the best practice case.

Structure of the Thesis. In the introduction chapter of the document purpose and goals of the thesis are represented, including brief clarification of research area. It also provides some information about methodology used in the thesis and structure of the document. Section one provides historical and legal framework of the CBA in EU Cohesion policy (contextualisation of the problem). It includes overview of the basic legislation and relevant strategic documents on the national and international level with focus on the research area (RDI projects: HEI and RI). In section two, the concept of CBA as analytical tool is presented explicitly with the emphasis on the economic theory behind CBA, including the role of economic analysis and the quality and quantification processes of

input data describing socio-economic benefits. This section also includes detailed description of the CBA guidelines, recommendations for the EU financed projects and it represents the base for the following sections. The role of the CBA in the project appraisal and its limitations are also highlighted.

In the third chapter a study of a best practice case of CBA of a major EU-financed project is presented. Case is analysed (with emphasis on the role of the quality and quantification processes of input data in economic analysis and consequently the use of the CBA) and set as a bench mark for another analysis, prepared in the fourth chapter. What is important in this case is the fact that CBA analysis of this project went through meticulous scrutiny of JASPERS CBA experts in the first phase of the confirmation process for the EU co-financing and, in the second phase went through another examination executed by EC experts. At the end of the process the project received a positive decision for EU co-financing, so it is possible to conclude that this CBA analysis was prepared in accordance with EU guidance and recommendations and that it represents an example case of CBA.

In the fourth chapter three similar, but smaller projects are described, critically analysed and compared among themselves (also with emphasis on the role of the quality and quantification processes of input data in economic analysis and consequently the use of the CBA). In the second step a comparative analysis against the best practice case is prepared. In last chapter, concluding remarks regarding the findings made in the third and the fourth chapter are put forward including the appraisal of usefulness of the CBA analysis as a decision-making tool and evaluation of CBA abuse. After conclusion, the list of the literature and sources is presented. Document ends with appendixes A - L, whose role is to support the thesis with more comprehensive sets of data that provide necessary information for better understanding of the text in the main document.

1 HYSTORICAL, LEGAL AND OPERATIONAL CONTEXT OF THE COST-BENEFIT ANALYSIS

1.1 History of application

There are some disputes about the origins of CBA principles and its application. Some authors claim (i.e. Hanley & Spash, 1993, p. 4) that origins are in the United States as early as in 1808 where Albert Gallatin U.S. Secretary of Treasury was recommending the comparison of costs and benefits in water related projects (A. Gallatin "Report of the Secretary of the treasury on the Subject of Public Roads and Canals; made in pursuance of a Resolution Senate of march 2, 1807). Others (i.e. Pearce, Atkinson & Murato, 2006, Quah & Toh, 2012) claim the procedure, equivalent to the business practice of CBA, was first proposed in 1844 by the French engineer A. J. Dupuit, who was concerned with the economic justification for constructing roads and bridges, and he showed that the net benefits of construction were measured by the sum of the consumers' surplus (Pearce et al, 2006, p. 32).

Another important aspect of the CBA concept (the concept of externalities), also strongly related to the measurement of the welfare, was developed in 1920s by the English welfare economist Arthur Cecile Pigou (Quah & Toh, 2012, p. 6). He described non-economic and economic (social) welfare, listed groups of causes that effect the latter in actual modern societies and try to develop methods to assess and quantify desires and distant satisfactions of the human beings. He explains, that the chief effect is felt when the interval of time between action and consequence is long…. Large undertakings (such as tunnel between Ireland and Great Britain, works of afforestation or water supply) are handicapped by the slackness of desire toward distant satisfaction…the same is also responsible for a tendency to wasteful exploitation of Nature's gifts" (Pigou, 1932, pp. 27-28).

In 1930s the formal practice of CBA began in the U. S. public sector as an aid to federal government decision-making in the field of water resource development and flood control. In 1936 The US Flood Control Act mandated, that proposed projects were to be evaluated to ascertain, that the benefits outweighed the associated costs. It was soon accepted by numerous disciplines and government agencies[2]. In 1950 the first guide to CBA was produced, named "The Green book"[3], followed by the Budget Circular A-47 in 1952. In the academic sphere, the body of modern-day welfare economics which underlies CBA was established by Hicks (1939, 1943), Kaldor (1939) and others in the 1930s and 1940s. The Kaldor – Hicks "compensation principle" established the idea of hypothetical

[2] For more detailed history of development of CBA in the United States see Hanley & Spash (1993), Fuguitt & Wilcox (1999), Quah & Toh, 2012.

[3] Federal Interagency River Basin Committee, Subcommittee on Benefits and Costs (1950): Proposed Practises for Economic Analysis of River Basin Projects, a report.

compensation as a practical rule for deciding on policies and projects in these real – life context. All that is required is that gainers can compensate losers to achieve a potential Pareto improvement (Pearce et al, 2006, p. 32). A Pareto improvement is any action that makes at least one person better off and harms no one (Hall & Liebermann, 2013, p. 429). Pareto improvement and Pareto efficient are explained in chapter 3.2 Economic theory behind CBA.

In 1950s to late 1970s use of CBA techniques and theories in U.S. gradually refined and rapidly expanded to public goods such as wildlife, air quality, human health and aesthetics. By the early 1960s the basic principles of CBA had been set out. CBA In 1958 Eckstein related them to welfare economic foundation. Followed by Krutilla and McKean (and others like Maass, Kneese, Clawson and Knetch), the firm theoretical framework for CBA based on neoclassical welfare economics on which current CBA practices stand was set-up. Development of CBA in this period is described more thoroughly in Hualey & Spash, 1993, pp. 4-5 and Quah & Toh, 2012, p. 7.

Eventually CBA spread to Britain in the 1960s (transport investments) as well as to other Western countries. The traditional technique therefore evolved within the context of the more advanced industrialized countries (Fuguitt & Wilcox, 1999, p. 3). A variant, referred to as "modern" CBA, was created in the 1970s, adapting the analysis to address the special circumstances of less developed countries and inform multilateral finding decisions.

Over the 1960s and 1970s the use of CBA spread not just from the U.S. to European countries, but also to less developed countries as well as international organisations, such as Organisation for Economic Co-operation and Development (hereinafter: OECD), United Nations Industrial Development Organisation (UNIDO) and the World Bank (Rabin, 2003, p. 1048). One reason of the CBA spreading to less developed countries is that citizens of donor countries required justification from their governments for investing their tax monies in these countries. The other is that agencies responsible for allocating these funds likewise sought an appraisal method for comparing investments alternatives (Fuguitt & Wilcox, 1999, p. 9).

Meanwhile, the use of the traditional analysis continued to grow. In the United States in the 1980s and 1990s, interest in requiring federal regulatory agencies to undertake CBA for proposed major regulations spread to several levels of public decision making, including both the executive and legislative branches of the federal government as well as state and local governments (Fuguitt & Wilcox, 1999, p. 3).

CBA has been used in cohesion policy since the 1990s and has been a requirement since 2000. M. Florio talks about two reasons for this revival of CBA in Europe, after some years of less interest elsewhere. First, there is a wide perception that infrastructure are

going to play an important role in European integration. Second, the European Union, through its cohesion policy and other frameworks, is a key player in the planning of infrastructure, along with national public governments and private investors. Substantial leverage effects are expected through public private partnerships, loan finance (including from the European Investment Bank and the European Bank for Reconstruction and Development), and other funding mechanisms (M. Florio, 2006, p. 5).

1.2 Legal context of the Cost-benefit Analysis in the European Union financing perspective 2007-2013

Over the last two decades, the SF and the CF have co-financed (through grants) a very large number of projects in the Member States of the European Union. Selection and management processes of projects involved a number of different actors. One of the goals of the EU is to unify criteria for project appraisal and put it in a more comprehensive framework, so all the projects are evaluated equally. While every project has its own specific features, for instance because of geography and of social condition, the Commission services need to be able to compare data and methods with some reference approaches and performance indicators (Guide to cost-benefit analysis of investment projects, 2008, p. 16). The first step towards unification of project appraisal criteria is to put them into regulatory system (the developments of the regulatory framework for the 2007–2013 programming period is in details described in continuation). The technique, which enables this, is the CBA.

EU cohesion policy regulations require a CBA for all major investment projects applying for assistance from the Funds. Legal base for CBA of investment project funded within the cohesion policy in the EU financing perspective 2007–2013 represents Council Regulation (EC) No 1083/2006. According to this regulation the legal threshold for the definition of the 'major' investment is €50 million (Article 39).

Article 40 of Council Regulation (EC) No 1083/2006 indicates which information on (major) projects must be submitted to the Commission by the member state or by managing authority. Those include also a cost-benefit analysis, including a risk assessment and the foreseeable impact on the sector concerned and on the socio-economic situation of the Member State and/or the region and, when possible and where appropriate, of other regions of the Community. The Commission shall provide indicative guidance on the methodology to be used in carrying out the CBA in accordance with the procedure referred to in Article103(2), that refers to Articles 3 and 7 in Council Decision 1999/468/EC laying down the procedures for the exercise of implementing powers (28 June 1999).

Other provisions on cohesion policy (and indirectly on CBA) for the period 2007–2013 are set out in the four specific regulations: (1) Council Regulation (EC) No 1080/2006, (2)

Council Regulation (EC) No 1081/2006, (3) Council Regulation (EC) No 1084/2006, (4) Council Regulation (EC) No 1082/2006 and in one implementation regulation (5) Commission Regulation (EC) No 1828/2006. The role of Regulation 1828/2006 is to ensure better implementation of Council Regulation (EC) No 1083/2006.

Latter harmonisation of the regulatory framework lead to Corrigendum to Commission regulation (EC) No 1828/2006[4] in Annex XX - Major Project Structured Data to be encoded; Annex XXI - Application form for infrastructure investment (Major project request for confirmation of assistance pursuant to Articles 39 to 41 of Regulation (EC) No 1083/2006 - European Regional Development Fund/Cohesion Fund - infrastructure investment) and Annex XXII - Application form for productive investment (Major project request for confirmation of assistance pursuant to Articles 39 to 41 of Regulation (EC) No 1083/2006 - European Regional Development Fund/Cohesion Fund - Productive investment). Those Annexes provide beneficiaries with general information on how to prepare project application documentation and how to perform CBA as the basis for the approval of the project co-financing.

To help beneficiaries to prepare CBA within prescribed regulatory framework EC prepared additional guidance documents (working documents):

1. The New Programming Period 2007–2013, Guidance on the methodology for carrying out cost-benefit analysis, Working document Nr. 4, August 2006,
2. Information note to the COCOF guidance on Article 55 of Council Regulation (EC) No 1083/2006: Revenue-generating projects (18. 6. 2008) and Revised guidance note on Article 55 for ERDF and CF of Council Regulation (EC) No 1083/2006: Revenue-generating projects (30. 11. 2010) and
3. Guide to Cost-Benefit analysis of Investment projects, July 2008.

On the national level there were no legal acts or other documents (except translations of the existing EU documents) which represented additional constraints or duplication of the implementation activities concerning CBA. The Decree on the implementation of procedures for the use of European Cohesion Policy Funds in the Republic of Slovenia in the 2007–2013 programming period was adopted in March, 2009 (amended several times until 2015) but it was not giving any additional specifications on how to conduct CBA analysis. It only gave general provision on how to adopt so called "big projects" that are mandatory to have CBA (Article 17). As, according to the Treaty on the Functioning of the

[4] Commission Regulation (EU) No 832/2010 of 17 September 2010amending Regulation (EC) No 1828/2006 setting out rules for the implementation of Council Regulation (EC) No 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of Regulation (EC) No 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund.

European Union (TFEU), Article 288, EU Regulations are legal acts that have general application, are binding in their entirety and directly applicable in all European Union countries[5], it would be not only inefficient to have dual systems (under presumption, that national system have additional constraint as it must be inside regulatory framework in the EU), but it would cause additional complexity of the system that is already very complex.

In the new programming period (the 2013-2020 EU Financial Perspective) new regulations were adopted and new guidance documents on the methodology for carrying out CBA were prepared. Those documents are:

1. Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006,
2. Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006,
3. Commission Delegated Regulation (EU) No 480/2014 of 3 March 2014 supplementing Regulation (EU) No 1303/2013 of the European Parliament and of the Council laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund,
4. Commission implementing Regulation (EU) 2015/207 of 20 January 2015 laying down detailed rules implementing Regulation (EU) No 1303/2013 of the European Parliament and of the Council as regards the models for the progress report, submission of the information on a major project, the joint action plan, the implementation reports for the Investment for growth and jobs goal, the management declaration, the audit strategy, the audit opinion and the annual control report and the methodology for carrying out the cost-benefit analysis and pursuant to Regulation (EU) No 1299/2013 of the European Parliament and of the Council as regards the model for the implementation reports for the European territorial cooperation goal and

[5]Consolidated versions of the Treaty on European Union and the Treaty on the Functioning of the European Union - Consolidated version of the Treaty on the Functioning of the European Union - Protocols - Annexes -Declarations annexed to the Final Act of the Intergovernmental Conference which adopted the Treaty of Lisbon, signed on 13 December 2007 - Tables of equivalences (OJ C326, 26/10/2012 P.0001-0390).

5. European Commission Guide to Cost-Benefit Analysis of Investment Projects. Economical Appraisal Tool for Cohesion Policy 2014–2020 issued.

The content of those documents does not represent a big deflection from the CBA theory point of view. Moreover, they represent an upgrade of those documents valid in the 2007–2013 financial perspective, developed accordingly to evaluators' experiences with CBA. Article 101 of Regulation (EU) No 1303/2013 of the European Parliament and of the Council determines: "Before a major project is approved, the managing authority shall ensure that the following information is available:

(a) details concerning the body to be responsible for implementation of the major project, and its capacity; (b) a description of the investment and its location; (c) the total cost and total eligible cost, taking account of the requirements set out in Article 61; (d) feasibility studies carried out, including the options analyses, and the results; (e) a cost-benefit analysis, including an economic and a financial analysis, and a risk assessment; (f) an analysis of the environmental impact, taking into account climate change adaptation and mitigation needs, and disaster resilience; (g) an explanation as to how the major project is consistent with the relevant priority axes of the OP or OP's concerned, and its expected contribution to achieving the specific objectives of those priority axes and the expected contribution to socio-economic development; (h) the financing plan showing the total planned financial resources and the planned support from the Funds, the EIB, and all other sources of financing, together with physical and financial indicators for monitoring progress, taking account of the identified risks; (i) the timetable for implementing the major project and, where the implementation period is expected to be longer than the programming period, the phases for which support from the Funds is requested during the programming period. The Commission shall adopt implementing acts establishing the methodology to be used based on recognised best practices, in carrying out the cost-benefit analysis referred to in point (e) of the first paragraph. Those implementing acts shall be adopted in accordance with the advisory procedure referred to in Article 150(2)."

The difference between Article 101 of Regulation (EU) No 1303/2013 of the European Parliament and of the Council and Article 40 of Council Regulation (EC) No 1083/2006 that indicates which information on major projects must be submitted to the Commission by the member state or by managing authority is therefore only minor though following implementation regulations and delegated regulations in 2014–2020 financial perspective describe more thoroughly rules and methodology for carrying out the cost-benefit analysis.

Although the analyses in chapter three and four of the thesis are based on projects, approved in the 2007–2013 EU financial perspective, approved accordingly to legal framework in force in that period, in chapter explaining general concepts of CBA (chapter

two) explanation of general concepts are made (because of the above reasons) primarily based on the new documents from the 2014–2020 perspective.

1.3 Research, Development and Innovation projects in the context of cohesion policy

1.3.1 The Lisbon Strategy

The Lisbon Strategy (the main strategic document for the 2007–2013 financial period) launched in 2000, was designed to enable the Union to regain the conditions for full employment and to strengthen regional cohesion in the European Union: "The European Council needs to set a goal for full employment in Europe in an emerging new society which is more adapted to the personal choices of women and men. If the measures set out below are implemented against a sound macro-economic background, an average economic growth rate of around 3% was planned to be a realistic prospect for the coming years" (Lisbon European Council, Presidency Conclusions, article 6).

Its main strategic goal for the next decade was for EU "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion and respect for the environment". This goal required an overall strategy aimed at: 1. preparing the transition to a knowledge-based economy and society by better policies for the information society and research and development (hereinafter: R&D), as well as by stepping up the process of structural reform for competitiveness and innovation and by completing the internal market, 2. modernising the European social model, investing in people and combating social exclusion and 3. sustaining the healthy economic outlook and favourable growth prospects by applying an appropriate macro-economic policy mix (Lisbon European Council, Presidency Conclusions, article 5).

Accordingly to some ex-ante analyses (see i.e. Commission Staff Working Document, Lisbon Strategy evaluation document, 2010, p. 3 or Rodriguez et al, 2010, p. 110), the Lisbon Strategy was not as successful as planned (its main targets such as i.e. 70% employment rate, and 3% of GDP spent on R&D were not reached) especially due to the world crisis. The main conclusions were that if the world crisis is taken into account, the Lisbon Strategy was relatively successful, but, nevertheless, the EU has failed to close the productivity growth gap with leading industrialised countries, as i.e. total R&D expenditure in the EU expressed as a percentage of GDP only improved marginally (from 1.82% in 2000 to 1.9% in 2008).

The Lisbon Strategy is important for the content of this thesis for two reasons:

1. it gave a significant role to R&D, including building knowledge infrastructure, for generating economic growth, employment and social cohesion,
2. the importance of R&D and strategic goals related to it (i.e. building knowledge infrastructure) had to be transferred into strategic documents at the national level (National Development Programme for the Period 2007–2013 (hereinafter: NDP), Slovenian's Development Strategy (hereinafter: SDS), National Strategic Reference Framework for the Period 2007–2013 (hereinafter: NSRF) and Resolution on National Development Projects for the Period 2007–2013 (hereinafter: RNDP)).

The Lisbon Strategy as well as NDP, SDS, NSRF and RNDP constituted strategic base for the most important document of the 2007–2013 programming period OP SRDP, which is more thoroughly analysed (in the context of our research area: HEI and RI) in the next chapter.

1.3.2 Operational Programme for Strengthening Regional Development Potentials for the Period 2007-2013

In accordance with the main purpose of this thesis (to help policy-makers involved in public investment decision-making processes by critically reviewing the role of CBA in the framework of EU cohesion policy with the focus on HEI and RI, and to determine whether the role meets its goal – improving transparency in the EU funding), it is necessary to analyse the most important programming and implementation document of the cohesion policy in the 2007–2013 programming period concerning RDI infrastructure: the OP SRDP.

Document is devised into five development priorities (priority axes), four in compliance with priorities of Lisbon Strategy, SDS, SRDP (and other strategic national and European documents) and one general (technical) priority, focused on administration of OP SRDP:

1. Competitiveness and research excellence,
2. Economic development infrastructure,
3. Integration of natural and cultural potentials,
4. Development of regions and
5. Technical assistance.

Although for the purpose of the thesis the second development priority (Economic Development infrastructure) is analysed more thoroughly, in the Appendix D of the thesis also the first development priority (together with the second) is put into the framework of the existing national strategic documents and Lisbon Strategy. Appendix D clearly presents, that RDI (including HEI and RI) infrastructure and activities for its promotion are at the focus point of all included strategic documents.

1.3.2.1 Development priority “Economic Development Infrastructure”

Although the first development priority of OP SRDP, Development priority Competitiveness and Research Excellence (hereinafter: DP CRE) enhances inventiveness, innovativeness and technological development with the accent on implementation of new technologies as key factors for competitiveness of economy and development of a knowledge-based society (OP SRDP, 2007, p. 69), the second development priority, Development priority Economic Development Infrastructure (hereinafter: DP EDI) represents corresponding implementation framework for the financing of HEI and RI although they are closely connected. The main difference is that through the implementation framework of DP CRE concrete R&D projects were supported, whereas through the DP EDI financing for the supportive infrastructure was provided. It is important to acknowledge, that supportive infrastructure in higher education and research (especially fundamental research) often include extensive building activities and sophisticated (and expensive) high-tech research equipment acquisition so the costs could represent an enormous financial burden for the beneficiary. In Republic of Slovenia (hereinafter: RS) usually the owner of such infrastructure is the RS or non-profit public organisation, founded by the RS) as it is in details described and explained in the case in the thesis. The case analyses major project (New building of Faculty of Chemistry and Chemical Technology and Faculty of Computer and Information Science of University of Ljubljana) in the field of HEI and RI where for example total costs of the project were estimated at more than EUR 116 million.

The strengthening of institutions of knowledge in line with needs of economy, technology and other priority developments in the state including the investments into public higher education and RI of national importance (i.e. in the infrastructure of organizations such as higher education institutions, public research institutions, institutions for the promotion of science and other public institutions acting in the fields that are connected with the needs of economy and other priority development areas), is one of the most important focus points of DP EDI (OP SRDP, 2007, p. 78). At the same time the document acknowledge that although these institutions are of national importance, they are frequently very poorly equipped and lack adequate spatial distribution, and this represents an obstacle for their quality operation and effective support for the economy (OP SRDP, 2007, p. 78).

Key goal of the DP EDI (“Concentration of knowledge and development infrastructure for increased competitiveness of economy”) is integrated within the framework of three priority guidelines:

1. Economic-development-logistics centres (infrastructural platforms),
2. Information society and
3. Development of higher education and RI of national importance (OP SRDP, 2007, p. 81).

For the purpose of creating appropriate contextual framework for this thesis and not to overburden the text of the thesis with unnecessary information, the focus from this point further is set on the third guideline only.

To achieve the goals of OP SRDP, DP EDI (including the third priority guideline), effectiveness and efficiency of its financial instruments (and indirectly also successfulness of SDS, Lisbon Strategy and other strategic documents) had to be monitored through indicators at the level of DP EDI showed in Appendix E of the thesis. The base for these indicators was a set of existing indicators in the Central information system (hereinafter: CIS) on the national level that already in the period before the implementation phase enabled supplementing and harmonisation with the quantified objectives that had been set up (OP SRDP, 2007, p. 126). Referential information system for monitoring and reporting operational programmes implementation activities (hereinafter: ISARR) enabled monitoring of objectives and indicators at the level of an operational programme (hereinafter: OP) (and development priorities) and as such enabled quantitative as well as qualitative monitoring of the progress made within the OP. The data collected was used to regularly report to the monitoring committee and represented a key tool for the Managing authority in Slovenia and other institutions involved in the OP implementation to monitor the progress made. With the information system the principle of equal opportunities as well as the impact on sustainable development with a stress on the environmental dimension was also be observed (OP SRDP, 2007, p. 126).

The domain of priority orientation (in the narrower sense) involved investments into public higher education and RI of national importance that is into infrastructure of organizations as higher education institutions, public research institutions, infrastructural centres and other similar public institutions. Although these institutions are of national importance they are still insufficiently equipped, spatially limited (expansion of activities was not possible), usually locally dispersed, their premises are environmentally inadequate and inaccessible by transportation. Due to these conditions the interest of the economy to cooperate with the research sphere was in the past lower than it would be if the conditions were different.

The goal of the OP SRDP was to obtain (by investments in infrastructure) adequate concentration of higher education and R&D infrastructure in the centres of national importance and consequently, in connection with technological networks and platforms, significantly strengthen the network of development institutions in Slovenia and their support of national development. Such concentration was expected to enhance the quality of scientific research work and latter reinforce investments by public and private sector (OP SRDP, 2007, p. 86).

In the framework of priority orientation, investments into unprofitable (public) infrastructure (construction of new and renovation of old premises) and into equipping

higher education and research institutions of national importance as well as investments into infrastructure which will be jointly used by these institutions of knowledge and their intermediaries were planned (OP SRDP, 2007, p. 87).

However, despite the fact, that domain creates strategic platform and consequently enables EC funding of adequate public unprofitable HI and RI infrastructures, allocation of this funds to any project that meets this criteria OP SRDP, DP EDI (including the third priority guideline) must not be taken for granted. To achieve those goals and to achieve effectiveness and efficiency of financial instruments (as it was already mentioned earlier in the context of monitoring of indicators of the projects) projects put into the pipeline for co-financing had to be thoroughly analysed and had to prove (in a transparent manner), that they need Community assistance and that they are worthwhile and likely to contribute to the goals of EU cohesion policy.

In OP SRDP is therefore already indicated, how this should be done: "The content of an individual project will be defined in detail on the basis of performed cost-benefit analysis from the aspect of the entire economy. In this respect, the soundness of investments will be verified," (OP SRDP, 2007, p. 78), "The basis for co-financing individual investments will be cost-benefit analysis at the level of the whole project," (OP SRDP, 2007, p. 83). In the next chapter the general concepts of CBA are described more thoroughly and CBA as a primary decision making tool for investment projects, co-financed from the EU funds, is explained, but before that it is appropriate to outline the financial framework of the OP SRDP.

2.3.2.2 Financial framework of the DP EDI, priority guideline "Development of higher education and RI of national importance" inside OP SRDP

It is important to explain financial framework of DP EDI, priority guideline "Development of higher education and RI of national importance" inside OP SRDP and its changes during the implementation period. For the purpose of this thesis data from the OP SRDP (published in 2007) and from the Cohesion Policy Absorption Report 2007–2013, objective: »Convergence«, for the period January 2015 – December 2015, published by Government Office for Development and European Cohesion Policy is compared and analysed.

Accordingly to the data, released by the Government Office for Development and European Cohesion Policy (Appendix F: Financial Tables for period 2007–2013, Table 1: Absorption in financial period 2007–2013 by OP), responsible for implementation and monitoring of cohesion policy in Slovenia in the 2007–2013 period, EC approved Slovenia (Slovenia was eligible for receiving) EUR 4,101,048,636 out of cohesion policy funds (ERDF, ESF and CF) under the Convergence objective (this number represents 85% of the whole amount (EU part), corresponding 15% had had to be assured by the national

authorities). Until 31st of December 2015 EUR 4,451,203,194 had been allocated which represents 108.54% of the available funds. The contracts signed with beneficiaries until 31st of December 2015 had amounted to EUR 4,383,649,533 (EU part) which represents 106.89% of the available funds and amount EUR 4,321,527,143 (EU part) had been paid from the national budget which represents 105.16% of the available funds. Certified expenditures had amounted to EUR 3,982,934,777 (EU part) which represents 97.12% of the available funds (the reimbursed funds from the EU budget do not equal the payments from the budget of the RS but are accordingly lower due to ineligible expenditure, financial corrections, the gap between the payments from the national budget and the submitted claims for reimbursement as well as due to other established irregularities). The process of certification of expenditures ended at 30th June 2016 and the results of reimbursements are expected (after the analysis is made) to be even closer to 100%.

The numbers differ from some other reports (for example Cohesion Policy Absorption Report 2007–2013, objective: »Convergence«, for the January 2015 – December 2015, also published by Government Office for Development and European Cohesion Policy)[6] where the amount that had been paid from the national budget represents 105.16% of the available funds (although the amount of payment is equal: EUR 4,321,527,143 (EU part)) and certified expenditures had amounted to EUR 3,951,547,309 (EU part) which represents 96.35% of the available funds. The slight differences in data can be explained by the fact that the data from the ISARR was not taken simultaneously (even if analysis was made within an hour difference, the numbers could differ considerably).

If we analyse sources of financing and absorption by development priorities of OP SRDP (see Appendix F: Financial Tables for period 2007–2013, Table 2: Sources of financing and absorption by development priorities of OP SRDP) we can see, that revision of OP SRDP brought substantial redistribution of financial sources between the first and the second priority in the favour of first priority (financial sources for the first priority inclined by 34%, financial sources for the second priority declined by 32% and for the third priority by almost 4%). The reason for the redistribution of financial sources was decision by the Government of RS[7] (because of the change in economic and social situation in the country in comparison to year 2007) in 2010 to diminish investment into "walls" and increase financial sources for competiveness, regional entrepreneurship and research excellence.

In accordance with the data in OP (2007), Slovenia was eligible for receiving EUR 396,934,393 (EU part) for the Operational Programme for Environmental and Transport

[6]http://www.svrk.gov.si/fileadmin/svrk.gov.si/pageuploads/kako_crpamo/PorocCrpan07_13_jan_dec2015.pdf).

[7]http://www.vlada.si/delo_vlade/dnevni_redi/dnevni_redi/article/85_redna_seja_vlade_rs_dne_3_junija_2010_ 10335/.

Infrastructure Development for the Period 2007–2013 (hereinafter: OP ETID),that represented 23.22% of the whole amount of OP sources (EUR 1,709,749,522). Corresponding 15% had had to be assured by the national authorities. Changes in OP (2010) caused that Slovenia was eligible for receiving a lot less for the OP ETID (due to the redistribution of sources described in the previous paragraph) namely EUR 269,451,040 (EU part), that represented only 15.11% of the whole amount of OP (increased to EUR 1,783,285,419).

Until 31st of December 2015 EUR 306,583,134 (EU part) had been paid from the national budget which represents 113.78% of the available funds, meaning that substantial over-commitments had been made (the first OP DP (Competitiveness and research excellence) and forth OP DP (Development of regions) where over-commitments were also made, they were only around 6% (the first OP DP 106.71%, forth OP DP 106.91%)). Certified expenditures had amounted to EUR 268,228,633 (EU part) which represents 99.55% of the available funds and 87.49% of the payments from the national budget. Such need for over-commitments and such absorption rate could be indicators, that revision of OP in 2010 was not deliberate enough to enable optimal redistribution of sources and consequently effective and efficient absorption.

2 GENERAL PRINCIPLES FOR CARRYING OUT COST-BENEFIT ANALYSIS

Belli et al (1998, p. 8) described the framework for the analysis: "It is important for the analysis to indicate the extent to which the success of the project depends on assumptions about macroeconomic, institutional, financial, behavioural, technical, and environmental variables, including assumptions about government implementation capacity, macroeconomic performance, and availability of local cost financing. The analysis should indicate the key actions — by the government and the borrower — necessary for project success; these actions include implementing policy and procedural measures and ensuring the requisite degree of government commitment to and popular participation in the project. The analysis should include a comparison of project assumptions with the relevant historical values, and spell out the rationale for any differences. When all these points are made clear, the economic analysis provides an easily understandable and transparent product that policymakers can confidently factor into decision making (Belli, Anderson, Barnum, Dixon, Tan, 1998, p. 8). As it is written in Nordic Guidelines for Cost-benefit Analysis (2007, p. 9), it is important, to bear in mind, that CBA is not a decision-making tool, CBA is a decision-support tool.

In previous chapters, I introduced the legal context of the CBA and its embedment into strategic documents relevant for the EU cohesion policy. I described surrounding elements of an idea of CBA. But to estimate the real value of the CBA it is necessary to describe and

explain basic principles, concepts and other entities of CBA (and relationships between them) and set the in-depth sight of the CBA and that is performed in this chapter. Before describing the individual concepts of CBA (Net Present Value (hereinafter: NPV), net social benefits (hereinafter: NSB), discounting principle, etc.), I outline economic theory around CBA, beginning with key principles of the CBA usage (bottom-up approach).

2.1 Key principles of Cost-benefit Analysis usage

"Cost-benefit analysis is not about the money. It is not about inputs and outputs. It is about welfare. Money is central to financial analysis but only instrumental in the economic appraisal of projects and policies. Money is the common unite in which economists express the social costs and benefits of projects. Volume of drinking water, accidents avoided, time savings and energy and labour consumed are measured in different units and we need a common unit of measure to express all this heterogeneous items in a homogenous flow. This is the key role of money in cost-benefit analysis" (De Rus, 2010, p. 1).

Key CBA principles were recently defined and adapted by the Society for Benefit Cost Analysis, an international, multi-disciplinary association working to promote and improve the theory and practice of benefit-cost analysis (https://benefitcostanalysis.org/). Society made a report that represents a summary and compilation of work done for the Principles and Standards for Benefit-Cost Analysis Project. Those contemporary principles were recognised by numerous associations dealing with CBA analysis and were summed up in a white paper of Vera Institute of Justice (Matthies, 2014, p. 2), an independent non-profit national research and policy organization in the United States, founded in 1961, that has been partnering with leaders in government and civil society to improve the systems dealing with justice and safety issues:

1. CBA is a decision tool, not a decision rule.
2. Analysts should strive to quantify all impacts of a policy alternative relative to current policy, and to monetize costs and benefits for all members of society.
3. Transparency in a CBA enhances its value.
4. A CBA should disclose areas of uncertainty and clearly describe how uncertainty has been addressed.
5. The effort required for a CBA should not outweigh the expected value of the resulting information.
6. The pursuit of a perfect analysis should not prevent the completion of a useful one.

The above principles pertains the use of the CBA, but to understand the CBA it is important to comprehend the economic theory behind the CBA. For more details regarding principles of CBA see for example Zerbe, R. O., Davis, T. B., Garland, N. & Scott, T., 2010.

2.2 Economic theory behind Cost-benefit Analysis

In this chapter, I present and explain some issues of the economic theory behind CBA. Because of the limitations of this thesis, explanations are prepared in a limited scale, but thorough enough, to highlight the basic logic behind the CBA. Some references regarding the topics are given along the text for a deeper explanation.

Modern growth theory offers a framework for empirical research at macroeconomic level, but it is not robust enough to be used for actual investment planning. Microeconomic social accounting (like CBA), despite its limitations, is more reliable as a support to investment planning (Florio, 2006, p. 1). CBA is an analysis of the cost effectiveness of different alternatives in order to see whether the benefits outweigh the costs. The aim is to somehow measure the efficiency of the intervention relative to the status quo. Economic theory has been founded on the notion of a rational individual, that is, a person who makes decisions on the basis of a comparison of benefits and costs. CBA, or strictly social CBA, extends this to area of government decision making by replacing private benefits and costs by social benefits and costs (Brent, 2006, p. 3).

All government policies are made to improve the welfare society and CBA is an important tool that helps to explain, whether government intervention is desired or not. Jonson et al (2016, p. 326) explain how conventional social CBA yielded the decision rule that "government has to make a decision for a policy that made at least some people better-off, while making nobody worst of". Economic theory calls such policy "Pareto efficient", but in reality it rarely exists, because it is difficult to tabulate benefits and costs to all persons affected by a policy. A requirement for Pareto efficiency would result in policy inertia. Consequently contemporary CBA adopted a more relaxed rule that "a policy should only be implemented when those who gain from the policy could compensate those who lose, and still be better off". The aim of the CBA is to provide a framework for assessing the ability of a policy (more precisely a single project through which policy is conducted) to offer a potential "Parretto improvement". If the benefits are greater than the costs (if there is a NSB*)* then in theory the gainers from the proposal would be able to compensate the losers and still be better-off, and the policy represents a potential Pareto improvement, also known as the compensation principle or the Kaldor – Hicks effect (Miceli, 2011, p. 161). The analysts task is to estimate costs and benefits of a policy proposal in monetary terms as precisely as possible to ease the comparison or in other words "Cost- benefit analysis, and its cousin, cost-effectiveness analysis, are tools for translating the economic theory of Pareto optimality and the theory of the second best into real – world application (both techniques attempt to evaluate the effect of alternative choices on social welfare, or utility, on society as whole (Ulbrich, 2011, p. 152).

One of the key messages of modern CBA theory is that shadow prices are not proxies of perfect markets outcome, but are planning signals that solve a (policy-constrained) social planner's problem. Planners must compute shadow prices, evaluators should use them for project appraisal, and the two functions should not be confused. In principle this distinction applies at each planning level, but a consensus decision-set should emerge from this process, using a bottom-up approach. In a multi-government setting there are, however, information asymmetries that need to be addressed, and we have to turn to incentive theory. Financial and economic analysis, ex ante and ex post, should be linked to an economic performance bonus for more socially deserving projects. Planners, managers and evaluators should be given appropriate incentives to use CBA as cooperative learning game (Florio, 2006, p. 1).

Despite this relatively simple explanation, the CBA process is faced with many problems and one must find answers to many complicated questions, for example: "Which costs and which benefits are to be included? How are the costs and benefits to be evaluated? At what interest rate are future benefits and costs to be discounted to obtain the Present Value (hereinafter: PV) (the equivalent value that one is receiving or giving up today when the decision is being made)? And what are the relevant constraints?" (Brent, 2006, p. 4).

A CBA process is not a process where subject of the research is a social problem, but is described by many authors dealing with a concept as problematic by nature itself. CBA as a problem solving process is similarly described by Ghataki (2003, p. 333). He represents a set of problems that must be solved before the project planner takes a decision regarding project choice:

1. The problem of identification of the benefits and costs,
2. The problem of valuation of these benefits and costs at prices which would be relevant to society,
3. The problem of choosing an appropriate rate of discount for evaluating such benefits and costs,
4. The problem of identifying actual constraints and
5. The problem of uncertainty.

Before solving these problems, project planner must deal with problems inside the problems as some of elements of CBA, which are assumed to be static, are in reality very dynamic. For example the demand curve is in reality not linear, marginal utility of income is hardly fixed, it is difficult to measure utility cardinally, it is hardly possible, that the prices of other goods remain the same and there are many elements (so called intangibles) that cannot be measured. Social CBA replaces private benefits and costs by social benefits and costs, which are even more difficult to define and measure. If we take the above into

the account, it is possible to see how difficult it is to carry out a reliable, believable and scientifically undisputable CBA.

Despite some criticism CBA remains important decision making tool for the formulation of public policies. In the next sub chapter I describe some general concepts of CBA, understanding of which is necessary for comprehend this analytical and rational decision making framework.

2.2.1 Net Social Benefits and Consumer Surplus in the context of Cost-benefit Analysis

One of the most important principles, the juncture between welfare society and welfare economics is the principle of NSB. As governments struggle to reach its ideal of the welfare society, basic principles of CBA are generally derived from welfare economics.

According to Kahraman and Kaya (2008, p. 129) the costs and benefits of the impacts of an intervention are evaluated in terms of the public's willingness to pay for them (benefits) or willingness to pay to avoid them (costs). Inputs are measured in terms of opportunity costs - the value in their best alternative use. The guiding principle is to list all parties affected by an intervention and place a monetary value of the effect it has on their welfare as it would be valued by them. This process involves monetary value of initial and on-going expenses in comparison with expected return. It is often difficult to create plausible measurements of the costs and benefits of certain actions. CBA analysis attempts to put all relevant costs and benefits on a common basis. A discount rate is chosen, which is then used to compute all relevant future costs and benefits in PV-terms.

The objective of the CBA is to choose the project that yields positive NSB. NSB is defined as in the below formula (1):

$$NSB = Benefits\ (willingness\ to\ pay) - Costs\ (compensation\ needed) \quad (1)$$

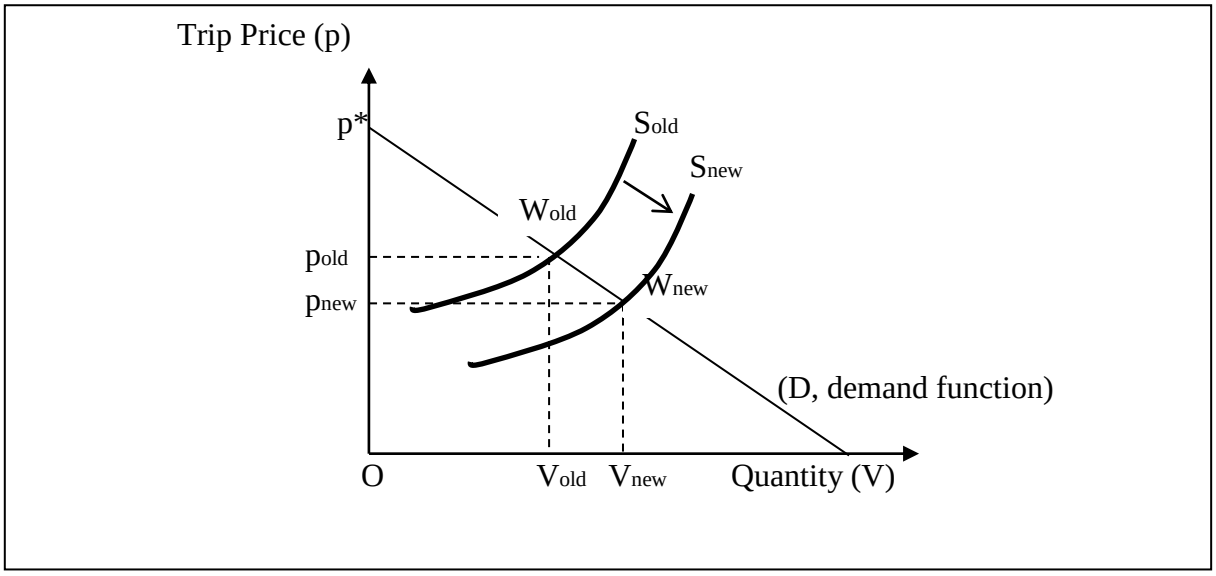
All benefits and costs should be expressed in monetary units. Ghataki explains that the willingness to pay is given by the area under demand curve, but the actual total price paid is given by the price multiplied by the quantity (2003, p. 332). In other words, the amount of consumer surplus reflects the size of gains (Ghataki, 2003, p. 332).

Fuguitt and Wilcox are explaining the consumer surplus in the context of markets for private goods, where consumers pay a monetary price in return for good or service that provides value (utility) to the consumer as extra value (value consumer receives in greater than the price actually paid) (1999, p. 45). The concept can be extended to analyse

decisions entailing social benefits and costs and it provides the conceptual basis for the economic valuation of social benefits and costs.

Figure 1 shows how consumer surplus is evaluated after improvement in transportation system (but the logic is the same in any area). In the figure, the demand curve (as a function of trip price) for a transportation system is depicted by line D. An improvement in supply, such as increased quantity (e.g. number of guideway lines, highway lanes, transit frequency) or improved quality of service (e.g. increased comfort, safety and security) causes the supply curve to shift from S_{old} to S_{new} (*ceteris paribus*). The new consumer surplus is given by the area enclosed by $p^* p_{new} W_{new}$. Thus, change in consumer surplus is represented by the area enclosed by $p_{old} p_{new} W_{old} W_{new}$ (Sinha & Labi, 2007, p. 58).

Figure 1. Changes in consumer surplus



Source: K. C. Sinha & S. Labi, *Transportation Decision Making Principles of Project Evaluation and Programming*, 2011, p. 58, Figure 3.8.

In the context of the above explanation a term *"ceteris paribus"* is used. Economists use the term *"ceteris paribus"* to signify that all relevant variables, except those being studied at the moment, are held constant. The Latin phrase literally means "all other things being equal". The demand curve slopes downward because, "*ceteris paribus*" lower prices mean a greater quantity demanded. Although the term "*ceteris paribus*" refers to a hypothetical situation in which some variables are assumed to be constant, in the real world many things change at the same time. For this reason, when we use the tools of supply and demand to analyse events or policies, it is important to keep in mind what is being held fixed and what not (Mankiw, 1998, p. 66).

2.2.2 Investment decision-making criteria

Campbell and Brown (2016, p. 45) are pointing out three main decision-rules, which are best known in the decision making process of CBA:

1. The NPV,
2. The B/C and
3. The internal rate of return (hereinafter: IRR).

In the following subchapters each of these criteria are described briefly.

2.2.2.1 Net Present Value

NPV is the criterion that enables the decision makers to make the appropriate decision. When a private, profit-maximizing firm faces a new business venture which produces a time stream of revenues and costs, one approach for deciding whether to undertake the venture is to compute the NPV of the time stream of revenues and costs, which is sometimes called a discounted value (Just, Hueth & Schmitz, 2004, p. 573). The NPV of a project expresses the difference between the discounted PV of future benefits (or revenues) and discounted PV of future costs (Campbell & Brown, 2016, p. 45). If NPV is >0 (positive value of NPV), then the project should be approved. In other words, for a decision of policy maker to be adequate it should demonstrate that the chosen proposal has a positive NSB. If there are several different projects, then the one with the highest NPV should be accepted out of a given alternatives. When the NPV is zero, the project meets the costs of capital, but yields no surplus to owners – indifference (Hoque, 2005, p. 156). More formally a definition of NPV is shown in equation (2)

$$NPV = \sum_{t=0}^{n} \frac{P1}{(1+i)^t} \qquad (2),$$

where P1 are net benefits and *i* the rate of discount. Further in the thesis the Financial Net Present Value (hereinafter: FNPV) and ENPV is explained in the context of EU cohesion policy following the Regulation (EU) 2015/207 methodology for carrying out the analysis (Chapter 3.3.1).

2.2.2.2 The benefit/cost ratio

Another form of the NPV as decision-rule is the B/C. As mathematical formula (3), B/C could be described in the following manner:

$$\frac{B}{C} = \frac{PV\,(benefits)}{PV\,(costs)} \qquad (3),$$

where PV includes all project costs, not just capital costs. Campbell & Brown (2016, p. 48) are explaining the decision-rule as stated below:

1. If NPV ≥ 0, then B/C ≥ 1, then accept the project and
2. If NVP <0, then B/C < 1 then reject a project.

When comparing two projects, the project with the higher B/C is better.

2.2.2.3 The Internal Rate of Return

Cahus, Carcillo & Zylberberg explain the IRR (sometimes called the time-adjusted rate of return) on an investment as the rate of return that makes the NPV of all benefits and costs from a particular investment equal to zero or (in other words) as a discount rate at which the NPV of costs equals the NPV of benefits of the investment (2014, p. 215). In a decision making process IRR points out the desirability of a project.

Hoque listed four decision rules related to IRR (2005, p. 156):

1. When IRR exceeds the cost of capital – accept.
2. When IRR equals cost of capital, the project meets the cost of capital, but yields no surplus – indifference.
3. When IRR is less than cost of capital – reject.
4. As with NPV, sources of cash flows and the accounting treatment of income and expenditure flows are irrelevant to IRR calculations. IRR has a high sensitivity to errors in forecasted cash flows.

According to Hoque NPV and IRR are the two main discounted cash flow (hereinafter: DCF) methods, superior to other techniques that measure cash inflows and outflows of the project and compare them as if occurring at a single point of time. Other basic investment appraisal methods, that are worth to be mentioned, but are not thoroughly explained in the thesis, because they are not recommended in the EU cohesion policy regulations are static methods (cost comparison method, profit comparison method, average rate of return method, static payback period method) and other discounted cash-flow methods (such as annuity method, dynamic payback period method or data collection). For more in-depth information regarding investment appraisal methods (some of them, such as risk analysis) see Götze, Northcott & Schuster, 2015, Röhrich, 2014, Erickson, 2013 and Lumby & Jones 2007.

2.3 Methodology behind the Cost-benefit Analysis in European Union financed projects

According to Commission Implementing Regulation (EU) 2015/207 of 20 January 201 EU financed projects (regulation refers to the so called »major projects«), are representing a substantial proportion of EU spending and are of strategic importance for achieving the EU goals. To ensure uniform conditions for applicants, regulation provides a standard format for submitting the information requested for the approval of this projects including methodology to be used in carrying out the CBA on major projects. Similar methodology was used on the national level in the financial perspective 2007–2013 in the case of RDI. A CBA had to include economic analysis, financial analysis and a risk assessment and should had shown that the project is desirable from an economic point of view and that the contribution from the EU fund is needed for the project to be financially viable. Accordingly, for the purpose of this thesis, the theory of CBA used for EU projects is explained based on the 2014–2020 documents (regulations, guidelines, etc.). Where there is a difference between 2007–2013 and 2014–2020 financial perspective, I prepared an additional explanation regarding this difference. For example general discount rate in 2007–2013 financial perspective stipulated by the Decree on the Uniform Methodology for the preparation and treatment of investment documentation was 7% (despite that the discount rate for EU was set at 5%) and in the 2014–2020 financial perspective financial discount rate (hereinafter: FDR) is 4% and social discount rate 5%.

Regulation (EU) 2015/207 determines that the objective of CBA in the context of cohesion policy is to support the project assessment in order to assess whether the project is **worth co-financing** (from an economic point of view) and to assess whether the project **needs co-financing** (from a financial point of view). CBA has to be carried out as soon as possible in the project preparation phase, usually at the end of the preliminary design stage of the project, and must be in compliance with the following principles:

1. It must be performed against predetermined policy objectives (usually policy objectives are predetermined in strategic documents such as national development programmes, strategies and OP's on different levels local, national and international. In the case of cohesion policy objectives are "cascading" top-down and bottom-up in a constant process of harmonisation),
2. It requires to define the relevant social context and perspective (local, regional, national, trans-boundary, global),
3. It requires a common measurement unit (usually monetary),
4. It requires a comparison of a scenario of the new investment with a scenario without the new investment (incremental analysis) under prediction that where a project consists of a new asset, the revenues and operating costs (or the benefits and costs in the economic analysis) shall be those of the new investment,

5. It requires to state a reference period relevant for the project,
6. It requires consideration of residual values of investment and
7. It requires a risk assessment to deal with uncertainty.

A CBA must include the following elements: presentation of the context, definition of objectives, identification of the project, results of feasibility studies with demand and option analysis, financial analysis, economic analysis and risk assessment.

For the purpose of this thesis, only financial and economic analysis is explained in details, as they represent the most important part of CBA; risk assessment process is explained in general; however, because of the limitation of the subject of the thesis other elements of the CBA are only mentioned, but not explained in details.

2.3.1 Financial analysis

As set out in Article 101(1) (e) of Regulation (EU) No 1303/2013, a financial analysis must be included in the CBA. It must include: assessment of the financial profitability of the investment and of national capital, determining the appropriate (maximum) contribution from the Funds and checking the financial viability (sustainability) of the project.

Financial analysis should (if possible and appropriate) be carried out from the point of view of the project owner and/or operator allowing to verify cash flows and guarantee positive cash balance in order to verify the financial sustainability and to calculate the indices of financial return on the investment project and on capital based on the discounted cash flows. If the owner and the operator are not the same entity, a consolidated financial analysis, which excludes cash flows between the owner and the operator, should be undertaken.

According to Guide to cost-benefit analysis of investment projects, where possible and appropriate, the financial analysis should be carried out in constant prices, but expected changes in nominal prices should be considered as part of the risk assessment. Constant prices are those that have been deflated by an appropriate price index based on prices prevailing in a given base year and they should be distinguished from current or nominal prices (European Commission, 2008, p. 16).

Discounted cash flow methodology, incremental method and other principles of financial analysis

The financial analysis of projects must be carried out taking into account the rules set out in section III of Commission Delegated Regulation (EU) No 480/2014, including: method

for calculating discounted net revenue (including the reference period and the incremental method) and discounting of cash flow (including the FDR in real terms).

According to Article 61(1) of Regulation (EU) No 1303/2013 'net revenue' means: cash in-flows directly paid by users for the goods or services provided by the operation, such as charges borne directly by users for the use of infrastructure, sale or rent of land or buildings, or payments for services less any operating costs and replacement costs of short-life equipment incurred during the corresponding period. Operating cost-savings generated by the operation had to be treated as net revenue unless they are offset by an equal. The eligible expenditure of the operation to be co-financed from the ESI Funds is reduced in advance taking into account the potential of the operation to generate net revenue over a specific reference period that covers both implementation of the operation and the period after its completion.

The potential net revenue of the operation is usually determined in advance by one of the following methods chosen by the managing authority for a sector, subsector or type of operation:

1. Application of a flat rate net revenue percentage for the sector or subsector applicable to the operation (This method was not used in 2007–2013 financial period) or
2. Calculation of the discounted net revenue[8] of the operation, taking into account the reference period appropriate to the sector or subsector applicable to the operation, the profitability normally expected of the category of investment concerned, the application of the polluter-pays principle and, if appropriate, considerations of equity linked to the relative prosperity of the Member State or region concerned. Except when operations or parts of operations supported solely by the ESF, operations whose total eligible cost before application of paragraphs 1 to 6 does not exceed EUR 1,000,000, repayable assistance subject to an obligation for full repayment and prizes, technical assistance, support to or from financial instruments, operations for which public support takes the form of lump sums or standard scale unit costs, operations implemented under a joint action plan and in some other exceptions.

The data required to perform a financial analysis are:

[8]For the purposes of the calculation of discounted net revenue the revenues shall be determined on the following basis (Article 16 of Delegated Regulation (EU) No 480/2014): 1.where applicable, user charges shall be fixed in compliance with the polluter-pays principle, and, if appropriate, shall take into account affordability considerations; 2. revenue shall not include transfers from national or regional budgets or national public insurance systems; 3. where an operation adds new assets to complement a pre-existing service or infrastructure, both contributions from new users and additional contributions from existing users of the new or enlarged service or infrastructure shall be taken into account.

1. Investment costs, including fixed investments, non-fixed investments including start-up costs, and, where appropriate, changes in working capital,
2. Replacement costs (as defined in Article 17 (a) of Commission Delegated Regulation (EU) No 480/2014),
3. Operating costs (as defined in Article 17 (b) and (c) of Commission Delegated Regulation (EU) No 480/2014),
4. Revenues (as defined in Article 16 of Commission Delegated Regulation (EU) No 480/2014) and
5. Source of funding including equity capital of the investor (either public or private), capital from loans (in this case loan repayment and interests are a project outflow in sustainability analysis) and any additional financial resources such as grants.

In sectors where this is relevant, including the environmental sector, tariffs must be fixed in compliance with the polluter-pays principle taking into account affordability, as set out in Section III (Method for calculating the discounted net revenue of operations generating net revenue) of Commission Delegated Regulation (EU) No 480/2014, and the full-cost recovery Specific Union's legislative provisions existing for water and waste sectors (namely: Water Framework Directive and Waste Framework Directive) shall be taken into account in application of these principles). Compliance with the full-cost recovery principle includes that: tariffs should aim as far as possible to recover the capital cost, the operating and maintenance cost, including environmental and resource costs and the tariff structure maximises the project's revenues before public subsidies, while considering affordability.

Limitations of the polluter-pays principle and full-cost recovery principle in user charges and fees should not jeopardize the financial sustainability of the project and (as a general rule), be seen as temporary restrictions and maintained only as long as the issue of affordability of users exists.

Results of the financial analysis

(a) Evaluation of financial profitability of the investment and national capital

FNPV is the sum that results when the expected investment and operating and replacement costs of the project (discounted) are deducted from the discounted value of the expected revenues. Financial Rate of Return (hereinafter: FRR) is the discount rate that produces a zero FNPV.

The financial profitability of an investment is assessed by estimating the FNPV and the FRR of the investment (FNPV(C) and FRR(C)). These indicators compare investment costs to net revenues and measure the extent to which the project's net revenues are able to

repay the investment, regardless of the sources of financing. In some cases (in the context of State Aid and private operators) the calculation of FRR (Kp) is required. Interest payments should not be included in the calculation FNPV(C).

FNPV(C) before the EU contribution should be negative and FRR(C) should be lower than the discount rate used for the analysis (except for some projects falling under State aid rules for which this may not be relevant).

If a project shows high financial profitability (i.e. FRR(C) is substantially higher than the FDR) it is, as a general rule, considered sufficient for an investor to implement the project without Union contribution. A Union contribution may be justified only if it is demonstrated that the investment is not bankable on its own considering that the risks for an investor to implement the project e.g. highly innovative project may be too high to carry out the investment without a public grant.

The financial profitability of national capital is assessed by estimating the FNPV and the FRR on capital (FNPV (K) and FRR (K)). These indicators measure the extent to which the project's net revenues are able to repay the financial resources provided by the national funds (both private and public sources).

Calculation of FNPV (K) and FRR (K) requires that:

1. The financial resources — net of EU support — invested in the project are treated as outflows disregarding investment costs,
2. Capital contributions are considered at the moment they are actually paid out for the project or reimbursed (in the case of loans),
3. Interest payments are included in the table for the analysis of the return on capital (FNPV(K)) and
4. Operating subsidies are not included in the table for the analysis of the return on capital (FNPV (K)).

For a project to require the contribution of the Funds FNPV (K) without Union assistance should be negative or equal to zero, and FRR (K) should be lower or equal to the discount rate, otherwise appropriate justification has to be provided. When relevant, the return on the project promoter's capital (FRR (Kp)) should also be calculated. This compares the net revenues of the investment with the resources provided by the promoter: i.e. the investment cost minus the non-reimbursable grants received from the EU and/or the national/regional authorities. This exercise can be particularly useful in the context of State aid in order to verify that the intensity of the aid (EU and national assistance) provides the best value-for-money with the objective of limiting public financial support to what is necessary for the project to be economically or financially viable. If the project expects a substantial positive return (i.e. significantly above the national benchmarks on expected profitability in the

given sector) it shows that the grant received would bring supra-normal profits to the beneficiary and therefore the Union contribution may not be justified.

(b) Determination of the appropriate (maximum) contribution from the Funds

Determination of the appropriate (maximum) contribution from the Funds for revenue generating projects should be done in accordance with one of the methods for determining the potential net revenue in accordance with Article 61 (Operations generating net revenue after completion) of Regulation (EU) No 1303/2013 and Annex V to Regulation (EU) No 1303/2013 and Section III of Commission Delegated Regulation (EU) No 480/2014 setting out rules for calculation of the discounted net revenue of operations generating net revenue.

(c) Ensuring financial viability (sustainability)

The financial sustainability analysis is based on undiscounted cash-flow projections. It is mainly used to show that the project will have year by year sufficient cash resources at its disposition enabling it to always cover expenditures for investment and operations throughout the entire reference period.

Key aspects of financial sustainability analysis are as follows:

1. Financial sustainability of the project is verified by checking that the cumulated (undiscounted) net cash flow is positive (or zero) on an annual basis and over the entire reference period considered,
2. The net cash flows to be considered for this purpose should:
   a) Take into account investment costs, all (national and EU) financial resources and cash revenues and operating and replacement costs at the moment they are paid, repayments of entity's financial obligations as well as capital contributions, interests and direct taxes,
   b) Exclude VAT unless VAT is not recoverable,
   c) Not take into account the residual value unless the asset is actually liquidated in the last year of analysis considered.
3. In the case of an operation not subject to the requirements set out in Article 61 of Regulation (EU) No 1303/2013, or whenever negative cash-flows are projected in the future, it must be indicated how costs will be covered with a clear long-term commitment of the beneficiary/operator to provide adequate funding from other sources to ensure the sustainability of the project.
4. If projects fall within a pre-existing infrastructure, such as capacity extension projects, the overall financial sustainability of the system operator in the ‘with-project scenario’ (more than the capacity of the single extended segment) must be checked and a

sustainability analysis at a system operator level must be performed and results must be taken into account in the risk assessment.

Formulas for financial analysis:

— Financial Net Present Value (FNPV)

$$FNPV = \sum_{t=0}^{n} a_t S_t = \frac{S_0}{(1+i)^0} + \frac{S_1}{(1+i)^1} + \cdots + \frac{S_n}{(1+i)^n} \quad (4)$$

— Financial Rate of Return (FRR)

$$0 = \sum_{t=0}^{n} \frac{S_t}{(1+FRR)^t} \quad (5),$$

Where S_t is the balance of cash flow at time t and a_t is the financial discount factor chosen for discounting at time t; i is the FDR.

2.3.2 Economic analysis

According for by Article 101(1) (e) of Regulation (EU) No 1303/2013, an economic analysis must be included in the CBA. Economic analysis is an analysis that is undertaken using economic values, reflecting the social opportunity cost of goods and services.

The main purpose of project economic analysis is to help design and select projects that contribute to the welfare of a country. Economic analysis is most useful when used early in the project cycle, to catch bad projects and bad project components. If used at the end of the project cycle, economic analysis can only help in the decision of whether or not to proceed with a project. When used solely to calculate a single summary measure, such as the project's NPV or ERR, economic analysis serves only a very limited purpose (Belli, Anderson, Barnum, Dixon, Tan, 1998, p. 3)

Key steps of economic analysis

The economic analysis should be carried out in constant accounting (shadow) prices and should be undertaken taking the financial analysis cash flows as a starting point. Economic analysis includes the following steps:

1. Fiscal corrections to exclude indirect taxes (e.g. VAT, excise duties), subsidies and pure transfer payments granted by a public entity (e.g. payments from national healthcare systems) from the economic analysis. Where indirect taxes/subsidies are

intended to correct for externalities, these should be included in the economic analysis, if considered to adequately reflect the social marginal value of the related externalities and provided that there is no double-counting with other economic costs/benefits.

2. Conversion of market to accounting (shadow) prices by applying conversion factors to financial prices to correct for market distortions. If conversion factors are not available from a national planning office and in the absence of significant market distortion for simplification the conversion factor can be set at one (CF=1). Conversion factors may be higher (or lower) than unity when accounting prices are greater (or smaller) than market prices.
3. Monetisation of non-market impacts (corrections for externalities): externalities should be estimated and valued, as appropriate, using stated or revealed preference method (e.g. hedonic pricing) or other methods.

Economic analysis must consider direct effects only in order to avoid double-counting while generally shadow pricing and monetisation of externalities account for indirect effects. Financial revenues in the form of user fees, charges and tariffs must be excluded from the economic analysis, and replaced with estimation of the direct effects on users, either through 'willingness to pay' or accounting prices. User fees, charges and tariffs especially in sectors not exposed to market competition, in regulated sectors or strongly influenced by political considerations should not be used as a proxy for 'willingness to pay' of user.

4. Discounting of the estimated costs and benefits: once the stream of economic costs and benefits is estimated, the standard discounted cash flow methodology should be applied using a social discount rate (SDR).

On the basis of Social Rate of Time Preference (SRTP) the following benchmarks for social discount rate are estimated: 4.95% for Cohesion Member States and 2.77% for other Member States. For simplification as a general rule a social discount rate of 5% is used as a benchmark in Cohesion Member States (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia) and 3% in other Member States (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Spain, Sweden, United Kingdom).

Member States may establish a benchmark for the social discount rate which is different from 5% or 3%, on the condition that they provide justification for this reference on the basis of economic growth forecast and other parameters determining the SDR under the SRTP approach and ensure its consistent application across similar projects in the same country, region or sector.

Information on the different benchmark should be available to beneficiaries and the Commission at the start of the OP.

Calculation of the economic performance indicators

The following economic performance indicators (as defined below) are the key indicators of the economic analysis:

1. Economic Net Present Value (ENPV) is the main reference indicator for project appraisal. It is defined as the difference between the discounted total social benefits and costs.
2. For a project to be acceptable from an economic standpoint the project's ENPV should be positive (ENPV>0) demonstrating that the society in a given region or country gains from the project because the project's benefits exceed its costs and therefore, the project should be implemented.
3. Economic rate of return is the IRR calculated using the economic values and expressing the socio-economic profitability of a project.
4. Economic rate of return should be greater than the social discount rate (ERR>SDR) to justify EU support to a project.
5. B/C is defined as the NPV of project benefits divided by the NPV of project costs.
6. B/C should be greater than one (B/C>1) to justify EU support to a project.

The main economic benefits per sector RDI to be considered in the economic analysis are set out in Table 1. Additional economic benefits can be added if needed and justified. In some specific cases those benefits may become economic costs e.g. increased vehicle operating costs in certain road projects.

Table 1. The main economic benefits per sector Research, Development and Innovation

Sector/Subsector	**Economic benefits**
Research and Innovation	Benefits to businesses (establishment of spin-offs and start-ups, development of new/improved products and processes; knowledge spill-overs).
	Benefit to researchers and students (new research, human capital formation, social capital development).
	Benefits to the general public (reduction of environmental risks, reduction of health risks, cultural effects for visitors).

Source: *Commission implementing Regulation (EU) 2015/207.*

Climate change mitigation and adaptation in the economic analysis

The CBA must take into account costs and benefits of the project in the context of Greenhouse Gas emissions and climate change. The quantification of the project's Greenhouse Gas emissions and the estimate of economic cost of carbon (or CO2) emissions used to monetise the externalities of such emissions should be based on a transparent methodology aligned with the EU 2050 decarbonisation objectives. As for climate adaptation, costs of measures aiming at enhancing the resilience of the project to climate change impacts that are duly justified in feasibility studies should be included in the economic analysis. The benefits of those measures, e.g. measures taken to limit the emissions of GHG or enhance the resilience to climate change and weather extremes and other natural disasters, should also be assessed and included in the economic analysis, if possible quantified, otherwise they should be properly described.

Simplified economic analysis in special cases

In certain limited cases where the benefits of a project are very difficult or impossible to quantify and monetise, but where costs can be predicted with reasonable confidence, notably for projects driven by necessity to ensure compliance with EU legislation, a cost-effectiveness analysis (CEA) can be performed. In such cases the appraisal should focus on verifying that the project is the most efficient solution for the society to supply a given, necessary service at the pre-defined conditions set out. In addition, qualitative description of main economic benefits should be provided.

CEA is carried out by calculating the cost per unit of 'non-monetised' benefit and is required to quantify benefits but not to attach a monetary price or economic value to the benefits. The conditions for applying CEA are as follows:

1. The project produces only one project output which is homogenous and easily measurable,
2. This output is a crucial supply, entailing that action to secure it is essential,
3. The aim of the project is to achieve the output at minimum cost,
4. There are no significant externalities, and
5. There is a wide evidence of appropriate benchmarks to verify that the chosen technology meets the minimum required cost performance criteria.

Formulas for economic analysis are shown in equations (6), (7) and (8):

— Economic Net Present Value (ENPV)

$$ENPV = \sum_{t=0}^{n} \rho_t V_t = \frac{V_0}{(1+r)^0} + \frac{V_1}{(1+r)^1} + \ldots + \frac{V_n}{(1+r)^n} \qquad (6)$$

— Economic Rate of Return (ERR)

$$0 = \sum_{t=0}^{n} \frac{V_t}{(1+SRR)^t} \tag{7}$$

— B/C

$$\frac{B}{C} = \frac{\sum_{t=0}^{n} \rho_t B_t}{\sum_{t=0}^{n} \rho_t C_t} \tag{8}$$

Where V_t is the balance of net benefits (B-C) at time *t*, B is total benefits flow at time *t*, C is total social costs flow at time *t*, ρ_t is the social discount factor chosen for discounting at time *t*; *r* is the social discount rate.

2.3.3 Risk assessment

As set out in Article 101(1) (e) of Regulation (EU) No 1303/2013, a risk assessment must be included in the CBA. This is required to deal with the uncertainty that always permeates investment projects. Risk assessment enables the project promoter to better understand the way the estimated impacts are likely to change should some key project variables turn out to be different from those expected. A thorough risk analysis constitutes the basis for a sound risk-management strategy, which in turn feeds back into the project design. Particular attention should be paid to climate change and environmental aspects. The risk assessment is made in two steps:

1. Sensitivity analysis, which determines the 'critical' variables or parameters of the model i.e. those whose variations, positive or negative, have the greatest impact on the project's performance indicators, should take the following aspects into consideration:
   a) The critical variables are the ones whose 1% variation results in more than 1% variation of the NPV,
   b) The analysis is carried out by varying one element at a time and determining the effect of that change on the NPV,
   c) The switching values are defined as the percentage change the critical variable should assume to make the NPV equal to zero and
   d) Scenario analysis allowing the study of the combined impact of determined sets of critical values and in particular, the combination of optimistic and pessimistic values of a group of variables to build different scenarios, which may hold under certain hypotheses.

2. Qualitative risk analysis including risk prevention and mitigation and the following elements:
   a) List of risks to which the project is exposed,
   b) A risk matrix showing for each identified risk the possible causes of failure, the link with the sensitivity analysis, where applicable, the negative effects generated

on the project, the ranked (e.g. very unlikely, unlikely, about as likely as not, likely, very likely) levels of probability of occurrence and of the severity of impact and the risk level (i.e. combination of probability and impact),

c) Identification of prevention and mitigation measures, including the entity in charge of preventing and mitigating the main risks, standard procedures, where appropriate and taking into account best practices, where possible, to be applied to reduce risk exposure, where considered necessary,

d) Interpretation of risk matrix including an assessment of the residual risks after the application of prevention and mitigation measures and

Table 2. The main risks in Research, Development and Innovation sector

Nr.	**Group of Risks**	**Risk**
1.	Demand risks	Development of relevant industry (demand for research results and demand for private contracted research). Evolutions on labour market (demand for university graduates and impact on demand for education services in the area). Interest of the general public different than predicted.
2.	Design risks	Inadequate design cost estimates. Inadequate site selection or delays in completing the project design. Invention of a new RDI technology making the infrastructure's technology obsolete. Lack of well-established technical engineering expertise.
3.	Administrative and procurement risks	Delays in obtaining building permits. Unresolved property ownership rights. Delays in the acquisition of intellectual property rights or higher-than-expected costs for their acquisition. Procedural delays to select the supplier and sign the procurement contract. Supply bottlenecks.
4.	Construction risks	Project delays and cost overruns during installation of scientific equipment. Lack of ready-made solutions to meet the needs arisen during the construction or operation of the infrastructure. Delays in complementary works outside the project promoter's control.
5.	Operational risks	Lack of academic staff/researchers. Unexpected complication connected with the installation of specialised equipment. Delays in making the equipment fully and reliably running. Insufficient production of research results. Unexpected environmental impacts/accidents.
6.	Financial risks	Insufficient committed funding on a national/regional level during the operational phase. Inadequate estimate of financial revenues. Failure to meet the demand from users. Inadequate system for protection and exploitation of intellectual property. Loss of existing clients/users due to competition from other R+D centres.

Source: *Commission implementing Regulation (EU) 2015/207,* 2015, Table 2.

2.4 The role of Cost-benefit Analysis in the appraisal of the project

2.4.1 The Role of the Cost-benefit Analysis

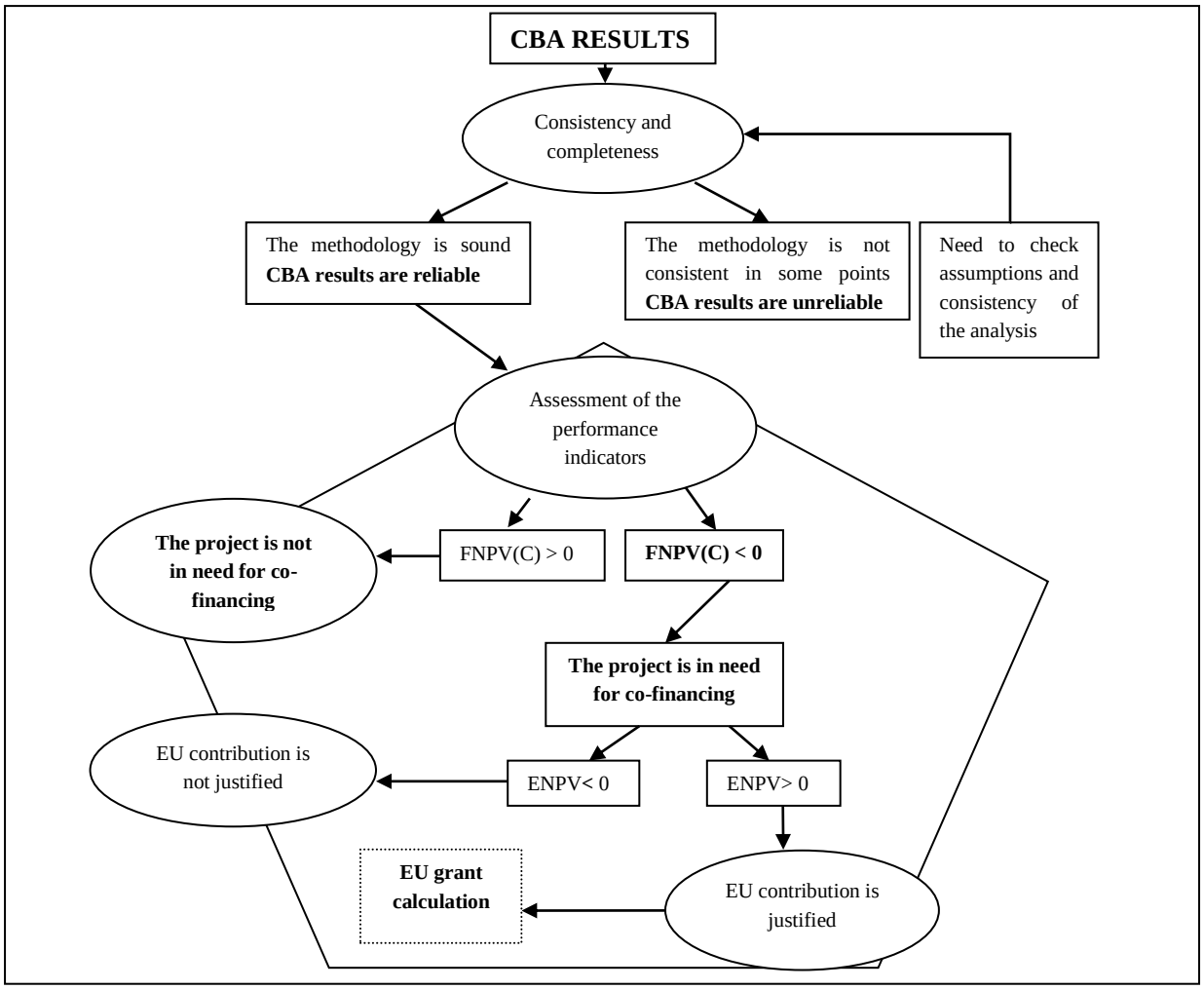
Accordingly to the "Guide to Cost-Benefit Analysis of Investment Project, economical Appraisal Tool for Cohesion Policy 2014–2020" (p. 27) CBA is structured in seven steps:

1. Description of the context,
2. Definition of objectives,
3. Identification of the projects,
4. Technical feasibility and environmental sustainability,
5. Financial analysis,
6. Economic analysis and
7. Risk assessment.

To narrow down the research area, thesis focuses on two types of public RDI projects: HEI projects and RI projects. However, in the context of the object of research (the CBA) to further narrow down the research area, the thesis focuses on the economic analysis, more precisely on quality and quantification processes of input data (primary elements of CBA) describing socio-economic benefits of the project. In regard with this constriction in the continuation of the thesis, the emphasis is on those processes; however, to understand those processes, it is important to thoroughly explain not only economic analysis but also financial analysis.

The main purpose of this thesis is to help policy-makers involved in public investment decision-making processes by critically reviewing the role of CBA in the framework of EU cohesion policy with the focus on HEI and RI, and to determine whether the role meets its goal – improving transparency in the EU funding. **The role of the CBA (represented in Figure 2) is to appraise a project and to show whether the project is consistent with the OP** (this is demonstrated by checking that the result(s) produced by the project contribute to the specific objectives of the priority axis of the programme and policy goals), **in need for co-financing** (this is assessed by the financial analysis and, particularly, with the calculation of FNPV(C)) and FRR; to gain the contribution from the Funds, the FNPV(C) should be negative and the FRR(C) should be lower than the discount rate used for the analysis) **and desirable from a socio-economic perspective** (This is demonstrated by the economic analysis result particularly by a positive ENPV) (Document Guide to Cost-Benefit Analysis of Investment Projects. Economical Appraisal Tool for Cohesion Policy 2014–2020. 2014, p. 18).

Figure 2. **The role of Cost-benefit analysis in the appraisal of the project**



Source: European Commission, *Guide to Cost-Benefit Analysis of Investment Projects. Economical Appraisal Tool for Cohesion Policy 2014–2020*, 2014, p. 20, Figure 1.2

2.4.2 Limitations of Cost-benefit Analysis

As it was already described in the introductory part of the thesis, there are some limitations, regarding the use of CBA. The most obvious are: uncertainty, assessment, subjectivity.

One of the main reasons to these limitations is, according to the Guide to cost-benefit analysis of investment projects, the fact that CBA is not an exact discipline but an applied social science. It is largely based on approximations, working hypotheses and shortcuts because of the lack of data or because of constraints on the resources of the evaluators (European Commission, 2008, p. 13). This is shown also in the literature as the literature on theory of CBA often departs from literature on practice. It is often the case that practitioners "go around" the theory, modifying it towards their needs. But, as R. J. Brent stated, it doesn't have to be that way. CBA was developed as a subject in order to be a

practical guide in social decision making. If the usefulness of the theory were made apparent, there would be a greater chance that the theory and practice of CBA would coincide (Brent, 2006, p. xv).

Different authors describe also some other limitations, not directly connected with the empirical and conceptual challenges of a CBA as a means to asses net economic benefits, as for example, that it is too often overruled by political and philosophical considerations, especially in decisions with regard to resource allocation, since usually many interest compete for limited public investment (Chen et al., 2015, p. 177). Policymakers are deciding whether benefits to different groups will be given equal distributional weight or may wish to emphasize benefits received by specific group and they all too often decide in accordance with voting power of the group (e.g. "give social transfers to those with less income"). Other serious limitation, often present in a health-care programmes CBA's, pointed out by Spiegel and Hyman (1998, p. 184), is value system and other limitations connected with ethical issues and moral deliberations, that prevents CBA experts to monetize benefits (e.g. although it would be possible it is socially unacceptable to monetize human life). The third serious limitation is time constraint. CBA is a method, when multidimensional is transformed into one dimensional. In other words it analyses many different factors in a point of time. The problem is that all those variables could change in the next moment, so at the time, the results are made, the reality could be quite different, as at the point CBA was conducted.

According to Hoque (2005, p. 156) one major operational problem of the CBA is also selecting appropriate discount rate, especially assumption of fixed/uniform discount rate over time. In the case of projects analysed in this thesis discount rate were determined by the EU and national regulations (Slovenia negotiated a different discount rate regarding general EU regulations 7% despite that the discount rate for EU was set at 5%) for all the projects for the entire financial period (2007–2013). Although Slovenia negotiated more convenient discount rate from the point of justification of projects for the EU contribution, the question remains if Slovenia could use EU Funds contributions more efficiently (in a more optimal way).

Despite these serious limitations CBA is at the moment one of the most widespread decision making tools worldwide and it was adopted by the EC to help improve transparency in policymakers' public investment decisions in the framework of EU cohesion policy. In the next chapter I determine whether he CBA meets its goal – improving transparency in the EU funding. To meet this purpose I analyse process and results of several existing analysis in the 2007–2013 EU financial perspective and draw lessons from this CBA experience.

3 A BEST PRACTICE CASE OF COST-BENEFIT ANALYSIS OF A MAJOR PROJECT

In chapters one and two a review and analysis of relevant literature, theoretical findings and regulatory rules were analysed to set up theoretical and legal framework of the thesis. In this chapter an analysis of a case of CBA prepared by the beneficiary, University of Ljubljana (hereinafter: UL) and included in the documentation for direct application to European Union Commission for EU grant for major investment projects in the programming period 2007–2013 is conducted.

In accordance with the purpose of the thesis (to help policy-makers involved in public investment decision-making processes by critically reviewing the role of CBA in the framework of EU cohesion policy with the focus on HEI and RI, and to determine whether the role meets its goal – improving transparency in the EU funding) and in order to answer the main research question ("can quality and quantification processes of input data estimating socio-economic benefits of the HEI and RI projects improve quality of economic analysis (as a part of CBA) and consequently its transparency and efficiency?"), I analysed CBA of the above project from the point of view of research sub-questions:

1. How experts, preparing economic analysis, collected and used the data received by the beneficiaries? Were they independent or influenced by the beneficiaries, who were trying to receive EU grant? Is the quality of data sources high or low? Are expert's assumptions about macroeconomic, institutional, financial, behavioural, technical, and environmental variables, including assumptions about government implementation capacity, macroeconomic performance, and availability of local cost financing trustworthy?
2. How often benefit double-counting occurred?
3. Are (consequently) economic performance indicators (ENPV, ERR and B/C ratio) of the projects analysed in this CBA real or are tailor made to satisfy the EU (and JASPERS) guidelines?

Analyses conducted were:

1. Review of the quality of sources,
2. Evaluation of quality and reality of data used (as input for the CBA) and
3. Critical assessment of results of CBA.

Before performing those analyses I tested and compared data, content, calculation and presumptions in the case investment programme (hereinafter: IP) according to methodology guidelines described in chapter 2.3.

What is important in this case is the fact that IP including CBA analysis of this project went through meticulous scrutiny of JASPERS CBA experts in the first phase of the confirmation process for the EU co-financing and, in the second phase went through another examination executed by EC experts. At the end of the process, the project received a positive decision regarding EU co-financing, so it is possible to conclude the CBA analysis was prepared properly and completely in accordance with EU guidance and recommendations. Accordingly, **basic presumption for review, evaluation and assessment of the case is that CBA, presented in the project investment documentation, represents best practice in RDI HEI projects CBA** as JASPERS provided technical expertise throughout the preparation of the final application for EU funding and prepared suitable Completion note to the project.

Additionally, the case was presented in a document (Staff Working Papers) published by JASPERS in 2013 (Project Preparation and CBA of RDI Projects, p. 37) as case of major HEI project. The purpose of Staff Working Papers was to provide methodological guidance for the development of the feasibility study and CBA for the RDI projects (p. 1) so I can conclude CBA of this project can be used as a sample case (best practice case) or as a benchmark for further analyses in chapter four.

The analysis is divided into subchapters that are of the same content as "the seven steps" of CBA, described in the chapter 2.4.1 (in accordance with the "Guide to Cost-Benefit Analysis of Investment Projects. Economical Appraisal Tool for Cohesion Policy 2014–2020" (p. 27). Source of information of all the data for the project presentation are documents, which were part of the project confirmation request submitted to the EC according to the procedures under Articles 39 to 41 of Regulation (EC) NO 1083/2006:

1. Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana Faculty of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science (version February 2011, revised in April 2011, May 2011, June 2011 and September 2011) with attachments 1-5,
2. Appendix 16b: Major project Request for Confirmation of Assistance under Articles 39 to 41 of Regulation (EC) NO 1083/2006,
3. Building permits (three Building Permits are referred to in the Application Form and attached as an Appendix: no. 351-1570/2009-9, issued 26. 10. 2009, no. 351-1573/ 2009-12, issued 21. 10. 2009 and no. 351-657/2009 – 16, issued 16. 10. 2009),
4. Natura 2000 (Annex 1, Declaration by authority responsible for monitoring Natura 2000 sites, obtained 31. 3. 2010) and
5. VAT confirmation (no. 4230-4394/2011-2-08082-53, issued 21. 6. 2011).

IP was the key document in the process of approving the project. It contained all the data (technical characteristics of the project, financial and economical inputs and outputs, managerial actions and measures, legal framework and other data), necessary to approve project co-financing. Document contained the CBA analysis of the project, which included financial, economic and risk analysis.

3.1 The best-practice case

3.1.1 The Beneficiary

The project New building of Faculty of Chemistry and Chemical Technology and Faculty of Computer and Information Science of University of Ljubljana was prepared and conducted by the beneficiary of the EU funds, UL. UL was established in 1919. It ranks among the top 500 of the world's best universities on the Shanghai, Times and Webometrics ranking lists. It is consisted of 26 full Members (3 art academies and 23 faculties) and 3 associated Members (National University Library, University of Ljubljana Central Technical Library, University of Ljubljana Innovation-Development Institute). According to UL Yearly Business Report for the year 2015 (https://www.uni-lj.si/o_univerzi_v _ljubljani/ organizacijapravilniki_in_porocila/poslovno_financno_in_letno_porocilo_ter_program_dela/), its annual revenues were EUR 289,775,884, 12. 2% of them came from the market activities (EUR 35,474,683 before taxes) (2016, p. 76). It had 5,747 employees and 40,833 students.

In the IP beneficiary prepared following analyses:

1. Analysis of the present situation including needs from the macro-economic point of view and from the UL FCCT and UL FCI level (analysis includes business and R&D environment state analysis exposing the role of the chemical components and ICT in the structure of trade (import, export), sector performance analysis),
2. Analysis of marketing possibilities including analysis of individual market activities and public services within public service sector which contribute to income,
3. Employment analysis considering alternatives “with” and “without” investment,
4. Location analysis with presentation of spatial planning documents,
5. Investment project environmental impact analysis and assessment of damage repair costs when appropriate and born by the investor,
6. Feasibility analysis,
7. Financial analysis,
8. Economic analysis,
9. Risk analysis and
10. Sensitivity analysis.

Those analyses helped him explain the nature of the project, main characteristics of the project, to support the eligibility of the project and to argue that the project is worth co-financing (from an economic point of view) and to assess whether the project needs co-financing (from a financial point of view). In next chapters financial, economic and risk analyses are reviewed (they represent last three steps in the CBA process), including the review of the quality of sources, evaluation of quality and reality of data used and critical assessment of results of CBA. The role of other analyses is to gather and prepare data for CBA; thus they are not specifically explained in this thesis.

3.1.2 Description of the context and identification of the project

At the end of 2009 UL received building permits for building UL FCCT and the UL FCI at location Brdo Ljubljana. Project included construction of three buildings, including purchasing and installation of research and technological equipment, ICT equipment and furniture: the UL FCCT premises (16,621 m2), UL FCI premises (9,245 m2) and "Building X" (3,987 m2) all of them connected by a glass bridge. Including parking and driving areas and outdoor technical premises the total surface of the building is 42,046 m2 (IP, p. 58).

Estimated project value (including eligible and non-eligible costs and expenses required for the implementation of the project) was (in current prices) EUR 116,449,389. Costs for preliminary works (land purchase, planning and design fees and construction works connected to flood control activities, necessary to gain building permit) added up to 10% of the total project value (EUR 10,001,821). Majority of them was financed by Ministry of Higher Education, Science and Technology (hereinafter: MHEST) in years 2001 – 2010. In Table 3 sources of financing are represented by year and by source.

Table 3. Sources of financing (at current prices in EUR)

Source	Until 2009 inclusive	2010	2011	2012	2013	2014	Total	Share
EU, ERDF	0	0	8,406,313	33,114,443	33,744,221	0	75,264,977	64.63
RS, MHEST-national particip.	0	0	1,483,467	5,843,725	5,954,863	0	13,282,055	11.41
Other sources of funds	8,812,709	1,189,112	123,684	130,295	7,204,951	10,441,606	27,902,357	23.96
Total	**8,812,709**	**1,189,112**	**10,013,464**	**39,088,463**	**46,904,035**	**10,441,606**	**116,449,389**	**100.00**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University Of Ljubljana Faculty Of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science*, 2011, p. 79.

In Table 4 costs divided by activities are represented including division of eligible and non-eligible costs per activity. The majority of the costs of the projects were planned for building and construction and for plant and machinery (technical and ICT equipment and furniture).

Table 4. Investment value in current prices for the eligible and non-eligible costs (in EUR)

	Cost	**Eligible**	**Non-eligible**	**Total**
1.	Planning/design fees	1,647,073	1,891,953	3,539,026
2.	Land purchase	3,994,389	2,485,611	6,480,000
3.	Building and construction	55,668,580	582,585	56,251,165
4.	Plant and machinery	27,041,596	0	27,041,596
5.	Technical assistance	2,603,322	469,777	3,073,099
6.	Publicity	900,000	0	900,000
7.	Supervision during implementation	800,024	9,402	809,426
	Sub – total	92,654,984	5,439,328	98,094,312
8.	VAT – non-refundable eligible costs (98%)	17,409,691	0	17,409,691
9.	VAT – 20% from non-eligible costs	0	590,743	590,743
10.	VAT – refundable for eligible costs (2%)	0	354,642	354,642
	Total	110,064,675	6,384,713	116,449,388

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University Of Ljubljana Faculty Of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science*, 2011, pp. 62-63.

Description of the context including presentation of the social, economic, political and institutional context and identification of the project are important for forecasting future trends for analyses (including CBA), prepared in the feasibility study. It has extensive influence on quality and reality of data used as inputs for the CBA. A review of data in IP demonstrates, that beneficiary used appropriate (incremental) approach towards project implementation (analysis of different projects options was made), used proper time horizon, properly identified and monetised project effects and that the adopted methodology does not differ from methodology prescribed with EC guidance, described in chapter 2.3. Description of the contexts of the project is meticulous and transparent and this shows, that beneficiary had clear idea of nature, purpose and impact of the project. Constrains to project implementation are described briefly, because risk analysis, that is also part of the feasibility study is prepared in separate chapter. Accordingly, a review proved that project constitutes a clearly identified self-sufficient unit.

Despite the thorough evaluation of economical context in preparation phase of the project, later in the implementation phase of the project (conduction of tender procedures) the

problem of overestimation of costs appeared (Final report, 2016, p. 4). The success of the project appears to be twofold:

1. Realisation of the project was conducted on time, with little or no changes in the project documentation (except changes based on the beneficiary's demand, because of the improvement of the energy efficiency of the project).
2. On the other hand, the project costs (especially the costs of building of premises and equipment) were estimated to be almost 30% higher as they were in reality, after the project conclusion.

When I analysed documents prepared in the preparation phase of the project I discovered, that JASPERS (JASPERS Completion note, 2011, p. 9) pointed out the possibility of cost overestimation, based on the benchmarking method. JASPERS predicted that costs per metre squared in similar project in EU area are usually around EUR/m2 1000 – 2500, but in this project were approximately EUR/m2 3678. Because there was no obvious signs of projects overdesign, JASPERS did not suggested project documentation revision. Later, after the tendering procedures were concluded, the project costs were, according to the beneficiaries Final report (Final report, 2016, p. 5) below the predicted values (total costs were EUR 79,786,352 eligible costs were, EUR 67,869,603, realised costs EUR/m2 2270).

This signals, that beneficiary, although it conducted comprehensive context analysis, could prepared additional comparative analysis of the project costs and improve evaluation of macroeconomic situation (world crisis caused enormous decline in prices in the field of construction industry and connected industries in Slovenia in construction and related economic sectors), although it was difficult to predict such development of the economy in the time of feasibility study preparation. I would also like to point out, that this overestimation of project costs did not have an effect on CBA analysis (Revision of IP, 2014). From that point of view, I can conclude that primary expert base guidelines for project, as a source of data for the project implementation, were of high quality, trustworthy and competent, despite latter changes in project costs values.

3.1.3 Definition of project purpose, goals, objectives and physical and financial indicators of the project

As for the purpose of the project beneficiary determined establishment of an education – R&D centre. Goals were set accordingly:

1. To support education processes, basic and applied research in chemistry, chemical technology, computer an information science and related disciplines,
2. To support interdisciplinary activities, related to the study and research on both faculties and

3. To set new foundations for further development of the university natural and technological science campus.

Objectives were determined as one general objective and several specific objectives. General objective was (in line with the above purpose) "to establish recognizable high quality educational, scientific, R&D centre in Central Europe" and suitably narrower specific objectives, divided into three groups of objectives:

1. R&D:
   a) Provision of an infrastructural centre for more successful inclusion in the European Research Area (hereinafter: ERA) through participation in the large EU and other international projects,
   b) Increase in co-operation and synergy among the institutions of the same and other areas of activities,
   c) Establishment of the R&D centres for the macro regions,
   d) Provision of conditions for the activities of the Competence Centres and Development Centres in Slovenian industry,
   e) Improvement of conditions for co-operation with Centres of Excellence and
   f) Increase in the capabilities for the two-way transfer of knowledge and co-operation between business and public R&D sectors with shared investment and use of the up-to date RI.

2. Education and training:
   a) Raise of the quality and effectiveness of education of undergraduate (1^{st}) and post graduate (2^{nd}) cycle,
   b) Provision of the conditions to raise the quality of the doctoral studies and more co-operation of post-graduate students in research for/with economy,
   c) Provision of the conditions for better internationalisation (more "incoming" and "outgoing" mobile students, graduates, teachers and researchers, especially in various EU schemes), accreditation and offer of joint programmes and summer schools and
   d) Provision of education for under-privileged groups.

3. Common and general objectives:
   a) Provision of the conditions for international accreditation of study programmes by international professional and education associations (FEANI[9], ECTNA[10]) for the purpose of establishing the international comparability of diplomas and the learning outcomes and profiles of the graduates and

[9] FEANI stands for European Federation of National Engineering Associations.
[10] ECTNA stands for European Chemistry Thematic Network Association.

b) Permanent salvation of the problem of the technical security of the facilities and thus eliminate fire risk according to the safety at work measures and health protection in the provision of pedagogical and research activities and effects on environment.

Project objectives were quantitatively identified by means of indicators and target values (Appendix G: Physical indicators of the project), to follow-up the project objectives realization. Beneficiary determined 24 specific indicators divided into three groups:

1. OP effect indicators,
2. OP result indicators and
3. Indicators specific to UL FCCT and UL FCI.

Analysis of project purpose, goals, objectives and indicators described in the IP and Appendix 16b in comparison to (at that time valid) national and EU strategic documents (document are listed in chapter 1.3) indicate, that the results of the analysis are in line with strategic documents (including OP) and in accordance with national and individual needs of the beneficiary, described in those documents and that project is relevant in light of those needs.

Beneficiary description of purpose, goals and objectives are detailed, clear and concrete. List of evidence (indicators, to follow-up the project objectives realization) is extensive (24 indicators) and targeted. Despite national strategic documents (OP SRDP) prescribed 5 compulsory indicators, beneficiary ambitiously added 19 indicators of his own. This could represent problem for the beneficiary latter in the follow-up period for several reasons:

1. Beneficiary predicted extensive time scope for follow-up activities (until 2028, with two intermediate measurements in 2014 and 2018),
2. Beneficiary predicted vast number of indicators to measure (24),
3. Due to the national legislation it would be very challenging for the beneficiary to achieve some of the indicators (in example indicator “Number of Spin-offs").

Nevertheless, the number and preciseness of specific indicators and its target values shows, that beneficiary have a clearly defined objectives stemming from a clear assessment of its needs. Accordingly, it is possible to identify the effects of the project to be further evaluated in the CBA and verify the projects relevance.

3.1.4 Technical feasibility and environmental sustainability

3.1.4.1 Technical feasibility

Technical feasibility of the project was checked and proven mostly during the process of building permit acquisition (2009), considering some of the studies were made almost ten

years earlier). According to the implementation schedule in the IP (p. 69) land acquisition was finished in 2008 when beneficiary started to make feasibility studies, CBA's and design studies and ended at the end of 2009 with the obtainment of the building permits.

The project was designed to follow all the relevant technologically technical requirements of safe use of the building. Accordingly, the following studies were produced: The Study of fire safety, the Elaborate of the anti-explosion hazard, Hydro-technical elaborate, Elaborate on safety and health at work and the Technological design as the foundation for the construction elements and installation systems.

3.1.4.2 Environmental sustainability

Although the project was designed in accordance with the existing relevant legislation on the energy efficiency and in accordance with relevant spatial planning documents at the time of the project preparation and the process of obtaining the building permit beneficiary conducted investment project environmental impact analysis and assessment of possible damage repair cost accordingly to the location of the building site.

During analysis it was determined that the location of the building site was in a wider water protection area (according to the Decree on the water protection zone for the aquifer of the Ljubljana Marshes and the surroundings of Ljubljana (OJ RS no. 1150/07, 9/08), in the protected area of the Tivoli, Rožnik and Šišenski hrib Regional Park, designated a natural feature (OJ Socialist Republic of Slovenia, no. 21/84), next to the protected area of the natural monument "Path of Memories and Comradeship" (Decree designating the "Path of Memories and Comradeship" a monument of common concern for the city of Ljubljana, OJ Socialist Republic of Slovenia, no. 3/88) and in the area of the natural feature of local significance, Tivoli with Rožnik and Šišenski hrib (Rules on the designation and the protection of the valuable natural features, OJ RS, no. 111/04 and 70/06). The location of the planned development was outside the Natura 2000 sites and outside the areas protected as the cultural heritage.

The analysis of the status of the environment did not revealed excessive burden in any of the examined environmental elements, however, beneficiary detected several possibilities of smaller environmental impacts (in construction and later in operational phase of the project) on air, soil, on the surface and groundwater, noise pollution, light pollution and predicted sufficient protection measures, including waste treatment activities. Analysis also revealed that there will be no impact of the electromagnetic radiation on the environment. Beneficiary concluded that if all planned and prescribed mitigation and protective measures would be consistently applied during the construction and the operation phase of the project and if the monitoring would be carried out as predicted the planned development is assessed to be acceptable in terms of environmental impacts, as the permissible environmental burden level will not be exceeded. The negative environmental

impacts were not expected. In the case of their appearance, the costs should be barred by the contaminant. Accordingly, the impact on the nature was set at the minimum and the impact on the landscape and the visual characteristics were appraised to be small.

In the planning and the operation of the investment, the following measures for the environmental protection were observed:

1. Efficient use of natural resources,
2. Environmental efficiency,
3. Sustainable accessibility and
4. Decrease in the environmental impact.

After June 2008, when the construction premises projects were finished and during the constructions of the buildings, the Slovenian and the EU regulation, regarding energy efficiency and efficient use of energy, constantly changed. There were also other circumstances which demanded certain modifications regarding energy efficiency of the buildings:

1. Adoption of the new EU directive from September 2011 (after the tender issued in June 2011),
2. Compliance with new national relevant regulation changes in the period from project planning to its execution (Regulations on efficient use of energy in buildings-PURES-2 (hereinafter: PURES) , valid from 1 July 2010),
3. Availability of new, better and more energy efficient materials (same thickness but better materials, with better isolation capabilities – the increased thickness of the isolation would demand significant changes to the construction premises),
4. New and more efficient devices (system with better energy efficiency and lower CO2 emissions (condensation boiler and more efficient recuperation devices and the recuperation of the waste water)).

Feasibility study of alternative systems for supplying buildings with energy was prepared by the IBE d. d. during the construction phase of the project (2 April 2013). The aim of the study was to make the project compliant with PURES and to provide economically feasible operation of the new systems.

The main targeted effects of planned changes were:

1. Reduction of energy consumption and operational costs,
2. Reduction of environmental impact (CO2) and
3. Approaching the targets of the directive aimed for all public buildings (to be low-energy consumers by 2018).

The review of the project documentation showed, that detailed information were provided on demand analysis, option analysis, environmental and climate change considerations were taken into account as well as technical design, cost estimates and implementation schedule were described. The methodology and parameters used for estimation in demand analysis are explicitly presented and justified and the link between demand analysis and capacity of the project is explained. There has been a substantial effort involved in the option appraisal. Option analysis includes various project option, that were correctly explained and evaluated (a large number of factors have been incorporated in the development of the proposal over a time span of over 10 years). Chosen option is in line with strategic vision of the beneficiary. I can conclude, that technical feasibility and environmental sustainability, although they were not formally part of CBA, were prepared in accordance with legislation (taking into account the expert base guidelines for the project prepared at time of investment documentation preparation) and properly used as the main data source within the CBA process.

A large part of IP is dedicated to technical design and related cost estimates (partially already described in chapter 3.1.2). Although beneficiary prepared all the relevant project documentation (listed in Appendix K: List of documentation used by the beneficiary for preparation of feasibility study, including financial and economic analyses and analysed in chapter), later in the project realisation an analysis of energy consumption on the basis of building models was conducted on 10 April 2013 (Revision of IP, 2014, p. 61), that included some project design changes. Analysis has shown that in order to improve in energy saving and to, comply with the relevant regulation (PURES) it was most reasonable to:

1. Replace the devices, specified in the construction documentation (PGD) in 2009, with more energy efficient equipment (significantly less CO2 emission), replace the low temperature boilers with condensation boilers (10% more efficient) and more efficient equipment for recuperation and regeneration of waste heat.
2. Replace the entire isolation of the building with a new one, made of better materials at the same thickness which provides better isolation,
3. Replace double-glazing windows with triple-glazing windows, which complies with the project documentation and the construction permit.

It was calculated, that these alterations would result in EUR 100,000 of savings generated annually (provided the prices of energy regain at the same level).

The question is, why beneficiary did not predicted those changes in technical design in the preparation phase of the project? After analysing project and investment documentation of the project, including risk analysis I concluded, that beneficiary knew at the time of the project confirmation negotiation with JASPERS and EC, that some energy efficiency

alteration of the project would have to be made, but because that could result in changes in building permit (this assumption was not correct as this was proven latter in the implementation of the changes) and consequently delays in project implementation, beneficiary did not decide, to open this equation at that time. Although consequently beneficiary had to pay for the conduction of project redesign by himself, the decision not to stop the project adoption procedure meant less risk for projects implementation or in another words the risk of not conducting the project because of project confirmation interruption due to the project documentation alteration would be too high.

3.1.5 Financial analysis

The financial analysis was made based on the following presumptions:

1. Assessment/evaluation is based on the CBA's analysis as the difference between "with" and "without" investment,
2. The calculation of eligibility is based on the 7% discount rate, as stipulated by the Decree on the uniform methodology for the preparation and treatment of investment documentation in the field of public finance,
3. The reported period, for which the calculation of profitability is made, is until 2028 (15 years after conclusion of the construction).

In the revenues of the project, the beneficiary included the following revenues (all as the difference between "with" and "without" investment (with VAT)):

1. Research activities revenue (programme groups, Slovenian Research Agency (hereinafter: SRA)) projects, young researchers, EU projects, co-operation with business, other research);
2. Educational activities revenue (educational activities on the first and the second cycle revenue, student fees and participations, doctoral study fees, co-financing of the doctoral study, EU projects and
3. Other current operation revenue sources (rents, parking, restaurants, other).

At the conclusion of the project, the net fixed assets value was calculated in total, including VAT. In the costs of the project the beneficiary included following costs (all as the difference between "with" as compared to "without" investment (with VAT)):

1. investment costs (with VAT),
2. operation costs (materials and supplies, auxiliary material, energy, fixed assets spare and replacement parts, equipment, small tools, literature, office supplies, other goods, rent (buildings, equipment), current maintenance, insurance, intellectual performances, municipal utility services, transport services, other services, labour, labour associated,

other costs, investment costs (needed investment to ensure safety standards in "without" investment conditions)).

According to thesis data, beneficiary prepared two tables, which are represented in Appendix F. In the Table 1 the net cash flow was calculated, taking into account undiscounted values of investment costs, operation costs, revenues and residual value. Table 2 shows the net cash flow calculation with discounted values.

Table 5 shows the financial analysis results. As I already explained in Ch. 2.3.1 the financial profitability of an investment is assessed by estimating the FNPV and the FRR of the investment (FNPV(C) and FRR(C)). These indicators compare investment costs to net revenues and measure the extent to which the project's net revenues are able to repay the investment, regardless of the sources of financing. FNPV before the EU contribution should be negative and FRR should be lower than the discount rate used for the analysis (in the financial perspective 2007–2013 was 7%, in the new perspective 2014–2020 4% discount rate used in financial analysis and 5% discount rate used in the economic analysis).

Table 5. Financial indicators calculations

Indicator	**Value**	
FRR	-4.90	%
FNPV (7%)	-76,691,466.23	EUR

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 90.

The FNPV(C) is less than zero, so the project is in need for co-financing. The project shows also low financial profitability (i.e. FRR(C) is substantially lower than the FDR) and is considered impossible for an investor to implement the project without Union contribution.

Accordingly, beneficiary calculated the so called financing gap (Table 3). That means he assessed whether the project needs co-financing (from a financial point of view). He used methodology, prescribed by the EC and adopted at the national level. Calculations showed, that beneficiary (because of his future estimated revenues) is not eligible to 100% co-financing but only 80.45% co-financing. That was not expected, according to the nature of the beneficiary and according to what was expected in line with VAT confirmation received by the Financial Administration of the Republic of Slovenia (hereinafter: FARS) and submitted by the beneficiary in the evaluation process. The confirmation displayed, that gap would be approximately between 2-3% as beneficiary was eligible to 2% deductible VAT, meaning it is estimated by the beneficiary and approved by the FARS that

it has 98% untaxed activities (activities that are in public interest) and 2% of activities that are taxable transactions (if simplified, taxable transactions are usually similar to market activities oriented transactions)[11].

The results of financial analysis showed that perhaps some of the input data had to be re-examined as worth of future estimated revenues differed from usual for this kind of projects and perhaps overestimated (EUR 22.3 million in next 15 years). To compare the data in financial analysis and to comprehend, why beneficiary assessed its future revenues as shown in financial analysis I examined beneficiary Yearly Business Report for the year 2011 (year of the beginning of the majority of activities in the project) and Yearly Business Report for the year 2015 (year when the project was finished).

Data in the report showed, that overall revenues in the year 2011 were EUR 330,688,449. 89.21% (EUR 295,002,134) were revenues from public service and 10.79% (EUR 35,686,315) were revenues from the sale of goods and services on the market. Overall revenues of the UL in the year 2015 were EUR 290,048,884. 87.68% (EUR 254,301,201) were revenues from public service and 12.32% (EUR 35,747,683) were revenues from the sale of goods and services on the market. Surplus of revenues over expenditures in the year 2011 after payment of corporation tax added up to EUR 7,121,755 (48% represents surplus made out of market activities) and in the year 2015 EUR 7,789,248 (46% represents surplus made out of market activities).

Data pertain for the UL, however, the FCCT and FCI were both contributing to the value of surplus. In the year 2011 FCCT contributed EUR 186,022 (2.6% of overall surplus) and FCI 849,381 (11.9% of overall surplus). In the year 2015 the situation was different. FCCT contributed EUR 1,168,820 to the surplus (15.0% of overall surplus while having 3.3% of all employees), while the FCI displayed a deficit (EUR -510,538, while having 3.0% of employees). It is possible, that the FCI deficit arise from the additional costs of the build, which were not eligible for co-financing from EU funds).

I assessed that beneficiaries estimations of the revenues are in line with its strategic development documents and with project indicators listed in Appendix G: Physical indicators of the project, especially indicators C18 (Research revenue) and C19 (Education revenue), for which beneficiary predicted 8.58% and 12.60% increase in 2019, and 22.56% and 34.31% after 2028.

If I take into account these predictions, I can confirm beneficiary's calculations in financial analysis as correct, in line with prescribed methodology and with inclusion of all the

[11]For more explanation of taxation of public sector and calculating deductible VAT see for example document, prepared by the FARS "Value Added Tax. Tax on Subsidies. Detailed description".

relevant costs and revenues. The beneficiary included correct net fixed assets value, used prescribed discount rate and suitable reference period of the project and in consequently financial analysis is real and calculation are provable.

3.1.6 Economic analysis

The economic analysis was made based on the following presumptions:

1. The assessment is based on the CBA's in the "with" compared to "without" conditions,
2. The calculation of eligibility was based on the 7% discount rate, as stipulated by the Decree on the uniform methodology for the preparation and treatment of investment documentation in the field of public finance and
3. The reported period, for which the calculation of profitability is made, is until 2028 (15 years after conclusion of the construction).

Presentation of financial flow (inflows, costs) with the calculation of economic indicators:

1. The considered inflows of the project are project inflows (from the financial analysis, reduced for the amount of the indirect taxes), assessed socio-economic effects of the project, further explained in detail and net fixed assets value (without VAT).
2. The considered costs of the project are investment costs and operation costs, reduced for indirect taxes.

In the case of the investment costs the conversion factor of 0.7167-reduction of indirect taxes (value added tax, other taxes and contributions) is applied. This is defined on the basis of the assessment of the structure of the investment. We assess that the investment includes 65% of the material and the 35% of the workforce. In the cost of labour are 40% of the taxes and contributions. Share of taxes and social contributions in full, is 0.35 x 0.4 x 0.833 = 0.1166. Material costs include 20% VAT (100/1.2 = 0.833). Conversion factor = 0.8333 – 0.1166 = 0.7167. Indicative conversion factor in the conversion of revenues and operating costs (from financial and economic analyses) is 0.8333 (a reduction of indirect taxes).

Presentation and assessment of socio-economic benefits of the project includes effects on the level of individual, higher level of inclusion in the R&D, direct increase in employment, and contribution to science and contribution to economy.

Planned revenues are assessed within the financial flow (they are an actual financial effect for the beneficiaries). Project revenues and benefits are calculated (discounted) to be EUR 144,847,915 representing 94.45% of total benefits, other 5.55% is representing residual value EUR 8,516,844. In all indicators used in benefit analyses present the additional benefits to labour market, business and society.

All the data for the economic analysis with explanation of data are presented in the Appendix I: Economic analysis data, tables 1–12. In table 6 there are presented only calculations of economic indicators.

Table 6. Presented calculation of economic indicators

Indicator	**Value**	
ERR	15.26	%
ENPV (7%)	71,561,017	EUR

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 97.

Presentation of project impacts, including impacts, not monetary assessed (benefits)

Beneficiary proved, that project indicates high economic level of return, despite assessment of only 5 benefits. The rest of the benefits, that were not assessed (exp. regional impact, time consumption, transport during study...), are representing (according to beneficiary) additional arguments for the project.

Removal of the two faculties into the new premises is enabling the UL and other owners to use the old facilities for their own activities (the UL NTF – textile department, the UL FFA, the UL MF, the UL FMF, the Jožef Stefan Institute, the National Institute of Chemistry, the Institute for Transfusion and other public education and research institutions).

Beneficiary predicted the following short-term and long term effects of the project:

The short-term (before 5 years) effects:

1. R&D area

1. More Full Time Equivalent (hereinafter: FTE) in the national R&D projects,
2. More citations in the first half of the indexed international publications,
3. More co-ordinating or partnerships in approved projects EUREKA, CORNET, 7 OP, COST, ESA,
4. More researchers of more than 6 months duration mobility,
5. More joint project applications (UL FCI, UL FCCT; NIB, UL BF, business) and
6. Increase the number of doctorates of science by 13% after the completion of the investment.

2. Education area

1. Reduction of drop-out,
2. Reduction of time of study,
3. Raise in number of above 29 yrs students which have not successfully completed their previous study,
4. International mobility of students and staff,
5. Number of doctoral study graduates from the Eastern Balkans and Mediterranean,
6. R&D centre for the regions of the Eastern Balkans, Ionic Adriatic initiative or Danube initiative or Euro-Mediterranean,
7. Number of joint study programmes,
8. Number of summer schools,
9. Number of interdisciplinary and multidisciplinary programmes, number of elective subjects and modules,
10. Increase in the number of study places on all cycles of study programmes,
11. Number of enrolled students of "vulnerable" social groups.

Long term effects, achieved and presentable in more than 5 years' time:

1. Labour market

1. Number of diploma works applied to the economic environment,
2. Number of the doctoral theses related to the economy,
3. Number of researchers and doctors of science employed in business sector,
4. Number of the life-long learning (LLL) programmes,
5. Adapted and requested LLL programmes for business sector,
6. Time to get employment after the graduation.

2. Innovative economy

1. Number of joint applied and development research projects,
2. Number of FTE engaged in the Centres of Excellence and Competence Centres in Research development centres in industry after the eligible funding period from SF,
3. Number of start-up companies (the Ljubljana University Incubator- LUI),
4. Number of patents, improvements,
5. Number of professionals, included in the study programmes from the business sector (domestic, foreign)
6. Number of professionals, included in the R&D projects from the business sector (domestic, foreign),
7. International accreditation of the study programmes,

8. Establishment of the supporting structures and instruments for the activities within the knowledge triangle (the Technology Transfer Office, the UL Career Centre and individual faculties, alumni associations, the Innovation-research Institute of the University of Ljubljana – IRI, the Ljubljana University Incubator-LUI.).

The review of the documents related to project showed, that beneficiary made an extensive effort, to define benefits of the project. Beneficiary predicted four categories of socio-economic benefits to the project (value added to the individual students, contribution of the science and innovation activity to economy, direct increase in employment and revenues from contract research).Because of the lack of similar projects (especially in education area) beneficiary had a hard time benchmarking its benefits; the support of JASPERS experts was used extensively as it is possible to see in the JASPERS Completion note comments on economic analysis (2011, p. 11): R&D and education projects are still relatively new phenomena in major ERDF projects and guidance is limited. This project has elements which are new and therefore JASPERS has sought with the Beneficiary and Slovenian Authority, to recommend values and methodology which are supported in precedent in other projects and/or are conservative in their estimation of benefits."

According to the fact, that beneficiary used methodology described in chapter 2.3.2 of this thesis, considering, the calculations were made correctly and bearing in mind, that JASPERS had an important role in defining and monetising benefits of the project, I can conclude, that benefits and its monetised values, described and used in the economic analysis are auditable, reflect a suitable set of values and are sufficient.

3.1.7 Risk assessment

Beneficiary prepared a risk matrix showing for each identified risk the level of risk, impact assessment (according to time, costs and quality), risk consequences and risk management measures. The risk analysis was concentrated on identification and definition of possible risks, which could endanger or have a negative impact on the project. The groups of risks were identified as risks in preparation period, risks in construction period and risks after the finalisation of construction. The analysis included the possibilities of the risks and their impact. The analysis of the risk was based on the past experience of the IP producer and similar projects prepared (Complete Risk analysis is displayed in Appendix J). I represent only a short summary of main findings.

Project development risk and general risks. Beneficiary estimated that identified risks primarily impact the time of realization and the quality of the project, lower impact is on the costs. Proposed risk management measures can significantly diminish the impact. The most important measure is engagement of different experts from the field of building construction and legislation for preparation of the public call and appointing experienced and professionally competent commission for the selection of contractor. Appointing a

responsible project leader was defined as crucial in this phase of the project, as well as the leader's experience, knowledge and absence of other work assignments. The leader was expected to clearly define the responsibility and realization lines of the project. Beneficiary predicted, that the audit trail must be constructed and with it the distribution of responsibilities determined.

Project realization risks. In the phase of the project realization, beneficiary determined, that all the listed risks have an impact on increase of costs of the realization of the investment and also on time and quality of the project. The higher level of risk or probability of a risk event is attributed to the choice of inadequate and inexperienced contractor, which, however, can be avoided with carefully prepared tender documentation, clear requirements; the bidders are expected to demonstrate (primarily reference, staff). To diminish these risks beneficiary predicted several measures:

1. Appointing experienced and professionally competent personnel in project office,
2. Permanent supervision of construction works and regular approval and confirmation of all changes including price changes,
3. Obligatory condition for the selection of the contractor is submission of bid bond and selected contractor must submit performance bond and warranty,
4. Project board UL has risk management tasks – regular informing the UL Governing Board and adoption of relevant decisions.

Risks after the construction. In the phase after the construction works will be finished the main risk is that the objectives of the project are not meet. The UL decided that also in this phase the monitoring and implementation of the project goals will continue. The Extended Project Board (two out of seven members are international experts) will monitor the realization and implementation of the goals of the project 5 years after the completion of the investment. The Extended Project Board submits reports to the rector and sends it to the UL Governing Board.

General risks. Beneficiary estimated that the general risks – political, economic, social, cultural are at the minimum and will not jeopardise the realization of the project.

Another risk that was predicted by the beneficiary to occur is that revenues do not match expectations. The first reason can be the present crisis that will affect the budget financing with a slight delay and we can foresee that the effects will last until the end of 2013. This will impact the height of funds for public service and co-operation with business.

Usually a typical source of forecasting mistakes is optimism bias, i.e. the demonstrated systematic tendency for project appraisers to be over-optimistic about the estimation of the key project parameters: investment costs (often underestimated), works duration (often

underestimated), operating costs and benefits (often overestimated). To reduce this tendency beneficiary made, explicit, empirically-based adjustments to the estimates of project's costs and benefits.

Additionally, in the context of risk analysis beneficiary prepared a sensitivity analysis, which determined the 'critical' variables that have the greatest impact on the project's performance indicators. As critical beneficiary determined: investment costs, operation costs and benefits. In my opinion beneficiary should include in sensitivity analysis also revenues, because they are representing the important part of CBA analysis. However, accordingly to guidelines described in chapter 2.3.3, beneficiary did not predicted as critical variables the ones whose 1% variation results in more than 1% variation of the NPV. Instead he prepared scenario analysis including three variables with 10% variation, the study of the combined impact of determined sets of critical values including combination of optimistic and pessimistic values of a group of variables.

Risk assessment did not discuss the question of the project costs overestimation, what happened latter in the project implementation phase. From the beneficiary point of view, project cost overestimation in the preparatory phase of the project does not represent a project implementation risk so the lack of this risk analysis in the risk analysis does not does not diminishing the quality of IP.

3.2 Critical assessment

3.2.1 Review of the quality of sources and evaluation of quality and reality of data used in Cost-benefit analysis

Beneficiary used vast but, according to the scale and complexity of the project, appropriate number of different data sources as a basis for the analyses in the IP (sources and relevant documents are listed in Appendix K). A calculation are based on prescribed mathematical formulas and are not representing the most critical part of the CBA in the sense of data manipulation and transparency in EU funding. They are known in advance as they are prescribed by regulations, exact and CBA experts use them all over the world. Despite standardised procedures, the results of the CBA differ enormously, even if on a first glance the projects nature is similar. The reason for differences is the input data used for the CBA, their quality, methodology of collecting and the way of their interpretation. This represent the most critical part of the CBA.

Accordingly I additionally evaluate the quality of sources and quality and reality of data used in the best practice case. The result of this analysis would give an answer to the main research question: "can quality and quantification processes of input data estimating socio-economic benefits of the HEI and RI projects improve quality of economic analysis (as a part of CBA) and consequently its transparency and efficiency?". The answer to that

question enables me to discover the impact of CBA in assisting policymakers' public investment decisions in the framework of EU cohesion policy in the field of RDI, and to determine whether the role meets its goal – improving transparency in the EU funding.

I divided sources of data used in the case into five different groups, according to their specific characteristic. All of them are in one form or another contributing to the results of CBA.

The first group of sources are expert base guidelines for the project (in a narrower sense) or so called project related sources. These are investment documents (Investment Project Identification Document (hereinafter: IPID), Preliminary investment design (hereinafter: PID) and IP (CBA is usually included in this document) with amendments, adjustments and revisions), project documents and other studies, reports and consents especially in connection with nature preservation, water and air pollution, geological conditions, etc. Those sources are crucial for preparation of the CBA. I divided them into two subgroups: primary expert base guidelines (project documentation and expertise) and secondary expert base guidelines (investment documentation), prepared based on primary expert guidelines.

The quality of these sources is highly dependent on numerous factors. I identified four most important:

1. Quality of procurement documentations;
2. Expertise of the tenderer and public institution;
3. Current macroeconomic environment;
4. Personal characteristics and aspirations of the key players involved in the documentation preparation.

For UL as a public institution it is compulsory, that all the procedures for the award of public works contracts, public supply contracts and public service contracts are in compliance with public procurement legislation. Despite the fact, that expert base guidelines for projects are prepared in accordance with the national legislation, they are often of poor quality, prepared by the experts, chosen because of the lowest price in the bidding documentation and not based on their quality and experiences. The quality of those documents is shown during the project implementation and after the project is concluded.

Because the implementation of the project UL FCCT and UL FCI is physically concluded (the build is concluded, predicted indicators are in the process of evaluation) I could (based on the deviations of the project presumptions in the expert base guidelines and realization of the project) estimate the quality of documents and data, included in the first group of sources.

From the point of the CBA preparation, this set of data has important impact on CBA, especially on the identification of the projects, technical feasibility and environmental sustainability, financial analysis and consequently economic analysis and partially on the risk assessment phase.

The second group of sources used for the preparation of feasibility study and CBA are statistical official sources. Date gathered from official institutions, whose basic activity is gathering and analysing of large quantities of data, as for example Institute for Macroeconomic Analysis and Development (hereinafter: IMAD), OECD, European Innovation Scoreboard, The European Centre for the Development of Vocational Training (hereinafter: CEDEFOP), Statistical Office of the Republic of Slovenia (hereinafter: SORS), are independent, official, the procedure of gathering is standardised, very often compulsory and periodical. Accordingly, the quality of these data is high, reliable and they enable competent benchmarking, but highly dependent on one factor: experiences of the expert (or expert team) using these data for the for preparation of the feasibility study and CBA and his ability to understand the broader meaning of data gathered, the methodology and purpose of the procedure of gathering and ability of expert, to interpret the analysis behind the data.

At this stage of the project UL FCCT and UL FCI it is difficult to evaluate, whether the data was used and interpreted correctly in the feasibility study and CBA analysis, because data were mainly used for long term assessments (assessments of benefits until 2028) in the economic analysis, for which they are of crucial importance. They were also used partially for the preparation of description of the context in the CBA process, partially for the definition of objectives and partially for the risk assessment analysis (for example risk after construction phase).

The third group of sources (strategic official sources), such as NSRF, NDP, RNDP, Slovenian Research and Innovation Strategy 2011 – 2020 (hereinafter: RISS) or Resolution on National Research and Development Programme, are especially important for the definition of the objectives of the project. Objectives were identified in consistence with those sources otherwise the EC would not give consent to the project co-financing. In my opinion those data are the least problematic from the point of view of interpretation, overestimation or misuse, because they are written, widely known and accepted by the relevant policy actors in previous phases of strategic documents agenda setting, preparation, confirmation and implementation processes.

Spatial planning documents are influencing preparatory phases, for example in the process of the project documentation preparation and consequently investment documentation preparation. They are influencing the building permit issuing process, can be reason for higher costs of the project or delays of a time plan, but are not (as a source of

data) critical for the CBA analysis. On the contrary, they are, similarly, as the previous group of sources, reliable, not problematic from the point of view of interpretation, overestimation or misuse, because they are written, widely known and accepted by the relevant policy actors in early phases of the project preparation. These data represents the fact, that beneficiary must include in feasibility study, especially in the step four of CBA technical feasibility and environmental sustainability.

Other relevant data for feasibility analysis as for example public procurement legislation, has to be taken into account in relation to the risk analysis estimations (project realisation risk), because they could be influencing delays in time plan or even sometimes a cancelation of the project, but from the point of view of CBA are irrelevant.

The last group are representing **internal sources** of the UL (primary sources) such as questionnaire for directors/managers responsible for R&D, sent to 62 most important companies in the targeted area (chemistry, chemical processing, pharmaceutical industry and the area of computer and ICT technology) (IP, p. 37), Official Annual reports and Annual Programmes etc.

The use of the questionnaire (or other similar research methods) was a method, which enabled expert and beneficiary to develop dialogue with the "users" of its students. And to asses economic benefits of the project more accurately (not excluding the data from the second group of sources). Those kinds of methods are at most welcome in the CBA preparation process, but are seldom used, because they are:

1. Time consuming,
2. Had to be done properly by experts, to be effective and efficient and to provide accurate and competent data, otherwise are useful and can be even tool for reducing transparency in the use of EU funds and
3. Are highly dependent on personal characteristics and aspirations of key players involved in the process.

At this stage of the project UL FCCT and UL FCI it is difficult to evaluate, whether the data was used and interpreted correctly in the feasibility study and CBA analysis, because data were mainly (the same as sources from group b) used for long term assessment's (assessments of benefits until 2028) in the economic analysis, for which they are of crucial importance. They were also used partially for the preparation of description of the context in the CBA process.

Taking into account the financial gap rate, calculated in Table 3: Calculation of financing gap and Community contribution calculation in EUR**,** Appendix H: Financial analysis data (80.45% for the public university project) I can speculate that experts that prepared

feasibility study including CBA were either too optimistic or prone towards increase in marketing of public university services. He overestimated revenues in the financial analysis and consequently the financial gap was a bit bigger as it could be. On the other hand, the surplus of FCI in 2011 and surplus of FCCI in 2015 could indicate that faculties have the potential to reach the predicted revenues, especially there would be no more additional costs, related to the build of the premises, the overall equipment including research equipment is new and has high potential to be market to private sector and despite the substantially bigger premises and consequently bigger operational cost, the real operational costs would not higher as before (due to the energy efficiency of the building and due to the fact that especially FCCT does not have to pay the rent for its premises).

After examination of the structure of IP, content of IP and methodology of the analyses I concluded, that IP is in consistency with the Regulation on a uniform methodology for the preparation and treatment of investment documents in the field of public finance and that already represents the step towards improving the transparency in the EU funding of the project. However, the quality of the analyses (including CBA) is determined strongly by the quality of sources and data used in the analyses and especially the competences and integrity of the beneficiary, providing the data for the analyses and the experts, conducting the CBA.

The most important from the point of view of the CBA are the financial, the economic and risk analyses that are represented in the following chapter.

3.2.2 Critical assessment of results of Cost-benefit Analysis

The results of the CBA assessment are in a connection with the nature of the project that is an RDI project. Basis for further analyses are representing the following facts:

1. At the time of preparing the CBA (October 2010 – September 2011) there existed little or no guidance on how to make a proper CBA for the RDI project, especially HEI projects (guidance are normally thoroughly presented for waste water treatment projects, energy production and distribution projects, transport related projects or other production projects)[12];
2. Despite at the moment of the CBA preparation there were no similar projects of such a scale in the EU Commission pipeline (according to JASPERS statement at the time)

[12]JASPERS helped the Czech government to prepare a working paper for the development of projects in the field of RDI called »Background Methodology for Preparing Feasibility and Cost-Benefit analysis of R&D Infrastructure Projects in Czech Republic«, but first general working paper, prepared by the JASPERS, representing a guidance for RDI Infrastructure Projects was published in April 2013, containing represented case as an example (also described in the beginning of subchapter 5.1.7).

and beneficiary had little or no data for the benchmark analysis, he made proper predictions;
3. Even if there were experience in the CBA with those kind of projects, specific nature of the national education system and related national legal framework are representing strong boundaries for the revenue generating activities strongly influencing financial analysis (wide access to free schooling as national good);
4. Even if there were no experiences with RDI projects, preparation of the CBA was strongly limited by the EU regulations as for example prescribed economic period and prescribed discount rate;
5. The macroeconomic environment was unstable, the world crises was at the moment of project realisation in its peak.

CBA analysis displayed that the project needs co-financing (financial analysis) and is worth co-financing (economic analysis), and calculation of the funding gap of the selected option revealed, project needs 80.45% (IP, 2011, p. 90) of EU funding of the eligible costs. Beneficiary made another calculation of funding gap in (IP, 2014, p. 93), after project was at the end of its implementation phase. Results were very similar to the result in previous IP, 80.68%

Although I listed several critics regarding CBA result in a previous chapter, taking into account the scale and complexity of the project, the overall evaluation of CBA is positive and the process of gathering and use of data the way it was in this feasibility study, was correct.

3.2.3 Conclusion

In accordance with the purpose of the thesis, I analysed CBA of the above project from the point of view of research sub-questions and came to these conclusions:

1. Experts, preparing economic analysis, collected and used data received by the beneficiaries correctly and accurately,
2. According to the analyses in the feasibility study and according to the JASPERS and EC findings, experts prepared CBA independently, they were not influenced by the beneficiary,
3. The quality of data sources were high, experts used numerous different sources including some tailor made sources (questionnaire),
4. Expert's assumptions about macroeconomic, institutional, financial, behavioural, technical, and environmental variables, including assumptions about government implementation capacity, macroeconomic performance, and availability of local cost financing are trustworthy and competent. In the socio-economic circumstances CBA was prepared incomes and project costs were evaluated properly,
5. In the economic analysis evaluation I did not discover benefit double-counting and

6. Economic performance indicators (ENPV, ERR and B/C ratio) of the projects analysed in this CBA are real, although they are tailor made to satisfy the EU (and JASPERS) guidelines.

I reviewed the role of CBA in assisting policymakers' public investment decisions in the framework of EU cohesion policy in the field of RDI, but it is difficult to determine after only one project analysis whether the role meets its goal – improving transparency in the EU funding. This case represents best practice in the field of CBA and can represent benchmark for comparative analysis, prepared in chapter four. In line with the aims of the thesis I analyse process and results of three other existing analyses in the 2007–2013 EU financial perspective (projects are primary focused on RI capacities building) and draw lessons from this CBA experience.

4 A COMPARATIVE ANALYISIS OF COST-BENEFIT ANALYSIS OF SELECTED SMALLER INVESTMENT PROJECTS

In chapter four I present and analyse three projects of similar nature according to best practice case project (except the size of the project is smaller), co-financed by the EU, but approved by the national managing authority:

1. Project 1: New construction for The Institute of Information Science (hereinafter: IIS) facility and energy renovation of the existing facility,
2. Project 2: Energy Institute of the Faculty of Energy Technology of the University of Maribor (hereinafter: FET UM),
3. Project 3: Adaptation works and purchase of XRD system,

Through:

1. Review of the quality of sources,
2. Evaluation of quality and reality of data used (as input for the CBA)[13],
3. Critical assessment of results of CBA.

4.1 Description of the projects

Project 1**:** New construction for the IIS facility and energy renovation of the existing facility

[13] In the 2007–2013 programming period operations where the total cost exceeds EUR 50 million (Art. 39, Regulation 1083/2006).

IIS is a public institution established by the Government of the RS as an information infrastructural service for Slovenian science, culture and education. Along with other agents of information activities in the country, it ensures Slovenia an entrance to the streams of the modern world's information society. This defines its mission; its functions are specified in the Foundation Act, passed by the Government of the RS. According to the Research and Development Act, it is defined as a public infrastructural institution and registered as a research organisation as well. According to the Librarianship Act, it is defined as a library information service in the COBISS.SI national bibliographic system. On the scientific and professional basis, IIS co-operates with similar organisations worldwide; in accordance with the guidelines of its founder, it has also expanded its activities abroad. It has more than 110 employees.

The activities of IIS are mainly engaged in the development and operation of the COBISS system and services (Co-operative Online Bibliographic System and Services), which represents the core of the library information system in Slovenia and of library information systems in some other countries linked in the COBISS. Net network (Serbia, Macedonia, Bosnia and Herzegovina, Montenegro, Bulgaria and Albania). IIS also develops the Information system on research in Slovenia - SICRIS (Slovenian Current Research Information System), which not only includes data on research organisations, researchers and research projects, but also supports the development of similar systems (E-CRIS) in other countries. On the basis of consortium agreements with foreign E-resource providers, IIS provides users in Slovenia with free access to different foreign databases and services (Web of Science, OCLC First Search, ProQuest, etc.). Extensive educational activity and well-established relations with users of IIS's products and services are an integral part of understanding the information society as well as its development

The majority of activities performed by IIS are a part of public service. Therefore, IIS's activities are mainly financed from public funds, either directly from the Budget (through the relevant ministry), or indirectly, through the organisations paying IIS for services performed on the basis of agreements; for that purpose, they usually use funds, allocated to them from the state or the municipal budget. Approximately 10% of IIS's activities are performed for the so-called market.

Funds are allocated to IIS for carrying out its activities on the basis of the annual Action Plan, which covers regular activities and the planned scope of activities related to special projects and orders:

1. MHEST covers the costs of the development and operation of the COBISS.SI and SICRIS systems and services using the programme financing methodology,
2. SRA covers the costs of the purchase of foreign databases and access to foreign information services,

3. Libraries are liable to cover a part of the costs for IIS's services by paying the membership fee for their participation in the COBISS.SI system (school libraries and special libraries operating in commercial companies pay full membership fee to IIS, while MHEST pays the costs for full membership fee for all other libraries directly to IIS,
4. IIS receives part of its funding from the sales of services and licences to use COBISS software abroad and from international cooperation projects.

Government Office for Development and European Cohesion Policy, acting as the Managing Authority for EU SF and the CF, issued a decision awarding EU funds for the project "New construction for the IIS facility and energy renovation of the existing facility". The value of the project, which implemented by the IIS, is a little under 9.5 million Euros of which the European Regional Development Fund contribution amounts to almost 7.2 million Euros.

The development IIS was hindered by the lack of space. The specific high-tech equipment requires specific space which makes the new construction a priority. The objective of the investment is to provide new work areas for the IIS employees, namely by constructing a new facility which will be connected to the existing facility as well as energy renovation of the existing facility. The new facility (together with the existing renovated facility), covering an area of 13,907.37 m2, will provide safer work areas as well as improve conditions for research and educational activities.

With the realisation of the investment, IIS gained additional office areas, conference rooms, lecture rooms and laboratories which will be used by the employees as well as others visiting IIS mainly for educational purposes (apprentices, undergraduate students, etc.). The improved conditions relating to space will also enable the purchase of new research equipment. The construction of a new computer centre, which will enhance competitiveness in the field of library information systems, is also of great importance. The project also strengthened the institution's relevance and thus contributes to greater quality of products and services in Slovenia as well as abroad.

The investment raised the level of research activity and the recognition of IIS, strengthen its links with the economy with emphasis on the transfer of new knowledge, integration into the international, and especially the European scientific community and development of RI.

Project 2: Energy Institute of the Faculty of Energy Technology of the University of Maribor

The Faculty of Energy Technology is one of youngest members of University of Maribor. The faculty began regular operation immediately following its establishment with the

Decision of the National Assembly on 22 June 2007. The pedagogic process at the Faculty of Energy Technology was first carried out during the academic year 2008/09.

The Faculty operates at two locations, in Krško and Velenje. The headquarters of the Faculty are in Krško, while the permanent dislocated unit is located in Velenje. Both locations are the largest energy pools in Slovenia, with Nuclear power plant Krško and hydro power plants on Sava River and the biggest Slovenian thermal power plant in Šoštanj, Velenje.

Government Office for Development and European Cohesion Policy, acting as the Managing Authority for European SF and the CF, issued a grant award decision for the project FET UM. The project resulted in the construction of an extension to the existing facility which will house the infrastructure for research in the field of aero and hydro energy technologies and computerised design and engineering. The investment worth over EUR 5.2 million received European Regional Development Fund support amounting to over EUR 4.2 million.

Energy technology is a fast evolving technical science, in particular in terms of energy processes, devices and technologies. Modern trends in energy technology call for developments to enhance energy efficiency and the use of renewables by giving emphasis to environment-friendly and ecologically-acceptable technologies. Such development requires adequate infrastructure and equipment which will facilitate a comprehensive and integrated research and scientific work performed in the field of energy technology.

To establish adequate conditions to carry out the research activity an extension was constructed to the existing facility of the FET UM. The extension housed the infrastructure for research in the field of aero and hydro energy technologies and computerised design and engineering. Also the research equipment for other laboratories of the FET UM, which will operate in the framework of the Energy Institute in Vrbina, was purchased. The project resulted in modern equipment and improved conditions for carrying out research and scientific activities in the framework of the faculty, thus also having an indirect impact on enhancing the quality of educational activities and new employment opportunities.

Project 3: Adaptation works and purchase of XRD system

Slovenian National Building and Civil Engineering Institute (hereinafter: SNBE) is the leading Slovenian Institute in the field of building and civil engineering. Through high-quality work it successfully promotes the progress-orientated Slovenian applied science and technical expertise on a global scale.

The organization is widely recognized both in Slovenia and in other countries by means of its experts, top-class equipment and multi-disciplinary work, including life cycle analyses of different construction materials.

SNBE is involved in the international co-operation in science and technology with institutions from the EU, the USA and other countries. Over the last 10 years SNBE has participated in more than 50 projects funded by the EU (4th - 7th FP).

Government Office for Development and European Cohesion Policy, acting as the Managing Authority for European SF and the CF, approved the project "Adaptation works and purchase of XRD system" worth a little under EUR 400 thousand. European Regional Development Fund contribution under the 2007–2013 programming period amounts to a little under EUR 300 thousand.

The project covers purchasing high-tech equipment (XRD system) and renovating the premises of the SNBE where the equipment is located. The renovated premises are used by researchers and employees as well as other participants visiting the Institute for educational purposes. Research equipment is also used by other research organisations. In performing the adaptation works emphasis was given to energy efficiency with the renovated working environment enhancing safety for the employees and external users.

Purchasing the new high-tech research equipment enabled basic conditions for the development of new technologies and for establishing closer cooperation between the research sphere and users of knowledge which will further strengthen transfer of knowledge from the academic sphere to the public, profit and non-profit sector, and promote taking an interdisciplinary approach to research.

4.2 Analysis

For the purpose of analysis of the best practice case I already made a review of the quality of five different groups of sources, and that is why I don't review their quality in this chapter again. I rather concentrate on evaluation of quality and reality of data used in the IP including CBA of the three projects described above, but with the same starting point as in the case (data divided into five different groups). I use the case presented in the Chapter 3 as a benchmark to assess the quality.

Compared to the best practice case, the number of sources used was lower in all three analysed cases (Appendix L: List of documentation used by the beneficiaries of Project 1, Project 2 and Project 3 for preparation of feasibility study, including financial and economic analyses and comparison to results in appendix K). In one hand that is understandable, as projects are less complex and smaller in values. Although the number of sources written down in the IP is lower, it is possible to say (because the data are existing),

experts used for the analyses more sources, but they are not properly quoted and consequently not provable, and that is reducing transparency of the IP analyses (including CBA).

Because of the binding legal framework in the field of spatial planning (partially including expert base guideline s for the project) in connection with construction and binding (for the beneficiary in order to become approval of the project) set of strategic official sources, those sources are more or less common to all four analysed projects analysed in the thesis, although the number differs, that difference depends on the size and complexity of the project.

More problematic is almost complete lack of use of Statistical official sources. Sources such as IMAS, SORS, Bank of Slovenia and similar are, as it was already described in chapter 4.2.1, independent, official, the procedure of gathering is standardised, very often compulsory and periodical and, accordingly, the quality of these data is high, reliable and they enable competent benchmarking. But they are highly dependent on one factor and that is experiences of the expert (or expert team) using these data for the for preparation of the feasibility study and CBA and his ability to understand the broader meaning of data gathered, the methodology and purpose of the procedure of gathering and ability of expert, to interpret the analysis behind the data. The question for further analyses remains why experts do not use these sources and derive data from them? Are they afraid of "reality" of these sources? Is it possible, that their proper use changes CBA analysis results and consequently change funding gap rate (cause an increase), evaluation of benefits or influence risk analysis? This question is not answered in this thesis, but they are representing interesting starting point for further researches.

Another problem is in my opinion the internal sources of beneficiary. They are representing a grey field in the quality and quantification processes of input data in economic analysis and consequently the use of the CBA. The problem is twofold. In one hand "the internal sources do not exist". Experts are using fragments of data gathered from different beneficiary sources and use them as "internal sources". These data are usually gathered randomly, often not approved by competent individuals, taken from the context and poorly interpreted. On the other hand, they use those internal sources, that they are in accordance with expected CBA result (for example, the Yearly report prepared one year before the IP preparation or the same year the IP preparation, whichever is more suitable for the expected CBA result.) Proper use of these data is, for example, to take average values from last five years, compare them with data from official sources for the last five years and then extrapolate them according to economic period for the CBA.

Partially problematic are also expert base guidelines. Although they are in large part determined by legal framework, they could be main source of data miss-failure in the IP

analysis (for example estimated value for the project) or they can have huge impact on risk analysis. They can be the reason also to project cancellation, if they are made by experts with no proper experiences. However, although they represent the base for CBA, they are usually not diminishing transparency of CBA.

In accordance with the purpose of the thesis, I analysed CBA of the above projects from the point of view of research sub-questions and came to these conclusions:

1. Experts, preparing economic analysis, tried to collect and use data for the CBA properly, but the process of gathering data was only partially transparent. Because of the lack of quotes of sources or ambiguous statements of sources (in example "internal sources") it is hard to evaluate, whether that is the case because the lack of expertise, the lack of time, or the demand of beneficiary to influence on the decision of receiving the grant or the height of the grant approved,
2. According to the fact, that managing authority approved the projects it is not possible to say, that analyses in the IP's were not prepared correctly and in accordance with the managing authority requirements,
3. The quality of data sources used was average, experts used numerous different sources, but they lack crucial sources, transparent, provable and competent internal sources, including some tailor made sources (such as a questionnaire in the case),
4. Due to the lack of proper data I cannot confirm expert's assumptions about macroeconomic, institutional, financial, behavioural, technical, and environmental variables, including assumptions about government implementation capacity, macroeconomic performance, and availability of local cost financing as trustworthy,
5. In the economic analysis evaluation I did not discover benefit double-counting,
6. Economic performance indicators (ENPV, ERR and B/C ratio) of the projects analysed in this CBA are calculated properly.

After reviewing the role of CBA in assisting policymakers' public investment decisions in the framework of EU cohesion policy in the field of RDI for four projects (including the best practice case) it is possible to determine that the role meets its goal – CBA is improving transparency in the EU funding. Comparative analysis of the above projects to the best practice project in the field of CBA, not only gave the answer to the research question, but during the analysis an opportunity to draw several useful experiences developed during the process.

CONCLUSION

The main purpose of this thesis is to help policy-makers involved in public investment decision-making processes by critically reviewing the role of CBA in the framework of EU cohesion policy with the focus on HEI and RI, and to determine whether the role meets its goal – improving transparency in the EU funding. I pursued throughout the thesis to provide theoretical and empirical evidence that CBA meets its goal in the EU Cohesion policy funded projects. I narrow down the research area, and concentrate the focus of the thesis around economic analysis, especially on quality and quantification processes of input data (primary elements of CBA) describing socio-economic benefits of the analysed projects.

Although section one of the thesis is meant to provide historical and legal framework of the CBA in EU Cohesion policy and to showcase the overview of the basic legislation and relevant strategic documents on the national and international level with focus on the research area, the thesis revealed, that understanding the origins of CBA principles and development of its application are of high importance to additionally highlight the role of CBA in improving transparency of public investment decision-making processes.

After analyses of the cases in the thesis it is possible to conclude that the CBA is improving transparency, but has its limitations and there still exist possibilities for misuse. The thesis show, that it is not the CBA process of analysis *per se* that determines the quality of the analysis, it is the input data and data interpretation quality that make the difference. Therefore it is possible to conclude, that garbage – in, garbage – out principle is valid for the CBA. The stakeholders, involved in the CBA processes must pay special attention to that fact. Accordingly, during the analyses in the chapters three and four of the thesis several guidelines are set accordingly, with special emphasis on the input data and data interpretation quality including improving transparent appraisal of the project's contribution to the welfare (benefits of the project).

At the end it is possible to conclude, that goals set in the introductory chapter of the thesis were achieved although CBA, it's (mis)use and its role and impact on decision-making processes remains a subject worth of a deeper research in the future. Overall the thesis answers the main research question. Quality and quantification processes of input data estimating socio-economic benefits of the HEI and RI projects improve quality of economic analysis (as a part of CBA) and consequently its transparency (and efficiency). Proper quality and quantification processes are not just improving quality of economic analysis; they are crucial for quality of economic and all other analyses in CBA and other similar analyses.

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APPENDIXES

TABLE OF APPENDIXES

APPENDIX A: Summary of the Master's Thesis in Slovenian Language

Uvod. Namen evropske kohezijske politike je, skladno s prenovljeno lizbonsko strategijo, spodbujanje gospodarske rasti, izboljševanje konkurenčnosti gospodarstva v primerjavi z drugimi globalnimi gospodarskimi velesilami in povečanje zaposlovanja, pomembna pa je tudi njena usmerjenost k trajnostnemu razvoju. V preteklih letih so se Evropska Unija oziroma njeni organi in države članice Evropske unije osredotočale na štiri prioritetna področja, tj. izboljševanje poslovnega potenciala, investicije v »človeški kapital«, znanje in inovacije in energetsko učinkovito rabo energije v povezavi z bojem proti podnebnim spremembam (Evropska komisija, 2008, str. 10).

Namen in cilji zaključnega dela. Namen zaključnega dela je, s temeljito analizo vloge analize stroškov in dobrobiti pridobiti nova spoznanja, ki bi omogočala deležnikom, vključenim v odločevalske procese povezane z investicijskimi projekti odpraviti tveganja pri izvedbi in uporabi ter ugotoviti, ali analiza stroškov in dobrobiti resnično omogoča bolj transparentno porabo sredstev evropske kohezijske politike in kje so njene omejitve. Analiza se osredotoča na konkretne analize stroškov in dobrobiti investicijskih projektov, izvedenih v finančni perspektivi 2007-2013 na področju izobraževanja, raziskav, razvoja in inovacij. Konkretne analize stroškov in dobrobiti, ki so predmet proučevanja v zaključni nalogi so bile izdelane za potrebe investicijskih projektov (izgradnja nove in prenova obstoječe izobraževalno-raziskovalne infrastrukture) javnih visokošolskih in javnih raziskovalnih zavodov, saj je to področje eno od manj raziskanih z vidika uporabe analize stroškov in dobrobiti (v nasprotju npr. s področjem transporta, energetike ali zdravstva).

Ključnih dejavnikov tveganja pri analizi stroškov in dobrobiti ne gre iskati v samem matematičnem postopku izračunov finančnih in ekonomskih parametrov projektov, ampak v procesih pridobivanja vhodnih podatkov v smislu kakovosti vira teh podatkov, v njihovem monetarnem ovrednotenju (npr. monetarno ovrednotenje družbenih koristi projekta) in pri interpretaciji dobljenih rezultatov.

Cilji zaključne naloge so:

1. Analizirati vlogo kvalitativnih in kvantitativnih postopkov pri obdelavi vhodnih podatkov za uporabo v ekonomsko analizo in posledično koristi uporabe analize stroškov in dobrobiti.
2. Ugotoviti, ali ima analiza stroškov in dobrobiti dejanske koristi za določevalce pri njihovih odločitvah v zvezi z prerazporejanjem javnih sredstev ali gre za instrument, ki ga uporabljajo zato, ker je predpisan s strani EU, v realnosti pa nima pravega vpliva na izbiro projektov.
3. Okvirno oceniti stopnjo oziroma možnosti zlorabe pri izdelavi analize stroškov in dobrobiti z namenom neupravičene pridobitve nepovratnih sredstev EU in oceniti vpliv oziroma vlogo na povečevanje transparentnosti porabe sredstev EU.

4. Pripraviti nabor usmeritev za transparentno evalvacijo projekta v okviru analize stroškov in dobrobiti in njegovega prispevka k dvigu blaginje.

Temeljno raziskovalno vprašanje je, kakšen vpliv imata kakovost virov podatkov in način pridobivanja podatkov, povezanih predvsem z družbeno-ekonomskimi dobrobitmi, uporabljenih v ekonomski analizi na njeno kakovost in transparentnost pri investicijskih projektih, izvedenih v finančni perspektivi 2007-2013 na področju raziskav, razvoja in inovacij.

Metodologija in struktura naloge. V nalogi so uporabljeni različni metodološki pristopi, ki so narekovani in omejeni s temo naloge. Z namenom pojasniti pomen in vlogo analize stroškov in dobrobiti in jo ustrezno umestiti v kontekst evropske kohezijske politike, je v prvem delu naloga osredotočena na pregled in analizo ugotovitev relevantne literature, ki se nanaša na zgodovinski razvoj analize stroškov in dobrobiti ter pravne in strateške podlage, ki določajo oziroma utemeljujejo njeno uporabo v evropski kohezijski politiki (predvsem na področju izobraževalni-raziskovalne infrastrukture). Nadalje se naloga osredotoča na pregled in analizo ekonomske teorijo, na kateri temelji analiza stroškov in dobrobiti.

V drugem delu naloge je izdelan podroben pregled analize stroškov in dobrobiti za primer »velikega projekta«, pregledanega in potrjenega s strani mednarodnih strokovnjakov za analizo stroškov in dobrobiti v okviru predpisanega postopka pregleda in potrjevanja. Primer je analiziran kot primer dobre prakse, pri čemer se je analiza osredotočila na pregled kakovosti virov za izdelavo analize stroškov in dobrobiti, oceno kakovosti uporabljenih vhodnih podatkov in oceno interpretacije rezultatov analize stroškov in dobrobiti. S tem je oblikovano merilo za zadnji del naloge, to je primerjalna analiza analize stroškov in dobrobiti treh podobnih, vendar manjših investicijskih projektov na področju znanosti in izobraževanja.

Zgodovinski razvoj ter pravna in strateška umestitev analize stroškov in dobrobiti. V zvezi z zgodovinskim razvojem analize stroškov in dobrobiti obstaja več teorij. Nekateri avtorji (Hanley & Spash, 1993, str. 4) so mnenja, da je bila prva analiza stroškov in dobrobiti izdelana leta 1808 v Združenih državah Amerike, drugi (Pearce, Atkinson & Murato, 2006, Quah & Toh, 2012), da lahko kot prvi primeren poskus izdelave analize stroškov in dobrobiti zasledimo v Franciji leta 1844. Ne glede na njen izvor, se je analiza začela v tridesetih letih prejšnjega stoletja postopoma razvijati, kar je tudi posledica razvoja ekonomske teorije na področju družbene blaginje (ekonomija blaginje), na kateri analiza stroškov in dobrobiti temelji. Omeniti je potrebno N. Kaldorja in J. Hicksa, ki sta nadgradila Paretove kriterije za merjenje družbene blaginje in razvila tako imenovan Kaldor-Hicks (kompenzacijski) kriterij, ki temelji na dejstvu, da so upravičeni do izvedbe

samo tisti projekti, pri katerih lahko tisti, ki imajo od projekta koristi, ustrezno kompenzirajo tiste, ki so zaradi projekta na slabšem.

Do poznih sedemdesetih se je razvoj analize stroškov in dobrobiti razvijal in širil tako v Združenih državah Amerike, kot v Evropi. S povečanjem transferjev finančnih sredstev iz razvitega sveta v manj razvite države pa se uporabo analize stroškov in dobrobiti pričele uporabljati tudi mednarodne organizacije in pa države prejemnice sredstev.

Uporaba analize stroškov in dobrobiti je bila na področje evropske kohezijske politike vpeljana v devetdesetih letih prejšnjega stoletja, njena uporaba pa je postala obvezujoča za izbor investicijskih projektov, ki bodo sofinancirani s sredstvi evropske kohezijske politike v finančni perspektivi 2007-2013. Pravno podlago za njeno uporabo (tudi na nacionalnem nivoju) predstavlja 40. člen Uredbe Sveta ES št. 1083/2006.

M. Florio navaja dva razloga za oživitev analize stroškov in dobrobiti v evropski kohezijski politiki. Prvi je velik pomen infrastrukturnih projektov za evropske integracijske procese, drugi pa velik vpliv Evropske Unije na izvedbo in financiranje teh infrastrukturnih projektov, v izvedbo katerih so običajno poleg kohezijskih sredstev vpeta tudi sredstva nacionalnih vlad, zasebnih partnerjev in velikih mednarodnih investicijskih bank (M. Florio, 2006, str. 5).

Pričakovanja povezana s pozitivnimi ekonomskimi učinki evropske kohezijske politike so upravičeno velika. S transferji preko ključnih finančnih instrumentov v okviru evropske kohezijske politike, to so strukturni skladi in kohezijski sklad, želi Evropska unija zmanjšati notranje socialno ekonomske razlike (konvergenca) in z enakomernejšim gospodarskim razvojem doseči ekonomski vzpon. Skladi predstavljajo (podatki so podani za finančno perspektivo 2007–2013) skoraj tretjino celotnega proračuna Evropske unije, saj je bilo v preteklem sedem letnem obdobju za namene evropske kohezijske politike namenjenih 347,4 milijard EUR sredstev, od tega jih je bilo 81,9% namenjenih tako imenovanim »konvergenčnim regijam« (najmanj razvitim regijam Evropske unije). Sloveniji je bilo dodeljenih 4,2 milijardi EUR. Sredstva je uspešno (finančni razrez je prikazan v tabeli št. 1, priloge št. 5) črpala preko petih finančnih instrumentov in sicer Evropskega sklada za regionalni razvoj, Evropskega socialnega sklada, Kohezijskega sklada, programov evropskega teritorialnega sodelovanja in inštrumenta »Tehnična pomoč«. V okviru cilja „konvergenca“ se v zaključni nalogi konkretno osredotočam na projekte, financirane iz Evropskega sklada za regionalni razvoj in sicer na vsebinsko področje ena od njegovih prednostnih nalog, ki je alokacija resursov na področje raziskav in tehnološkega razvoja, inovativnosti in podjetništva, vključno s krepitvijo zmogljivosti na področju raziskav in tehnološkega razvoja ter njihovega vključevanja v Evropski raziskovalni prostor ter izboljšanje povezav med podjetji, institucijami višješolskega izobraževanja, raziskovalnimi institucijami ter raziskovalnimi in tehnološkimi centri.

Eden od rezultatov vedno večjih potreb na eni strani in vedno bolj omejenih finančnih resursov (tudi kot posledica vključevanja novih držav, t.i. neto prejemnic v unijo) na drugi pa je tudi razvoj metod in tehnik za finančno in ekonomsko analizo projektov, ki so jim sredstva dodeljena. Ti inštrumenti naj bi poleg uspešne in učinkovite porabe sredstev omogočali predvsem transparentnost pri njihovem dodeljevanju. Pojem »transparentnosti« je sicer postal imperativ delovanja Evropske unije že v letu 2002 s sprejetjem Uredbe Sveta (ES, Euratom) št. 1605/2002 z dne 25. junij 2002 o finančni uredbi, ki se uporablja za splošni proračun Evropskih skupnosti in se v letu 2012 še utrdil s sprejetjem Uredbe (EU, Euratom) št. 966/2012 z dne 25. oktober 2012 o finančnih pravilih, ki se uporabljajo za proračun Unije in razveljavitvi Uredbe Sveta (ES, Euratom) št. 1605/2002.

Z namenom izboljšanja transparentnosti pri porabi sredstev Evropske unije je bila v 40. členu Uredbe Sveta (ES) št. 1083/2006 z dne 11. julij 2006 o splošnih določbah o Evropskem skladu za regionalni razvoj, Evropskem socialnem skladu in Kohezijskem skladu in razveljavitvi Uredbe (ES) št. 1260/1999 analiza stroškov in dobrobiti, vključno z oceno tveganja in predvidenega učinka na zadevni sektor in socialno-gospodarske razmere v državi članici in/ali regiji ter, če je mogoče in če je primerno, v ostalih regijah Skupnosti navedena kot bistvena sestavine vloge za potrditev »velikih projektov« s stani Evropske Komisije. Posledično je bila analiza pripoznana kot temeljno orodje za ovrednotenje ekonomskih koristi projektov financiranih iz sredstev Evropske unije na vseh ravneh evropske kohezijske politike. Njen pomen povzema Florio (2007b), ki opisuje dvojno vlogo analize stroškov in dobrobiti in sicer kot 1. orodje za izdelavo ocene (s pomočjo finančne analize), ali projekt sploh potrebuje finančno pomoč Evropske unije za svojo izvedbo in 2. kot orodje, s katerim se oceni ekonomski pomen projekta (projekt mora imeti širši pozitiven vpliv in mora prispevati k ciljem evropske kohezijske politike.

Ekonomska teorija analize stroškov in dobrobiti. V nalogi so pojasnjeni ključni pojmi in metodološke predpostavke analize stroškov in dobrobiti, pri čemer je poseben poudarek na metodologiji analize stroškov in dobrobiti, ki jo določajo pravila evropske kohezijske politike.

Ključno za analizo stroškov in dobrobiti je, da se poleg finančne izdela tudi ekonomska ocena projekta, pri čemer se pri tem upoštevajo koristi, ki jih ni mogoče izraziti v denarju. Finančno ovrednotenje teh koristi je ena od temeljnih nalog analize stroškov in dobrobiti. Temeljni kriteriji za odločitev, da je projekt »vreden« izvedbe so:

1. neto sedanja vrednost večja od nič (razlika med diskontiranim tokom prilivov (vključno z ostankom vrednosti investicije) in diskontiranim tokom stroškov projekta, tj. tako investicijskih kot operativnih stroškov),

2. razmerje med koristmi in stroški enako ali večje od ena (razmerje med vrednostjo koristi in vrednostjo stroškov) in
3. interna stopnja donosnosti (diskontna stopnja, pri kateri je neto sedanja vrednost enaka nič; med projekti je boljši tisti, ki ima večjo interno stopnjo donosnosti).

Pravila evropske kohezijske politike podrobneje določajo vhodne podatke, postopek izračuna in zaostrujejo kriterije za določitev, ali je projekt upravičen do sofinanciranja z evropskimi sredstvi in v kakšni višini, za vse zgoraj naštete odločevalske kriterije. Namen postavitve strogih okvirjev za izdelavo analize stroškov in dobrobiti je poenotenje metodologije z namenom pravičnejše razdelitve sredstev. Ali so projekti lahko sofinancirani se določa predvsem na podlagi neto sedanje vrednosti, pri čemer ločimo finančno neto sedanjo vrednost in ekonomsko neto sedanjo rednost. V primeru, ko se odobri sofinanciranja projekta iz sredstev evropske kohezijske politike, sta finančna neto sedanja vrednost in finančna interna stopnja donos projekta manjši od nič (to dokazuje, da projekt potrebuje sredstva evropske kohezijske politike, saj z vidika finančnih kazalnikov uspešnosti ni mogoče pričakovati, da se bo izvedba projekta lahko v celoti financirala iz prihodkov projekta, zaradi česar potrebuje nepovratna sredstva), ekonomska neto sedanja vrednost pa večja od nič ob hkratnem izračunu ekonomske interne stopnje donosnosti, ki mora biti višja od družbene diskontne stopne (to pomeni, da je kljub negativnim finančnim kazalnikom uspešnosti z ekonomskega vidika upravičen do sofinanciranja iz sredstev evropske kohezijske politike, saj prispeva d širšim družbenim koristim oziroma dobrobitim).

Proces analize stroškov in dobrobiti, kot ga določa regulatorni okvir evropske kohezijske politike, vključuje 7 korakov, in sicer:

1. opis konteksta,
2. opredelitev ciljev,
3. identifikacija projekta,
4. izdelava analize izvedljivosti vključno z analizo okoljske vzdržnosti,
5. izdelava finančne analize,
6. izdelava ekonomske analize in
7. izdelava ocene tveganj.

Največ metodoloških težav, ki so lahko tudi namerne, se običajno pojavi predvsem pri izdelavi ekonomske analize, v kateri je potrebno monetarno ovrednotiti družbeno-ekonomske koristi projekta, zato je v poglavju naloge, v katerem je analizirana, kot primer dobre prakse, analiza stroškov in dobrobiti za »veliki projekt«, ovrednoten tudi ta vidik.

Primer analize stroškov in dobrobiti za »veliki projekt«. Veliki projekt (infrastrukturni projekt, ki prejme več kot 50 milijonov EUR podpore) »Novogradnja Fakultete za kemijo

in kemijsko tehnologijo in Fakultete za računalništvo in informatiko Univerze v Ljubljani je v nalogi izbran, analiziran in ovrednoten kot primer dobre prakse analize stroškov in dobrobiti. Razlog za izbor projekta je predvsem v tem, da je investicijska dokumentacija, katere sestavni del je analiza stroškov in dobrobiti, uspešno prestala podroben pregled in postopek usklajevanja s strokovnjaki za področje analize stroškov in dobrobiti s strani iniciative JASPERS, kakor tudi s strani strokovnjakov Evropske komisije za področje analize stroškov in dobrobiti, ki je za projekt izdala tudi odločbo o sofinanciranju v višini 88.547.032 EUR. Istočasno gre za edini »veliki« projekt na področju izobraževanja v Republiki Sloveniji in enega izmed največjih tovrstnih projektov na področju Evropske Unije. S tem se aplikativna vrednost uporabljenih podatkov, postopka in rezultatov preučevane analize stroškov in dobrobiti še zviša, zato je smiselno, da se primer podrobneje analizira in predstavi dobljene rezultate. Projekt oziroma njegova analiza stroškov in dobrobiti zaradi navedenih lastnosti predstavlja standardno primerjalno merilo za druge tovrstne projekte.

Pri predstavitvi primera analize stroškov in dobrobiti v nalogi se osredotočam na:

1. kakovost uporabljenih virov,
2. kakovost uporabljenih podatkov s poudarkom na oceni njihove realne vrednosti in
3. oceno interpretacije dobljenih rezultatov analize stroškov in dobrobiti.

V nalogi so podrobno predstavljeni in ovrednoteni posamezni koraki, kot jih določa regulatorni okvir evropske kohezijske politike. Poseben poudarek pri pregledu oziroma analizi primera je namenjen finančni analizi, ekonomski analizi in analizi tveganj, saj te predstavljajo temelj analize stroškov in dobrobiti. Pregled temeljnih predpostavk finančne analize in njihova primerjava s pravili (kot na primer uporaba 7% diskontne stopnje, upoštevanje 15 letne ekonomske dobe in drugo) napotuje na dejstvo, da je izdelovalec analize stroškov in dobrobiti ustrezno upošteval navodila za pripravo analize. Ocene prihodkov projekta in operativnih stroškov projekta je korektna, upoštevan ostanek vrednosti je pravilno izračunan. Izračuni finančne neto sedanje vrednosti in finančne stopnje donosnosti projekta so negativni, kar kaže na potrebo po dodatnem sofinanciranju v višini 80,45% upravičenih stroškov in je skladno s pravili za dodeljevanje nepovratnih sredstev evropske kohezijske politike.

Naslednji korak v analizi primera je pregled ekonomske analize in analize tveganj s poudarkom na ovrednotenju uporabljenih virov in vhodnih podatkov ter oceno interpretacije dobljenih rezultatov analize stroškov in dobrobiti. Izračuni ekonomske neto sedanje vrednosti so pozitivni, ekonomska interna stopnja donosnosti izkazuje precejšnje družbene koristi projekta, saj močno presega predpisano družbeno diskontno stopnjo 5%, ki predstavlja standardno vrednost za projekte financirane iz sredstev evropske kohezijske

politike. Analiza stroškov in dobrobiti torej izkazuje upravičenost projekta do sofinanciranja.

Ob zaključku analize primera ugotavljam, da je predstavljena analiza stroškov in dobrobiti, predvsem iz stališča velikosti in kompleksnosti projekta, izdelana ustrezno, vhodni podatki so ustrezno ovrednoteni, rezultati pa odražajo realno stanje. Pomen analize kot primera dobre prakse je še toliko večji ob upoštevanju dejstva, da je pripravljavec v času izdelave analize ni imel možnosti primerjati rezultatov s podobnimi projekti, saj na nacionalnem nivoju tovrstnih projektov še ni bilo, prav tako ne na področju Evropske Unije. Četudi bi morda podobni projekti v času izdelave na področju Evropske Unije obstajali, pa predstavlja specifična narava nacionalnega izobraževalnega sistema in z njo povezani regulatorni okvir precejšnjo omejitev za neposredno uporabo tovrstnih rezultatov za izdelavo neposredne primerjalne analize. Dodatno oviro pri izdelavi analize stroškov in dobrobiti je predstavljala tudi porast vpliva svetovne gospodarske krize tako na mednarodno kot na nacionalno gospodarstvo.

Primerjalna analiza stroškov in dobrobiti izbranih investicijskih projektov z analizo stroškov in dobrobiti predstavljenega projekta. V zaključnem delu naloge je izdelana primerjalna analiza stroškov in dobrobiti treh, po naravi podobnih projektov z analizo predstavljenega projekta, kot primera dobre prakse. Projekti so bili sofinancirani iz sredstev evropske kohezijske politike, njihovo sofinanciranje pa je odobril nacionalni organ upravljanja. Ti projekti so:

1. Dozidava k objektu Inštituta za informacijske znanosti in energetska sanacija obstoječega objekta,
2. Inštitut za energetiko Fakultete za energetiko Univerze v Mariboru – 2. faza in
3. Preureditev prostorov in nakup XRD sistema.

Primerjava analiz stroškov in dobrobiti navedenih projektov pokaže, da so analize izdelane sicer korektno z vidika predpisanih postopkov, rezultati vseh analiz pa izkazujejo, da so projekti upravičeni do sofinanciranja in sicer v višini 100% upravičenih stroškov. Pri pregledu kakovost uporabljenih virov in kakovost uporabljenih podatkov s poudarkom na oceni njihove realne vrednosti je ugotovljeno (delno pričakovano), da so podatki za izdelavo analize stroškov in dobrobiti zajeti iz manjšega nabora virov (odstopanje pri številu strokovnih podlag za izvedbo projektov je sicer razumljivo, zaradi kompleksnosti in obsega prvega projekta), pri čemer je v analizah stroškov in dobrobiti manjših projektov opaziti predvsem popolno odsotnost uporabe uradnih statistični virov podatkov (podatki iz teh virov so zaradi neodvisnega, standardiziranega, transparentnega postopka zbiranja, ki je običajno periodično, zelo kakovostni in kot taki predstavljajo dobro podlago za izdelav analize stroškov in dobrobiti). Podatki imajo lahko velik vpliv na izdelavo ekonomske analize (na primer pri postopkih vrednotenja družbenih koristi). Ali je odsotnost uporabe

podatkov vplivala ne izračune ekonomske analize in posledično na upravičenost projektov do sofinanciranja ni predmet te zaključne naloge, predstavlja pa zanimivo izhodišče za nadaljnja preučevanja.

Zaključek. V zaključku ugotavljam, da je namen naloge dosežen. Izdelana je bila temeljita analizo vloge analize stroškov in dobrobiti in pridobljena nova spoznanja, ki omogočajo deležnikom, vključenim v odločevalske procese povezane z investicijskimi projekti odpraviti tveganja pri izvedbi in uporabi. Prav tako je ugotovljeno, da analiza stroškov in dobrobiti resnično omogoča bolj transparentno porabo sredstev evropske kohezijske politike, pri tem pa je treba biti pozoren na morebitne zlorabe postopka, ki jih podrobni predpisi in navodila ne morejo omejiti. V nalogi so navedene tudi nekatere omejitve analize stroškov in dobrobiti, ki predstavljajo zanimivo izhodišče za nadaljnja proučevanja na tem področju.

APPENDIX B: List of Abbreviations

B/C – benefit/cost ratio
CBA – Cost-Benefit Analysis
CEDEFOP – The European Centre for the Development of Vocational Training
CF – Cohesion Fund
CIS – Central Information System
DP CRE – Development priority Competitiveness and Research Excellence
DP EDI – Development Priority Economic Development Infrastructure
DCF – discounted cash flow
EC – European Commission
ECTNA – European Chemistry Thematic Network Association
ENPV – Economic Net Present Value
ERA – European Research Area
ERDF – European Regional Development Fund
ERR – Economic Rate of Return
ESF – European Social Fund
EU – European Union
FARS – Financial Administration of the Republic of Slovenia
FDR – Financial Discount Rate
FEANI – European Federation of National Engineering Associations
FET UM – Energy Institute of the Faculty of Energy Technology of the University of Maribor
FNPV – Financial Net Present Value
FRR – Financial Rate of Return
FTE – Full Time Equivalent
HEI – Higher Education Institutions
IIS – Institute of Information Science
IMAD – Institute for Macroeconomic Analysis and Development
IP – Investment Programme
IPID – Investment Project Identification Document
IRR – Internal rate of Return
ISARR – Referential information system for monitoring and reporting operational programmes implementation activities
JASPERS – Joint Assistance to Support Projects in European Regions
MHEST – Ministry of Higher Education, Science and Technology
NDP – National Development Programme for the Period 2007–2013
NPV – Net Present Value
NSB – Net Social Benefit
NSRF – National Strategic Reference Framework for the Period 2007–2013
OECD – Organisation for Economic Co-operation and Development

OJ – Official Journal
OP – Operational Programme
OP SRDP – Operational Programme for Strengthening Regional Development Potentials for the Period 2007–2013
OP HRD – Operational Programme for Human Resource Development for the Period 2007–2013
OP ETID – Operational Programme for Environmental and Transport Infrastructure Development for the Period 2007–2013
PECA – Post and Electronic Communication Agency of RS
PID – Preliminary investment design
PURES – Regulations on efficient use of energy in buildings
PV – Present Value
R&D – Research and development
RDI – Research, Development and Innovation
RI – Research infrastructure
RNDP – Resolution on National Development Projects for the Period 2007–2023
RISS – Slovenian Research and Innovation Strategy 2011–2020
RS – Republic of Slovenia
R&TD – Research and Technical Development
SDR – Social Discount Rate
SDS – Slovenian's Development Strategy
SF – Structural Funds
SNBE – Slovenian National Building and Civil Engineering Institute
SRA – Slovenian Research Agency
SORS – Statistical Office of the Republic of Slovenia
UL – University of Ljubljana
UL FCCT – University of Ljubljana Faculty of Chemistry and Chemical Technology
UL FCI – University of Ljubljana Faculty of Computer and Information Science

APPENDIX C: Terminological glossary[14]

1. Feasibility Analysis is an analytical process used to identify potential constraints of individual project options (variants) and related solutions with respect to technical, economic, regulatory and organisational (managerial) aspects; it aims to establish the feasibility of the project proposal. The expert groundwork provides an important basis for selecting the optimum variant.

2. Sensitivity Analysis is an analytical technique to test the impacts of changes in some key assumptions on the CBA results.

3. Cost-benefit Analysis is a method for assessing as many project costs and benefits as possible in terms of money units and also includes the costs and benefits for which no adequate price is determined by the market. It is a key tool in the investment decision making process.

4. Cost-effectiveness Analysis is used to compare the costs of alternative methods of achieving the same or similar results. It is usually carried out by calculating cost per unit when benefits cannot be measured in money terms or in another unit of value.

5. Risk Analysis is the assessment of the probability that the project will not achieve the desired results; if this probability can be quantified, it is referred to as the risk level. The analysis covers the project risk (project development risk, project implementation and project operational risks) and the general risks (political, national economic, socio-cultural and other risk types).

6. Impact Analysis is an assessment of changes or the long-term effects on the society that can be attributed to projects and measures with pre-defined objectives (e.g. employment and competitiveness); impacts should be expressed in in the units of measurement adopted to deal with the problems that triggered a need for urgent implementation of such projects and measures.

7. Group of Projects is composed of several investment projects, each of which is a technically, technologically and economically integrated whole aimed at achieving common objectives. This group includes the projects satisfying specific criteria, such as the projects located within or along the same transport corridor, the projects achieving a common measurable goal, or belong to a general plan for a particular area or corridor.

8. Discounting is the process of adjusting the future money values of projects inflows and outflows to PV by using a discount rate.

9. Discount Rate is the annual percentage rate at which the PV of a money unit is assumed to decrease through time. It reflects the valuation of future costs and benefits against the current ones.

10. Social Discount Rate attempts to reflect the social view on how future costs and benefits should be valued against the present. When the capital market is incomplete, the social discount rate may differ from the financial one.

[14]According to the national legislation: Decree on the uniform methodology for the preparation and treatment of the investment documentation in the field of public finance.

11. Economic Analysis (social CBA) is the common expression for valuation that takes into account all economic costs and benefits of the society. It justifies the viability of the project in terms of broader social, economic development and welfare issues.

12. Economic Useful Life of the Investment (reference time horizon) is a number of years for which forecasts on effects of the investment are provided and analysed; it covers the period from the beginning to the completion and trial operation of the project in accordance with the required quality standards.

13. Economic (internal) Rate of Return is an indicator of socio-economic profitability of the project, when the values used in the calculation of the project's economic performance are assessed in terms of accounting prices (shadow prices; opportunity cost of goods).

14. Project Phase is a functionally, technically, technologically and financially distinct whole that meets the project requirements referred to in point 37 of this Article. Preliminary studies as well as other preparatory activities required for the implementation of the (major) project may also be considered as project phases.

15. Financial Analysis is an analysis of revenue and expenditure which facilitates more accurate forecasts as to whether the revenue will suffice to offset future expenditure. It allows one to:

a) verify and guarantee the cash balance (verify the financial sustainability),

b) calculate the indices of financial return based on performance indicators of investment projects.

16. Financial (internal) Rate of Return is an indicator of the financial and market performance of the project, when the values used in the calculation of the project's financial performance are assessed in terms of actual market prices.

17. Internal Rate of Return is the discount rate at which the NPV of the project equals zero. The IRR is compared with a benchmark, a discount rate, which is a criterion for assessing the expected results of the proposed project.

18. Investments are investments for increasing and maintaining the assets held by the state, local communities and other investors in the form of land, buildings, machinery and equipment and other tangible and intangible assets, including investments in education and training, the development of new technologies, the improvement of the quality of life, and other investments that will yield benefits in the future.

19. Investment Project is a set of all activities within a particular investment for which limited financial resources are used to gain benefits.

20. Investment Costs are all expenses and contributions, both in cash and in kind, which are directly associated with a particular investment project and allocated by the investor(s) for preliminary surveys and studies, obtaining of documents, licences and approvals, land acquisition, preparatory and earthmoving operations, execution of construction and craft works and installations, acquisition and installation of equipment and appliances, advisory and supervisory activities relating to the implementation, education and training, and other expenditure on goods and services including compensations directly associated with the investment project and, when necessary, working capital.

21. Investor or Co-investor (project owner or co-owner; project promoter) is a legal entity which is defined in investment documents and acquires possession and/or assumes the management and maintenance of the facility on completion of the project.

22. Benefit/Cost Ratio is the NPV of project benefits divided by NPV of costs.

23. Multi-Criteria Analysis is an evaluation method based on multiple criteria, which considers many objectives from various aspects and attributes a weight to each measurable objective; a set of various financial, economic and other criteria serves as the basis for uniform assessment of different project objectives according to which project proposals or options can be classified.

24. Net Present Value is the difference between the discounted value of expected revenues (benefits) and discounted value of expected costs arising from the investment.

25. Accounting Prices or Shadow Prices are opportunity costs of goods and services which are sometimes different from the actual market prices and the required tariffs. They are used in the economic analysis of the project.

26. Estimated Project Value (total costs) represents investment costs plus Value Added Tax and other expenses estimated on the basis of pro forma invoices and other required expert assessments and studies; it includes eligible costs and other costs and expenses required for the implementation of the project.

27. Project is an economically indivisible set of activities performing a specific (technical-technological) function and having clearly defined objectives on the basis of which it can be determined whether a project meets the pre-determined criteria. The project duration is determined in advance by the specific starting point and specific ending point;

28. Relative Net Present Value is a ratio between the project's NPV and discounted value of investment costs.

29. Constant Prices are a common denominator for all items expressed in money terms. These are the prices prevailing in a given base year, usually applied when investment documents are being prepared. Constant prices may also include the anticipated structural changes (e.g. the changes in the ratio between supply and demand) that are examined within the scope of sensitivity analysis.

30. Current Prices are nominal prices that are expected at a given time and include the effects of the general price increase (inflation); in the analysis of partially realised investments, current prices are the actually realised prices of the investment based on progress stages, i.e. billings for work and other invoices.

31. Efficiency is the ability to achieve the expected results with minimum costs; it is the optimum benefit/cost ratio.

32. Eligible Costs are that part of the costs that are the basis for calculating the co-financing share of public funds in a project or programme.

33. Effectiveness is the ability to achieve the set project or programme objectives.

APPENDIX D: Compliance of OP SRDP with other strategic documents

Table 1. Table of compliance of OP SRDP with other strategic documents for development priorities Competitiveness and research excellence and Economics development infrastructure

Priorities of OP SRDP	Activities of Slovenian Development Strategy	Reform Programme for Implementation of the Lisbon Strategy in Slovenia	Community Strategic Guidelines for Cohesion
Competitiveness and research excellence	1. fostering technological development 2. promotion of areas where Slovenia has competitive advantages 3. promotion of areas which are development-oriented and which, through their networks, positively affect development at regional and international level. 4. business networking 5. development of financial instruments for development of small and medium-sized enterprises 6. promotion and development of innovative environment and innovativeness 7. establishing new technology zones **8.promotion of investments (domestic and foreign) into higher levels of technology** 9. attraction of new foreign investments 10. promotion of internationalization of Slovenian enterprises 11. promotion of linking of economic activities with development potential 12. rising the level of science in Slovenia 13. formation of financial mechanisms for financing high-tech and innovative companies 14. improvement of education quality	1. improvement of quality and access to support services for small and medium-sized enterprises 2. improvement of access to initial and venture capital and simplification of banking loan procedures 3.collection and exchange of quality foreign trade information and counselling services; supporting promotion activities of enterprises abroad 4. education and training for international business operation **5. gradual changing of structure of public investments into R&D, so that the additional public funds for R&D will be allocated to technology and science in the ratio of 80:20 and that in the existing public funds the share for special applicable and development research will gradually increase in the sense of promotion of technological development and innovations** 6. establishing of legal and financial environment which will encourage founding and growth of high-tech and innovative companies, especially small and medium-sized enterprises (strengthening of Slovenian entrepreneurial fund, co-founding and supporting venture capital funds and other support in the form of refundable resources) 7. inclusion of inhabitants into use of ICT and information service	1. strengthening of cooperation between companies and public research/education organizations by promotion of formation of regional and super-regional clusters of excellence 2. promotion of R&D activities in SME and providing access of SME to R&D sector **3. strengthening and enhancing R&D sector capacities, including ICT, of RI and human resources in the areas with great growth potential** 4. enhancing effectiveness and accessibility of regional innovations and R&D knowledge for companies, especially SME – for instance by establishing poles of excellence, which link educational SME with R&D and technological institutions, or by establishing regional clusters around large companies 5. providing business support services, helping companies, especially SMEs, to improve competitiveness and to internationalize themselves, especially by utilization of possibilities created by domestic market. The business services must give advantage to exploitation of synergies (transfer of technologies, science parks, ICT centres, incubators and related services, cooperation with clusters) 6. promotion of entrepreneurship, acceleration of establishment and development of new companies and promotion of establishing of business stems using technologies of research institutions and companies 7. supporting refund able means instruments, such as loans, insured loans for subordinated debt, convertible instruments and venture capital (seed capital and venture capital) 8. non-refundable means must be used or building and maintaining of infrastructures which facilitate access to financial means (offices for technology transfer, incubators, "business angel" networks, investment promotion programmes). Mechanisms of guarantees and joint guarantees, especially for facilitating the access to micro loans for SMEs 9. promotion of designing and introduction of reforms in the education systems and training **10. promotion of modernization of higher education and development of human resources in research and innovation and investment into education infrastructure and training (ICT)** 11. development of infrastructure which directly supports economic growth (development of tourism, enhancing attractiveness of industrial areas) 12. providing attractive conditions for economy and highly qualified staff. This can be done by accelerated planning of land use which reduces expansion of city areas.

(table continues)

(continued)

Priorities of OP SRDP	**Activities of Slovenian Development Strategy**	**Reform Programme for Implementation of the Lisbon Strategy in Slovenia**	**Community Strategic Guidelines for Cohesion**
Economic development infrastructure	1. promotion of technological development 2. supporting areas where we have competitive advantages 3. promotion of areas which are development-oriented and which through their networks, positively affect development at regional and international level 4. development of financial instruments for development of small and medium-sized enterprises 5. stimulation and development of innovative environment and innovativeness 6. establishing new technology zones 7. **promotion of investments (domestic and foreign) into higher levels of technology** 8. attraction of new foreign investments 9. promotion of internationalization of Slovenian enterprises 10. promotion of linking of economic activities with development potential 11. rising the level of science in Slovenia 12. formation of financial mechanisms for financing high-tech and innovative companies 13. improvement of education quality	**1. setting up ways for better cooperation of enterprises with education and research institutions and promotion of mobility of staff** 2. increasing the access to ICT by accelerating development of wireless networks, investing into passive infrastructure 3. restructuring higher education, higher specialized education and vocational training **4. comprehensive restructuring university by increasing the number of providers, greater adaptability to the needs of economy, better quality and competitiveness**	1. providing business support services, helping companies, especially SMEs, to improve competitiveness and to internationalize themselves, especially by utilization of possibilities created by domestic market. The business services must give advantage to exploitation of synergies (transfer of technologies, science parks, ICT centres, incubators and related services, cooperation with clusters) 2. promotion of reform implementation in organizations of education and training **3. promotion of higher education modernization and development of human potential for the purpose of research and innovations; investment in education and training infrastructure** 4. ensuring advantageous conditions for economy and its highly qualified labour force, done via carefully planned land use which prevents city areas from growing 5. promotion of R&D activities in SME and providing access of SME to R&D sector

Source: *OP SRDP*, 2007, pp. 61-62, Table 7, p. 63, Table 8 and pp. 67-68, Table 10.

APPENDIX E: Indicators at the level of DP EDI of the OP SRDP

Table 2. Indicators at the level of DP EDI of the OP SRDP

2. DP EDI quantified targets		Baseline (last available data)	2013 target	Revised 2013 target	Source
OUTPUT					
1.	Number of operational business support institutions	12	36	17	CIS
2.	Number of new broadband connections	253.000	Increased by 10.000	Increased by 10.000	PECA
3.	Number of projects in the field of e-services and e-content		30	30	CIS
4.	Number of renovated faculties in the field of natural science and technics moved to new premises		6 (31% of all)	3	CIS
	Number of research organisations in the field of natural science and technics moved to new premises		1 (10% of all)	0	CIS
5.	Newly established business zones (in ha)	359*	900	0	CIS
5. **	Number of operational emergency medical aid centres	1	/	10	CIS
RESULTS					
6.	Number of additional population covered by broadband access as a consequence of co-financed activities	600.000	Increased by 30.000	Increased by 30.000	PECA
	Global broadband population coverage (transmission speed over 256/s) as a consequence also of non-co-financed activities	92%	100%	100%	PECA
7.	Number of newly established enterprises in the context of business support institutions		300	50	CIS
8.	Share of students enrolled in natural science higher education programmes in the whole population	6,8%	9%	9%	MHEST
9.	Share of higher education students enrolled in technical higher education programmes in the whole population	13,5%	20%	20%	MHEST
10.	Number of gross jobs created		3.800	110	CIS

CIS: central information system; PECA (hereinafter: Post and Electronic) Communication Agency of RS; MHEST: Ministry of Higher Education, Science and Technology

* Business zones' areas as a consequence of a Single Programming Document 2004-2006 implementation

** Nr. 5 in revised OP SRDP as primary nr. 5 (business zones) is excluded from the table.

Source: *OP SRDP*, 2007, p. 79, Table 12; *OP SRDP*, 2011, p. 79, Table 12.

APPENDIX F: Financial Tables of financial period 2007–2013

Table 3. Absorption in financial period 2007–2013 by OP (in EUR, current prices)

		Approved by the EC with approval of OP SRDP, OP HRD[15] and OP ETID*		**Cohesion Policy Absorption Report 2007–2013***		
	Development Priority	Community Funding (a)	% (b)	Available funds in the national budget (c)	Payments from national budget (d)	Certified expenditures (e)
1.	OP SRDP	1.709.749.422	41,69	1.783.285.419	1.895.336.329	1.752.752.301
2.	OP HRD	755.699.370	18,43	755.699.370	761.305.299	723.703.696
3.	OP ETID	1.635.599.744	39,88	1.562.063.847	1.655.885.515	1.506.478.782
	TOTAL	4.101.048.536	100,00	4.101.048.636	4.312.527.143	3.982.934.777

* Data are representing EU part only (Community Funding), which always represents 85% of eligible costs; national counterpart always represents 15% and it could be calculated

Explanations to the Table:
1. Why there is a difference between total amounts in columns (a) and (c) could not be explained, but the difference is not significant (less than 0,01%) and it does not affect results of the analysis.
2. A difference between single amounts in OP SRDP and OP ETID between columns (a) and (c) was made due to reallocation of financial sources between OP's in the years 2007–2013 (amount of the transfer was around 4.5%).
3. A difference between single amounts between columns (c) and (d) was made due to the possibility of over-commitment (instrument, that enabled more efficient absorption of EU funds) and due to the fact, that some financial payments from national budget, that had to be returned to the budget for different reasons (for example financial correction) in the same year and that were not yet included into certification of expenditures process are not derived from the whole amount of payments (in other word, some money transfers are included twice in the sum of payments).
4. A difference between single amounts between columns (c) and (e) was made due to the fact that certification of expenditures process is the last step in the reimbursement process and it is predicted to be concluded in June 2016. Financial transfers to beneficiaries, made in December 2015 are probably not yet included into the certification of expenditures process.

Source: summarised from *Cohesion Policy Absorption Report 2007–2013 objective: »Convergence«, for the period January 2015 – December 2015*, 2016.

[15] OP HRD stands for Operational Programme for Human Resource Development for the Period 2007–2013.

Table 4. Sources of financing and absorption by development priorities of OP SRDP (in EUR)

		Plan OP SRDP			Cohesion Policy Absorption Report 2007–2013*		
	Development Priority	Community Funding (a)	National counterpart (b)	Total Funding (c)	Available funds in the national budget (d)	Payments from national budget (e)	Certified expenditures (f)
1.	Competitiveness and research excellence	402.133.645	70.964.762	473.098.407	613.152.895	654.353.352	597.854.362
2.	Economic/ development infrastructure	396.934.393	70.047.246	466.981.639	269.451.040	306.583.134	268.228.633
3.	Integration of natural and cultural potentials	263.235.116	46.453.259	309.688.375	253.235.116	248.303.339	226.087.729
4.	Development of regions	619.442.634	109.313.408	728.756.042	619.442.634	662.255.835	641.534.747
5.	Technical assistance	28.003.734	4.941.836	32.945.570	28.003.734	23.840.669	19.046.825
	TOTAL	**1.709.749.522**	**301.720.511**	**2.011.470.033**	**1.783.285.419**	**1.895.336.329**	**1.752.752.300**

* Data are representing only EU part (Community Funding), which always represents 85% of eligible costs; national counterpart always represents 15% and it could be calculated.

Explanations to the Table:

1. A difference between single amounts in Development Priorities between columns (a) and (d) was made due to reallocation of financial sources between OP's and DP's in the years 2007–2013 (amount of the transfer from OP ETID to OP SRDP (see also Table 1) was around 4.5%).
2. A difference between single amounts between columns (d) and (e) was made due to the possibility of over-commitment (instrument, that enabled more efficient absorption of EU funds) and due to the fact, that some financial payments from national budget, that had to be returned to the budget for different reasons (for example financial correction) in the same year and that were not yet included into certification of expenditures process are not derived from the whole amount of payments (in other word, some money transfers are included twice in the sum of payments).
3. A difference between single amounts between columns (e) and (f) was made due to the fact that certification of expenditures process is the last step in the reimbursement process and it is predicted to be concluded in June 2016. Financial transfers to beneficiaries, made in December 2015 are probably not yet included into the certification of expenditures process.

Source: summarised from *Cohesion Policy Absorption Report 2007–2013 objective: »Convergence«, for the period January 2015 – December 2015*, 2016.

APPENDIX G: Physical indicators of the project

Table 5. Physical indicators of the project

No.	Indicator	Without investment	After investment (2014)	5yrs after completed investment (2019)	After reference period (2028)
A	**OP effect indicators**				
A1	Number of renewed natural sciences and technology faculties, moved to new premises	0	2	2	2
B	**OP result indicators**				
B1	Share of enrolled students of natural sciences (in %) compared to the total population of students in higher education; 39%of the share are the students of UL FCCT and UL FCI	6,8%	6,8%	6,8%	9%
B2	Share of enrolled students of technology (in %) compared to the total population of students in higher education; 35.9%of the share are the students of UL FCCT	13,5%	13,5%	20%	20%
B3	Number of new direct workplaces	-	6	45	93
B4	Number of new indirect workplaces	-	-	15	30
C	**Indicators of the UL FCCT and the UL FCI**				
C1	Number of articles	188	241 (+53)	312 (+124)	474 (+286)
C2	Number of citations	1332	1430 (+98)	1830 (+498)	2840 (+1508)
C3	Number of patents	0	0	1 (+1)	2 (+2)
C4	Number of Spin-offs	0	0	4 (+4)	4 (+4)
C5	Number of young researchers for employment in business	34	35 (+1)	37 (+3)	45 (+11)
C6	Number of researchers at the UL	205	208 (+3)	238 (+33)	273 (+68)
C7	Number of teachers at UL	201	201	209 (+8)	223 (+22)
C8	Number of technical staff at UL	46	46	43 (-3)	39 (-7)
C9	Number of national researchers (in FTE)	41	41	42 (+1)	47 (+6)
C10	Research direct contractual cooperation with business (in FTE)	11,69	12,94 (+1,25)	16,17 (+4,48)	22,96 (+11,27)
C11	Number of international researchers (in FTE)	8,19	8,86 (+0,67)	9,80 (+1,61)	11,70 (+3,51)
C12	Number of first cycle graduates	376	410 (+34)	455 (+79)	535 (+159)
C13	Number of second cycle graduates	181	181	221 (+40)	285 (+104)
C14	Number of doctors in science	40	50 (+10)	56 (+16)	68 (+28)
C15	Number of students with special needs	20	23 (+3)	31 (+11)	46 (+26)
C16	Number of students older than 29 yrs	37	45 (+8)	50 (+13)	65 (+28)
C17	Number of first and second cycle foreign students	42	50 (+8)	81 (+39)	120 (+78)

(table continues)

(continued)

No.	Indicator	Without investment	After investment (2014)	5yrs after completed investment (2019)	After reference period (2028)
C	**Indicators of the UL FCCT and the UL FCI**				
C18	Research revenue (in EUR)*	6.378.892	6.659.473 (+280.580 or 4,40%)	6.926.065 (+547.173 or 8,58%)	7.817.935 (+1.439.043 or 22,56%)
C19	Education revenue (in EUR)*	14.717.920	15.038.921 (+321.001 or 2,18%)	16.572.205 (+1.854.285 or 12,60%)	19.767.972 (+5.050.053 or 34,31%)

*Indicator is not included in CBA

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana Faculty, of Computer and Information Science*, 2011, p. 19, Table 2.

APPENDIX H: Financial analysis data

Table 6. Presentation of financial flow – undiscounted values in EUR

Constant price values						
No.	**Year**	**Investment costs**	**Operation costs**	**Revenue**	**Net fixed assets value**	**Net cash flow**
0	2010	10.001.821,20	0,00	0,00		-10.001.821,20
1	2011	9.817.121,17	0,00	0,00		-9.817.121,17
2	2012	37.497.086,45	0,00	0,00		-37.497.086,45
3	2013	44.025.900,10	320.587,69	428.553,42		-43.917.934,37
4	2014	9.783.276,30	189.890,41	821.986,06		-9.151.180,65
5	2015		244.272,79	1.207.916,07		963.643,28
6	2016		541.550,53	1.578.797,88		1.037.247,35
7	2017		852.660,02	1.897.041,36		1.044.381,34
8	2018		1.208.872,19	2.288.908,74		1.080.036,55
9	2019		2.028.172,18	2.621.862,55		593.690,37
10	2020		2.393.337,53	2.963.589,46		570.251,93
11	2021		2.759.317,47	3.340.092,25		580.774,78
12	2022		3.044.340,73	3.757.031,70		712.690,97
13	2023		3.424.333,10	4.259.597,93		835.264,83
14	2024		3.766.706,60	4.736.458,00		969.751,40
15	2025		4.156.394,22	5.146.404,73		990.010,51
16	2026		4.507.298,60	5.645.619,02		1.138.320,42
17	2027		4.908.314,38	6.233.543,21		1.325.228,83
18	2028		5.236.831,09	6.709.500,24	40.165.141,36	41.637.810,51
	Total	**111.125.205,22**	**39.582.879,53**	**53.636.902,62**	**40.165.141,36**	**-56.906.040,77**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science,* 2011, p. 88, Table 58 .

Table 7. Cash flow presentation – discounted values in EUR

DISCOUNTED VALUES						
No.	**Year**	**Investment cost**	**Operation costs**	**Revenue**	**Net fixed assets value**	**Net cash flow**
0	2010	10.001.821,20	0,00	0,00		-10.001.821,20
1	2011	9.174.879,60	0,00	0,00		-9.174.879,60
2	2012	32.751.407,51	0,00	0,00		-32.751.407,51
3	2013	35.938.248,78	261.695,05	349.827,25		-35.850.116,58
4	2014	7.463.614,65	144.866,49	627.089,23		-6.981.391,91
5	2015		174.163,12	861.227,47		687.064,35
6	2016		360.857,98	1.052.019,69		691.161,71
7	2017		530.993,81	1.181.382,02		650.388,21
8	2018		703.574,62	1.332.165,73		628.591,11
9	2019		1.103.191,28	1.426.119,51		322.928,23
10	2020		1.216.651,44	1.506.538,60		289.887,16
11	2021		1.310.931,85	1.586.853,76		275.921,91
12	2022		1.351.723,69	1.668.167,01		316.443,32
13	2023		1.420.976,50	1.767.581,70		346.605,20
14	2024		1.460.793,76	1.836.880,08		376.086,32
15	2025		1.506.468,54	1.865.293,91		358.825,37
16	2026		1.526.777,98	1.912.366,49		385.588,51
17	2027		1.553.846,63	1.973.380,14		419.533,51
18	2028		1.549.389,35	1.985.099,02	11.883.416,02	12.319.125,69
	Total	**95.329.971,74**	**16.176.902,09**	**22.931.991,61**	**11.883.416,02**	**-76.691.466,20**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana Faculty of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science*, 2011, p. 89, Table 59.

Table 8. Calculation of financing gap and Community contribution calculation in EUR

No.	Main elements and parameters		Value Not discounted	Value Discounted (NPV)
1	Reference period (years)	15 years		
2	Financial discount rate (%)	7% real rate		
3	Total investment cost excluding contingencies (in euro, not discounted)		111.125.205	
4	Total investment cost (in euro, discounted)			95.329.972
5	Residual value (in euro, not discounted)		40.165.141	
6	Residual value (in euro, discounted)			11.883.416
7	Revenues (in euro, discounted)			22.931.992
8	Operating costs (in euro, discounted)			16.176.902
	Funding gap calculation			
9	Net revenue = revenues – operating costs + residual value (in euro, discounted) = (7) – (8) + (6)			18.638.506
10	Investment cost – net revenue (in euro, discounted) = (4) – (9)			76.691.466
11	Funding gap rate (%) = (10) / (4)		80,45%	
	Community contribution calculation			**Value**
	Eligible cost (in euro, not discounted)			110.064.675

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 90, Table 60.

APPENDIX I: Economic analysis data

Table 9. Base for economic analysis

Indicator	Effects		Unit	Assessment
	No.	**Effects on the level of individual – benefit 1**		
C12	1	No. of first cycle graduates	1 graduate	Assessment of the value added to the average wage in the RS
C13	2	No. of second cycle graduates	1 graduate	Assessment of the value added to the average wage in the RS
C14	3	No. of doctors of science	1 doctor of science	Assessment of the value added to the average wage in the RS
C15	4	Students with special needs	1 student with special needs	Assessment of the value added to the average wage in the RS
C16	5	No. of students above 29 yrs of age	1 students above 29 yrs of age	Assessment of the value added to the average wage in the RS
C17	6	No. of foreign students	1 foreign student	Tuition fees
		Higher level of inclusion in R&D (in FTE) – benefit 2		
C 9	7	National research (Slovenian Research Agency)	1 FTE	Value of FTE defined by SRA for national natural science research projects
C 10	8	Research with business	1 FTE	Value of FTE defined by SRA for national natural science research projects
C 11	9	International research	1 FTE	Value of FTE defined by SRA for national natural science research projects
C1	10	No of articles SCI	1 publication	0,5 FTE value
C2	11	No of citations SCI	1 citation	0,335 FTE value
		Direct increase in the number of employments – benefit 3		
C5,C6, C7,C8	12	Additional employment of young researchers, researchers and teachers		
		Contributions to economy – benefit 4		
C3	13	No. of national applications for patents	Patent	1 FTE + costs
C3	14	No. of international applications for patents	Patent	1 FTE + costs
C4	15	No. of spin-offs/start-ups	Firm	1*3 employed*30.000 EUR
		Other socio-economic long-term effects (non-assessed effects)		
	16	Shortened time of study		
	17	LLL programmes offer		
	18	Improvements in economy		Young researchers, graduates and doctorates
	19	Improved quality of life		Citizens living in surroundings

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana Faculty of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science*, 2011, p. 92, Table 62.

Table 10. Benefits 1 – Effects on the level of individual include following indicators[16]

Ref.	Indicator	Unit	Value in EUR per year
C12	No. of first cycle graduates	1 graduate	4.584,96
C13	No. of second cycle graduates	1 graduate	6.310,08
C14	No. of doctors of science	1 doctor of science	8.038,08
C15	Students with special needs	1 student with special needs	5.501,95
C16	No. of students above 29 yrs of age	1 students above 29 yrs of age	5.500,80
C17	No. of foreign students	1 foreign student	4.584,96 (first cycle), 6.310,08 (second cycle)

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana Faculty of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science,* 2011, p. 93, Table 63 .

[16]Contribution of the added value is based on difference between the expected individual wages of graduate and without diploma.

Table 11. Assessed benefits 1, per year

Year	First cycle graduate (1) – C12			Second cycle graduate (2) –C13			Doctor of science (3) –C14			Student with special needs (4)-C15		
	No	Added value/per year in EUR	Benefit In EUR	No.	Added value/per year in EUR	Benefit in EUR	No.	Added value/per year in EUR	Benefit in EUR	No.	Added value/per year in EUR	Benefit in EUR
2013	24	4.584,96	110.039,04	0	6.310,08	0	5	8.038,08	40.190,40	0	5.501,95	0,00
2014	34	4.584,96	155.888,64	0	6.310,08	0	10	8.038,08	80.380,80	3	5.501,95	16.505,85
2015	43	4.584,96	197.153,28	12	6.310,08	75.720,96	11	8.038,08	88.418,88	4	5.501,95	22.007,80
2016	52	4.584,96	238.417,92	18	6.310,08	113.581,44	12	8.038,08	96.456,96	6	5.501,95	33.011,70
2017	61	4.584,96	279.682,56	25	6.310,08	157.752,00	13	8.038,08	104.495,04	9	5.501,95	49.517,55
2018	70	4.584,96	320.947,20	33	6.310,08	208.232,64	15	8.038,08	120.571,20	9	5.501,95	49.517,55
2019	79	4.584,96	362.211,84	40	6.310,08	252.403,20	16	8.038,08	128.609,28	11	5.501,95	60.521,45
2020	88	4.584,96	403.476,48	47	6.310,08	296.573,76	17	8.038,08	136.647,36	12	5.501,95	66.023,40
2021	97	4.584,96	444.741,12	54	6.310,08	340.744,32	19	8.038,08	152.723,52	16	5.501,95	88.031,20
2022	105	4.584,96	481.420,80	61	6.310,08	384.914,88	20	8.038,08	160.761,60	17	5.501,95	93.533,15
2023	114	4.584,96	522.685,44	68	6.310,08	429.085,44	21	8.038,08	168.799,68	19	5.501,95	104.537,05
2024	123	4.584,96	563.950,08	76	6.310,08	479.566,08	23	8.038,08	184.875,84	20	5.501,95	110.039,00
2025	132	4.584,96	605.214,72	83	6.310,08	523.736,64	24	8.038,08	192.913,92	20	5.501,95	110.039,00
2026	141	4.584,96	646.479,36	89	6.310,08	561.597,12	26	8.038,08	208.990,08	24	5.501,95	132.046,80
2027	150	4.584,96	687.744,00	97	6.310,08	612.077,76	26	8.038,08	208.990,08	25	5.501,95	137.548,75
2028	159	4.584,96	729.008,64	104	6.310,08	656.248,32	28	8.038,08	225.066,24	26	5.501,95	143.050,70
	1472		**6.749.061,12**	**807**		**5.092.234,56**	**286**		**2.298.890,88**	**221**		**1.215.930,95**

(table continues)

(continued)

Year	Student above 29 years of age (5)-C16			Foreign first cycle students (6) –C17			Foreign second cycle students (7) – C18		
	No.	Added value/per year in EUR	Benefit in EUR	No.	Added value/per year in EUR	Benefit in EUR	No.	Added value/per year in EUR	Benefit in EUR	Total BENEFIT 1 (1-7) in EUR
2013	0	5.500,80	0,00	0	4.584,96	0,00	0	6.310,08	0,00	150.229,44
2014	8	5.500,80	44.006,40	3	4.584,96	13.754,88	5	6.310,08	31.550,40	342.086,97
2015	9	5.500,80	49.507,20	6	4.584,96	27.509,76	5	6.310,08	31.550,40	491.868,28
2016	9	5.500,80	49.507,20	9	4.584,96	41.264,64	5	6.310,08	31.550,40	603.790,26
2017	10	5.500,80	55.008,00	13	4.584,96	59.604,48	16	6.310,08	100.961,28	807.020,91
2018	12	5.500,80	66.009,60	16	4.584,96	73.359,36	17	6.310,08	107.271,36	945.908,91
2019	13	5.500,80	71.510,40	20	4.584,96	91.699,20	19	6.310,08	119.891,52	1.086.846,89
2020	14	5.500,80	77.011,20	22	4.584,96	100.869,12	20	6.310,08	126.201,60	1.206.802,92
2021	16	5.500,80	88.012,80	26	4.584,96	119.208,96	21	6.310,08	132.511,68	1.365.973,60
2022	18	5.500,80	99.014,40	29	4.584,96	132.963,84	23	6.310,08	145.131,84	1.497.740,51
2023	19	5.500,80	104.515,20	32	4.584,96	146.718,72	23	6.310,08	145.131,84	1.621.473,37
2024	21	5.500,80	115.516,80	35	4.584,96	160.473,60	24	6.310,08	151.441,92	1.765.863,32
2025	23	5.500,80	126.518,40	39	4.584,96	178.813,44	26	6.310,08	164.062,08	1.901.298,20
2026	25	5.500,80	137.520,00	42	4.584,96	192.568,32	27	6.310,08	170.372,16	2.049.573,84
2027	26	5.500,80	143.020,80	45	4.584,96	206.323,20	29	6.310,08	182.992,32	2.178.696,91
2028	28	5.500,80	154.022,40	48	4.584,96	220.078,08	30	6.310,08	189.302,40	2.316.776,78
	251		**1.380.700,80**	**385**		**1.765.209,60**	**290**		**1.829.923,20**	**20.331.951,11**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 93 Table 63, 94, Table 64.

Table 12. Benefits 2 - Higher level of inclusion in R&D include following indicators

Ref.	Indicator	Unit	Value (EUR) per year*
C 9	National research (Slovenian Research Agency)	FTE	48.200
C 10	Research revenue - direct contractual co-operation with business (in EUR)	FTE	48.200
C 11	International research	FTE	48.200
C 1	Publications SCI	Number of articles	24.100
C 2	Articles SCI	Number of citations	16.147

*Note**. The benefit is calculated on the bases of expected volume of the national research, research with business and international research, as the difference between "with" compared to "without" investment. The significantly improved conditions for research will contribute to greater internationalization and increased excellence of research and innovation. This impact is measured according to the number of published articles and citations (SCI), as the difference between "with" and "without" investment. One article represents 0,5 FTE, one citation 0,335 FTE (1 FTE represents 48.200 EUR net).

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 94.

Table 13. Assessed benefits 2, per year

Year	National research - C09		Research with business - C10		International research - C11		Articles – C1		Citations – C2		Total BENEFIT 2 in EUR
	No. FTE	Benefit in EUR	No. FTE	Benefit in EUR	No. FTE	Benefit in EUR	No.	Benefit in EUR	No.	Benefit in EUR	
2013	0	0	0,88	42.416,00	0,29	13.978,00	42	1.012.200,00	38	613.586,00	1.682.180,00
2014	0	0	1,25	60.250,00	0,48	23.136,00	53	1.277.300,00	98	1.582.406,00	2.943.092,00
2015	0	0	2,30	110.860,00	0,77	37.114,00	65	1.566.500,00	158	2.551.226,00	4.265.700,00
2016	1	48.200,00	2,84	136.888,00	0,96	46.272,00	79	1.903.900,00	243	3.923.721,00	6.058.981,00
2017	1	48.200,00	3,39	163.398,00	1,04	50.128,00	94	2.265.400,00	328	5.296.216,00	7.823.342,00
2018	1	48.200,00	3,94	189.908,00	1,23	59.286,00	109	2.626.900,00	413	6.668.711,00	9.593.005,00
2019	1	48.200,00	4,48	215.936,00	1,42	68.444,00	124	2.988.400,00	498	8.041.206,00	11.362.186,00
2020	1,5	72.300,00	5,03	242.446,00	1,71	82.422,00	139	3.349.900,00	588	9.494.436,00	13.241.504,00
2021	2,45	118.090,00	5,58	268.956,00	1,9	91.580,00	156	3.759.600,00	703	11.351.341,00	15.589.567,00
2022	2,5	120.500,00	6,67	321.494,00	2,09	100.738,00	174	4.193.400,00	818	13.208.246,00	17.944.378,00
2023	3,5	168.700,00	7,77	374.514,00	2,28	109.896,00	192	4.627.200,00	933	15.065.151,00	20.345.461,00
2024	3,5	168.700,00	8,87	427.534,00	2,47	119.054,00	210	5.061.000,00	1048	16.922.056,00	22.698.344,00
2025	3,5	168.700,00	9,47	456.454,00	2,65	127.730,00	229	5.518.900,00	1163	18.778.961,00	25.050.745,00
2026	4	192.800,00	10,07	485.374,00	2,94	141.708,00	248	5.976.800,00	1278	20.635.866,00	27.432.548,00
2027	6	289.200,00	10,67	514.294,00	3,13	150.866,00	267	6.434.700,00	1393	22.492.771,00	29.881.831,00
2028	6	289.200,00	11,27	543.214,00	3,32	160.024,00	286	6.892.600,00	1508	24.349.676,00	32.234.714,00
	36,95	**1.780.990,00**	**94,48**	**4.553.936,00**	**28,68**	**1.382.376,00**	**2139**	**59.454.700,00**	**11208**	**180.975.576,00**	**248.147.578,00**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, pp. 94-95, Table 65.

Table 14. Benefits 3 - Direct employment includes following indicators

Ref.	Indicator	Unit	Value in EUR, per additional employee, per year*
C 5	Young researcher for employment in business	Number of additional employees	21.213,70
C 6	Researcher at the UL	Number of additional employees	29.723,66
C 7	Teacher at the UL	Number of additional employees	29.723,68
C 8	Technical staff at the UL	Number of additional employees	16.120,51

Note*. The number of additional employees is presented as the difference between "with" and "without" investment, contribution of the added value is based on the expected individual wages.

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 95.

Table 15. Assessed benefits 3, per year

Year		Young researchers from the business (C5)		Researchers at UL (C6)		Teachers at UL (C7)		Technical staff at UL (C8)		Total BENEFIT 3
		No.	Benefit in EUR	No.	Benefit in EUR	No.	Benefit in EUR	No.	Benefit in EUR	in EUR
0	2013	1	21.213,70	3	89.170,98	0	0,00	-1	-16.120,51	94.264,17
1	2014	1	21.213,70	7	208.065,62	0	0,00	0	0,00	229.279,32
2	2015	1	21.213,70	10	297.236,60	1	29.723,68	-1	-16.120,51	332.053,47
3	2016	0	0,00	17	505.302,22	3	89.171,04	-2	-32.241,02	562.232,24
4	2017	1	21.213,70	22	653.920,52	5	148.618,40	-3	-48.361,53	775.391,09
5	2018	2	42.427,40	28	832.262,48	7	208.065,76	-3	-48.361,53	1.034.394,11
6	2019	3	63.641,10	33	980.880,78	8	237.789,44	-3	-48.361,53	1.233.949,79
7	2020	4	84.854,80	40	1.188.946,40	10	297.236,80	-4	-64.482,04	1.506.555,96
8	2021	5	106.068,50	45	1.337.564,70	12	356.684,16	-5	-80.602,55	1.719.714,81
9	2022	5	106.068,50	47	1.397.012,02	13	386.407,84	-5	-80.602,55	1.808.885,81
10	2023	6	127.282,20	51	1.515.906,66	14	416.131,52	-5	-80.602,55	1.978.717,83
11	2024	8	169.709,60	55	1.634.801,30	16	475.578,88	-6	-96.723,06	2.183.366,72
12	2025	9	190.923,30	58	1.723.972,28	17	505.302,56	-6	-96.723,06	2.323.475,08
13	2026	9	190.923,30	61	1.813.143,26	19	564.749,92	-6	-96.723,06	2.472.093,42
14	2027	10	212.137,00	65	1.932.037,90	20	594.473,60	-6	-96.723,06	2.641.925,44
15	2028	11	233.350,70	68	2.021.208,88	22	653.920,96	-7	-112.843,57	2.795.636,97
	Total	**76**	**1.612.241,20**	**610**	**18.131.432,60**	**167**	**4.963.854,56**	**-63**	**-1.015.592,13**	**23.691.936,23**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 95, Table 66.

Table 16. Benefits 4 - Contribution to business include following indicators

Ref.	Indicator	Unit	Value in EUR per unit*
C3	National applications for patents	Number	49.080
C3	International applications for patents	Number	52.200
C4	Spin-offs/start-ups	Number	90.000

Note.* The impact is calculated on the basis of the national and international applications for patent, spin-offs, as the difference between "with" and "without" investment. One national patent application is assessed as 1 FTE + costs for application; one international patent application is assessed as 1 FTE + costs and one spin-off or start-up firm as costs for 3 employed researchers per firm.

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 95.

Table 17. Assessed benefits 4, per year

Year		Patents (nat. application) – C3		Patents (international application) – C3		Spin – offs (C4)		Total BENEFIT 4
		No.	Benefit in EUR	No.	Benefit in EUR	No.	Benefit in EUR	in EUR
0	2013	1	49.080,00	0	0	0	0,00	49.080,00
1	2014	0	0,00	0	0	0	0,00	0,00
2	2015	1	49.080,00	0	0	4	360.000,00	409.080,00
3	2016	0	0,00	0	0	4	360.000,00	360.000,00
4	2017	1	49.080,00	0	0	4	360.000,00	409.080,00
5	2018	1	49.080,00	0	0	4	360.000,00	409.080,00
6	2019	1	49.080,00	0	0	4	360.000,00	409.080,00
7	2020	1	49.080,00	0	0	4	360.000,00	409.080,00
8	2021	2	98.160,00	0	0	4	360.000,00	458.160,00
9	2022	1	49.080,00	0	0	4	360.000,00	409.080,00
10	2023	2	98.160,00	0	0	4	360.000,00	458.160,00
11	2024	1	49.080,00	0	0	4	360.000,00	409.080,00
12	2025	2	98.160,00	0	0	4	360.000,00	458.160,00
13	2026	2	98.160,00	0	0	4	360.000,00	458.160,00
14	2027	2	98.160,00	0	0	4	360.000,00	458.160,00
15	2028	2	98.160,00	0	0	4	360.000,00	458.160,00
	Total	**20**	**981.600,00**	**0**	**0**	**56**	**5.040.000,00**	**6.021.600,00**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science,* 2011, p. 96, , Table 66.

Table 18. Presentation of all benefits per year, including revenue in EUR

Year		Benefit 1	Benefit 2	Benefit 3	Benefit 4	Total benefit	Revenue without VAT	TOTAL revenue - benefit
		Effects on the level of individual	Higher level of inclusion in R&D.	Direct employment	Contribution to business	BENEFIT		
0	2013	150.229,44	1.682.180,00	94.264,17	49.080,00	1.975.753,61	357.127,85	2.332.881,46
1	2014	342.086,97	2.943.092,00	229.279,32	0	3.514.458,29	684.988,38	4.199.446,67
2	2015	491.868,28	4.265.700,00	332.053,47	409.080,00	5.498.701,75	1.006.596,73	6.505.298,48
3	2016	603.790,26	6.058.981,00	562.232,24	360.000,00	7.585.003,50	1.315.664,90	8.900.668,40
4	2017	807.020,91	7.823.342,00	775.391,09	409.080,00	9.814.834,00	1.580.867,80	11.395.701,80
5	2018	945.908,91	9.593.005,00	1.034.394,11	409.080,00	11.982.388,02	1.907.423,95	13.889.811,97
6	2019	1.086.846,89	11.362.186,00	1.233.949,79	409.080,00	14.092.062,68	2.184.885,46	16.276.948,14
7	2020	1.206.802,92	13.241.504,00	1.506.555,96	409.080,00	16.363.942,88	2.469.657,88	18.833.600,76
8	2021	1.365.973,60	15.589.567,00	1.719.714,81	458.160,00	19.133.415,41	2.783.410,20	21.916.825,61
9	2022	1.497.740,51	17.944.378,00	1.808.885,81	409.080,00	21.660.084,32	3.130.859,75	24.790.944,07
10	2023	1.621.473,37	20.345.461,00	1.978.717,83	458.160,00	24.403.812,20	3.549.664,94	27.953.477,14
11	2024	1.765.863,32	22.698.344,00	2.183.366,72	409.080,00	27.056.654,04	3.947.048,34	31.003.702,38
12	2025	1.901.298,20	25.050.745,00	2.323.475,08	458.160,00	29.733.678,28	4.288.670,61	34.022.348,89
13	2026	2.049.573,84	27.432.548,00	2.472.093,42	458.160,00	32.412.375,26	4.704.682,52	37.117.057,78
14	2027	2.178.696,91	29.881.831,00	2.641.925,44	458.160,00	35.160.613,35	5.194.619,34	40.355.232,69
15	2028	2.316.776,78	32.234.714,00	2.795.636,97	458.160,00	37.805.287,75	5.591.250,20	43.396.537,95
	Total	**20.331.951,11**	**248.147.578,00**	**23.691.936,23**	**6.021.600,00**	**298.193.065,34**	**44.697.418,85**	**342.890.484,19**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 96, Table 67.

Table 19. Presented economic flow – undiscounted values in EUR

Value in EUR without VAT						
Year		**Investment costs**	**Operation costs**	**Revenue and benefit**	**Net fixed assets value**	**Difference (benefit-costs)**
	Konv. factor*	0,7167	0,8333	0,8333	0,7167	
0	2010	7.168.305,25	0,00	0,00	0,00	-7.168.305,25
1	2011	7.035.930,75	0,00	0,00	0,00	-7.035.930,75
2	2012	26.874.161,86	0,00	0,00	0,00	-26.874.161,86
3	2013	31.553.362,60	267.156,41	2.332.881,52	0,00	-29.487.637,49
4	2014	7.011.674,13	158.242,01	4.199.446,82	0,00	-2.970.469,32
5	2015	0,00	203.560,66	6.505.298,69	0,00	6.301.738,03
6	2016	0,00	451.292,11	8.900.668,75	0,00	8.449.376,64
7	2017	0,00	710.550,02	11.395.702,25	0,00	10.685.152,23
8	2018	0,00	1.007.393,49	13.889.812,53	0,00	12.882.419,04
9	2019	0,00	1.690.143,48	16.276.948,80	0,00	14.586.805,32
10	2020	0,00	1.994.447,94	18.833.601,56	0,00	16.839.153,62
11	2021	0,00	2.299.431,23	21.916.826,52	0,00	19.617.395,29
12	2022	0,00	2.536.950,61	24.790.945,01	0,00	22.253.994,40
13	2023	0,00	2.853.610,92	27.953.478,17	0,00	25.099.867,25
14	2024	0,00	3.138.922,17	31.003.703,48	0,00	27.864.781,31
15	2025	0,00	3.463.661,85	34.022.350,04	0,00	30.558.688,19
16	2026	0,00	3.756.082,16	37.117.058,99	0,00	33.360.976,83
17	2027	0,00	4.090.261,98	40.355.233,99	0,00	36.264.972,01
18	2028	0,00	4.364.025,91	43.396.539,31	28.786.356,81	67.818.870,21
	Total	**79.643.434,59**	**32.985.732,95**	**342.890.496,43**	**28.786.356,81**	**259.047.685,70**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, p. 97, Table 68.

Table 20. Presented economic flow – discounted values in EUR

Discounted values					
Year	**Investment costs**	**Operation costs**	**Benefits**	**Net fixed assets value**	**Net**
2010	7.168.305,25	0,00	0,00	0,00	-7.168.305,25
2011	6.575.636,21	0,00	0,00	0,00	-6.575.636,21
2012	23.472.933,76	0,00	0,00	0,00	-23.472.933,76
2013	25.756.942,90	218.079,21	1.904.326,23	0,00	-24.070.695,88
2014	5.349.172,62	120.722,07	3.203.737,87	0,00	-2.266.156,82
2015	0,00	145.135,94	4.638.188,06	0,00	4.493.052,12
2016	0,00	300.714,99	5.930.891,41	0,00	5.630.176,42
2017	0,00	442.494,84	7.096.670,64	0,00	6.654.175,80
2018	0,00	586.312,18	8.083.997,35	0,00	7.497.685,17
2019	0,00	919.326,07	8.853.581,68	0,00	7.934.255,61
2020	0,00	1.013.876,20	9.574.048,02	0,00	8.560.171,82
2021	0,00	1.092.443,21	10.412.526,40	0,00	9.320.083,19
2022	0,00	1.126.436,41	11.007.476,07	0,00	9.881.039,66
2023	0,00	1.184.147,08	11.599.699,64	0,00	10.415.552,56
2024	0,00	1.217.328,13	12.023.770,74	0,00	10.806.442,61
2025	0,00	1.255.390,45	12.331.265,35	0,00	11.075.874,90
2026	0,00	1.272.314,98	12.572.832,05	0,00	11.300.517,07
2027	0,00	1.294.872,19	12.775.433,60	0,00	11.480.561,41
2028	0,00	1.291.157,80	12.839.470,07	8.516.844,26	20.065.156,53
Total	**68.322.990,74**	**13.480.751,75**	**144.847.915,18**	**8.516.844,26**	**71.561.016,95**

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science,* 2011, p. 97, Table 69.

APPENDIX J: Risk analysis

Table 21. Presentation of risks

Risks	Level of risk (probability of event)*	Impact assessment**	Risk consequences	Risk management measures
PROJECT DEVELOPMENT RISK AND GENERAL RISK				
Risk: appointing inexperienced and professionally incompetent leader for the investment project realization	**1**	Time: 2 Costs: 1 Quality: 2	The project not successfully co-ordinated and completed in time; Wrong decisions will be made; The tasks inappropriately delivered The responsibilities and competences not transparent	Appointing experienced and professionally competent leader for the investment project realization Appointing internal and external advisors
Risk: overloaded responsible person for the investment project realization and the project board members overloaded with other working activities	**2**	Time: 2 Costs: 1 Quality: 2	The project not successfully co-ordinated and completed in time; The project not adequately monitored and the problems not solved in time	Appointing experienced and professionally competent leader, not overloaded with other working assignments, Appointing the project board members, not overloaded with other working assignments
Risk: documentation for IP not prepared on time and send to the EC	**1**	Time: 3 Costs: 3 Quality: 1	Co-financing ERDF funs not approved Deadlines for implementation of the project are not met	Appointing experienced and professionally competent project team and establish relevant management structure
Risk: Open public call for contractor/s not published on time, procedure of selection not concluded on time	**2**	Time: 3 Costs: 1 Quality: 1	Exceeded deadlines for implementation of the project	Engagement of different experts from the field of building construction and legislation for preparation of the public call
Risk: Selection of inappropriate contractor	**2**	Time: 3 Costs: 3 Quality: 3	Quality not meet Exceeded deadlines for implementation of the project Additional costs	Appointing experienced and professionally competent commission for the selection of contractor
Risk: negative public opinion towards realization of the project (exp. Impact on the quality of living...)	**1**	Time: 1 Costs: 1 Quality: 1	Prolongation of the deadline for the realization of the project	Considering the requirements and suggestions Positive information of the public about the project
Risk: Economic crisis risks, strengths of the contractors	**3**	Time: 3 Costs: 2 Quality: 2	Prolongation of the deadline for the realization of the project, unrealization of the project, change of contractors	The Government is expected to adopt risk management instruments
Risk: unreliability of the bank insurance instruments (instability of banks and disagreeable financial consequences for banks)	**3**	Time: 1 Costs: 3 Quality: 1	Inadequate securities	The Government is expected to adopt risk management instruments
Risk: Non-acquisition of the financial means (additional financial funds from MHEST)	**1**	Time: 1 Costs: 2 Quality: 1	Uncompleted financial construction, Incapability of preparing all necessary to apply for the EU funds 2007–2013	Preparation of adequate documentation and co-operation with competent institutions- Project board has risk management tasks
PROJECT REALIZATION RISK				
Risk: procedures of contracting	**2**	Time: 1 Costs: 2 Quality: 3	Repeated public tender; Delay in contracting	Special attention to the contracting procedures (transparently delegated tasks...)

(table continues)

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Risks	Level of risks (probability of the event)*	Impact assessment**	Risk consequences	Risk management measures
PROJECT REALIZATION RISK				
Risk: choice of unprofessional and inexperienced external experts	**3**	Time: 2 Costs: 2 Quality: 3	Prolongation of the contracting and need to acquire additional funds (national budget revision); Delays in acquiring appropriate documentation; Complications in approval of the documentation, Changing and complementing the documentation	Preparation of good tender documentation, in line with the applicable legislation; Clear definition of requirements for the bidders, especially regarding reference, staff; clear criteria for the bidders,
Risk: insufficient financial means (in comparison to the collected bids)	**2**	Time: 2 Costs: 3 Quality: 3	The project not realized in expected time, The need for additional funds (national budget revision); When exceeding the project budget by 20%, the need for revision of project documentation.	Preparation of good tender documentation, in line with the applicable legislation; Preparation of well-defined task list, as a part of the tender documentation, and accurate cost estimation
Risk: project phases/construction not finalized on time	**2**	Time: 3 Costs: 3 Quality: 1	Financial sources not approved or have to be repaid; Renting cost increasing Influence on other projects, connected on emptying existing FCCT and FCI premises Objectives of the project are not met;	Appointing experienced and professionally competent leader and personnel in project office for the investment project realization Obligatory condition for the selection of the contractor is submission of bid bond During the construction permanent supervision of construction works Project board has risk management tasks – regular informing the UL Governing Board and adoption of relevant decisions
Risk: project costs exceeded	**1**	Time: 3 Costs: 3 Quality: 2	Construction works and in consequence project not finished on time Objectives of the project are not met; Credit arrangement for covering additional project costs	Relevant preparation of documentation for open public call Supervision of construction and other project works; regular approval and confirmation of all changes including price changes Project value is estimated in period before the recession – possibility for price reduction exists in procedure of selection of bidders/contractors
Risk: bankruptcy of the contractor during the construction works	**3**	Time: 3 Costs: 3 Quality: 2	Repeated public tender; Delay in contracting	Obligatory condition for the selection of the contractor is submission of performance bond and warranty
Risk: Quality of construction work and equipment not on expected level	**2**	Time: 1 Costs: 3 Quality: 3	Additional cost after the completion of the construction works Moving to new premises delayed Increasing renting cost Influence on other projects, connected on emptying existing FCCT and FCI premises	Selected contractor must submit performance bond and warranty Supervision of construction works
Risk: Weather	**2**	Time: 3 Costs: 3 Quality: 3	Prolongation of the investment documentation; The need for additional funds (national budget revision) in the phase of realization to repair the weather influenced consequences	In case of expected delays in work under normal weather conditions, work longer than usual

(table continues)

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Risks	Level of risks (probability of the event)*	Impact assessment**	Risk consequences	Risk management measures
RISKS AFTER CONSTRUCTION PHASE				
Risk: not observing the environmental protection standards	**1**	Time: 2 Costs: 3 Quality: 3	Negative impact on environment, higher burden on environment, Higher costs of project realization	Observing the environmental protection standards in all phases of the realization of the investment and the project running
Risk: political factors	**1**	Time: 2 Costs: 2 Quality: 1	Elections can cause changes in distribution of funds and priorities, so the results of the project will not be achieved in time	The UL defines the priorities in its strategic goals and tries to reach them with own means
PROJECT REALIZATION RISK				
Risk: economic situation	**2**	Time: 2 Costs: 2 Quality: 2	Decreased co-operation with business or lesser income due to lower service prices	Increase co-operation with the international environment
Risk: loss of EU funds	**2**	Time: 2 Costs: 3 Quality: 1	Loss or return of the EU funds Irregularities in public tendering Irregularities in investment conducting Disregard of the publication and public information rules Disregard of legislation for payments	Keeping separate accounting records (recording revenue, operation costs on both faculties), providing records for audits, controlling authorities, archives (10 years) Observe publication measures
Risk: Objectives of the project are not met	**2**	Time: 1 Costs: 3 Quality: 1	Repayment of funds to the EC;	Extended project board Strategic plan of both faculties compliance with project objectives

Note. *Level of risk: 1-low probability, 2-medim probability, 3-high probability
Note. **Impact assessment: 1-low impact, 2- medium impact, 3-high impact

Source: *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University of Ljubljana, Faculty of Computer and Information Science*, 2011, pp. 102-104, Table 71 .

APPENDIX K: List of documentation used by the beneficiary for preparation of feasibility study, including financial and economic analyses

Table 22. List of documentation used for the preparation of feasibility study

A	**Expert base guidelines for the project (project related sources)**
1.	Study of possible locations for the UL FCCT in Ljubljana (Imos d.d., June 1999)
2.	Study of spatial verification for the faculties next to Aškerčeva cesta in Ljubljana (Imos d.d., May 2000)
3.	Programme spatial requirements of the ULFCCT(2000)
4.	Investment project identification document (IPID), UL, FCCT (Imos d.d., September 2001)
5.	Preliminary investment design for the new construction of the UL FCCT (Imos d.d., November 2001), Amendment (Imos d.d., December 2002 and April 2004)
6.	Study on construction of the facility of the UL FCI (June 2000)
7.	Study on alternative construction of UL FCI
8.	Spatial verification of the construction programme for the UL FCI – IEVT facility, (Domplan d.d. Kranj, July 2001)
9.	Project task for producing special expert bases for the development area VI 3/3 (Municipality of Ljubljana, Municipal Administration – Urban Planning Department, May 2001)
10.	Programme design bases of the UL FCI (Studio Tržič d.o.o., September 2001)
11.	Investment Project Identification Document (IPID), UL FCI (Domplan d.d. Kranj, June 2004)
12.	Preliminary investment design – construction of the facility of the UL FCCT and the UL FCI (Altus consulting d.o.o., July 2007)
13.	Preliminary design UL FCCT and UL FCI 14/2007A (Inženiring 4M d.o.o., August 2007)
14.	Hydro-technical study no. 893-RF/08 (IZVO d.o.o., May 2009)
15.	Geological and Geomechanical report (Civil Engineering Institute ZRMK, October 2007)
16.	Amendment to the preliminary investment design – construction of the facility of the UL FCCT and the UL FCI (Altus consulting d.o.o., March 2008)
17.	Environmental Impact Analysis (E-net okolje for Proplus d.o.o., December 2008)
18.	The Institute of the Republic of Slovenia for Nature Conservation opinion on effects on Natura 2000 sites (no. 3-III-538/2-O-08/KR, dated July 3, 2008 and no. 3-II-145/4-O-10/KR, dated March 30, 2010)
19.	Nature protection consent statement, issued by the Ministry of the Environment and Spatial Planning, Environment Agency of the Republic of Slovenia (no. 35621-297/2008-4, July 4, 2008)
20.	Nature protection consent, the Ministry of the Environment and Spatial Planning, Environment Agency of the Republic of Slovenia (no. 35621-297/2008-4, July 4, 2008)
21.	CPP project documentation (Inženiring 4M d.o.o., June 2008, and IBE d.d., June 2008, Komunala project d.o.o., July 2008, Novera d.o.o., February 2009)
22.	WEP documentation (Inženiring 4Md.o.o.June 2009, IBE d.d. June 2010, Komunala project d.o.o.; February 2009 and June 2009 and, and Novera d.o.o., July 2009)
	The Study of fire safety
23.	Investment Programme (Imos d.d., June 2009)
24.	Investment Programme – adjustment number 1 (Imos d.d., December 2009)
25.	Investment Programme – adjustment number 2 (Imos d.d., September 2010)
26.	Investment Programme – adjustment number 3 (Proplus d.o.o. and University of Ljubljana, February 2011, revised in April, May, June and September 2011)
27.	Feasibility study of alternative systems for supplying buildings with energy (IBE d.d., April 2013)
28.	Revision of Investment Programme with elements of Feasibility Study: New Construction of the UL CCT and the UL FCI (Proplus d.o.o., 2014)
B	**Statistical official sources (different documents and analysis)**
29.	IMAD
30.	OECD
31.	European Innovation Scoreboard
32.	CEDEFOP
33.	SORS
34.	Bank of Slovenia

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C	**Strategic official sources**
35.	NSRF
36.	OP SRDP (OP SRDP draft modifications November 2010)
37.	Slovenian Exit Strategy 2010–2013 (February 2010)
38.	National Reform Programme (draft, RS Government, November 2010)
39.	National Programme of Higher Education 2007–2010 and the draft of new Resolution of the National
40.	Programme of Higher Education 2011–2020 (September 2010), adopted by the Parliament of the RS on May 24, 2011)
41.	National Research and Development Programme 2006–2010 and the draft of the new Resolution of the RISS (October 2010),), adopted by the Parliament of the RS on May 24, 2011)
42.	Information Society Development Strategy, si 2010 (June 2007)
43.	Target Oriented Budget 2011–2012
44.	Europe 2020 "Strategy for Smart, Sustainable and Inclusive Growth" (COM 2010), 3.3.2010
C	**Strategic official sources**
45.	Europe 2020 Flagship Initiative »Innovation Union« (COM(2010) 546 final, 6. 10. 2010)
46.	Europe 2020 Flagship Initiative "European Digital Agenda", (COM(2010) 245 final. 19. 05. 2010)
47.	Europe 2020 Flagship Initiative »Youth on the move«, 2010
48.	Strategic framework for European co-operation in education and training – »ET 2020«, (OJ EU, no. 2009/C 119/02)
D	**Spatial planning documents**
49.	Decree on Building Plan for the Development Area VI 3/3 UL BF (OJ RS, no. 123/04)
50.	Development Plan for the Development Area VI 3/3 UL BF
51.	DB for the facilities, external arrangement, utility and traffic arrangement, acquired project conditions (Šabec Kalan Šabec Arhitekti, project no. 14/2007, June 2007)
52.	Planning information (Municipality of Ljubljana – Urban Planning Department, no. 3501-2607/05-JB (284457))
53.	Hydro-technical study no. 893-RF/08 (IZVO d.o.o., May 2009)
54.	Reports on archaeological field examinations in the area projected for the construction of the new facility of the UL FCCT and the UL FCI no. 247/2007 dated 24 October 2007 (Institute for the Protection of Cultural Heritage of Slovenia, Ljubljana Regional Office)
55.	The Institute of the Republic of Slovenia for Nature Conservation opinion on effects on Natura 2000 sites (no. 3-III-538/2-O-08/KR, dated July 3, 2008 and no. 3-II-145/4-O-10/KR, dated March 30, 2010)
56.	Nature protection consent statement, issued by the Ministry of the Environment and Spatial Planning, Environment Agency of the Republic of Slovenia (no. 35621-297/2008-4, July 4, 2008)
57.	Nature protection consent, the Ministry of the Environment and Spatial Planning, Environment Agency of the Republic of Slovenia (no. 35621-297/2008-4,July 4, 2008)
E	**Other relevant data for feasibility analysis (public procurement legislation)**
58.	Public Procurement Law (ZJN-2, OJ RS, no. 126/06, 16/2008 and 19/2010), hereinafter referred to as ZJN-2
59.	Commission Regulation (EC). 1564/2005, dated 7. 9. 2005, establishing standard forms for the publication of notices in the framework of public procurement procedures pursuant to Directives 2004/17/EC and 2004/18/EC of the European Parliament and the Council
60.	Law enforcement budgets for 2010 and 2011 (ZIPRS1011, OJ RS, no. 99/2009 and 29/2010)
61.	Law on Auditing of Public Procurement (ZRP JN-UPB5, OJ RS, no. 94/2007)
62.	Construction Act (PGI-1, OJ RS, no. 102/04, 126/07, 108/09)
63.	Public Finance Act (OJ RS, no. 79/99, 124/00, 79/01, 30/02, 109/08 and 49/09)
64.	Rules for the Treatment of waste from construction work (OJ RS, no. 3 / 03, 50/04, 62/04 and 34/08)
65.	Regulations on safety and health at work at temporary or mobile construction sites (OJ RS, no. 83/05)
66.	Regulation on a uniform methodology for the preparation of documentation and treatment of investment in public finance (OJ RS, no. 60/06)
67.	Code of Obligations (OZ-UPB1 OJ RS, no. 97/07)
68.	Council Regulation (EC). 1083/2006 of 11 July 2006 laying down general provisions on the European Regional Development Fund, European Social Fund and the Cohesion Fund and repealing Regulation (EC)
69.	Regional Development Fund, European Social Fund and the Cohesion Fund and repealing Regulation (EC). 1260/1999 (OJ L no. 210 of 31. 7. 2006) and amendments (1. 9. 2006, 7. 6. 2007, 24. 12. 2008, 7. 4. 2009)
70.	Regulation (EC). 1080/2006 of the European Parliament and the Council of 5 July 2006 on the European Regional Development Fund and repealing Regulation (EC). 1783/1999 (OJ L no. 210 of 31.07.2006)

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E	**Other relevant data for feasibility analysis (public procurement legislation)**
71.	Commission Regulation (EC). 1828/2006 of 8 December 2006 on rules for their operation of Council Regulation (EC). 1083/2006 laying down general provisions on the European Regional Development Fund, European Social Fund and the Cohesion Fund and of Regulation (EC). 1080/2006 of the European Parliament and Council of the European Regional Development Fund (OJ L no. 371 of 27. 12. 2006, as amended)
72.	Regulation on the implementation of procedures for the use of European cohesion policy in Slovenia in the programming period 2007–2013 (OJ RS no. 41/07 and 17/09) and amendments published in the OJ l. 2010 - Regulation amending the Regulation on the implementation of procedures for the use of European cohesion policy in the Republic of Slovenia in the programming period 2007–2013 (OJ RS 40/09, 3/10, 31/10)
73.	Instructions for the implementation of cohesion policy 2007–2013 and Manual on procedures for implementing the budget of the RS (OJ RS, no. 50/2007, 116/2007, 61/2008 and 99/2009)
74.	All positive laws and regulations in force in the RS and the EU that regulate the area covered by the contract i.e. subject to public procurement. The most favourable contractor will be selected through open procedure, which means that the tender will be open for all interested providers, who will have to submit their bids based on the requirements specified in the tender documentation. Given the extent of the investment, the tender will be published on the public procurement portal and in the EU OJ
F	**Internal sources of beneficiary (primary sources)**
75.	Questionnaire for directors/managers responsible for R&D, sent to 62 most important companies in the targeted area (chemistry, chemical processing, pharmaceutical industry and the area of computer and ICT technology)
76.	University of Ljubljana Yearly Business Reports

Source: summarised from *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana, Faculty of Chemistry and Chemical Technology and the University* of Ljubljana, Faculty of Computer and Information Science, 2011.

APPENDIX L: List of documentation used by the beneficiaries of Project 1, Project 2 and Project 3 for preparation of feasibility study (IP), including financial and economic analyses and comparison to appendix K

Table 23. List of documentation used for the preparation of feasibility studies of Project 1, Project 2 and Project 3

Nr. of sources	**Study**	**Project 1**	**Project 2**	**Project 3**
Estimated value of the project (in EUR)	116.449.389	9.091.911,28	5.246.275,63	398.970,50
A	**Expert base guidelines for the project (project related sources)**			
	28	**6**	**8**	**1**
B	**Statistical official sources (different documents and analysis)**			
	6	**1**	**0**	**0**
C	**Strategic official sources**			
	14	**6**	**7**	**7**
D	**Spatial planning documents**			
	9	**23**	**1**	**17**
E	**Other relevant data for feasibility analysis (public procurement legislation)**			
	17	**14**	**3**	**16**
F	**Internal sources of beneficiary (primary sources)**			
	2	**1**	**2***	**1***
SUM	**76**	**51**	**21**	**42**

*Note.** Web pages of beneficiaries and quote "internal sources" are not included

Source: summarised from *Investment Programme with elements of Feasibility Study: New Construction of the Buildings and Premises of the University of Ljubljana Faculty of Chemistry and Chemical Technology and the University of Ljubljana Faculty of Computer and Information Science,* 2011; *Investment Programme: New construction for the IIS facility and energy renovation of the existing facility*, 2013; *Investment Programme: Energy Institute of the Faculty of Energy Technology of the University of Maribor*, 2015*;Investment Project Identification Document: Adaptation works and purchase of XRD system*, 2015.