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The Biosciences Technology Commercialisation
And Incubation Centre

BIOCENTRE

Feasibility Study
with
Cost – Benefit Analysis

Version 7.0

Zagreb, January 2010

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Table of Contents

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Planinska 1, 10000 Zagreb, CROATIA
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Table of Figures

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Table of Tables

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List of Abbreviations

BAL	Bio-analytical laboratory
BICRO	Business Innovation Centre of Croatia Ltd.
BMU	Buffer and media preparation unit
BP	Business plan
CAGR	Compound annual growth rate
CAPRI	Centre for Antibody Production Rijeka
CBU	Cell banking unit
CCL	Cell culture laboratory
CEO	Chief executive officer
CIBR	Croatian Institute for Brain Research
CLU	Central laboratory unit
CRANE	Croatian Network of Business Angels
CRD	Contract research & development
CTO	Chief technology officer
EPO	Erythropoietin
EU	European Union
EUR	Euro
FS	Feasibility study
G-CSF	Growth colony stimulating factor
GDP	Gross domestic product
GLP	Good laboratory practice
GMP	Good manufacturing practice
GSK	Glaxo Smith Kline
GTP	Good tissue practice
HKN	Croatian kuna
I(C)T	Information (communication) technology
IPA	Instrument of Pre-Accession
IPR	Intellectual property rights
IRB	Institute Ruđer Bošković
JGL	Jadran Galenski Laboratory
LAMRI	Centre for Laboratory Mice Production in Rijeka
LV	Lentiviral vector
mAb	Monoclonal antibodies
MCL	Microbial culture laboratory
MedILS	Mediterranean Institute for Life Sciences
MELE	Ministry of Economy, Labour and Entrepreneurship
MSES	Ministry of Science, Education and Sports
NIH	National Institute of Health
NSF	National Science Foundation
PRU	Product recovery unit
PUL	Purification laboratory
R&D	Research and development
RTD	Research and technology development
SEE	Southeast Europe
SIIF	Science and Innovation Investment Fund
SME	Small and medium size enterprise
STP	Croatia Science and Technology Project
TAL-2	Technical Assistance Project for Institutional and Regulatory Reform to Support Private Sector Development

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TTO	Technology Transfer Offices
UAP	Urban architectural programme
Ub	Ubiquitin
UKF	Unity Trough Knowledge Fund
US	United States
WB	The World Bank
YIC	Young innovative company

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1. Executive Summary

1.1. Project Promoters and Authorities

The project promoter is **the Business Innovation Centre of Croatia (BICRO),** a professional innovation and investment company, established in 1998 by the Croatian Government (i.e. Ministry of Science, Education and Sports - MSES). BICRO has developed into one of the main agencies that implement national science, innovation and technology policies. Its mission includes facilitation of technology transfer and commercialisation activities primarily in the sector of SMEs, contribution to the creation and development of private equity industry (especially venture capital), and promotion of establishment and development of science and technology parks, incubators and other related institutions.

Operating structure is as follows:

Body Responsible for Operational Programme:

- Ministry of Economy, Labour and Entrepreneurship (MELE)
  Ulica grada Vukovara 78, 10000 Zagreb
  Contact person: Tajana Kesić Šapić, State Secretary
  Phone: +385 1 6106 548; e-mail: Tajana.KesicSapic@mingorp.hr

Bodies Responsible for Priority/ Measure:

- Ministry of Science, Education and Sports (MSES)
  Trg hrvatskih velikana 4, 10 000 Zagreb
  Contact person: Dražen Vikić-Topić, State Secretary
  Phone: +385 1 4594 341; e-mail: drazen.vikictopic@mzos.hr

Implementing Body:

- Central Finance and Contracting Agency
  Vukovarska 284, 10000 Zagreb
  Contact person: Marija Tufekčić, Director
  Phone: +385 1 4591 450; e-mail: marija.tufekcic@mfin.hr

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1.2. Object of Analysis

1.2.1. Project Name

Biosciences Technology Commercialisation and Incubation Centre (BIO*Centre*)

The project has been developed as **Operation 2.2.2. of the Regional Competitiveness Operational Programme (IPA IIIC).**

1.2.2. Brief Description of the Project

The Business Innovation Centre of Croatia (BICRO) aims to establish a **biosciences technology transfer and business incubation facility (Biosciences Technology Commercialisation and Incubation Centre - BIOCentre)** in partnership with the MSES, the University of Zagreb and the City of Zagreb. Successful transfer of knowledge into commercially exploitable products is central to Croatia's ability to increase competitiveness and enter international markets. This operation consists of a specific project for the development of a high-technology incubation and business development support institution that creates a network of all necessary knowledge, skills and corresponding material resources essential to supporting establishment and growth of knowledge-based enterprises (start-ups and SMEs) in the area of biosciences. It is envisioned as a **central national resource in a highly propulsive technology sector** which Croatia has set as one of its national developmental priorities and, also important, as a first **good-practice model** for the development of other technology-based incubation infrastructures for the R&D sector throughout Croatia.

This project addresses specialized needs of target groups in the following 5 **areas of activity**:

- Infrastructure support
- Incubation support
- Technology transfer support
- Education / Training support
- Network support

The main target groups of the BIOCentre are **start-up companies (i.e. spin-offs from universities or other research institutions) operating in the field of biotechnology and life sciences**. The basic eligibility criteria these companies will have to fulfil are secured financing for the first three years of their life cycle and a patent application (if a new product is going to be developed). Moreover, the facility and its services should be offered to **existing companies and SMEs** as well as **national and international research institutions** and groups for the implementation of innovative projects with significant commercial potential. Preference should be given to projects with strong cooperation between science (university) and business (SME/industry). Business opportunities from multinational companies (industry) are envisioned as well.

The BIOCentre will be a national resource providing expert services and facilities to promote and facilitate the transition of biotechnological innovations from Croatian research institutes and universities into commercial products. Commercialization of such innovations provides direct economic benefit as well as developing a skills base for the continued expansion of the biotechnology industry in Croatia.

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Located in Zagreb, the BIOCentre will comprise an expert team of Croatian managers (assisted by international consultants) with many years of collective experience in research, technology development, product development, business development and product commercialization in the biotechnology and pharmaceutical industries. BIOCentre will offer a full range of services to assist the start-up and incubation of new biotechnology companies, as well as the development of established biotechnology companies, including:

- The conduit for the spin-out, start-up and incubation of new Croatian biotechnology companies through the Technology Transfer Offices of universities and research institutes.
- Full business development consultancy services to existing Croatian and international biotechnology SME's.
- A full service capability for the process development of biopharmaceuticals on the laboratory scale.
- Comprehensive education courses on the business development and technical aspects of product development.
- Networking with the all actors involved in the process of establishment and development of new technology based companies, both domestic and international.

With these services, BIOCentre will address a key unmet need within the envisioned reform of Croatian science and technology under the STP program. In this role, BIOCentre will act as a catalyst synergistic partner with the Croatian universities and research institutes and will specifically complement the activities of the Technology Transfer Offices that are now being set up within the universities and research institutes. BIOCentre will also market and provide services to the international community with specific focus on South East Europe (SEE) and the European Union (EU). Through the above, BIOCentre will make a significant contribution to the development of a new generation of skilled managers for the successful growth of the Croatian biotechnology industry into a sustained economic force. With the chosen concept, which includes process development service, it will be able to offer its services for affordable prices to the start-up companies, simultaneously enabling BIOCentre to provide comprehensive training of university internships and secure its future self sustainability as it is well known that incubation activity alone is not profitable and sustainable business.

1.2.2.1. Sector

Life sciences / biotechnology

1.2.2.2. Location

The location of the BIOCentre in **Zagreb** seems to be the optimum location for a biosciences Centre in Croatia. Zagreb is the centre point of biotechnology in Croatia with 62 per cent of R&D institutions related to the scientific field of biosciences. The City can be reached easily from all parts of the country that are considered to domicile potential partners of the BIOCentre. Furthermore for international partners the traffic access through the airport of Zagreb and international train connections is better than in all the other cities and regions of Croatia.

The possibility of establishment of the Centre next to the **new University Campus comprising the faculties related to biosciences** is the main advantage of the planned location in the Eastern part of

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Zagreb. Due to this proximity, the core facilities like the laboratory can also be used by the university. Furthermore a direct exchange of employees of the companies and university staff is promoted.

1.2.2.3. Area Impacted by the Project

The main **target regions** from which clients (in particular start-up companies) are to be recruited are firstly **Croatia,** secondly **Southeast Europe** and thirdly (when possible) **Central and Eastern Europe**. Croatia and Southeast Europe have not yet developed facilities similar to those which are to be offered through the BIOCentre.

It is thus expected that the BIOCentre will serve as **a leading incubator, knowledge generator and a networking channel for outstanding biotechnology and life sciences initiatives in Croatia and Southeast Europe**.

1.2.2.4. Alternative options

Alternative options might include a **'business as usual'** scenario, **additional investments into existing technology parks,** a **series of smaller regional centres,** and **alternative location** (other than Zagreb) of the BIOCentre. However, **none of these options can adequately contribute to the project objectives** and facilitate the development of the biotechnology industry (please see 1.3.).

The **existing technology parks cannot provide the necessary environment** for the development of the biotech start-ups. Moreover, these **technology parks cannot be upgraded** to serve the purposes of biotechnology incubation, because of the need to provide highly specialized infrastructure and know-how, necessary for the needs of the biotech-start-ups.

The strategic investment in BIOCentre under Operation 2 is envisaged as a national resource. Given the size and nature of the project, it was considered **that it does not make economic sense to position such incubator infrastructure in each university or region (i.e. build a series of smaller centres)**. **Critical mass of researchers, support institutions and other inputs necessary for successful operation exists only in Zagreb.** Regional technology infrastructure will be linked to the national centre through virtual incubation units so the regions throughout Croatia that have an interest in developing their biosciences capacity (SMEs etc.) will benefit from the business support services offered by the BIOCentre. Given the fact that in Croatia only Zagreb can provide a critical mass of researchers, service providers and active companies for sustaining the operations of the BIOCentre, alternative options regarding macro location (i.e. other cities) have not been considered. Therefore, Zagreb with two largest research institutions – the University of Zagreb and the Ruđer Bošković Institute (IRB) – is the most convenient place for this Centre.

Therefore, the decision to locate one single business centre in the metropolitan area was taken early in the project development. **Option of "not doing the BIOCentre" in any of possible ways was discarded with approval of Regional Competitiveness Operational Programme** when construction of the BIOCentre was adopted as a Operation 2.2.2.

1.3. Promoter's Objectives

The overall project objective is to build technology transfer and commercialization capacities of higher education institutions and public research organizations in order to contribute to development of the biotechnology industry, as well as to sustainable regional development, innovation and industry competitiveness of high value added sectors of the economy and

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knowledge-based SMEs. A log frame with a detailed overview of the project objectives, expected results, activities, assumptions and risks is provided in the Appendix I.

1.4. Previous Experiences with Similar Projects

BICRO and MSES have the experience of collaboration with The World Bank on the **Science & Technology Project (STP).** The project has facilitated the restructuring of public R&D institutions in order to reorient them more towards industry needs, to create technology financing programmes (seed capital programme, cooperative research and development programme targeted at young innovative companies and SMEs) and a platform for development of technology centres, commercial R&D centres and topic-oriented business incubators, upgrading technological capabilities of SMEs, assist development of the venture capital industry in Croatia, promote the intellectual property regime and prevent brain drain. These challenging and comprehensive tasks have laid a foundation to the National Innovation System in Croatia.

1.5. Brief Description of the Feasibility Study

1.5.1. Authors of this Report

This document has been prepared by the team of Mreža znanja Ltd., in cooperation with the Business Innovation Centre of Croatia – BICRO Ltd. Elements of the draft feasibility study prepared by Austin Pock & Partners GmbH have also been used. These teams comprised the following authors and contributors:

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1.5.2. Scope of the Report. Ties to other Projects.

Within the **Regional Competitiveness Operational Programme 2007 – 2009** (IPA IIIC) for Croatia, **measure 2.2. (Technology Transfer and Support Services for Knowledge-Based Start-Ups)** has been defined. The measure consists of two operations. In addition to the Operation 2.2.2. (Biosciences technology commercialisation and incubation centre (BIOCentre)), which is tackled in this report, there is also **Operation 2.2.1. Science and Innovation Investment Fund**. Science and Innovation Investment Fund envisages the following:

- **A procurement contract** through which the assistance will be extended for the following activities: training workshops and consultancy services for beneficiaries, on the topic of developing business plan and feasibility study, of project preparation and implementation (i.e. secondary procurement, project pipeline preparation) and technology transfer activities in general (technology assessment, planning and evaluation; technology commercialization strategies; intellectual property; technology transfer and technology licensing; spin-out programmes);
- **A grant scheme** (with multiple calls for proposals) for the following knowledge transfer activities:
    - Development of infrastructural capacity in higher education institutions and research organisations to interact with business, particularly SMEs;
    - Commercialisation activities;
    - Enhancing science-industry collaboration;
    - Programmes for effective networking and communication

The two operations are linked through the focus on support essential to unlocking the potential in strategic growth areas and improving the quality of institutional support infrastructure key to sustaining economic competitiveness by enhancing the contribution of technology and R&D to economic development and supporting the creation and growth of technology- and knowledge-based SMEs, as well as building up capacity to support the commercialization of R&D. Operation 2.2.1. shall provide additional support, raise awareness and know-how and enable a pipeline of innovative projects thereby increasing the demand for services of the BIO*Centre*.

Methodology of the Project Analysis.

The project analysis follows the prescriptions of the Guide To COST-BENEFIT ANALYSIS of investment projects: Structural Funds, Cohesion Fund and Instrument for Pre-Accession (cf. EC, 2008). The structure of the report follows Annex J of the Guide.

1.6. Main Results of the Analysis

The project is **not financially feasible on its own, but its founders and partners** (BICRO, City of Zagreb and the University of Zagreb) are willing to **cover any operational losses** the project might

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incur. The calculation shows that discounted net revenue is negative (chapter 8.8.2.). Therefore the funding gap rate equals 100% (EC, 2008).

On the other hand, **economic benefits outweigh the costs** (B/C ratio is 1,20).

1.6.1. Financial Returns

FNPV(C) = -16.490.276,55€
FRR(C) = -3,97%
Scrap = 2.471.040,00€

FNPV(K) = -3.446.588,60€
FRR(K) = 1.24%
Scrap = 2.471.040,00€

The time horizon for project analysis is **20 years**, whereas the applicable **discount rate is 7%**, which is in accordance with EC (2008).

1.6.2. Economic Returns

The time horizon for project analysis is **20 years**, whereas the applicable **social discount rate is 5.5%**, which is in accordance with EC (2008). The calculation for the **baseline scenario** shows that the **net present value of the project** in monetary terms **(ENPV)** is EUR **7.526.725,71**. The corresponding **economic rate of return** (**ERR**) is **8,30%**. The present value of the total benefits is EUR **45.890.911,93**, whereas the present value of the total costs is EUR **38.364.186,22**. That leads to the **B/C** (benefit/cost**) ratio** of **1,20**.

In the best case scenario, **ENPV** equals **EUR 13.079.621,89**, whereas **ERR** equals **10,10%.** Both values are strongly acceptable. The present value of the total benefits is EUR **54.430.027,44**, whereas the present value of the total costs is EUR **41.350.405,55**. That leads to the **B/C** (benefit/cost**) ratio** of **1,32**.

In the worst case scenario, **ENPV** equals **EUR 1.522.757,91** whereas **ERR** equals **6,06%**, which is still acceptable. However, the risk of the project needs to be systematically mitigated; risk mitigation measures have been outlined in Table 98. The present value of the total benefits is EUR **37.877.691,07**, whereas the present value of the total costs is EUR **35.375.044,68**. That leads to the **B/C ratio** of **1,06**.

The expected ENPV is calculated by taking into account the respective ENPV values and probabilities in each of the three scenarios. The **expected ENPV** is **EUR 6.836.114,61.** The corresponding **expected value of ERR is 7,99.** The expected present value of the total benefits is EUR **45.037.000,38**, whereas the expected present value of the total costs is EUR **38.064.687,62**. That leads to the **expected B/C ratio** of **1,18**.

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1.6.3. Impact on Employment

Projects that are conducted in the central laboratory unit will provide employment effects for the partners and generate further high-qualified jobs in partner organisations of the Centre (national and international companies, universities and research institutes in Croatia). So the direct employment effect of the Centre will reach **up to 135 highly qualified jobs per year**.

1.6.4. Environmental Impact

The project is to be implemented in an **environmentally friendly** manner. The land plot, which has previously been used by the military, is clean from soil pollutants.

BIOCentre is not energy-intensive. BIOCentre will use the energy from renewable energy sources and **will not require any specific provisions**. The BIOCentre facility has been designed as a very well isolated building of extremely low energy consumption. Only **up to 50 kWh/m² of heating energy will be used up annually.** Renewable energy sources will be applied for heating and cooling, enabling the building not to need further conventional heating media like gas, oil or electricity.

The contribution of the BIOCentre project to the quality of the environment will be achieved through safe and efficient waste disposal, as well as through applications of biotechnology products created at the BIOCentre to **production efficiency** (including the reduced use of resources and lower emissions) of the industrial base, also making it easier to respond to the **regulatory requirements**.

1.6.5. Other Results

The key fiscal benefits include taxes paid into the state and local budgets, which stem directly from the project. Given that CBA methodology stipulates that all inputs and outputs should be considered net of VAT and other indirect taxes, we focus on the **profit** and **capital gains tax**.

The external benefits of the BIOCentre may include **increased demand for the services of companies that will serve the companies operating within the BIOCentre**. These may include technology and business development consultants, educators, intellectual property rights attorneys, venture capital providers etc.

The **major non-monetary social benefits** generated by the BIOCentre project also include:

- technological improvements
- educational effects (diffusion of entrepreneurial knowledge and skills among the beneficiary companies)
- reputational and promotional effects

The project is implemented in accordance with the principles of equal opportunities and sustainable development.

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2. Socio-economic Context

2.1. Main Elements of the Socio-economic Context

2.1.1. Territorial and Environmental Aspects

The Republic of Croatia covers a total surface area of 87.677 km², some 56.610 sq. km of which is land and 31.067 km² of which is marine area. Croatia has a rich natural resource base, with 53% of its territory covered by agricultural land, 37% by forests, and 0.6% by wetlands. Croatia is a coastal country with a coastline extending 1.777 kilometres and forming over one-third of the country's border.

The BIOCentre will be located in **Zagreb**, Croatia. As the capital of Croatia the City of Zagreb is centrally located in Croatia and represents a place of encounter within the South East European region. Although Croatia is not yet a member country of the European Union, Zagreb is easily accessible by road, rail or air traffic from any of its neighbouring countries, not least due to the vastly improved road infrastructure, and it has rail and airline connections with all major European cities.

FIGURE 1: LOCATION OF CROATIA (ORANGE) ON THE EUROPEAN CONTINENT

The highlight of Croatia's recent infrastructure developments is its rapidly-growing highway network; Croatia has now over 1.200 km of highways connecting Zagreb to most other regions. A **major highway network** links Zagreb with Slovenia and Hungary, as well as other Central European countries. Zagreb is also a central traffic hub within Croatia and can be accessed easily by highway systems from the north (E71 – direction Varaždin and Hungary and E59 – direction Maribor and Austria), east (E70 – direction Osijek and Serbia), south (E65 – direction Split and Dubrovnik) and south-west (E70 – direction Rijeka, Ljubljana and Italy). Because of its geographic position, Croatia is an extremely important east-west transit corridor. Transport plays a significant role in the development of the country's economy because it enables access to goods and labour. The transport sector represented 8.4% of GDP in 2007.[1]

[1] http://www.dzs.hr/

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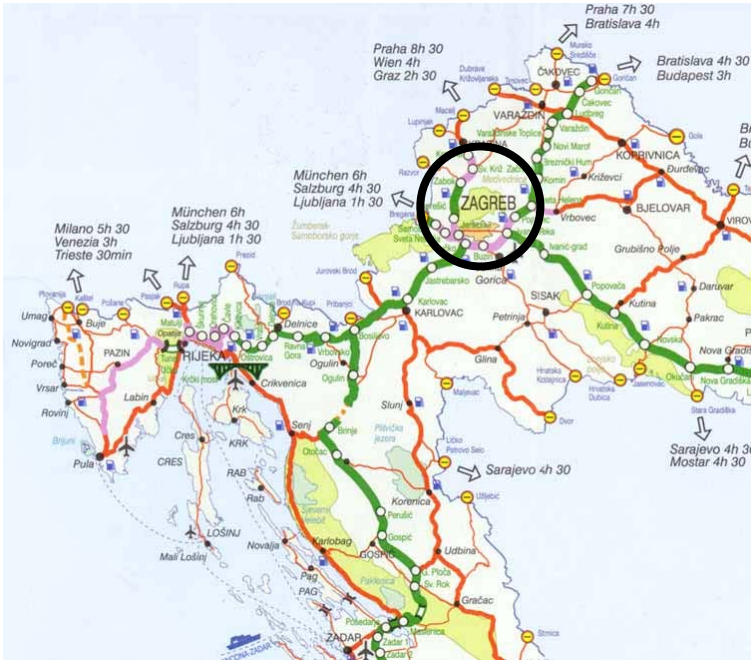
FIGURE 2: CROATIAN HIGHWAY NETWORK AND DISTANCES FROM NEAREST EUROPEAN CITIES



The transport infrastructure of Zagreb is complemented by the **main airport** of Croatia (other major international airports in Croatia serve Dubrovnik and Split) and good **railway** connections. In the case of railways, investments are needed to increase speed and operational efficiency.

To sum up, key territorial and environmental aspects related to the project provide excellent conditions for setting up the BIOCentre in Zagreb. As a burgeoning medium-sized national capital and one of the **key educational and economic centres of Southeast Europe**, Zagreb provides an excellent environment for such a project. Its geographic location and excellent transport connections will facilitate an efficient implementation of the project and setting up the planned partnerships within Croatia and Europe.

2.1.2. Demographics

According to the census undertaken in 2001, Croatia has 4.437.460 inhabitants. Estimates made in 2003 indicate a **population of 4.442 million**. The proportion living in urban areas is about 59%. The birth rates in Croatia are low. The natural population increase in Croatia is negative, while net migration is positive.

Population decrease has been partly kept in check by **migration inflows**, mainly from Bosnia and Herzegovina (net positive inflows amounted to 11.921 citizens in 2003), which have now been mostly exhausted. Although attraction of highly skilled migrants would be beneficial, especially in sectors in which such workers are in demand, **no migration policy exists**. Such inflows are not likely in the foreseeable future.

The size of the population is stagnant and is likely to decline in the future. Although direct comparisons are not possible because of the changes in census methodology, estimates indicate a reduction of approximately 1.7% in relation to the 1991 census. It is estimated that **the total number of inhabitants will decline by 5.1% between 2000 and 2020** (World Bank, 2004).

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The age structure of the Croatian population is relatively unfavourable. **The population is aging, but the life expectancy is also growing**. Average ages of men and women in 2001 were 37.5 and 41.0 years, respectively, whereas life expectancy was 71.1 years for men and 78.1 years for women. Younger age groups are on average shrinking; this trend can be observed in the case of all 5-year age groups of men and women less than 45 years of age (with the exception of the age groups 25-29 and 30-34, which are even smaller than the trend would suggest). Consequently, an imminent reduction in the working age cohort due to lower birth rates and an aging population can be expected. These trends will also influence the demand for tertiary education, in that the increasing demand for education due to the labour market trends will be partly reduced due to the smaller size of younger age groups.

In **ethnic terms**, the majority of Croatian citizens (89.7%) are Croats. The only minority with a share above 1% are Serbs (4.54%). In terms of cultural identity and representation in the national parliament, one can include Italian, Hungarian, Bosnian and some other minorities. Moreover, the officially reported share of Roma (0.21%) is likely to be seriously underestimated. The main religions of Croatia are Roman Catholic 88%, Orthodox 4.4%, other Christian 0.4%, Muslim 1.3%, other and unspecified 0.9%, none 5.2%.

Current **educational achievement levels among the population 15 years and over indicate a need for improvement**. 11.9% of the population has obtained a tertiary education, whereas another 47.1% has completed secondary school. Moreover, 21.8% of the citizens have completed only primary school, while 18.6% of the population has no education at all. The less educated to a large extent pertain to senior segments of the population. However, the percentage of the total population that is both university graduates and 4-year secondary school graduates (15%) is not sufficient to meet the challenges of a knowledge-based society, especially given the low participation of working age citizens in adult education and lifelong learning (about 3%). There is the widespread perception that human knowledge and capabilities are strategic resources for future development. Knowledge and education are gradually being recognized as factors of personal achievement, corporate competitiveness and economic development as a whole. However, the practice of lifelong learning has not yet gained ground – not in terms of the perceived needs of businesses and individuals, nor in terms of the institutional preconditions for such learning.

However, there are some positive trends. **Gross enrolment rates at all education levels have been gradually improving over the past few years**. Between 1995 and 2004 enrolments rose from 33 per cent to 48 per cent at the pre-school level, from 83 to 96 at the primary level, from 75 to 88 per cent at the secondary level and from 26 to 42 per cent at the tertiary level. However, these improvements are not as rapid as in peer countries (e.g. EU new member states), and may be insufficient to ensure future sufficient competitiveness of the economy.

According to the Labour Force Survey, **activity rate of the age group 15-64** has increased from 61.6 % in 2001 to 63.5% in 2006, which is still lower than in EU countries; the education achievements of inactive population are lower than in the average population.

However, recent years have witnessed **increased enrolment in tertiary education and lifelong learning** programmes, which is likely to have positive effects on educational achievement levels, as well as on knowledge-based economy in general. However, more efforts are needed when it comes to linking education and the labour market needs. All these developments are likely to have beneficial effects on projects such as BIOCentre.

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2.1.3. Socio-cultural Elements

Croatia displays a **specific socio-cultural and political heritage** that has been shaped by a variety of influences, including historical traditions, the legacy of socialism and the experience of the post-1990 reforms and transformations (including the war and post-war reconstruction). All of them arguably still influence norms, values and practices, shaping the state of mind and practical day-to-day governance. In this section we focus on the aspects that can influence the implementation of the BIOCentre project.

Primary and secondary **education** does not contribute enough to the development of creative and entrepreneurial capacities of children and students. Educational reforms that are currently underway in Croatia (cataloguing of knowledge and skills, reforms of tertiary education in accordance with the Bologna Declaration) show that there is a political will, but that the efficiency in application of these mechanisms depends on the consistency of policies in the educational sphere, as well as on institutional capacity of the educational sector for their implementation.

One important aspect is related to the **reform of public administration**. The transition process and harmonisation of the national legislation with the EU acquis communautaire are expected to eventually bring about such reforms. However, the transparency and efficiency of public administration are still often inadequate, which can be, to some extent, ascribed to the prevailing socio-cultural norms which do not sufficiently favour proactivity and initiative within the public sector. Moreover, external (e.g. EU) pressure may play a complementary role in speeding up the implementation of specific measures and policies. Consequently, complex projects such as the BIOCentre have to be designed and implemented with utmost care and coordination in order to avoid inefficiencies.

Although it is sometimes assumed that dominant societal norms and values are not particularly supportive to entrepreneurship, the observable reality is somewhat different. When it comes to **entrepreneurial activity**, the trends are positive. According to the Global Entrepreneurship Monitor project results, in 2005 one out of every 16 working age adults was entrepreneurially active, (which amounted to a significant increase in comparison to 2002). The trend also shows a growing number of small businesses with a growth potential (i.e. those businesses that can grow significantly in terms of sales and jobs created). Both in the structure of start-up businesses (not older than 42 months) and in the structure of established businesses, there is a significant increase in number of businesses with growth potential. Regional developmental differences can be seen in the level of entrepreneurial activity. They are however decreasing. Although starting up businesses has traditionally been associated with lower educational levels (e.g. secondary school) of their founders, this has begun to change. **People with higher education are increasingly motivated to start up their entrepreneurial activity**. However, the gap between entrepreneurial activity of men and women seems to be increasing. People with lower income start their entrepreneurial activity more often than those with high income, but that is often associated with inability to find other employment; such businesses rarely display a significant growth potential.

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2.1.4. Economic Aspects

Key macroeconomic indicators and trends

When it comes to **main economic indicators**, in the last few years Croatia has been undergoing **convergence towards EU27 average levels**. However, given the low starting points, the observed levels of economic performance are in most cases well behind the EU27 average.

The analysis of indicators of macroeconomic performance shows that some macroeconomic indicators in Croatia grow faster than in the EU. In 2007 **GDP per capita** reached 57.5% of the EU-27 average. In 2007, the Croatian real GDP growth rate maintained its solid expansion with the overall growth rate reaching 5.6%, in comparison to the EU-27 average of 2.0%. The growth was predominantly based on private consumption and investments, whereas the trade deficit has expanded. In 2007, 7.2 per cent of economic output was accounted for by agriculture, 32.8 per cent by manufacturing and 60.7 per cent by the service sector.

Unemployment rate has dropped by 2 percentage points to 9.1%, but remains higher than the EU-27 average (7.1%) in 2007. This has much to do with the expansion of the SME sector and the overall growth of the employment rate in the last few years (from 53.4% in 2002 to 55.6% in 2006). Labour productivity (GDP over total employment) showed a fast convergence towards the EU-27 productivity levels, reaching 71.1% in 2007.

Strong improvements were recorded in the case of **public balance** (net borrowing/lending) as a % of GDP: here the deficit amounted to 1.6% of GDP (i.e. a notable improvement in comparison to 4.1% in 2002). The indicator of **general government debt** as a % of GDP has also improved (from 40.0% in 2002 to 37.7% in 2007). However, borrowing by individuals/households and the business sector has grown strongly in recent years; it has mainly been financed by Croatian banks which have borrowed funds from their parent companies abroad. The turbulences in world financial markets and the reduced ability of local economic actors to incur further debts has resulted in somewhat higher interest rates which may burden economic activity to some extent in the future. **External debt** grew by 12.5% in 2007.

Furthermore, improvements are particularly required in the areas of **employment creation** and **export competitiveness**. The exports of goods grew by 9.1%, but imports increased by 10.1%; the external trade deficit amounted to 9.8 billion EUR. Exports now cover only 47.9% of imports (a historical low). These deficits are somewhat compensated through surpluses generated in services (i.e. tourism). In 2007 a record level of FDI was reached - 3.63 billion EUR, which was 32.4% higher than in 2006. However, the structure is still unfavourable, as greenfield investments that can generate stronger employment and technology spillover effects are still rare.

Finally, it seems that **the observed GDP growth is still weakly related to innovation capability and export competitiveness of Croatian enterprises**. On the other hand, the conditions for further borrowing by private and public sector may be unfavourable, and inflation pressures due to global trends are likely to be present in the future. All of these factors make improvements in competitiveness crucial for future macroeconomic stability and economic growth.

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TABLE 1: COMPARABLE INDICATORS OF ECONOMIC PERFORMANCE

Indicator	National performance		EU 27 average	
	2002	2007	2002	2007
GDP per capita in PPS (EU27=100)	48.4	57.5	100*	100*
Real GDP growth rate (% change previous year)	5.6	4.5	1.2	2.0
Labour productivity per person employed (EU27=100)	61.6	71.1	100*	100*
Total employment growth (annual % change)	4.2	0.8^	0.4	1.6
Inflation rate (average annual)	2.2	5.8	2.1	2.3
Unit labour costs (growth rate)	:	:	-0.4	-0.9
Public balance (net borrowing/lending) as a % of GDP	-4.1	-1.6	-2.5	-0.9
General government debt as a % of GDP	40.0	37.7	60.3	58.7
Unemployment rate (as % of active population)	14.7	9.1	8.9	7.1
Foreign direct investment intensity	:	:	:	:
Business investment as a percentage of GDP	:	:	17.3	18.2^

Source: Eurostat - Structural Indicators and Long-term Indicators, CBS

Key: (*) EU25 average, (^) or latest available year (for example: 2005); (:) not available

Microeconomic trends

The key issue at the micro-level is the competitiveness of Croatian companies in domestic and foreign markets. Transitional restructuring of the Croatian economy has entailed **a shift from manufacturing towards services**. However, productivity growth has often been grounded in the non-investment reallocation of resources, which was facilitated by privatization. The situation at the micro-level also has profound implications for tertiary education.

The transitional restructuring of the economy has **negatively affected the technological capability** of many companies. Some industries at the medium-high technology levels have been negatively affected, and such companies have traditionally occupied crucial positions in the industrial sector (i.e. manufacturing of machinery and equipment, manufacturing of chemicals, and shipbuilding). Business activities that feature prominently within the current economic structure and display competitiveness are often characterized by **relatively low knowledge and technology levels**. That implies that the companies in such sectors mainly compete on the basis of cost, rather than in a more sustainable way – through product differentiation and higher value added. Correspondingly, the **innovation of products and processes tends to occupy a secondary role** within corporate strategy and therefore has relatively weak economic impact.

Finally, **entrepreneurial activity is insufficient**, which points to the need to stimulate the emergence and growth of small and medium sized enterprises. This may be enhanced by the removal of administrative barriers, better education, the provision of financial resources, the facilitation of clusters, cooperation with academic institutions, the attraction of export-oriented foreign direct investments, and public procurement, etc.

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Innovation performance in Croatia

Within the **European Innovation Scoreboard** framework, Croatia belongs to the group of catching up-countries (alongside Malta, Lithuania, Hungary, Greece, Portugal, Slovakia, Poland, Bulgaria, Latvia and Romania). Its Summary Innovation Index (SII) score has remained at 0.23; it has been at this level since 2004. Its performance seems to be trailing. There are no catching up effects observed, as the SII score of Croatia remains low and stable – i.e. it is not moving towards the EU average.

In the area of **knowledge creation** Croatia has had a relatively favourable position. As for **R&D expenditures**, a relatively strong position can be observed in the case of public expenditures (0.70% of GDP). The efficiency of these expenditures remains an issue, as they rarely seem to be transferred into commercially viable knowledge. Public R&D expenditures mainly support the existing academic infrastructure and costs of salaries of researchers, most of whom currently do not have sufficient capabilities to develop applicable knowledge and which have weak linkages to external actors (including the business sector). On the other hand, business R&D expenditures remain stagnant and insufficient (0.51% of GDP). It should be noted that the latter figure is still **higher than in most new member states**. Moreover, the coverage of business R&D survey undertaken by the Central Bureau of Statistics is likely to be inadequate, as it focuses too strongly on larger firms, which may be less likely to increase their R&D expenditures because of restructuring or unfavourable economic trends. There is some indicative evidence that SMEs have been increasingly investing in R&D and innovation. Aralica, Račić and Redžepagić (2007) found these effects (including knowledge transfer and increasing innovation capability) in the case of SMEs that have received foreign direct investments. This is linked to previous findings that innovation propensity of enterprises is linked to their level of integration into international flows of capital and goods - through export orientation and foreign direct investments. However, the overall picture is still quite unfavourable. According to Račić et al. (2005), a high share of innovators in Croatia do not undertake research and development at all (33.8% in the manufacturing sector and 20.8% in the service sector), and enterprises that invest into research and development have generally a low level of research and development intensity. This shows the low level of innovativeness of new products and processes, and the secondary role of innovations within business strategy.

Global Entrepreneurship Monitor (GEM), which analyses new entrepreneurial activity across countries, has demonstrated **above-average frequency of innovative start-ups** in Croatia – in comparison to other analysed countries. These high growth potential start-ups are characterised by innovation capability, export orientation and employment generation capability (CEPOR, 2006). Venture capital and private equity as means of innovation financing are underdeveloped. On the one hand, existing funds point to the insufficient number of feasible projects and to a weak interest of entrepreneurs in their services and resources (Young and Cvijanović, 2006). On the other hand, individual inventors and innovation-based SMEs point to the lack of financial resources as the key obstacle to innovation (cf. Račić et al., 2005). According to a 2007 study commissioned by Microsoft, ICT services account for 2.3% of GDP (global average is 2.5%, and the average for CEE countries is 1.7 %). The available data on applications imply lags in terms of employment in technologically advanced manufacturing and services. Employment in high-tech services accounts for 2.18% of the total workforce. This is somewhat lower than the EU27 average (3.63%). This figure is mainly explained by employment in post and telecommunications (NACE64) and, to a lesser extent, information technology including software development (NACE72); R&D services (NACE73) are much less pronounced. Exports of high technology products accounted for 6.8% of total exports. Although that is significantly below the EU27 average (16.7%), **Croatia surpasses many new and some old EU**

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member states. That performance is largely due to the **exports of pharmaceutical industry products**, which provide an exception to the low overall export competitiveness of Croatian manufacturing.

However, what is of higher concern is decreasing competitiveness of high technology exports (whose share in the year before was 10.8%). The share of employment in medium-high and high tech manufacturing is 4.87% (EU27 average is 6.63%). Croatia has a long-standing tradition, especially in medium-high technology industries such as chemicals (NACE24) and machinery (NACE29) and electrical equipment (NACE31). The transition period has had negative effects on employment in these sectors, but its share is still significant. High technology has not been developed extensively; this has not changed in the post-socialist period.

When it comes to **innovation drivers**, the key deficits are observed in the areas of S&E graduates and lifelong learning. The share of S&E graduates per 1000 population aged 20-29 (5.7%) is low. Restructuring of the economy has brought about reduction of employment opportunities in manufacturing, whereas services that can utilise the knowledge of S&E graduates have not been developed, with a possible exception in some areas of electrical engineering. Consequently, despite significant increases of the overall number of enrolled students, few of them enrol and obtain degrees in S&E courses. Furthermore, lifelong learning has only recently started receiving an increasing attention by policymakers and some employers. Participation of working age citizens in lifelong learning is still low (2.9%, whereas the EU 27 average is 9.6%). The situation with working age population with tertiary education is somewhat better. Croatia (16.2%) lags behind the EU27 average (23.0%). However, given the increased enrolment and graduation rates of the last few generations, the position should gradually improve in the coming years. On the other hand, youth education attainment level (93.8%) well surpasses EU27 level (77.8%) and is one of the highest overall. That shows potential to improve other education-related indicators in the long term.

The area of **intellectual property** remains of the most underdeveloped. In this area there is the largest gap between developed economies (both old EU members and comparison countries) and new member states and candidate countries (Croatia and Turkey). Perhaps surprisingly, when it comes to indicators related to patents Croatia surpasses most new member states, although its performance is still very weak. It is in the area of community trademarks and community industrial design that its performance is at its lowest point, indicating the lack of export competitiveness in non-generic goods and services.

There is a **lack of data on sectoral or regional aspects of innovation performance**. However, economic activity (especially its more prosperous parts) tends to be concentrated in the capital and largest regional centres, with only some coastal and/or industrialised counties providing exceptions. Therefore, it is likely that innovation performance follows a similar pattern.

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TABLE 2: INNOVATION PERFORMANCE MEASURED BY EIS INDICATORS, CROATIA, 2002 – 2006

	CROATIA	2002	2003	2004	2005	2006
	Summary Innovation Index	0,24	0,23	0,23	0,23	0,23
	rank	*29*	*31*	*31*	*33*	*33*
1	**INPUT - Innovation drivers**	**0,35**	**0,35**	**0,35**	**0,34**	**0,34**
1.1	S&E graduates	--	5,6	5,4	5,7	--
	relative to EU	--	*46*	*44*	*44*	--
1.2	Population with tertiary education	15,4	15,8	16,2	16	16,2
	relative to EU	*77*	*76*	*75*	*72*	*71*
1.3	Broadband penetration rate	--	--	--	--	--
	relative to EU	--	--	--	--	--
1.4	Participation in life-long learning	1,9	1,8	1,9	2,1	--
	relative to EU	--	*21*	*20*	*22*	--
1.5	Youth education attainment level	90,6	91	93,5	93,8	--
	relative to EU	*118*	*118*	*121*	*121*	--
2	**INPUT - Knowledge creation**	**0,29**	**0,29**	**0,30**	**0,34**	**0,34**
2.1	Public R&D expenditures	0,64	0,67	0,70	--	--
	relative to EU	*97*	*102*	*109*	--	--
2.2	Business R&D expenditures	0,47	0,44	0,51	--	--
	relative to EU	*39*	*37*	*44*	--	--
3	**INPUT - Innovation & entrepreneurship**	**n.a**	**n.a**	**n.a**	**n.a**	**n.a**
4	**OUTPUT - Applications**	**0,25**	**0,21**	**0,22**	**0,19**	**0,24**
4.1	Employment in high-tech services	2,6	2,1	2,0	2,0	2,2
	relative to EU	*76*	*64*	*61*	*62*	*67*
4.2	Exports of high technology products	9,0	9,0	9,6	8,0	6,8
	relative to EU	*47*	*48*	*52*	*42*	*41*
4.3	Sales new-to-market products			--		
	relative to EU			--		
4.4	Sales new-to-firm products			--		
	relative to EU			--		
4.5	Med-hi/high-tech manufacturing employment	4,6	4,2	4,7	3,9	4,9
	relative to EU	*64*	*61*	*69*	*59*	*73*
5	**OUTPUT - Intellectual property**	**0,02**	**0,02**	**0,02**	**0,02**	**0,01**
5.1	EPO patent	19,8	18,2	--	--	--
	relative to EU	*16*	*14*	--	--	--
5.2	USPTO patents	--	--	--	--	--
	relative to EU	--	--	--	--	--
5.3	Triad patents	--	--	--	--	--
	relative to EU	--	--	--	--	--
5.4	Community trademarks	0,2	1,1	3,4	4,5	1,6
	relative to EU	*0*	*1*	*4*	*5*	*1*
5.5	Community designs	--	11,9	4,7	0,9	1,8
	relative to EU	--	*19*	*5*	*1*	*2*

Source: Adapted from Račić, D. (2008): INNO-Policy Trend Chart - Policy Trends and Appraisal Report: Croatia 2008. Bruxelles: European Commission, Enterprise Directorate-General.

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Croatian GDP has recently been recalculated, because unofficial economy has been estimated and included in GDP calculations. This has increased the GDP by 15,8 %. The current R&D Eurostat data for Croatia are thus different from the table above and are given in the following table.

TABLE 3: PUBLIC AND PRIVATE R&D EXPENDITURES IN CROATIA (% OF GDP), 2002 – 2007

R&D expenditures in Croatia	2002	2003	2004	2005	2006	2007
Public R&D expenditures (government + HEI)	0,6	0,64	0,66	0,59	0,55	0,51
Business R&D expenditures	0,45	0,41	0,47	0,41	0,32	0,35

Source: Eurostat, Structural indicators

2.1.5. General Political Outlook

Croatia held its first free elections in 1990 and regained independence in 1991, after seceding from the former Yugoslavia by exercising its constitutional rights. However, this process was followed by an imposed war. The defence activities in some areas of the country lasted until 1995. Economic and social consequences of war are still felt in many affected areas, especially since such areas also tend to be underdeveloped.

Despite these problems, Croatia has been developing in economic, political and institutional terms. It is currently a **functioning democracy**. Since 2000, it has had several coalition governments. **The current majority has been led by the centre-right Croatian Democratic Union**, which won the last parliamentary elections in late 2007, following its first term which began in 2003. The parliamentary majority includes centre-right and liberal parties, as well as representatives of national minorities. The first year of its current term has been challenging, partly due to worsening of the global economic prospects, but the coalition remains stable. The government founded Economic Council, a new advisory body consisting of senior economists and businesspeople that advises the Government in formulating responses to the current economic challenges. In July 2009 a new Prime Minister (Ms. Jadranka Kosor) was sworn in, but the parliamentary majority has not changed.

The **local elections** have been held in May 2009, in which heads of cities, municipalities and counties will be elected directly. That has marked an important step in increased legitimacy of local authorities and may bring about less friction related to local coalition building and dissolution, which have tended to hinder local government efficiency in some cases. However, it may also contribute to frictions between local executive authorities and local representative bodies (e.g. city, municipal and county councils).

In early 2010, the voters have elected a new **President**, Dr. Ivo Josipović who is to be inaugurated in February. He has been a member of the Social Democratic Party. However, as the President-Elect he is constitutionally bound to revoke party membership.

More efforts are needed to build institutions and strengthen the rule of law, including the protection of human and civil rights. Moreover, public administration reforms are needed in order to improve transparency, administrative capacity and effectiveness, as well as to reduce costs and provide more accountability to citizens and taxpayers. Further **decentralization of administrative authority and control of fiscal revenues** must be implemented as well.

Croatia has also been **deepening its relationships with the European Union**. Croatia signed a Stability and Association Agreement in 2001 and became a candidate for EU accession in 2004. The beginning of accession negotiations has occurred on 3 October 2005. One of the characteristics of

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the Croatia's approach to negotiations has been inclusion of a wide number of external experts in the working groups for particular chapters - in addition to working group members coming from the public sector. These experts, who come from academia, business, civil society, media, trade unions etc., have contributed both to outcomes, as well to the legitimacy of the negotiation process.

When it comes to the chapters directly relevant for the BIOCentre (Chapter 20 - Enterprise and industrial policy; Chapter 25 - Science and research; Chapter 26 – Education and culture), all the EU requirements and benchmarks have been fulfilled by Croatia. All of these chapters have thus been closed. **It is currently expected that the negotiations will be finished by the end of 2010, making it possible for Croatia to join the EU by 2012**. Croatia has become a member of the NATO in 2009.

2.1.6. Innovation Policy in Croatia

Croatia is in the midst of a challenging transition from a labour-intensive economy to a knowledge-based economy. Economic performance, although strong in the past years, will not be sustainable if it remains over-dependent on private domestic consumption, fuelled by the expansion of credit, and investment concentrated in civil construction. To be sustainable and more robust to global financial shocks, an alternative growth strategy must be anchored on the development of a knowledge-based economy by fostering technological progress. With the Lisbon Agenda setting ambitious goals of making the EU "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", supportive policies for innovation and in particular R&D activities are gaining momentum. Recent World Bank estimates find that by increasing the ratio of R&D to GDP from the current 1.2 to 3 per cent, Croatia would increase its income by around 6 per cent in 2025 (8.2 per cent by 2040), the second largest contributor amongst the five Lisbon agenda targets considered (after employment).[2]

Other factors, together with low R&D intensity, also place constraint on innovation in Croatia. The private sector employs only 16 per cent of total researchers and financed 42 per cent of the total R&D expenditure in 2004, low in comparison to most EU15 countries, considering that R&D financed by the private sector is more likely to lead to commercially-relevant technological progress. Low productivity in the private sector is a result of not only low levels of private sector investments in innovation, but also of the limited linkages between the country's knowledge institutions and firms.

The Science and Technology Policy 2006-2010 for Croatia and its **corresponding Action Plan of June 2007** address these concerns. Among other things, it aims at developing the institutional framework conducive to commercialization of research and development (R&D) and to innovation by the private sector. The government established a high-level body, led by the Prime Minister, the Science and Technology Strategic Council (SVEZNATE) to oversee the implementation of S&T policies. In April 2008, the members of the National Innovation System Council (VNIS) were appointed, headed by the Ministry of Science Education and Sports (MSES) Director for Science. The Council will coordinate and monitor the implementation of the Action Plan for the S&T Policy. In addition, the following programmes are in the process of development: (a) restructuring of public RDI; (b) strengthening of technology transfer offices in local Universities; (c) revision of tax exemption for R&D investments; and (d) technology-brokers.

The role of the Croatia Science & Technology Project (STP) co-funded by a Loan from The World Bank is to catalyze the creation of a comprehensive national science and technology policy framework. The Figure below displays the position and effects of STP's components along the Croatian innovation

[2] Lejour et al. (2008). *The Economic Effects of the Lisbon Target on Croatia*. Background paper for the Croatia EU Convergence report.

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chain. Together, the components form the nucleus of the Croatian science and technology (S&T) policy. STP's most significant and durable impact has been to create a continuous stream of policy and programme capacity across the entire spectrum of the innovation chain. STP support to national innovation system policy-making ensures coherence and integration of the different STP components, as well as the realignment of other S&T programs and infrastructure outside of STP. STP increases the efficiency and market orientation of R&D institutes and universities through both "technology push" and "market pull" strategies. STP "technology push" support to the Unity through Knowledge Fund (UKF) and the Brodarski Institute, provides key inputs to domestic universities, R&D institutes and firms through international knowledge flows. STP "market pull" strategies increase the market orientation of R&D institutes and universities by supporting the restructuring of the Brodarski Institute, the establishment of new technology transfer offices at Rudjer Boskovic Institute, the University of Zagreb and the University of Rijeka, the provision of financial instruments to foster industry-university-research collaboration through IRCRO programme and the creation of supportive environments for technology commercialization through TEHCRO programme. STP's role is also to increase demand for innovation by leveraging private sector investments through RAZUM and VENCRO programmes.

The Ministry of Science, Education and Sports (MSES) is the central government institution responsible for implementing, coordinating and monitoring the science, innovation and technology activities. It is in charge of allocation of the budgetary funds for R&D activities in public institutes and higher education institutions, as well as allocation of budgetary funds for technology programs and related activities (including science-industry cooperation and commercialisation of research results).

In 2006 the Croatian Government passed the Guidelines to the Programme for Supporting Innovative and Technology-based Entrepreneurship implemented by two specialised agencies. The first one is the **Business Innovation Centre of Croatia (BICRO)**, an innovation and investment company established in 1998 in order to provide financial and other support to innovation and technology based businesses in Croatia. The second agency is the **Croatian Institute of Technology (HIT)**, founded in 2006 in order to create pre-conditions for accelerated application of new knowledge and technologies, by providing services, expertise and project funding. HIT is also in charge of developing the national technology foresight platform and business intelligence system.

The Ministry of Economy, Labour and Entrepreneurship (MELE) is the central government institution in charge of implementing enterprise policy. The SME Directorate within the Ministry implements measures and activities for the development of entrepreneurship through promotion, education of entrepreneurs, technical assistance, local financing, institutional capacity building and commercialisation of innovations. It also encourages clustering and networking of entrepreneurs, implements measures for the development of SMEs and co-operatives, improves entrepreneurial and managerial skills, undertakes the harmonisation of legal framework with EU regulations and implements measures for international co-operation and export and investment promotion. **HAMAG** (Croatian Small Business Agency) provides support and implements measures from the 2008 - 2012 Development Programme for Small and Medium-Sized Enterprises, focusing on financial incentives schemes and business advisory services through a network of certified consultants.

Although they partially cover similar grounds, the two ministries operate quite independently. In addition to the MELE and MSES and their affiliated agencies there is a range of other public or private institutions that are in charge of SMEs and entrepreneurship development. The key ones are mentioned below. **Croatian Chamber of Economy (CCE)** and **Croatian Employers Association (CEA)** are two leading organisations representing employers. The former one is more traditional, with a compulsory membership and stronger linkages to the government, whereas the latter is voluntary, smaller and more flexible. Both of them have an important role in the entrepreneurial policy arena,

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but are arguably not sufficiently active in promoting innovation. CCE has excelled in information dissemination related to EU accession, whereas CCE has initiated the establishment of the National Cluster Centre.

2.2. Specific issues related to the BIOCentre

2.2.1. Sources of Financing

The financing of the BIOCentre's initial investment can be divided into the following parts:

TABLE 4: SOURCES OF FINANCING

Item	Source of finance	Sum (in EUR)	Type of finance
LAND*	**MSES/BICRO**	0	grant
START UP COSTS	**BICRO and WB** (design)	524.874,00	loan
	The City of Zagreb (public fees and utilities)	1.027.187,00	grant
	BICRO (other services)	340.780,00	grant
	BICRO and The City of ZGB (other costs)	554.744,00	grant
MARKETING ACTIVITIES AND TECHNICAL ASSISTANCE	**IPA**	634.678,00	grant
CONSTRUCTION	**IPA**	8.905.897,00	grant
EQUIPMENT	**IPA**	4.867.657,00	grant
SUPERVISION	**IPA** (supervision during construction)	890.589,00	grant
	IPA (supervision for equipment)	187.000,00	grant
TOTAL		**17.933.406,00**	

**The land is provided free of charge by the Republic of Croatia, which is giving it away for the purpose of building the BIOCentre.*

Since the operational income of the project is to be lower than operational expenditures, an additional financial contribution will be needed in these first years to ensure the liquidity of the Centre. It is planned that **50% of the operational financing gap** is going to be **covered through sub-financing in the Technology Infrastructure Development Programme (TEHCRO)** implemented by BICRO, whereas **50 % of operational costs** should be covered by the **City of Zagreb (Confirm by City budget 2010)**. Bicro and the City of Zagreb also need to ensure that **new office and laboratory equipment is purchased upon its depreciation**, in accordance with the project plan.

These commitments are to be supported by the **Memorandum of Understanding** between BICRO, the University of Zagreb and the City of Zagreb, as well through the **Articles of Association of the BIOCentre** which will stipulate all the commitments and entitlements of the project partners. Please see "Letter of Intent" attached as Annex IV in the Major Project Application.

2.2.2. Financial Coverage on the Part of Aforementioned Sources

The aforementioned sources are expected to cover 100% of the start-up costs, 100% of the investment costs and 100% of the operational financing gap that can be expected on the basis of financial analysis.

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2.2.3. Administrative and Procedural Obligations and Decision-making Authorities for the Project

The project is subject to a variety of decisions and procedural obligations, as follows:

- The **plot of land** has been granted by the **Republic of Croatia (by way of MSES)** to BICRO, as the beneficiary, free of charge for the purpose of building the BIOCentre. Please see Annex VIII in the Major Project Application "Agreement for disposal of location for construction of BIOCentre within IPA IIIc", issued by the Ministry of Science, Education and Sports.

- In order to define urban planning parameters for the aforementioned plot of land, an **Urban-Architectural Programme** (UAP) had to be prepared and validated by the City Council in Zagreb. BICRO initiated and contracted preparation of the UAP in spring 2008; the UAP was validated by the **City council** in May 2008.

- The UAP was adopted as a part of the **general strategy for the new University campus** by the **Board for the Planning and Construction of the University Campus** at Borongaj, consisting of University and Ministry officials.

- A **preliminary design** for the building was chosen/awarded following a **public bid**.

- The **detailed architectural and engineering designs** for the building are financed through the **Science and Technology Project** (through **BICRO) by the World Bank** (BICRO-CONS-05). The services contract includes conceptual design (site plan, floor plan etc.), basic engineering (building construction design etc.) and detailed implementation design (architectural design, electrical design etc.), accompanied by technical projects and bills of quantities for works and supplies (equipment). Please see Annex IX in the Major Project Application.

- The project has been adopted within the **Regional Competitiveness Operational Programme** of the Instrument for Pre-accession Assistance for Croatia (Priority Axis 2, Measure 2.2, Operation 2.2.2).

- **BICRO** and the **City of Zagreb** are assuming **responsibility for covering operational financing gap and new equipment purchase.** This is done through Memorandum of Understanding and Articles of Association of the BIOCentre (please see under 2.2.2).

- In order to obtain EU funding, **Major Project Application** needs to be submitted to and validated by the **European Commission**.

- **Location permit** was issued by the **City of Zagreb** (City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport).

- **Building permit** is to be issued by the **City of Zagreb** (City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport).

- **The contracts for construction and supervision** are subject to **public tender**.

- **Operational (use) permit** is to be issued by the **City of Zagreb** (City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport).

- **The contracts for equipment** are subject to **public tender**.

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2.2.4. Expected Times for Licenses / Permits

The expected times for licenses and permits are given in the project timeline. They are as follows:

- BIOCentre is to be **registered** by the Commercial court in Zagreb – expected by the 1Q of 2010.
- **Building permit** is to be issued by the Zagreb City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport – expected by July 2010.
- **Operational (use) permit** is to be issued by the Zagreb City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport – expected by December 2012

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3. Supply of and the Demand for Project Outputs

3.1. Potential Demand Expectations

3.1.1. Current and Future Trends in Demand

The biotechnology industry is considered to be one of the most promising and prospective industries today. In 2005, the **global biotechnology market** grew by 12.2 per cent to an estimated $126.3 billion and is forecast to reach $226.1 billion by 2010. Between 2001 and 2005, there was a compound annual growth rate (CAGR) of 12.8 per cent. Revenues generated from the development and sales of medical sector products accounted for $77.7 billion or 61.5 per cent of the 2005 global market's value. The agriculture and food segments were also significant with 2005 revenues of $15.4 billion. Some estimates suggest that by the end of the decade, global markets, including sectors where life sciences and biotechnology constitute, a major portion of new technology applied could amount to over EUR 2000 billion, i.e. ten times more than the biotechnology itself. The biotechnology industry is now a significant contributor to many national economies. For example, the current market capitalization of the biotechnology industry (public companies) is valued at $408 billion ("Beyond Borders: Ernst & Young Global Biotechnology Report"). In terms of revenue, in 2008, the biotechnology industry (705 public companies) had recorded US$89,7 billion. The US biotechnology industry reached aggregate profitability for the first time. To reap the benefits, many **nations are aggressively building bioscience and biotechnology infrastructure** with time horizons of 5 – 10-years. Notable examples of these visionary programs are Singapore, Taiwan, China, India, New Zealand & Australia.

The **European biotechnology industry** directly employs over 96.500 people, mostly in SMEs. Employment in industries that use biotechnology products is many times higher. The industry is highly research intensive, with 44% of its employees involved in R&D activities. In 2004, the 2163 dedicated biotechnology companies spent €7.6 billion on R&D. The EU accounted for 34.8% of biotechnology patents filed at the European Patent Office in 2002-2004, compared to 41.1% for the US.

Due to the advancement of molecular biology, intensive investments in research and development, and effectiveness of innovation and technology transfer, biotechnology has become **one of the fastest growing and potentially most profitable industries** in the world today. Today, on the global market, the proportion of biotechnology drugs is close to 20%; it is expected that in less than a decade this will reach up to 50 %. This potential has been recognised by the **industry** (which invests significant resources into biotechnology development), as well as by **policy makers**. Although its roots are in the United States, countries all over the world have realised the importance of biotechnology. Biotechnology development is therefore one of the crucial science and innovation policy goals in the European Union as well.

Biotechnology has the potential not only to become rather profitable industry in itself, but also **a platform for technology advancement that can facilitate transformation and increase productivity of various other 'traditional' industries** (somewhat similar to the way that ICT has been transforming other industries). These broad applications of biotechnology can thus have strong effects on economic development and growth, as well as on the quality of life - which also makes them

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legitimate economic policy goals. However, given the limited experience in biotechnology development, policymakers should also implement stimulating measures in a cost-effective way.

Experts predict that in coming years there will be increased investment in all sectors of the biotechnology industry including:

- Healthcare – the diagnosis and treatment of illness and disease.
- Wellness – particularly the understanding and application of how natural active ingredients of plants and herbs affect the health of humans.
- Food – particularly the broader acceptance and utilization of genetically modified (GM) crops for food production and the use of GM plants for production of enzymes and therapeutic proteins.
- Energy – particularly the conversion of organic waste into fuel sources.
- Environment – particularly the treatment of waste and toxic chemicals with the potential to generate useful materials there from.

Biotech start-ups rarely have at their disposal their own R&D infrastructure, because it is irrational to make such investments in the early stages of business development given the extreme high costs and high risks for the young company. Additionally, building of such infrastructure facilities as a green-field investment requires 2 to 3 years, and this shortens the patent life of the invention and consequently the economic effect of market exploitation of the product. **Infrastructure facilities must be readily available and are generally built as part of government initiatives to provide support to knowledge-based entrepreneurship and development of new technologies, providing the access to specialized technical infrastructure and capital** for enduring the time-consuming and risky process of taking a product to the market.

The development of this industry sector in the recent decades and its impact on the global economic development underlines also its importance for Croatia. As opposed to the global and European markets, **the Croatian biotechnology market is rather underdeveloped**. Despite the know-how and some limited experiences (please see below), **the environment has not provided supporting conditions** that would enable foundation and development of a population of biotechnology start-ups. In other words, since such an industry is extremely unlikely to develop without a policy intervention that can provide such conditions, the BIOCentre is being set up to **strengthen the value chain** and enable biotechnology projects to prosper. The future trends and the market potential for the BIOCentre project can only be envisaged on the basis of experiences of other countries. The demand forecasts outlined in this chapter are based on relatively conservative estimates of future trends.

3.1.2. Evolution of a biotechnology company and the product development continuum

To provide direct context to the positioning of the BIOCentre, a review of the types of biotechnology companies, their products/services, the governing regulatory framework and their relative routes to profitability would be useful.

The main categories of biotechnology companies are:

a) Those that develop and commercialise biopharmaceuticals for the treatment of human or animal diseases.

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b) Those that develop medical devices for the diagnosis and/or treatment of disease.

c) Those that develop kits for the diagnosis of disease.

d) Those that carry out discovery R&D. This is carried out either as a contract service, or as an independent operation that then sells/licences the results to other companies for onwards development, or may co-develop with another company.

e) Those that develop and sell R&D reagents & kits.

f) Those that develop devices for R&D applications.

g) Those that provide contract R&D, manufacturing and/ or testing/screening services.

h) Those that develop and commercialise products and processes in business sectors other than health (i.e. agriculture, food, energy, industrial processes).

The highest profit margins can be reached by the companies in category (a). However, the regulatory requirements are strict and the development path is long and expensive, and thus the risk of failure is also high. A typical cycle of development for a biopharmaceutical is shown in Figure 3; this cycle can take between 7 – 10 years and cost more than €100 million.

The companies in categories (b) & (c) can take a faster regulatory acceptance path through CE marking (Europe) and 510K (US). The speed and cost to bring a product to market are favourable, however, the ultimate profit margins are lower.

The success of companies in categories (d), (e) and(f) depends on quality, price and technological competitiveness. Normally they do not have regulatory compliance issues to deal with, although they may adopt ISO standards. Such companies are straightforward to set up; if they are efficient, they can rapidly generate revenue and become profitable. However, the profit margins can be low, unless specific more profitable niches can be exploited.

The companies in category (g) vary in their regulatory burden depending upon the services that they offer to clients. There are multiple variations on these service providers. However, if they provide more complex or high volume services, they tend to be capital intensive, as they require costly infrastructure.

The companies in category (h) can achieve high profit margins, tend to be capital intensive, whereas their regulatory burden varies according to the business sector they belong to.

It is expected that BIOCentre will often serve companies that develop biopharmaceuticals (category (a)). These companies will need the Central Laboratory Unit to develop their products. Other types of companies may also be accommodated in accordance with the selection criteria of the BIOCentre. The typical research and development cycle for a biopharmaceutical product is shown in Figure 3, and the typical life cycle of a company from start-up in category (a) is shown in Figure 4. Many aspects of the research phase of years 0 – 3 are common to all biotechnology companies. In the case of biopharmaceuticals, after that initial phase increased technological complexity and regulatory requirements create specific costs over a prolonged period of time. Following a successful pre-clinical development and clinical trials, a biopharmaceutical can be registered and marketed.

FIGURE 3: TYPICAL DEVELOPMENT CYCLE FOR A BIOPHARMACEUTICAL PRODUCT

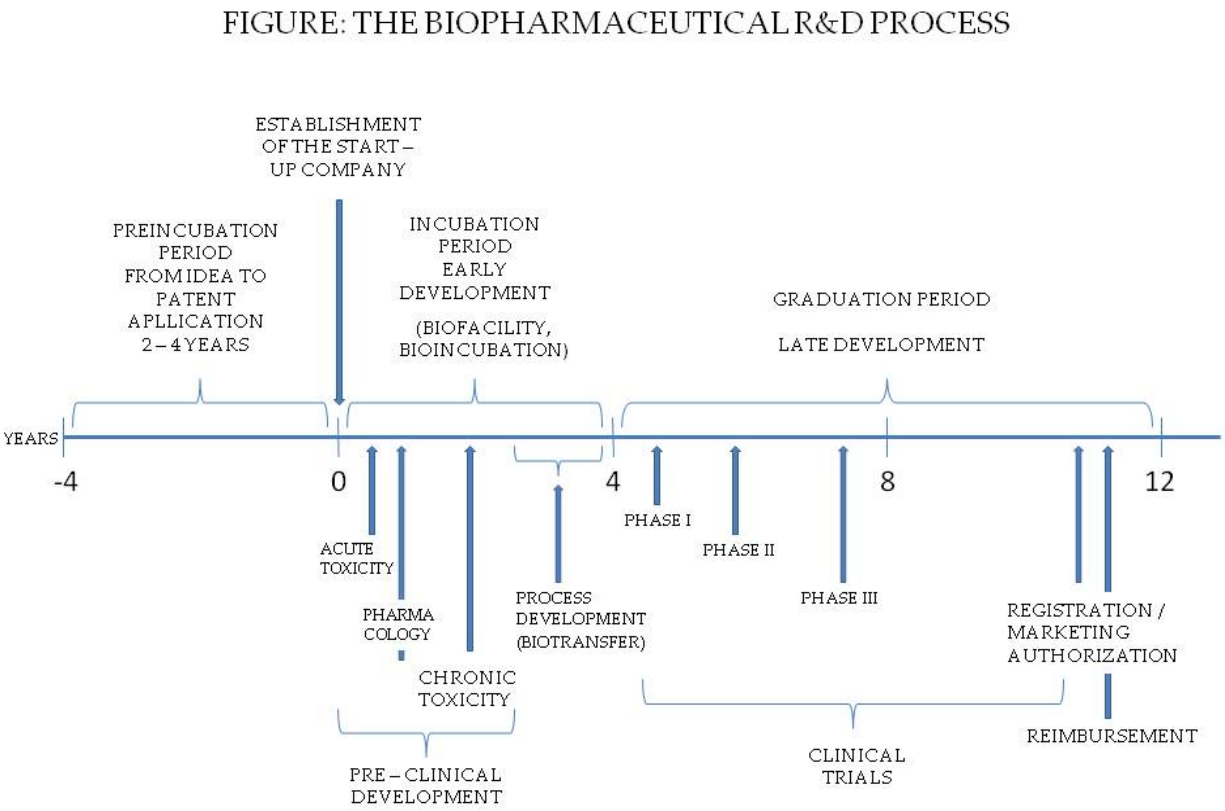
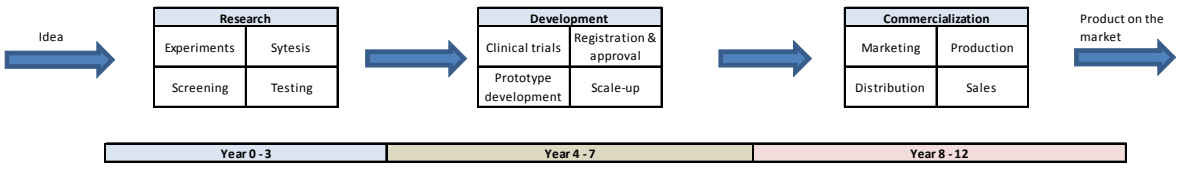


FIGURE 4: TYPICAL LIFE CYCLE OF A START UP BIOTECHNOLOGY COMPANY INTENDING TO DEVELOP AND COMMERCIALISE A BIOPHARMACEUTICAL PRODUCT

The Life Cycle of Biotechnology Start-up



	Research	Development	Commercialization
Financing	€ 2 - 5 Million	€ 20 - 50 Million	€ 80+ Million
Sources	Seed and venture capital	Strategic alliances / IPO / Follow on Rounds	Secondary sources / Product sales
Space requirements	R&D Labs	Office space / Pilot plant facility	Production facility

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3.1.3. Life sciences potential in Croatia

The rationale for the establishment of the BIOCentre is mainly determined by the **capability and potential of the scientific community to provide R&D results with a commercial potential**. For this purpose in this chapter the following parameters are examined:

a) R&D / Scientific base

b) Small biotechnology companies operating in Croatia

c) The Industrial base – with a view to application markets

A more in depth look at the R&D statistics, research groups studying life sciences and biotechnology, scientific projects, identification of the most advanced research areas and identification of the R&D projects with commercial potential and initiatives that are closest to commercialisation, can be found in the Appendix II.

3.1.3.1. Historical perspective

Croatia traditionally has internationally recognized expertise, both in higher education services and scientific research, as well as in industry applications in life sciences and biotechnology, dating back to early 1960s. The country has a long tradition of successful research in healthcare, chemistry and biotechnology engineering. It was also **among the first in Europe to establish undergraduate and graduate programmes in biotechnology** and today educates more than 15.000 undergraduates annually through 4-, 5- and 6-year life sciences programmes at the four largest universities in Croatia[3].

Over the years, Croatia has nurtured exceptionally talented individuals in life sciences although many came to live abroad to pursue a career in science, from Nobel prize winning chemists **Lavoslav Ružička** (1939) and **Vladimir Prelog** (1975), **Andrija Štampar** (epidemiologist and one of the founders of the World Health Organisation), **Mladen Vranić** (distinguished researcher and educator in medical sciences and global leader in diabetes research), to **Miroslav Radman** (a leading figure in molecular genetics studying evolution in progress and aging and repair mechanisms), **Ivan Đikić** (one of the leading tumor biologists in the world, studying signalling pathways causing malignancies), **Igor Štagljar** (distinguished molecular biologist recognized for his advancements in proteomics which have paved the way for the research of grave genetic diseases, particularly cystic fibrosis), **Goran Šimić** (world's best neuropathologist in 2008[4]), to **Nenad Ban** (molecular biologist who spearheaded the X-ray crystallographic structure determination of the large ribosomal subunit for which his mentor Thomas Steitz was awarded the Nobel Prize for Physics in 2009[5]).

The Ruđer Bošković Institute (IRB), founded in 1950, in Zagreb is the largest Croatian research centre for basic and applied sciences[6]. The multidisciplinary character of the Institute is reflected through the different research fields in physics, chemistry, oceanography (including marine and environmental

[3] University of Zagreb, Split, Rijeka and Osijek

[4] The "Kurt Jellinger Prize" is awarded by one of the world's leading magazines specialising in neuropathology, "Acta Neuropathologica."

[5] Based on this discovery the largest biotech start-up company Rib-X was established in the US in 2000 and has been operating successfully ever since.

[6] The academic staff of the IRB includes 513 persons, including 296 researchers, 189 Ph.D. students and 28 postdoctoral fellows.

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research and geosciences), biology, biomedicine, computer science and electronics/engineering. 4 of its 12 divisions are dedicated to life sciences.

The **Institute of Immunology**, based in Zagreb, has been a world renowned institution for production of human vaccines since 1893, and is famous for pioneer production of small-pox vaccine and human interferon alpha. Today it is one of the largest regional producers of blood and plasma products, as well as viral and bacterial vaccines.

The Croatian pharmaceutical giant **PLIVA**, since its early days under the Nobel Prize winner professor Vladimir Prelog, has been developing innovative pharmaceuticals for global markets. In the 1930s, the company became one of the first global sulphonamide producers, and went on to patent the groundbreaking macrolide antibiotic azithromycin in 1980[7]. The company has developed significant therapeutic expertise in the areas of antibiotics, oncology, psychiatry, cardiology and allergy, drawing mostly from high quality research and knowledge of Croatian chemists, biologists and biotechnologists. In 1996, Pliva became the first manufacturing company from Central and Eastern Europe whose shares have been listed on the London Stock Exchange. Based on the success of Sumamed, PLIVA expanded its international operations through acquisitions and then moved strongly towards the generics markets. In 2006 PLIVA was acquired by Barr, which was in turn in 2008 acquired by Teva. These processes lead to selling of some Western European business units (Spain and Italy) and cost restructuring. On the other hand, **GlaxoSmithKline** and **Hospira** acquired some of its units (please see below).

3.1.3.2. R&D / Scientific base

Research and development in Croatia is mainly concentrated in the public sector, i.e. academic institutions and public R&D institutes. Public institutes conduct all types of activities, from continuous research activities to contract research projects. **160 public research organisations (PROs)** constitute the national scientific and high education system in Croatia, including faculties as separate organisational and legal entities of the Croatian universities, public and private institutes, university departments, academies[8]. There are **7 public universities** in Croatia (Zagreb, Rijeka, Split, Osijek, Zadar, Dubrovnik, Pula), with the University of Zagreb being the largest.

In the period from the mid-1990s up to 2004, R&D investments as a % of GDP constantly grew, totalling 1.24% in 2004. In the period 2005-2007, the share of GERD as a % of GDP has declined, amounting to 0.86% in 2007. This was due to the fact that GDP growth in that period was relatively strong but largely unrelated to R&D (the sectors such as real estate, tourism and retail played a more significant role), as well as to the inclusion of grey economy into the calculation of GDP. Croatian business expenditure on R&D (BERD) shows an increasing trend of investments measured in absolute terms. In 2002 the business sector invested €115 million and €145.5 million in 2007.

According to the classification of the National Institute for Statistics there are 3 scientific fields that can be subsumed as life sciences & biotechnology (= biosciences) in the broad sense and that therefore have been taken into account for the evaluation. These are: Natural sciences, Biomedicine & Health, and Biotechnical sciences. The share of GERD in the sectors of life sciences and biotechnology have grown to more than 45% of total in the same period (as shown in Table 5).

At the same time, the share of GERD in the sectors of life sciences and biotechnology (=biosciences) have grown to more than 45% of total (as shown in Table 5).

[7] Azithromycin, which was further developed in strategic partnership with Pfizer as, is also known as Zithromax and/or Sumamed and is a bestselling antibiotic in its class.
[8] Also university Centres, student centres, libraries, are included in this system

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TABLE 5: GROSS DOMESTIC EXPENDITURE FOR R&D AS PER ALL SECTORS AND FOR THE SECTOR OF BIOSCIENCES

GERD / in thousands	Year		
	2005	2006	2007
TOTAL - All sectors	**2.311.712**	**2.179.160**	**2.553.530**
BIOSCIENCES Total	***985.854***	***943.718***	***1.153.268***
Natural Sciences	555.534	468.578	683.063
Biomedicine & Health	177.355	190.915	205.340
Biotechnical sciences	219.609	247.251	232.252
Business Sector	**953.523**	**799.891**	**1.037.832**
BIOSCIENCES Total	***324.196***	***273.717***	***415.916***
Natural Sciences	219.922	142.161	308.806
Biomedicine & Health	31.010	37.610	40.099
Biotechnical sciences	73.264	93.946	67.011
Public Sector	**555.341**	**577.682**	**650.960**
BIOSCIENCES Total	***348.923***	***355.490***	***391.542***
Natural Sciences	253.546	256.287	289.208
Biomedicine & Health	51.816	53.462	54.951
Biotechnical sciences	43.561	45.741	47.383
Non-profit Sector	**2.968**	**3.107**	**3.249**
BIOSCIENCES Total	***400***	***0***	***0***
Biomedicine & Health	400	0	0
Higher Education Sector	**799.880**	**798.480**	**861.489**
BIOSCIENCES Total	***312.335***	***314.511***	***345.810***
Natural Sciences	82.066	70.130	85.049
Biomedicine & Health	94.129	99.843	110.290
Biotechnical sciences	136.140	144.538	150.471
% of Biosciences in Total	**42,65%**	**43,31%**	**45,16%**

Looking more closely at the statistical data, half of the entire R&D community (which comprises about 10.000 FTE researchers) in Croatia is dedicated to life sciences and biotechnology. Their output is close to 10,000 published papers and 25,5 registered patents[9] per annum. The life sciences and biotechnology R&D community in Croatia has several unique features: 34% of its 77 research units are located in academia, with 37% in industry and 29% in government sector. The academic research units tend to be small on average (around 4 students to a laboratory head) and could benefit from linking into larger units, while industry groups are much larger. The academic research units however collaborate strongly with foreign partners (29% in Europe, 13% in US and Canada, 12% elsewhere). Furthermore, 54% of all scientists engaged in life sciences and biotechnology hold a PhD.

[9] Both domestic and PCT

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TABLE 6: NUMBER OF RESEARCHERS EMPLOYED FULL OR PART-TIME IN BIOSCIENCES, 2005 – 2007

	2005	2006	2007
TOTAL - All sectors	**8.629**	**8.884**	**9.755**
BIOSCIENCES Total	***4.286***	***4.263***	***4.672***
Natural sciences	1.288	1.247	1.468
Biomedicine and Health Care	2.189	2.233	2.360
Biotechnical sciences	809	783	844
Business Sector	**879**	**862**	**1.001**
BIOSCIENCES Total	***254***	***218***	***330***
Natural sciences	113	112	210
Biomedicine and Health Care	37	38	45
Biotechnical sciences	104	68	75
Public Sector	**2.209**	**2.230**	**2.287**
BIOSCIENCES Total	***1.681***	***1.688***	***1.715***
Natural sciences	685	673	685
Biomedicine and Health Care	879	892	910
Biotechnical sciences	117	123	120
Non-profit Sector	**9**	**3**	**N/A**
BIOSCIENCES Total	***6***	***0***	***N/A***
Biomedicine and Health Care	6	0	N/A
Higher Education	**5.532**	**5.789**	**6.467**
BIOSCIENCES Total	***2.345***	***2.357***	***2.627***
Natural sciences	490	462	573
Biomedicine and Health Care	1.267	1.303	1.405
Biotechnical sciences	588	592	649
% of Biosciences in all sectors	***49,67%***	***47,99%***	***47,89%***

Scientific research in the public sector is supported by government grants (directly from the Ministry of Science, Education and Sports, MSES) for basic and applied research. The following table shows the volume of projects supported between 2006 – 2009 in the relevant fields of life sciences and biotechnology, carried out at the 4 largest universities in Croatia and the largest R&D institute dedicated wholly to natural sciences, biomedicine and health - the Rudjer Boskovic Institute (IRB) in Zagreb. The value of these projects is estimated at around 24 million Euros, and these 868 projects account for 46% all R&D projects funded by the MSES.

TABLE 7: NUMBER OF RESEARCH PROJECTS (BASIC AND APPLIED RESEARCH) SUPPORTED BY THE MSES IN LIFE SCIENCES AND BIOTECHNOLOGY, 2006 – 2009

Research projects in the biotechnology sector, yrs 2006 - 2009	Natural sciences	Biomedicine and Health	Biotechnical Science	Total
Institute Rudjer Boskovic, Zagreb	100	29	2	131
University of Zagreb	139	256	163	558
University of Split	20	32	2	54
University of Rijeka	0	79	0	79
University of Osijek	4	29	13	46
TOTAL	**263**	**425**	**180**	**868**

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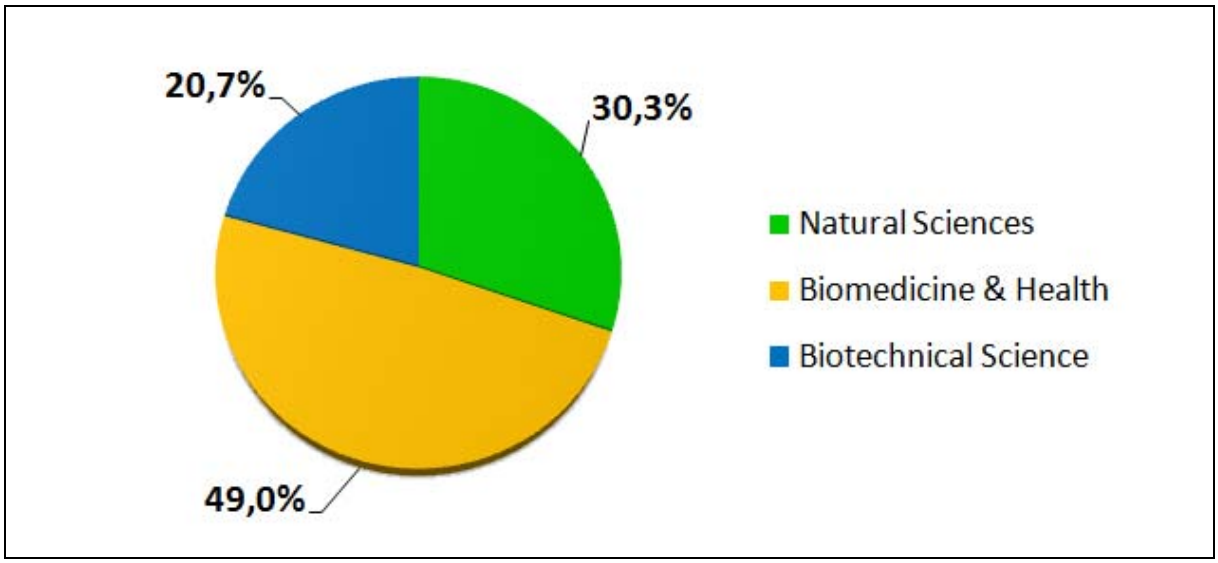
This table includes only official MSES data on R&D projects. There are a number of other funds available for supporting R&D (Unity Through Knowledge Fund, National Science Foundation etc.). Life sciences and biotechnology top the list of R&D projects in most funding programmes.

The distribution of R&D projects shows that almost half of them are dedicated to biomedicine and health, around 30% are exploring various phenomena in natural sciences and close to 21 % are dedicated to problem-solving biotechnical science.

FIGURE 5: DISTRIBUTION OF SCIENTIFIC PROJECTS IN VARIOUS FIELDS OF LIFE SCIENCES, 2006 - 2009



The following overview gives us the most relevant scientific and higher education institutions related to life sciences and biotechnology in Croatia today. Detailed description and evaluation of the potential for applied and developmental research relevant to BIOCentre for each of these institutions can be found in the Appendix II.

University of Zagreb

- Faculty of Science, Department of Natural Science
- Faculty of Chemical Engineering and Technology
- Faculty of Medicine / Medical School
- Faculty of Pharmacy and Biochemistry
- Faculty of Stomatology / School of Dental Medicine
- Faculty of Veterinary Medicine
- Faculty of Food Technology and Biotechnology
- Faculty of Agriculture
- Faculty of Forestry

University of Rijeka

- Medical Faculty Rijeka

University of Split

- Medical Faculty Split
- Faculty of Chemical Engineering and Technology
- Faculty of Natural sciences, Mathematics and Education

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University of Osijek
- Faculty of Food Technology
- Faculty of Medicine / Medical School
- Faculty for Agriculture

Ruđer Bošković Institute in Zagreb (IRB)
- Division of Molecular Medicine
- Division of Materials Chemistry
- Division of Molecular Medicine
- Division of Organic Chemistry and Biochemistry

The Croatian Institute for Brain Research in Zagreb (CIBR)

Institute for Medical Research and Occupational Health in Zagreb

Mediterranean Institute for Life Sciences (MedIls), Split

The majority of research and development takes place at the institutes and universities located in and around **Zagreb and Split**, with **Rijeka** emerging as the third node[10]. The regional distribution of university departments and R&D divisions shows that 13 of them (**62%) are located in Zagreb**. These include faculties of the University of Zagreb and the Ruđer Bošković Institute. 3 (24%) of the institutions are located in Split and are concentrated at the University of Split, 2 in Osijek and 1 in Rijeka.

The Croatian Scientific Bibliography allows us to gain insight into the outputs of the Croatian scientific community involved in life sciences and biotechnology research.

[10] New university department of biotechnology (which offers offering courses in biotechnology and drug discovery) has just been established. A science park with dedicated biotech laboratories and Centre for Genomics and Proteomics is under construction. Headquarters of a major Croatian pharmaceutical company Jadran Galenski Laboratorij are also situated there.

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TABLE 8: COLLECTIVE STATISTICAL DATA AND OUTPUTS OF RESEARCH WORKS CARRIED OUT IN THE FIELDS OF: NATURAL SCIENCES, BIOMEDICINE AND HEALTH, AND BIOTECHNICAL SCIENCES, 2000 – 2008

YEARS	2000	2001	2002	2003	2004	2005	2006	2007	≥2008*
Author's Books	32	43	49	64	63	63	45	50	35
Editors' Books	17	19	26	34	33	25	2	30	22
Chapters in books	275	212	285	502	487	309	172	626	169
Tekstbooks and Scripts	60	54	88	118	149	82	84	101	49
Original scientific & reviewed works in CC magazines	838	904	1083	1259	1346	1476	1515	1633	1390
Works accepted for publishing in CC magazines	0	0	0	0	0	0	0	1	78
Other works in CC magazines	74	93	187	199	214	269	172	115	51
Scientific works in other magazines	595	634	733	816	981	957	880	850	486
Other works in other magazines	413	378	574	593	625	619	529	638	341
Congress releases (briefs) in CC magazines	23	24	38	18	26	71	112	267	138
Congress releases (briefs) in other magazines	6	9	10	25	27	19	50	335	198
Works in process of publishing	0	1	0	0	43	122	147	122	641
Plenaries	5	10	19	50	29	47	44	70	56
Published lectures on meetings	108	75	89	136	132	103	76	87	67
Scientific works in conference procedings with reviews	205	238	304	382	422	368	377	41	292
Other works in conference procedings with reviews	199	143	134	224	280	306	217	266	164
Works in conference procedings without reviews	75	71	94	143	135	142	91	65	79
Extracts in conference procedings	1639	1368	1866	2527	2481	2586	2476	2293	1606
Unpublished participation on congresses	77	76	173	226	290	346	298	292	253
Dissertations	107	93	137	176	132	181	189	181	111
Master thesis	138	128	169	208	213	205	125	82	63
Gradute thesis	415	305	645	619	746	745	776	647	472
Other types of works	220	152	301	389	399	444	262	292	160
Patents	33	10	28	39	34	13	25	22	9

*Incomplete data

3.1.3.3. Small biotechnology companies in Croatia

Small businesses are an important and most dynamic segment of Croatian economy. Their share of the total number of companies in Croatia is 99.5% and they account for some 66.3% of the total number of employed persons in Croatia. They are one of the most important impetuses of overall economic development which stimulates private ownership and entrepreneurship, employment growth and significantly contributes to an increase of production and exports.

The current number of companies listed in the Croatian Biotech database[11] is as follows:

[11] This database was created by Venture Valuation AG, Zurich/Switzerland. This organisation has two main business focuses: 1) assessment, valuation and monitoring of high-growth companies, where they provide independent, third party valuation reports for investors as well as for companies; 2) it specializes in the development and running of internet based database applications such as Biotechgate and several databases each specialized in Biotechnology/Life Sciences companies.

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TABLE 9: NUMBER OF COMPANIES LISTED IN THE CROATIAN BIOTECH DATABASE

TOTAL, by sector	**35**
Biotechnology – Therapeutics	2
Pharma	6
Medical technology	1
Professional services and consulting	2
Public / Non-profit organisations	21
Supplier and engineering	2

The **number of small biotechnology companies in Croatia is currently low** (Table 9), which is understandable due to a **lack of appropriate infrastructure** which would provide the necessary facilities and environment for these companies to develop and grow. Nonetheless, **out of the eight current biotechnology start-ups in Croatia, BICRO is financing and supporting development of four** (Chirallica Ltd., Genera Research Ltd., Molecule Ltd. and Gentius Ltd.) through its innovation commercialisation programmes RAZUM and IRCRO. One company (Biozyne Ltd.) managed to attract venture capital funds (Horizonte Venture Management) for their start-up phase.

TABLE 10: CURRENT NUMBER OF BIOTECH START-UPS IN ZAGREB, CROATIA

TOTAL	**8**
BIOZYNE Ltd. (Zagreb) *Based around a new sulfonylcytosine derivative with anticancer activity; protected under the European patent 0 877 022 B1). At the stage of preclinical evaluation*	
CHIRALLICA Ltd. (Zagreb) *Core business is production of chiral stationary phases, custom separation and synthesis of optically pure compounds (US patent 6,437,167 B1)*	
GENERA RESEARCH Ltd. (Zagreb) *New methods for bone regeneration; development of a homologous (autologous) osteogenic medical device for clinical testing; patent pending*	
MOLECULE Ltd. (Zagreb) *New start-up (registration pending) involved in research & development of new chemotherapeutics*	
RUDJER MEDIKOL DIAGNOSTICS Ltd. (Zagreb) *New methods for cancer testing of genetically inherited breast and ovarian cancer; non-invasive, based on imaging*	
RUDJER MEDIKOL CYCLOTRON Ltd. (Zagreb) *Production of radionuclides for cancer diagnostics and R&D of new radionuclides and R&D connected to the cyclotron device in general*	
GENOS Ltd. (Zagreb, Osijek) *R&D of new methods for DNA analysis with application in human and animal forensics, and molecular diagnostics*	
GENTIUS Ltd. (Zadar) *Development of new multiple bead array platforms (isoelectric particles) for application in diagnostics*	

Furthermore, **GENERA Inc.,** located in Zagreb, manages a group of 7 bioscience dedicated companies with 250 plus employees, engaged in R&D, manufacturing and distribution of animal health care

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products, chemo pharmaceuticals, vaccines, animal feed additives, agrochemicals, human bone regeneration research and product development, and pharmaceuticals.

There are also examples of **successful biotechnology start-ups founded by Croatian expatriate scientists abroad, with interest to develop ventures in Croatia**, if appropriate infrastructure and environment can be established:

TABLE 11: SUCCESSFUL BIOTECHNOLOGY START-UPS FOUNDED BY CROATIAN EXPATRIATE SCIENTISTS ABROAD

TOTAL	**2**
LENTIGEN LTD. *is a diversified biologics company focused on the development and commercialization of breakthrough treatments for human disease. Lentiviral vectors (LV), the company's technology platform, are widely recognized by the scientific community as the most efficient method for delivery of genetic sequence information into cells to reprogram their function. The ability to efficiently and stably reprogram mammalian cells has numerous uses in biotechnology and biomedicine, including drug discovery, target validation, biologics manufacturing and cellular therapies. Lentigen has established a strong intellectual property position in the area of LV technology. The combination of strong academic and corporate collaborations that support a robust proprietary pipeline are fueling company growth, while a diversity of funding models and business opportunities are mitigating risk. Founder and Chief Scientific Officer is Boro Dropulić, PhD MBA*[12].	
DUAL SYSTEMS Ltd. *is a leading provider of custom services and products in the field of proteomics based in Switzerland. Their portfolio includes: Solutions for protein interaction discovery, Custom screening services for protein interactions discovery, Solutions for protein expression and purification, and Solutions for cDNA library construction. Founder and Vice President is Igor Štagljar, PhD* [13].	

Two start-up companies in the field of biomedicine could be identified, that due to the lack of the development possibilities (i.e. mainly infrastructure) in Croatia continued with the product development work and established their companies abroad:

TOTAL	**2**
EUCODIS *Ltd. is a biotechnology company successfully generating novel products in the life science area by successfully applying two most powerful technologies mimicking natural processes of evolution, in vivo recombination and somatic hyper mutation. EUCODIS' current activities are focused on projects and products in the fields of industrial enzymes and strain optimization, as well as the generation of novel biopharmaceuticals and human antibodies. The most advanced projects are in the field of industrial enzymes, where two projects are in the lead-optimization phase.*	

[12] Dr. Dropulic has more than 20 years of experience in academia and the biotech industry. Prior to founding Lentigen, he was founder and chief scientific officer of ViRxSys where he successfully led a multidisciplinary team to initiate and complete the first lentiviral vector clinical trial in humans. Previously, Dr Dropulic was Adjunct Assistant Professor at Johns Hopkins University School of Medicine in Baltimore, Maryland, where he was the first to develop an HIV-based vector targeted to inhibit the replication of the HIV/AIDS virus.

[13] Igor Stagljar is Associate Professor at the Department of Biochemistry and the Department of Medical Genetics and Microbiology, University of Toronto.

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BIOLAND Ltd. *develops its own active components for the production of healthy food, production and processing of vitamins and minerals products for special dietary needs i.e. diabetic patients, patients with liver ailments and foods and beverages for sporting activities. The products mainly resulted from the research work of IRB in Zagreb. In 1998 the first pilot plant was constructed and in 2001 Bioland decided to completely concentrate on research of, and optimisation of biologically active components used in nutraceutical and pharmaceutical industry. Bioland develops carriers which enhance stability and bioactivity of active components. In 2006, Bioland commenced with a couple of pre-clinical studies and studies of efficacy of Bioland products. Due to the lack of the necessary infrastructure the company replaced the operations from Croatia to Graz, Austria. The studies are performed in cooperation with the Medical University and the University Hospital in Graz. Bioland is also agile in licensing its technologies and it awaits products based on its technologies to appear on the EU market this year.*

3.1.3.4. Industrial base in Croatia

Biotechnology is the fastest growing industry today. The total world market for biotechnology products is estimated at 530 billion Euros in year 2008, exhibiting an average growth rate of 8% p.a. between 2001 and 2008[14].

As reported in ERAWATCH Research Inventory Report for Croatia in 2007, about 85% of all business R&D in Croatia is performed by several large companies engaged in pharmaceuticals and ICT (high tech), as well as agriculture and the food and beverages industries (low tech), which are among the most successful branches of the Croatian economy with a sizeable share of the GDP, employment and exports.

Pharmaceuticals

The pharmaceutical industry has a long standing tradition in Croatia. The available know-how enables successful future development of this and related industries. In Croatia the pharmaceutical industry consists of several local and foreign-owned generic manufacturers: **PLIVA** (Barr/Teva Pharmaceuticals group), **GlaxoSmithKline**, **Hospira, Belupo** and **Jadran Galenski Laboratory**.

PLIVA's generic pipeline includes over 100 projects with over 90 molecules pending registration across Central East Europe (CEE), Western Europe and the US. The company has developed significant therapeutic expertise in the areas of antibiotics, oncology, psychiatry, cardiology and allergy, drawing mostly from high quality research and knowledge of Croatian chemists, biologists and biotechnologists. The restructuring of PLIVA is likely to lead to an increasing pool of potential professionals that can contribute to the development of new biotechnology companies in Croatia.

Hospira Inc., a global specialty pharmaceutical and medication delivery company, recently acquired worldwide rights to a biogeneric version of filgrastim and an affiliated European manufacturing facility from PLIVA. As a part of the agreement, Hospira has also acquired process development capabilities and a manufacturing plant in Croatia. The site has capacity sufficient to meet Hospira's worldwide filgrastim and pegfilgrastim requirements, along with expansion possibility for additional biogenerics manufacturing.

GlaxoSmithKline is another major company in Croatia with capabilities to develop pharmaceutical biotechnology. Its Centre for excellence (which has been acquired from PLIVA) based in Zagreb is

[14] IMS Health Market prognosis, March 2009

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focused on proprietary research and development of next generation macrolide antibiotics.

Other pharmaceutical companies (**Belupo** and **Jadran - Galenski laboratorij**) are generic drug makers which manufacture prescription and OTC drugs licensed from leading producers. They are currently not engaged in pharmaceutical biotechnology development.

The pharmaceutical sector employs a highly skilled work force, and the pharmaceutical industry is one of the most R&D-intensive sectors of Croatian economy. All major Croatian generic manufacturers have significant R&D capabilities. Most R&D, however, is focused on the generic pipeline product development and commercialisation. In addition, there are more than 50 international pharmaceutical companies present in Croatia, mostly sales representative offices. The pharmaceutical industry represents 4% of the total manufacturing industry employing 1.7% of the total employment in manufacturing in Croatia. The Croatian market for pharmaceuticals shows an increasing trend. According to Business Monitor International's report (2006), the market value is expected to reach 460 million Euros by 2010. After a period of accelerated growth (up to 15% annually), a growth rate of 7-9% per annum is expected in the next few years.

Food technologies and agriculture

In 2000, Croatia had 842 companies registered in the food, beverage and tobacco industry. These sectors employed roughly 45.000 workers or 17% of the workforce in the manufacturing sector. A few companies play a dominant role in the Croatian market, such as the Agrokor Group, Podravka in Korpivnica, Vindija in Varaždin, Kraš and Franck in Zagreb. Despite the importance of this sector to the Croatian economy, in the 1990s and 2000s production declined in most sectors (including for e.g. wheat flour, bread, condiments, sugar and spirits) or remained stagnant (for e.g. pasta, canned vegetables, concentrated soups and biscuits). Only in a few sectors (mainly fruit juices and dairy products) has there been a moderate-to-substantial increase. Agricultural and food products compose approximately 18% of the total exports and imports market. However, the export value of these industries has declined steadily. This is worrying not only because Croatia cannot seem to produce enough food to feed its ca. 4,5 million citizens, but needs to import significant amounts. A boost in domestic agriculture and food industry could have an additional application market with tourism, as well as add value to the Croatian tourism offer (income from tourism accounts for some 20% of Croatian GDP).

Agriculture, fishing, and forestry generate about 7% of the total GDP in Croatia (this percentage has been declining steadily over the last few years), but they are nevertheless important to the overall economy. The war had a devastating effect on the sector, changing our country from an exporter of agricultural products to a net importer. Croatia has a total of 3.15 billion hectares of agricultural land, 63.5% of which is cultivated and the rest pastoral. The vast majority of the cultivated land is privately owned (81.5%). After the war, government efforts to boost agricultural production created positive results, increasing production of wheat, improving agricultural machinery, and increasing the number of cattle.

The sectors agriculture, fishing and forestry combine to employ over 33.000 people and produce earnings of approximately 2,9 billion Euros per year[15]. Aside from wheat, fruits, olives and grapes, the agricultural sector also produces corn, sugar beets, seed, alfalfa, clover, livestock and dairy products.

Croatia manufactures around 3.587 hectolitres of beer per year in seven breweries (located in Zagreb, Karlovac, Osijek, Split, Koprivnica, Daruvar and Buzet), which together employ around 2 300

[15] According to CBS

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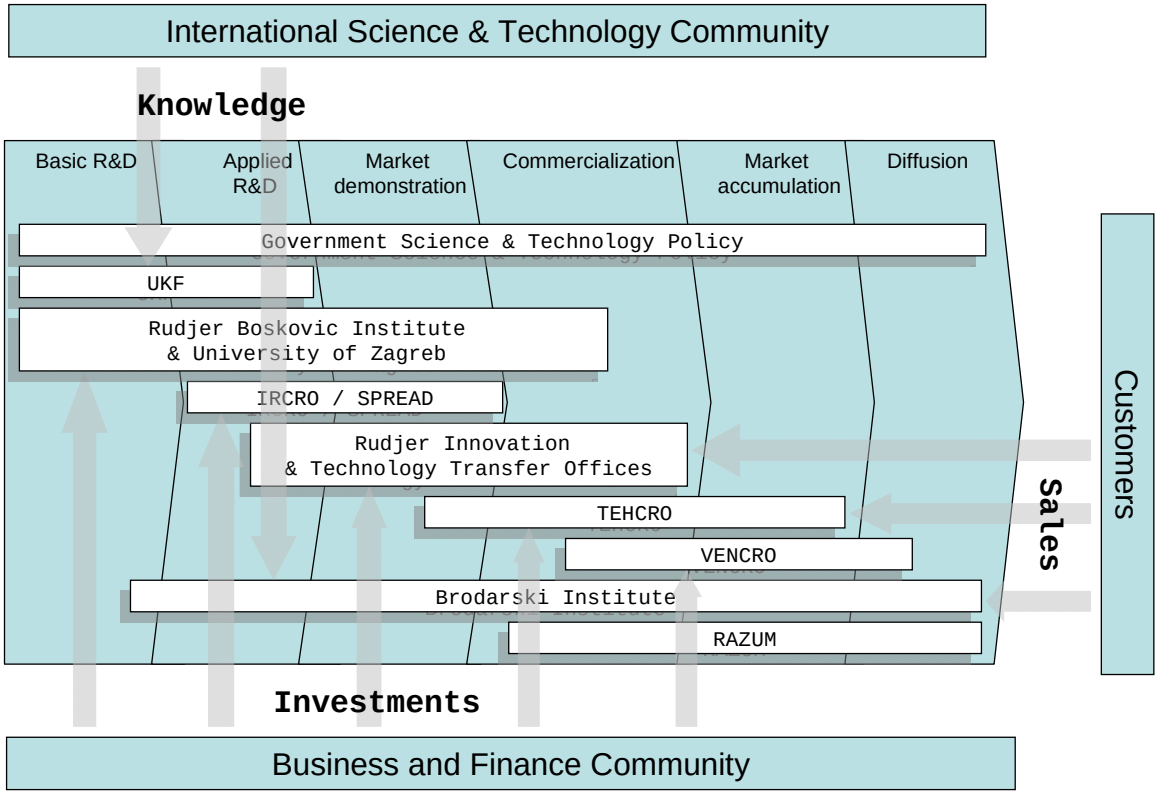
workers. Two largest breweries located in Zagreb and Karlovac account for more than half of production. It is estimated that some 29 100 workers owe their employment to beer production in Croatia. The sector contributes an estimated annual 315 million Euros to the national budget. Some 495 thousand of hectolitres of beer are exported annually (at the same time around 688 thousand hectolitres are imported). All breweries are privatized, most of the largest now owned by global corporations such as Anheuser-Busch InBev, Heineken and Carlsberg.

3.1.4. The factors enabling new technology-based firms

The emergence and development of new technology-based firms in Croatia is enabled by several factors. They include R&D support programmes, preincubation support, access to early stage financing and technology infrastructure. All of **these factors will facilitate the development of projects from which BIOCentre clients will be selected**.

FIGURE 6: FACTORS ENABLING NEW TECHNOLOGY-BASED FIRMS



3.1.4.1. R&D support programmes

In order to secure a high quality BIOCentre project pipeline, the development of commercially viable knowledge should be actively stimulated. The current situation is as follows.

The basic research funding is provided by **MSES**, which supports the R&D/scientific base. In 2007, a total of **868 research programmes/projects related to the field of biosciences** were accepted for funding. Approximately 20 million EUR (142,5 million HRK)[16] has been secured in the state budget in 2007 for the funding of these research projects.

[16] The project funding includes the operations of the projects without personnel costs and capital investments.

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Research with a commercial potential and collaborative research that links science and industry is supported through several funding programmes. In 2001, the **TEST** (Technology-Related Research and Development Projects) programme was established. It supports research activities focused on development of new technologies (products, processes, services) prior to their commercial use up to the stage of original solutions (prototype/pilot stage) and strategic, generic research that links fundamental research and its application in technology, and bears importance for the development of industry and various branches of economy[17].

The **National Science Foundation** has implemented the programme **Partnership in Basic Research**, which enables co-financing (up to 70% of eligible costs) of research projects implemented in collaboration between higher education institutions or public research organisations and private entities.

The collaboration between science and industry is facilitated through the **Unity through Knowledge Fund (UKF)**, which has launched a programme **"Research in industry and academia"** with an aim to increase mobility of young scientists and experts between academia and industry.

3.1.4.2. Preincubation support activities

In order to develop research results into marketable products, preincubation support activities need to be implemented. This is particularly critical for complex products whose development is costly, risky and time-consuming, which is the case in biotechnology and life sciences. During preincubation the potential projects will still be developed within an academic environment and will predominantly rely on financial support provided by public sources (outlined in the previous section). However, they will need additional assistance in preparation for incubation at the BIOCentre.

The key role in this regard is played by **technology transfer offices** at major Croatian higher education and research organizations. These offices are Ruđer Innovations Ltd., a technology transfer company of Croatia's largest research Institute Ruđer Bošković (IRB), and the technology transfer offices at the Universities of Zagreb, Rijeka and Split. These offices focus on scouting for innovative ideas with commercial potential facilitate protection of intellectual property and offer coaching through the commercialisation process. Their activities and capabilities are going to be expanded over time.

Finally, the **Science and Innovation Investment Fund** is being implemented within the Regional Competitiveness Operational Programme 2007 – 2009 (IPA IIIC). This operation will support the development of a wide range of knowledge and technology transfer activities at public research organisations and higher education institutions (for details, please see 1.5.2.). Currently, there is a process of consultation with European Commission regarding the continuation of this funding scheme through IPA 2010-2011. There is suggestion of expending the scope of the activities to be eligible for funding. Beside the grants already in place, based on the funding gap, introduction of additional activities such as funding of collaborative R&D projects with a goal to create a new product/service is also planned. An additional operation aimed at excellent research projects and funding of collaborative scientific projects attracting and using resources of Croatian scientific diaspora is also being discussed.

[17] In February 2007, the Croatian Institute of Technology (HIT) took over the implementation of the TEST program.

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3.1.4.3. Intellectual property regime

Intellectual capital and intellectual property are at the core of the innovation process. Croatia has a long history of intellectual property protection (since 1884) and legal framework harmonized with all European and international regulations and standards. Applicable national laws include the Patent Law, Trademarks Law, Law on Geographical Indications and Designations of Origin of Products and Services, Law on the Protection of the Topographies of Semiconductor Products, Industrial Designs Law, Copyright and Related Rights Law, as well as a series of Regulations.

Key features of the intellectual property system in Croatia include:

- about 100 published papers per one registered patent
- private sector (companies and individual inventors) is more inclined to registering patents
- public sector researchers predominantly focuses on publications
- the culture of the protection of intellectual property is still insufficiently developed within the Croatian academic community (furthermore, patenting still does not contribute to academic advancement)

In addition to the **lack of incentives and developed practices related to intellectual property development, protection and use**, there are several other uncertainties. Neither the relationships between inventors and institutions in which they are employed, nor the mode of transfer of IP from the public to the private sector are clearly defined. Therefore, the natural flow of technology is disturbed: it is not clear what is available, who owns it, who is responsible to commercialize it, nor who can utilize and profit from it, and under which conditions. These **uncertainties discourage enterprises to seek attractive intellectual property and invest in it**. However, further **development of technology transfer offices at universities and major research institutes should help in bridging the gap between science and industry**.

Legislation equivalent to the Bayh-Dole Act is currently in preparation in Croatia, which should greatly facilitate and **increase the commercialisation of research results**. The aforementioned law, which was passed in 1980, enabled US universities, small businesses and non-profits to control and use intellectual property that resulted from federal-government funding of research.

3.1.4.4. Access to early stage financing: public and private sources

Entrepreneurs trying to transform new ideas into products face significant challenges in raising finance at the very early stages of development of a product or a company. Traditional financing institutions (such as commercial banks) are risk-averse, and venture capital often cannot be relied on as an initial source of financing either (as it only ever comes into play when a company achieves a certain minimum size). In addition to entrepreneurs' own resources, financing of start-up companies usually begins with seed capital from friends, family and 'fools' (FFF) angel investors and public seed capital funds. Once the idea has been proven, patent has been applied for or granted, etc. the entrepreneur can approach venture capital funds (VC) for another round of investment. The success and growth of the company attracts further rounds of investment from VC funds. At some point they will also be able to get loans from commercial banks (sometimes with the assistance of guarantee schemes). Finally, the company is sold or goes public with an initial public offering (IPO) (Figure 7).

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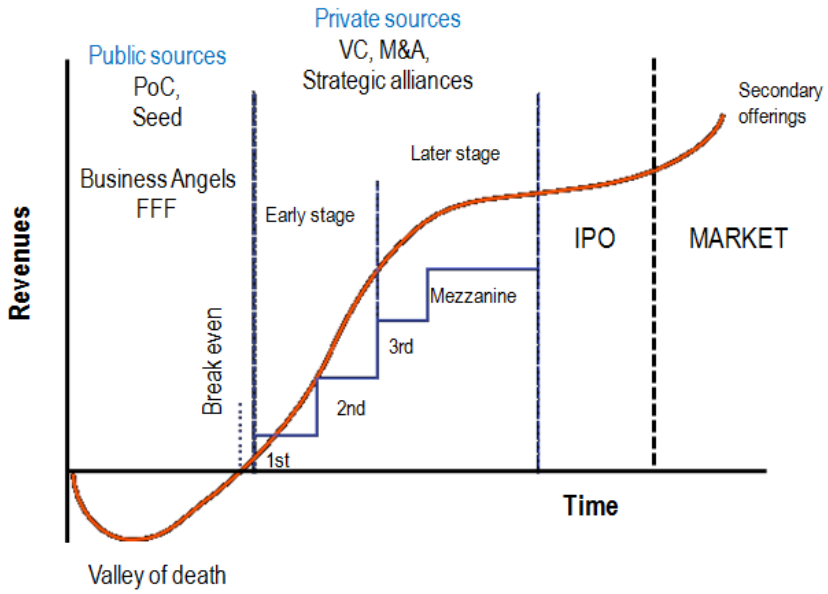
FIGURE 7: START-UP FINANCING CYCLES



In Croatia, this financing cycle has not been fully developed, but the remaining gaps are being strategically addressed.

In the initial stage, when the risk of failure ('the valley of death') is high, **public sources** can be used in the development of high quality projects with a strong commercial potential. The corresponding **programmes** are **implemented by BICRO**. These are:

- **RAZUM** (Innovation Commercialization), a seed fund programme that provides up to 70% conditional loan and now focuses on new product development in start-up and existing SMEs;
- **IRCRO** (Sponsored Research and Development) provides a 50% matching grant to SMEs that are partnering with research organizations for implementation of R&D projects;
- **KONCRO** (Business Competitiveness Upgrading) provides 50% matching grants to innovative manufacturing SMEs looking to access technology knowledge and management skills; and
- **VENCRO** (Risk Capital Industry Development) is being developed to provide adequate sources of early-stage funding for young, innovative companies through establishment of a hybrid public-private VC fund that would also incentivize investors and fund managers to start VC funds in Croatia.

Innovative companies particularly benefit from existence o**f BICRO's seed programme (RAZUM)**, which **addresses the gap in early-stage financing for promising technologies** and offers early-stage financing (at very favourable conditions) to start-ups and SMEs for new product development. Croatian-based companies which have projects that fulfil these four innovation criteria: i) degree of innovation (state-of the-art), ii) commercial potential, iii) competitive advantage, and iv) quality of management, can count on up to 70% conditional loan funds (in the maximum amount of 1,64

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million Euros per three-year cycle)[18]. The remainder of the funds needs to be provided by the entrepreneur[19]. The conditional loan is paid back, interest free, only if the product is successfully delivered to the market[20]. RAZUM has a 3-year budget of 8,5 million Euros and has invested in 15 projects in innovative companies (SMEs) so far, the average size of investment being 698 thousand Euros per company[21].

To sum up, the support measures include co-financing of R&D (IRCRO), co-financing of product development (RAZUM), access to external knowledge (KONCRO) and access to finance (VENCRO). These programs provide an **encompassing range of support measures necessary to develop new technologies and high tech firms** while **sharing the risks of such development with entrepreneurs and investors**. This should ensure effective and efficient use of public funds combined with providing a strong stimulus to new technology development and commercialisation.

Innovation commercialisation also needs to include **sources of finance provided by entrepreneurs themselves or external investors they can attract**. Investors in innovative projects usually take a hands-on approach and actively support the development of the project. Depending on the stage of the project in which they invest and the size of the investment, they are usually classified as business angels, providers of seed capital and providers of venture capital.

Business angels are private investors who invest directly in private companies in return for an equity stake. A business angel network called CRANE (Croatian Angels Network) has been developing for some time. It comprises businesspersons with successful business ventures under their belt, but the network has not yet reached the sufficient size or diversification. Members of CRANE regularly look at business propositions or plans, but have made only one investment into a company thus far. However, angel investments in promising projects are also already being made outside of the CRANE network.

The providers of **venture capital** are willing to take higher risks in exchange for above average returns generated by the companies that typically have high growth potential[22]. Many countries strive to increase the supply of VC. On average in the EU countries some 39.8 billion Euros are raised annually by various private equity funds. VC funds contribute to that amount with 30% but still further development of the VC market is seen as an important objective in most EU countries. In

[18] It should also be noted that the criteria for RAZUM are quite similar to the admission criteria for the BIOCentre; however, the candidates for incubation will also need to hold a registered patent.

[19] In all its innovation support programs, BICRO actively pursues is leverage of private co-financing for beneficiaries. E.g. in IRCRO 1 million Euros investment from the state budget managed to leverage an additional 1,6 million Euros of private financing. The benefits are several fold, as all projects are cooperative R&D efforts between research organizations and SMEs.

[20] This is one of the most competitive instruments in practice today in Europe, modelled after the hugely successful SBIR programme created in 1982 in the US. The current budget of SBIR is 2 billion euros per year.

[21] Based on the internal calculations by BICRO, potential financial returns to the government (in the form of profit tax, labour tax and VAT) exceed are on average 10 times larger than the initial investment (in the time span of 20 years, assuming 50% success rate of projects). If BICRO would make investments with a 60% success rate, the return would climb to 19,3 Euros for every 1 euro invested. For comparison, in Finland today the TEKES agency (national funding agency for technology and innovation) invests with a 57% success rate and achieves the return of 20 Euros for every 1 euro invested. These calculations are taking into account only direct financial returns and not even economic or social benefits, which would make the results even more significant. The numbers were obtained from communication with Ivo Friganović, RAZUM director at BICRO and Hiekke Kotilainen, Deputy Director General of TEKES.

[22] The relationships formed between these companies and venture capital (VC) investors create significant spill-over effects in terms of benefits for the economy by creating jobs, growing faster than other companies, investing heavily in R&D and accessing international markets.

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1997, the first private equity fund was registered in Croatia. Since then, five more have been in operation. **VC funds managed to raise 127,92 million EUR and invested thus far in 45 Croatian companies.** These funds operated in the whole SEE region, and the capital was allocated for investments coming from the entire region not only Croatia, so the real size of the private equity market in Croatia is difficult to ascertain, but it is obviously, from the figures, underdeveloped (Table 12). However, available research also indicates **the reluctance of many high technology entrepreneurs to accept external (VC) financing** and property sharing due to corporate governance and control issues (Young and Cvijanović, 2006).

TABLE 12: PRIVATE EQUITY AND VENTURE CAPITAL MARKET IN CROATIA

Management company	Size of fund (in million EURs)	Average size of investments (in million EURs)	Total size of all investments (in million EURs)	Total number of investments	Total number of VC investments	Overall results of the fund
Horizonte Venture Management	20	N/A	N/A	2	2	Average
SEAF Croatia	5,3	0,19	4,53	21	21	Good
Copernicus Capital	19,4	N/A	16,81	6	5	Good
Quaestus Provate Equity Partners	35	2,92	11,67	4	4	Average
Vienna Capital Partners	40	9	38	4	1	Average
Croatian Bank for Reconstruction and Development – HBOR	8,22	0,51	4,1	8	8	Poor
Total	**127,92**	**12,62**	**75,11**	**45**	**41**	

Source: CVCA

Finally, **guarantees** allow businesses without sufficient collateral for commercial bank lending to obtain loans from participating banks that are guaranteed by the government. The largest guarantee scheme in Croatia is operated by HAMAG[23], although regional development agencies have started to offer this modality of intervention to benefit their local SMEs.

3.1.4.5. Technology Infrastructure

Between 1998 and 2006, the development of business parks and related infrastructure in Croatia has been slow and sporadic, and mostly based on local public initiatives. Four technology parks were established with support of local self-governments - in Zagreb, Varaždin, Čakovec and Kutina. At that time, Croatia also started to build an informal network consisting of **four operational technology centres (in Zagreb, Split, Rijeka and Osijek), one commercial R&D centre in Dubrovnik (specialized for aquaculture and fishery) and one centre for manufacturing processes (Zagreb).**

Centres for entrepreneurship development in Croatia include entrepreneurship centres, business parks, business incubators and technology parks. It is difficult to estimate the number and scope of work of all these centres since here isn't any systematic analysis of them to date. According to informal data, there are 24 operational entrepreneurship centres and business incubators in Croatia[24]. They offer start-up entrepreneurs business space and premises under favourable

[23] Croatian Small Business Agency
[24] According to data available from the Business navigator (www.business-navigator.biz), a website developed with the assistance of the Ministry of Economy, Labour and Entrepreneurship.

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conditions for a limited time period (several years). Besides space, entrepreneurs have access to intellectual and business services (such as administrative services, bookkeeping, management etc.)[25].

According to a study carried out by the Business Incubator in Osijek (BIOS), 10 out of 17 surveyed business incubators have been established in Croatia in the last 6 years. Most incubators are established as limited companies, and almost all have regional/local self-governments as stakeholders. Interestingly, 17,6% of incubators have private sector participating in the shareholder structure. The average size of a business incubator in Croatia is 1.056 m², but a good majority of incubators are still smaller than 500 m². The average number of tenant companies is a low 8 (the vast majority of these companies are services-based), the average number of employees in those companies is 4. Thus the average number of jobs sustained in the incubators, not counting incubator staff, is 32. Out of 149 companies that graduated (or exited) from an incubator, 85% survived the first year on the market, showing at least that the incubators fulfil one of their major objectives – helping new entrepreneurs. 7 out of 17 incubators answered they would rate themselves as being technology-oriented, although only 11,8% reported having a University or another higher education institution (HEI) as partner or shareholder. However, it is a negative sign that most incubator managers describe their incubators' core activity as renting space, and only a few have developed entry and exit policies for companies.

TABLE 13: SERVICES AND PRICING POLICY OF CROATIAN BUSINESS INCUBATORS (IN % OF THE TOTAL)*, 2008 SURVEY

Type of service	Market price	Subsidized price	Free of charge	Not offered
Business space rent	47,1	82,4	17,6	5,9
Help in finding financial and business support	11,8	0	88,2	11,8
Fax and copy machine usage	23,5	17,6	58,8	11,8
Consulting services	29,4	11,8	58,8	11,8
Training and seminars	23,5	23,5	52,9	11,8
Help in creating projects	35,3	17,6	47,1	11,8
Marketing services	11,8	11,8	58,8	17,6
Internet access	23,5	5,9	58,8	23,5
Administrative services	17,6	29,4	41,2	23,5
Fairs and exhibitions	0	35,3	23,5	41,2
Book keeping services	17,6	23,5	0	64,7
Sharing machinery	6,3	12,5	6,3	81,3
Quality management services	0	17,6	0	82,4

Source: Business Incubators and Technology Parks in Croatia 2008

Please note: multiple answers possible

In 2007, BICRO Ltd., introduced a programme for systemic development of business and technology infrastructure in Croatia – **the technology infrastructure development programme (TEHCRO)**. TEHCRO focuses on developing sustainable technology transfer facilities and business support infrastructure to meet the needs of private entrepreneurs, as well as researchers and academia. The programme provides 3 - 5 year financing to projects aimed at establishment, upgrading and development of technology business centres, science & incubation centres (including technology incubators and STPs) and commercial R&D Centres. TEHCRO is building a network of technology and business support facilities on the regional level, that are slowly gaining recognition in technology

[25] These services are usually not provided by the centres themselves but by external consultants, though the centres can usually signpost to such services.

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transfer and incubation services, and which will play an increasing role in creating a supportive and nurturing environment for innovation-based SMEs development and growth. All projects are selected by public tenders and/or BICRO initiative, where applicants are invited to submit project proposals in the form of a business plan. In order to be eligible for funds, applicants must be (not-for-profit) legal persons and have their headquarters in the Republic of Croatia. Only those projects which target full sustainability within a reasonable time-frame are eligible for support. TEHCRO also encourages outsourcing of management to private entities (LLCs, NGOs or private entrepreneurs).

TABLE 14: TEHCRO PROGRAMME LINES AND FEATURES

TECHNOLOGY BUSINESS CENTRES	SCIENCE & INCUBATION CENTRES	RESEARCH & DEVELOPMENT CENTRES
– Focus on innovation and technology in general – No specific technology/thematic focus – Support to technology-oriented SMEs – Support to regional start-ups – Technology transfer and business support services – Supporting establishment and growth of technology-oriented, innovative companies in regional /local areas – Providing infrastructure and supporting framework for enterprise growth and job creation	– Centres with specific technology focus (IT, biotechnology, nanotechnology, medical sciences, engineering, etc.) – Incubation programs for spin-offs and support of start-ups in a specific technology field – Participation of partners with proven track record in R&D – Network of technology experts and technology-oriented companies with a strong international orientation – Supporting the incubation of innovative academic spin-offs and start-ups – Emphasis on fostering the establishment and development of businesses in the field of new technologies (high-tech), based on implementation of R&D results through new products and services	– Strong focus on applied science, commercialization and/or contract R&D with a specific technology focus – Competitive R&D projects linked to business sector demand – Concentration of R&D infrastructure resources, best practice and commitment to creating internationally recognized centres of excellence – Companies of all types (start-ups, SMEs and industry) – Location in urban areas and university surrounding – Transfer of know-how and R&D results to businesses – Cooperation with established industry and business partners on common projects (involving companies of all types and sizes)

Funding is granted to beneficiaries for a maximum of 5 years. Investments are made in form of grant, soft loan and/or equity, but the total amount of TEHCRO funding does not exceed 65% of project's operational costs or 50% of total costs, and is financed on a declining scale for the duration of project until self-sustainability is reached. All projects must also be co-financed out of own resources (minimum 30% of total costs) and/or through sources other than TEHCRO. Public-private partnerships are welcomed in the program.

TABLE 15: INFRASTRUCTURE PROJECTS CURRENTLY SUPPORTED THROUGH THE TEHCRO PROGRAM

Project	Total project value in EURs	Committed TEHCRO funds in EURs
Varaždin Technology Park (VA::TechPark)	1.423.630	616.408
Science and Technology Park of the University of Rijeka (STeP)	4.377.751	1.861.150
Mariculture Business Innovation Centre (Mari-BIC)	7.108.861	2.073.861
Business Innovation Support Centre Nova Gradiška	1.740.714	720.912
Technology Innovation Centre Međimurje	3.294.753	1.648.413
Projects - TOTAL	**17.945.710**	**6.920.743**

Source: BICRO

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Between the years 2007 and 2009, TEHCRO combined more than 7.75 million Euros of financing from The World Bank and state budget and invested thus far in 10 projects. The funding is distributed in such a way that more than 44% of funds goes to soft services - business services and technology transfer activities of the TEHCRO centres, around 30% for the purchase of specialized equipment (laboratory space etc.), and around 25% for improvement of infrastructure (Figure 8). Thus far, TEHCRO managed to leverage around 11 million Euros additional investments to technology infrastructure projects. The total value of projects is estimated at 18.8 million Euros, apart from TEHCRO programme coming from other public and private sources of finance (Figure 9).

FIGURE 8: DISTRIBUTION OF TEHCRO FUNDING IN PROJECTS

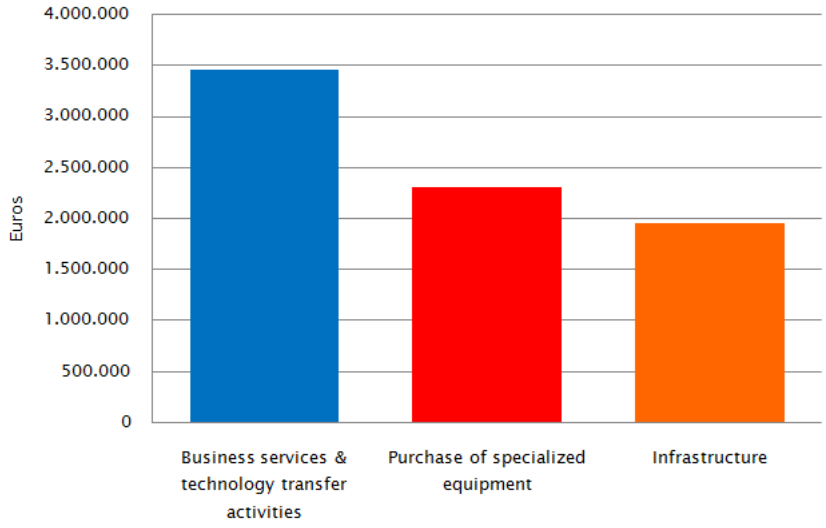
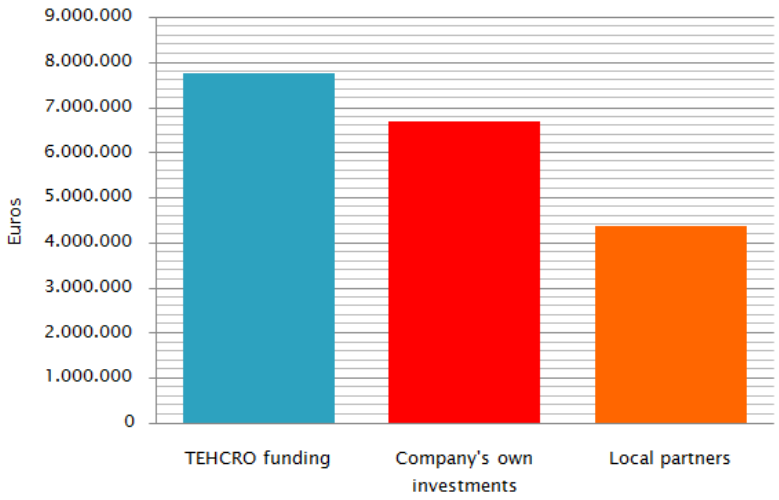


FIGURE 9: SHARE OF TEHCRO FUNDING COMPARED TO COMPANIES' OWN INVESTMENTS AND LOCAL STAKEHOLDERS' CONTRIBUTION



Technology parks and incubators are the perfect habitat for young innovative companies. They stimulate interaction between universities and businesses, creation of new jobs business opportunities and adding value to mature companies. That leads to diversification of local economies and promotes economic development and competitiveness of regions. However, **effective utilisation of existing technology infrastructure and successful development of new facilities (e.g. BIOCentre**

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and science / technology parks) requires further work by various stakeholders within the national and regional innovation systems.

3.1.5. Structural gaps addressed by the BIOCentre and BICRO

The **three main structural gaps** that prevent the development of the biosciences sector in particular, although significant expertise, research and discovery potential do exist are:

I) **lack of infrastructure to support establishment of biotechnology companies** which need to locate abroad as a consequence;

II) **lack of support in soft services** (business advisory and technology transfer know-how);

III) **underdeveloped financial instruments** for financing promising young innovative companies, seed and venture financing in particular.

The **existing technical infrastructure of the universities and other R&D institutes comprises of laboratory equipment which cannot be used for the purpose of start-ups**. They enable the basic R&D and experimental work, but **none of them can provide a closed technical (laboratory facility) system which would enable the whole process development and product testing under the GLP conditions**, necessary for the transferring the research results into products designed and developed for the market needs. Pharmaceutical companies have similar technical facilities, though they are closed systems, serving their own needs only.

3.1.6. The position of the BIOCentre within the national innovation system

The concept of the BIOCentre **integrates incubation facilities with a central laboratory with a specialised staff**. It has been designed to cover the whole process development on the lab scale under the GMP conditions in compliance with regulatory requirements and it can be used for the development of the wide range of products for biotech-industry. In combination with the highly qualified staff the professional service of this type can attract not only the domestic industry (companies) but also the international companies. The planned central lab facility is a **unique biotechnical facility** within South East Europe. Such facility is even not very common in the Western European countries that are near to Croatia. Such facilities exists within Biopartner Center Maastricht (www.bpcm.nl) and Bioprocessing Technology Institute (www.bti.a-star.edu.sg) .

The BIOCentre has been positioned to provide the entire infrastructure necessary for the start-up and incubation of new companies and for the support of existing SME's as a **centralized, national resource**. Namely, Croatia is too small to justify locating several incubators within major several major institutes or universities (as happens with many large western universities), or within each region (for example as happens in the German BioRegio's). Examples of this centralized concept for small emerging nations are the Tartu Biotech Park that is now being set up in Estonia (www.biopark.ee) and the established Singapore Bioprocessing Technology Centre (http://www.bti.a-star.edu.sg/).

Consequently, BIOCentre will have **a particular position within the national innovation system**, which will develop **strong partnerships with a network of partners and stakeholders in Croatia and abroad**. The BIOCentre will be positioned to provide:

- The conduit for the spin-out, start-up and incubation of new Croatian biotechnology companies through technology transfer offices of universities and research institutes.

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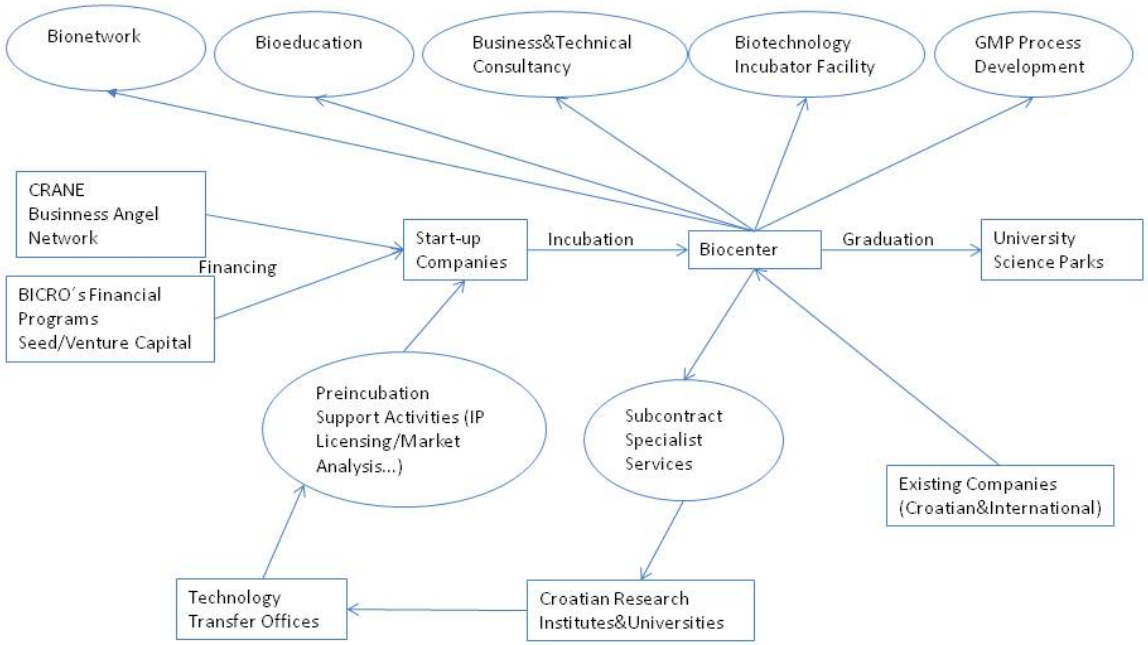
- Full business development consultancy services to existing Croatian and international biotechnology SME's.
- A full service capability for the process development of biopharmaceuticals on the laboratory scale.
- Comprehensive education courses on the business development and technical aspects of product development.
- Networking with the all actors involved in the process of establishment and development of new technology based companies, both domestic and international.

FIGURE 10: POSITIONING AND RELATIONSHIP OF BIOCENTRE WITH CROATIAN UNIVERSITIES/RESEARCH INSTITUTES AND WITH EXISTING CROATIAN AND INTERNATIONAL BIOTECHNOLOGY COMPANIES



The envisioned **roles of other organizations** are:

- **Research institutes & higher education institutions** need to provide high quality fundamental research with a new additional focus toward contract research and commercial applications of intellectual property (through out-licensing and/or spin-outs of new companies). They will also support preincubation of future tenants of the BIOCentre.
- **The technology transfer offices** will ensure intellectual property (IP) protection of inventions and provide business development functions for the licensing of such IP as well as other

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preincubation activities for the establishment of spin-off/start-up companies (technology mapping, coaching, market analysis).

- **BICRO** and **CRANE** (Croatian Network of Business Angels) will provide adequate sources of financing for the companies.
- **The BIOCentre and its tenants** will subcontract specialist services from research institutes, higher education institutions.
- **Science and technology parks** (several of which are expected to be developed and co-financed through structural funds) are expected to become centres for innovation-based growth of new technology based firms. In particular, science parks will provide necessary accommodation for the companies, once they graduate from the BIOCentre.
- **Existing companies (SMEs and corporations)** will use the services of BIOCentre, including process development, education and networking.

3.1.7. Needs the Project Meets

The goal of the BIOCentre is to serve as **a focal point within the national innovation system that will support the development of biotechnology and life sciences start-ups that have been founded on the basis of research undertaken primarily (but not exclusively) at Croatian academic institutions.** It is thus expected that the BIOCentre will thus serve as a leading incubator, knowledge generator and a networking channel for outstanding biotechnology and life sciences initiatives in Croatia and South East Europe[26].

BIOCentre will provide incubation of companies during their first few years of existence following which they will outgrow the space and move on to their own dedicated facilities within science and technology parks. The **basic eligibility criteria** for future tenants will be: **secured financing** for the first three years of their life cycle (please see Figures 3 and 4) and a **patent application** (for those which are going to develop a new product). A detailed selection policy will be elaborated using technical assistance. It is assumed that the **incubation period will on average last four years** (please see Figure 3). During that period of time companies will finish early development phase for their product including pre-clinical development and process development. Process development will be provided by Central Laboratory Unit through BIOTransfer Programme as this activity requires highly skilled professional team due to the strict regulatory requirements. Expansion of the development activities will result in a growing number of employees. Following a successful development process, the **incubated companies will graduate to a science / technology park[27]** or be **acquired by larger corporate entities** (please see Figure 10). It is estimated that the basic graduation criteria will include the period of incubation (up to 4 years) and the size of the company (up to 15 employees). A more detailed graduation policy will be subsequently elaborated using technical assistance.

The unused capacities of the CLU as well as education and networking services will also be offered to **young innovative companies** (some of which will be previous BIOCentre tenants) and **industry** – in order to both increase income and stimulate cross-fertilisation of knowledge between the BIOCentre

[26] Similar facilities as those which are to be offered through the BIOCentre have not yet developed in Southeast Europe.

[27] Science and technology parks that will accommodate such companies and provide them with the neccessary support still need to be developed. The development of such facilities is among the top priorities of BICRO and the relevant ministries; co-financing through structural funds is expected.

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and the external partners. Preference is to be given to projects with strong cooperation between science and business.

The needs of the target groups (**researchers, start-ups, young innovative companies**) vary according to the maturity level of each group. There are three maturity level can be divided into three levels:

- **preincubation** (from idea to experimental proof of principle/concept)
- **establishment** of the spin-off/start-up, incubation and **early development**
- **late development** and **graduation** from the BIOCentre

We also consider the needs of **young innovative companies and SMEs (those that have graduated from the BIOCentre or have developed outside of it)** and **corporations** which will be in part served by the BIOCentre. The needs for each level, providers and current status of the service are summarized in the following table. As it can be observed, **most of the needs of target groups will be met by particular BIOCentre programmes**. Other needs of the biotechnology start-ups and other target groups (e.g. funding, IPR protection etc. – please see the following table) will be fulfilled by **BICRO, technology transfer offices, private investors and other partners**.

However, even when the BIOCentre becomes fully operational, there will still be room for **addition of complementary services** in the future – e.g. through the use of EU structural funds. This is particularly related to **funding** and **additional infrastructure** (e.g. pilot plant and science / technology parks).

TABLE 16: NEEDS OF THE TARGET GROUPS

TARGET GROUP	NEEDS	PROVIDER(S)	STATUS
Researchers: idea, research and preincubation	coaching (through the commercialisation process)	technology transfer offices	available (to be expanded)
	Funding	MSES, TEST, National Science Foundation, Unity through Knowledge Fund, Science and Innovation Investment Fund	available (to be expanded)
	entrepreneurial training	BIOCentre	to be developed through the BIOEducation programme
	IPR support (legal/technical/funding)	technology transfer offices	Available
	infrastructure (space & equipment)	universities & research institutes	Available
Start- ups and spin offs: Establishment and incubation	Funding	CRANE (and other business angels), BICRO, VC funds	available (to be expanded)
	infrastructure (laboratories & offices)	BIOCentre	to be developed through BIOIncubation and BIOFacility programmes
	training (management, planning, negotiation skills)	BIOCentre	to be developed through the BIOEducation programme
	regulatory knowledge	BIOCentre	to be developed through BIOIncubation programme
	process development	BIOCentre	to be developed through the BIOTransfer programme
	international networking	BIOCentre	to be developed through BIONetwork
Young innovative companies: Late development, graduation and post-graduation	Funding	VC funds, corporations	Available
	infrastructure (laboratories & offices)	science / technology parks	to be developed through new projects (EU structural funds)
	pilot production	BIOCentre	to be developed through a new project (pilot plant)
	human resources development	universities, BIOCentre	available/ to be further developed through BIOEducation program
	international networking	BIOCentre	to be developed through BIONetwork
	understanding of the industry	BIOCentre	to be developed through BIOEducation program
SMEs and corporations: Specialised services	Process development	BIOCentre	to be developed through the BIOTransfer programme
	human resources development	universities, BIOCentre	available/ to be further developed through BIOEducation program
	International networking	BIOCentre	to be developed through BIONetwork
	pilot production	BIOCentre	to be developed through a new project (pilot plant)

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3.1.8. Demand Breakdown by Consumer Type

3.1.8.1. Target Groups

The BIOCentre aims at the following target groups (as **clients** or **strategic partners**):

- The main target group are **academic start-ups / spin offs**

  The primary target group includes academic start-ups / spin offs in the field of biotechnology and life sciences that will actually be served by BIOCentre programmes. The foundation of such start-ups will be facilitated through research funding (aimed at knowledge with a commercial potential), intellectual property protection (with the assistance of technology transfer offices) and the pre-incubation process (undertaken at academic institutions).BIOCentre will be an active participant in these processes, which should lead to a strong deal flow of potential candidates for incubation. Those start-ups that fulfil the selection criteria will be incubated and developed through the BIOCentre programmes. BIOCentre will provide them with infrastructure, training, regulatory knowledge, process development and networking opportunities. As these start-ups develop their products and approach graduation from the BIOCentre, the services provided to them will move towards preparation for the pilot production and relocation to a science / technology park (both are to be developed as new projects in the future).

- The second target group are **young innovative companies, SMEs and corporations**

  The young innovative companies that graduate from the BIOCentre will be served by some of its services (e.g. education and networking), as well as by services that still need to be developed as a separate project (pilot production). The same applies to other SMEs and corporations that find in their interest to use available capacities within the BIOCentre. Centre will primarily attract these companies to use the available R&D services of the BIOCentre through the BIOTransfer programme, as well as to initiate R&D cooperation with research groups. Training opportunities will be available to them through attending the BIOEducation programme and the Centre will try to attract them as members of the BIONetwork.

- The third target group are **researchers and academic institutions (including their technology transfer offices)**

  Their researchers (including doctoral students and interns) that carry out projects with a commercial potential comprise the pool from which future start-ups will be identified, supported and selected for incubation at the BIOCentre. **The quantity and quality of the deal flow of the BIOCentre crucially depend on the quality of research, IPR protection and pre-incubation undertaken at academic institutions.** Therefore, the universities and research institutions (including their technology transfer offices) should be considered as key stakeholders of the BIOCentre, which should be targeted through marketing activities and engaged through networking and education activities. Researchers and other university staff can also benefit from cooperation with incubated companies in the field of process development. External research institutions should also be allowed to rent space in BIOCentre for temporary projects, as long as they are third-party financed (e.g. within technology transfer projects). Although the BIOCentre will primarily host start-ups initiated at

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Croatian academic institution, international collaboration with foreign academic institutions (from the EU countries, as well as US and Southeast Europe) needs to be developed in order to increase available knowledge and the pool of projects from which BIOCentre can benefit.

- Fourth, the activities of the BIONetwork are designed to establish connections between the biosciences community and institutions or potential partners from other sectors – target groups are therefore **investors**, **public institutions** and **business partners from other industries.**

3.1.8.2. Goals of the Project

The **overall project objective** is to **build technology transfer and commercialization facilities** in the field of **biotechnology and life sciences** that will serve **academic institutions** in order to facilitate biotechnology / life science industry, innovation, competitiveness and regional development.

Specific project objectives are:

- development of common technical infrastructure and service portfolio that will support biotech start up businesses (as a precondition of specific activities of the BIOCentre) and
- development of biotech start-ups through incubation, process development and associated services

By linking science and business in one of the most propulsive technologies, the BIOCentre will contribute to **industry competitiveness of high value added sectors of the Croatian economy** and emergence of **new knowledge-based SMEs**.

These goals are to be achieved through:

- Fostering the **entrepreneurial climate** within the academia (by providing support and training to researchers whose project may have a commercial value and by establishing linkages with academic institutions)
- Strengthening the **technology transfer** between science and business (by collaboration with technology transfer offices)
- **Fostering innovation and R&D activities** in existing companies (by providing process development services at competitive prices)
- **Enhancing competencies in biotechnology** in general and in process development in particular (by providing a modern infrastructure and a highly skilled team; by providing training courses) in Croatia and Southeast Europe
- Creating **highly skilled jobs in incubated companies and their clients**
- Enabling the development of one of the most dynamic technology sectors that will have **spillover effects** on other sectors (e.g. food industry)
- Accelerating **growth and diversification** of the regional economy
- Strengthening international **cooperation** and investment in Croatia (by international research collaborations, process development projects and acquisitions of incubated companies by foreign investors)
- Establishing of a new **high-tech image** of Croatia on the international markets

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3.1.9. Conclusion

The demand analysis shows that **Croatia has a significant R&D potential** given by the traditionally well established scientific base and a well established educational base (broad range of curricula) in the field of biosciences, numerous initiatives and traditional well established main application industries. But to reach the excellence and establish as a high-tech site in one of the biotechnology niches, Croatia also needs companies that will transfer this knowledge into market oriented products and services that respond to the international market needs. Such companies, mostly SMEs, emerge from the scientific community. Due to the structural gaps outlined above, the biotech SME sector in Croatia is still underdeveloped. The **BIOCentre aims to close these gaps and provide the missing link in the structures necessary for the development of the biotech SME sector in Croatia**.

The establishment of the BIOCentre will have following **impacts on the innovation system** in Croatia:

- General increase of R&D and technology transfer in different industrial branches, i.e. increase of the R&D investments by the private sector
- Development of high-tech small and medium businesses (SMEs)
- Driving existing industries towards new products, i.e. fostering the growth of the industry sector in Croatia and increasing competitiveness of the traditional industrial branches, increasing the innovation rate in the existing industries
- Positioning of Croatia as a technology site, i.e. strategic diversifying from other transition countries that are strategically establishing as low-cost production countries

3.2. Proposed Strategy

There is **a strong need for a common technical infrastructure and service portfolio that will support biotech start up business in the most critical phase of the development cycle** minimizing the risk of investment for entrepreneurs and investors and open the access to the commercial exploitation of the scientific results with biggest market potential. However, in order **to maximise the socio-economic benefits of the investment in that infrastructure, the whole range of complementary facilities and services should be provided**.

The **Central laboratory unit** with equipment for specialized **lab-scale process development** should be established as a core facility of BIOCentre which is made available to different tenants and partners of the Centre, as well as outside contractors. The BIOCentre will also offer office space, qualified laboratory space for start-ups, as well as conference and social rooms. Besides the general and specialized laboratory facilities, biotech start-ups need flexible general infrastructure environment that would enable their fast growth and at the same time provide the vicinity to the Universities and R&D institutes and their research groups. It can be assumed that **at least half of the companies in the BIOCentre will use process development service mainly in its third or fourth year of incubation,** as this is the usual time framework for this activity. The reason is that the production process for a product which is going to be tested on humans should be locked up in front of such testing. Without this service in BIOCentre, companies will be forced to meet their requirements abroad.

Besides that, BIOCentre offers the possibility to establish **training courses** for the use of new technologies, processes and products in the field of biosciences (**technical training**) and for new tools and methods in the field of innovation management and business development (**business training**). The BIOCentre will also develop a **network or cluster of research institutions and companies in the**

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field of biotechnology and life sciences across Croatia and abroad. Therefore, the Centre will benefit not only the region of Zagreb, but all regions with their universities, research institutions, start-ups and companies related to the topic of biosciences.

3.2.1. Outputs

The envisaged outputs of the BIOCentre's market strategy are:

- Development of academic spin-offs;
- Incubation and start-up support to young innovative companies (YIC);
- Technology transfer support;
- Business (including SMEs) R&D activities;
- Process development for new products;
- State-of-the-art technical and business knowledge of methods and tools;
- Network development in the fields of Biotechnology and life sciences.

The above outputs are to be attained through a portfolio of 5 programmes, which constitute in fact the market products portfolio that the BIOCentre is expected to develop and deliver:

BIOFacility

Physical infrastructure: Office space, Laboratory space, equipped Central Laboratory Unit

The BIOFacility will offer **qualified laboratory space** to biotechnology companies (start-up and existing). Laboratories will be suitable for experimental work in the bioscience area. The BIOFacility will also have available **office space** for 10-15 start-ups with up to 15 employees, with basic office equipment and conference rooms.

BIOIncubation

Programme for business development, mentorship, specified services and financial support for academic entrepreneurship, start-up and incubation

In the conception phase, the BIOIncubation programme will first have to deliver an **awareness programme** for scientists and other target groups. When new entrepreneurs have been identified, the programme must provide high quality business assistance and advisory services to these clients. The BIOCentre staff should tailor their business services to meet the needs of each individual client. For specific topics, the BIOCentre staff may need the support of external experts.

The following **business assistance** and **advisory services** will be offered as a part of the BIOIncubation programme: Technology assessment, Market analysis, Competition assessment, Business model development, Intellectual property safeguarding, Financial planning, Seed and Venture financing networking programmes, Regulatory knowledge, Business administration, Controlling, Risk management, Assistance in building the management team, Human resources development, National and international marketing etc.

A **mentoring programme** should be established within the BIOIncubation programme, i.e. each of the new entrepreneurs should be in close contact with an experienced scientific and business

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mentor, who is able to provide start-up support with their experience in the respective field of business.

BIOTransfer

Programme for technology transfer supporting cooperative R&D projects between national and international companies and research institutions, with a focus on the up-scaling process of new bio-products

The planned BIOCentre should not only enable **technology transfer** and **commercialization** through incubation of new businesses (start-up and university spin-off companies), but also through process development service. An equipped **Central laboratory unit (CLU)**, providing central laboratory services, is the heart of the BIOCentre. The CLU is conceptualized to offer complete process development service necessary for bio-product development in line with regulatory requirements necessary to develop, commercialize and register new products. The CLU shall be managed by the BIOCentre and staffed with appropriate technical personnel. From a minimum of 10 to a maximum of 30-34 people (depending on the number of simultaneously running transfer projects) will be able to work in the CLU. About 50% of the people working in the CLU are expected to be interns, thus enhancing research-business cooperation and leveraging job creation potential after the transfer projects are concluded.

BIOEducation

Business and technical training courses for specific know-how, methods and new technologies

The BIOEducation programme will provide two types of training:

- Business training (focused on Business development)
- Technical training (focused on Product development)

Every year the BIOCentre will alternatively provide Business development courses and Product development courses tailored to biosciences and biotechnology businesses.

Business development courses will offer training and support in topics like innovation management, business strategy, market analysis, business financing, legal issues (IPR), development of management, planning and negotiation skills and understanding of the industry.

Product development courses should enable the tenants and clients to receive training and support in process development, GLP (good laboratory practice), GTP (good tissue practice), and GMP (good manufacturing practice) procedures, regulatory compliance etc. Such knowledge is essential to business and professional development.

The courses will be organized and presented together with University staff and industry experts contributing the expert knowledge needed.

BIONetwork

Programme for cooperation, regional networking and international marketing of biotechnology and life sciences in Croatia

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With the BIONetwork programme the Centre aims at **building up a network of all institutions**, **companies and individuals** in Croatia which are directly or indirectly connected with the topic of biosciences. "Directly connected" refers to organizations within the field of biosciences, "indirectly connected" refers to all support institutions and potential partners from other sectors like financial investors and prospective business partners.

BIOCentre will collect relevant business information about the partners and build up a **database** (for example general partner information, research activities, publications, patents, core competences, etc.). Meetings between the partners will take place regularly; international marketing activities will include conferences and international projects.

The BIONetwork will be a useful tool for enhancing business and building **partnerships** and can also be used for national and international students/researcher exchange programmes and the other activities of the BIOCentre.

BIONetwork will connect domestic network with international counterparts.

Development of the BIOCentre

By offering a comprehensive set of services to biotechnology start-ups, the BIOCentre will create strong synergies that will make the development of these companies more efficient. However, due to their complexity, the BIOCentre product portfolio will be developed over several years. It is planned that BIOCentre will develop in two distinct stages – **construction and planning (start-up)** phase (up to mid-2012) and **operational** phase (from mid-2012 onwards).

In the **construction and planning (start-up)** phase (up to 2012):

- **the relationships with academic institutions (in Croatia and abroad), technology transfer offices, external experts, funding agencies and the investor community** need to be built
- **marketing strategy** needs to be implemented
- **the BIOCentre building** needs to be constructed and equipped
- **BIOCentre team** needs to be selected and trained
- **The preparations for implementation of all BIOCentre services** (programmes) need to be completed
- **operational procedures**, as well as **selection and graduation policy** need to be defined
- **Good Laboratory Practice (GLP) certification** for relevant laboratories and services needs to be obtained
- the **project portfolio of potential candidates for incubation** needs to be developed; following a period of preincubation, the first **incubator tenants need to be selected**

In the **operational phase (from 2012 onwards)**:

- in the first year of operation (2012) **at least 25% occupancy rate of lab and office space** should be achieved (2 incubated companies); this should gradually increase **towards 85% occupancy rate** in 2024 (15 incubated companies)

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- in 2013 **the first BIOTransfer (process development) project** should be initiated; this should gradually increase to **4 projects per year** (in year 2027)
- from 2013 onwards, every year, **one (1) comprehensive education/training course** should be delivered as part of BIOEducation. The training focus and topics (business development, product and process development) can alternate from year to year.
- The **Croatian biosciences network (BIONetwork)** should grow continuously. From 2012 onwards it should attract **15 new members each year** - during the first seven years of operation. From 2019 onwards the network is expected to grow at a more modest pace (5 new members per year) and reach the maximum of **150 members** - companies, research institutions and other organisations.

3.2.2. Prices

Given the lack of competition in the strict sense, the main criterion regarding the prices charged at the BIOCentre is that they should not become a deterrent that makes the facilities unattractive to prospective tenants. In other words, given the relatively low financial and much higher social returns on investment, it is calculated that **the prices will be locally and internationally competitive**.

The planned prices for **rent** will be around EUR 8.00 per square meter of office space and about EUR 12.00 per square meter of laboratory space. As for the utilities, the corresponding direct operating costs and an adequate proportion of general operating costs will also be borne by the tenants. A comparison with rent and utility prices of some similar facilities is given below.

TABLE 17: RENT AND UTILITY PRICES AT SELECTED BIOTECHNOLOGY INCUBATORS

EU:	Rent per 1 m²/month	Utility Expenses/ per 1 m²
University of Saarland: Starter Zentrum Science Park	4.50 Euro	2 Euro
	13 Euro	included in rent
Birmingham Science Park Aston	17.37 Euro	9.77 Euro
Heidelberg Technology Park	12 Euro	3.90 Euro
Turku Science Park Office	from 11.50 to 13.50 Euro (including utility)	electricity charged extra
Laboratory	22 Euro (including utility)	electricity charged extra
ASIA		
Haifa Life Science Park	7,32 Euro	4 Euro
USA		
Sid Martin Biotechnology Incubator	15.5 Euro	-

The planned prices for **process development** services in the BIOCentre will be **much lower (at least 40%) than the prices for similar R&D services in Central Europe**. It is estimated that these prices, which reflect local price levels, will be **conducive for lowering the threshold for biotech investments in Croatia and Southeast Europe**. Moreover, they will be attractive enough for foreign companies to utilise the possible unused capacities within the BIOCentre. However, in that case it is important that any crowding out of high quality start-ups is avoided.

On average, **process development on laboratory scale lasts 12 months and involves 8 full time equivalents** (FTE's). Taking into account the salaries of laboratory engineers (EUR 33.459 per annum)

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and the other costs (please see Table 54), that would lead to an average cost of such service of EUR 560.000 per project (i.e. EUR 70.000 per FTE). In the case of the BIOCentre, this cost will be somewhat lower, as half of the BIOTransfer staff will be interns (please see 3.2.1.). Their knowledge and productivity will be somewhat lower than in the case of experienced professionals (but their costs to the BIOCentre will be significantly lower). Consequently, the number of professionals working in the CLU is going to slightly higher than it would have been if only laboratory engineers had been hired. It is planned that the selling price for this service will be **EUR 700.000**, which is significantly lower from the prices for such services in Europe (from EUR 100.000 upwards per FTE)[28]. The cost of this service will be acceptable for start-up companies - taking into account overall development costs, intensity of funding and the timing within its life cycle (Figure 7).

This service is usually set up as a for-profit business. It is offered by contract research and contract manufacturing companies (e.g. Lonza and DSM) at significantly higher prices. In the BIOCentre concept this service will be offered by publicly owned incubation facility at prices that will be affordable to the start-up companies (which will also benefit from other BIOCentre services). On the other hand, the income generated through process development services will enable the BIOCentre to devote its resources to activities which are not profitable in themselves (e.g. incubation). In this way, the socio-economic benefits of the project will be maximised.

3.2.3. Marketing, promotion and distribution activities

Successful operation of the BIOCentre project will require **efficient implementation of several complementary biotech-related activities** that will create synergies through cross-promotion and cross-selling.

The marketing strategy should be based on the analysis of the **needs of the target groups** outlined above (3.1.7). This is particularly important for the **start-up phase**, when the initial **project portfolio** of potential candidates for incubation needs to be developed. The key target group at this stage are **researchers engaged in projects with a commercial potential** and their **academic institutions**. However, in order to reach them and initiate the research commercialisation process, the BIOCentre needs to build **working relationships with partners and stakeholders that will assist the researchers in project development and financing, technology transfer and other preincubation activities**. As a provider of services operated from one location, the BIOCentre will not develop distribution channels in the usual sense, but rather **a network of corresponding institutions and partners that will support its work**. These stakeholders include academic institutions (in Croatia and abroad), technology transfer offices, external experts, professional service providers (e.g. IP lawyers), funding agencies, the investor community and industry associations. Moreover, the understanding and support of the **wider academic and general public** should be facilitated through marketing and public relations activities.

Through a technical assistance project, **external expert**(s) will assist BICRO and the BIOCentre management in development and implementation of a **marketing and communication strategy** towards each of the **target groups** (**researchers** and **academic institutions, academic spin offs, young innovative companies, SMEs and corporations**). The costs of implementation of the marketing strategy will be included in the project as incidental expenditures. Initial list of activities related to marketing and public relations is given in the table below. The current estimate of the total amount available in 2011 and 2012 is EUR 101.548.

[28] The information has been obtained by Mr. Ivo Friganović in communication with a company which purchases such services. However, the informant identity cannot be disclosed.

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Simultaneously, **HIT and BICRO**, as the pivotal public innovation agencies will strengthen their activities related to **new technology development** (especially in the field of biosciences), improve the effectiveness of **technology transfer** and promotion of **academic entrepreneurship**. In such a way, they will foster the demand for the future services of the BIOCentre. In cooperation with the Ministry of Science, Education and Sports, innovation **policy measures will be adjusted, improved or re-designed** in order to stimulate technology transfer, with an emphasis on entrepreneurial projects in biotechnology and life sciences.

TABLE 18: MARKETING AND PR ACTIVITIES IN THE START-UP STAGE

Year	Activities
2010	▪ Press releases ▪ Information sessions for researchers and university staff
2011	▪ Development of the visual identity ▪ Web page ▪ Brochures / leaflets / media pack ▪ Press releases ▪ Setting up information desk for future tenants and partners ▪ Workshops for researchers at major universities and research institutes, organized in collaboration with TTO (5 workshops) ▪ Workshops for management of universities and research institutes (2 workshops) ▪ Collaboration and promotion with technology transfer offices (media day, coordination sessions) ▪ Outreach activities with other partners (funding agencies, professional associations, investor community, similar facilities in the EU, Croatian researchers abroad) ▪ A series of presentations at high-profile events in Croatia and South East Europe ▪ Collaboration with Enterprise Europe Network (EEN), International Association of Science Parks (IASP), European BIC Network (EBN)
2012	▪ Press releases ▪ Opening event ▪ High profile biotechnology conference ▪ Open days of the BIOCentre – (information sessions for academic and general public) ▪ Workshops for researchers at major universities and research institutes, organized in collaboration with TTO (5 workshops) ▪ Workshops for management of universities and research institutes (2 workshops) ▪ Collaboration and promotion with technology transfer offices (media day, coordination sessions) ▪ Outreach activities with other partners (funding agencies, professional associations, investor community, similar facilities in the EU, Croatian researchers abroad) ▪ Regional presentation, information workshops and seminars ▪ Collaboration with Enterprise Europe Network (EEN), International Association of Science Parks (IASP), European BIC Network (EBN)

From the moment when BIOCentre becomes fully operational, there will be an **ongoing marketing effort** focusing on **target groups**, as well as on the **extension and efficient use of the partner network**. The corresponding costs will be included in the **operational expendit**ures of the BIOCentre.

The BIOCentre aims at integrating local and national research partners as well as governmental and international institutions. Furthermore, also international research cooperation and projects will be targeted. Therefore a supra-regional, national as well as international orientation of the BIOCentre should be guaranteed, and an accompanying **project flow should be secured**.

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3.3. Competition

Comparing the BIOCentre with other similar international projects, the infrastructural and technical possibilities that will be offered **meet or even exceed the international benchmarks**. The possibility to use the central laboratory unit with the latest equipment in the field of biosciences provides the Centre with a competitive advantage. Comparable international Centres, the newly established Centres in Central Eastern Europe especially often do not offer these kinds of equipment and services for the tenants and also the size of the laboratory spaces, and hence the targeted innovation degree of the BIOCentre Zagreb, is much higher.

The BIOCentre will combine **all the necessary investments and activities that are important for establishing an innovation Centre for biosciences**. Comparing the Centre with similar European institutions, it offers more services that are consolidated at the BIOCentre. The main reason for this approach is the fact that no supporting institutions like clusters, technology transfer institutions etc. are available in Croatia. However, for a successful implementation and start of the innovation Centre all these different programs / parts of the BIOCentre are needed.

When it comes to projects such as the BIOCentre, which focus on the nascent industries, **it is difficult to analyse competition in the strict sense**, i.e. the competitors trying to reaching the same or similar target groups. What is at stake is the pace of development of biotechnology industry in Croatia and the wider region, i.e. the **opportunity cost of not being able to provide a nurturing environment for high potential biotechnology projects**. If the scenario **without the BIOCentre, some of these projects may be developed elsewhere** (at other incubators or companies), but **many more are unlikely to developed at all** – since they will not be able to overcome the accompanying transaction costs.

For that reason, in this section we briefly examine the features of two successful biotechnology incubators from developed countries (Holland and Austria), as well as an recent example from the Central and Eastern Europe (Czech Republic). The purpose is primarily **to examine the conditions that have enabled success of these initiatives**, and secondarily **to discern how to design the BIOCentre to become more attractive to its potential clients that its alternatives**. It should be noted that **all of these biotechnology incubators have been visited by BICRO experts** and their experiences have been used in the BIOCentre design.

3.3.1. Supply Features of Similar Outputs

BioPartner Center Maastricht

BioPartner Center Maastricht is a life sciences incubator and business centre that offers business accommodation to life sciences start-ups and expanding life sciences companies. Its mission is to increasing the chance of success for life sciences start ups. Its facilities include 5.000 m² office or laboratory space (50 flexible units), a Shared Facilities Center (tissue incubator, cold laboratory room, meeting rooms etc.), GMP cell therapy clean rooms and access to various research facilities of the Maastricht University. The building has a direct connection to the Academic Hospital Maastricht (AZM) and the buildings of the Faculty of Medicine of the University of Maastricht (UM). In addition, Center Maastricht offers guidance and support with regard to business, fiscal, IPR and legal issues. The establishment of both start-ups and expanding life sciences companies at the Center will help to create an elaborate and extensive network of local life sciences businesses. At the moment, 17 companies and two project organizations, employing 54, are in residence. There is a mix of starters and existing companies and life science support services.

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Vienna Biocenter

Campus Vienna Biocenter was founded in 1992, as a result of the **close relationships between private industry and the life science research facilities** at the University of Vienna. The nucleus was made up of eight university departments doing world-class research in molecular biology and the Research Institute of Molecular Pathology, a life science think tank set up by the Boehringer Ingelheim Group. Over 250 publications are produced annually by the Institute of Molecular Pathology and the university institutes on the Campus, many of which are translated into patent applications. The quality of the science done at Campus Vienna Biocenter is backed up by the teams of **top-quality international advisers**. R&D is carried out in **cooperation with international institutions** such as the National Institutes of Health in the USA, the Karolinska Institute in Sweden or the US Institute for Genomic Research (TIGR). The Campus's **network of business contacts** started by Boehringer Ingelheim (Germany) has been expanding. It includes US companies such as Baxter Bioscience, Merck & Co., Chiron and Affymetrix, as well as European (Berna, MediGene, Novartis, Q One and Syngenta. Including also its contacts in Asia, **the network now extends to three continents**.http://www.viennabiocenter.org/

South Moravian Innovation Centre (INBIT & Gate2Biotech)

The South Moravian Innovation Centre (JIC) **supports innovation-based entrepreneurship** in the Czech Republic. JIC activities follow the Regional innovation strategy of the South Moravian region (RIS). It deals with projects financed from the state budget and EU Structural Funds**.** New spaces for start-up innovation companies are being created thanks to Technology incubator 2 and **biotechnology incubator INBIT (Incubator for Biomedical Technologies)**. JIC is engaged also in other activities, which support innovations in the region, such as e.g. project of International Clinical Research Center (ICRC), or project of Central European Technology Institute (CEITEC). JIC has participated in the creation of some clusters. Clusters are regional groups of companies with common interests. JIC has co-created the biotechnology cluster for water treatment and water purification, Czech aircraft industry cluster and bioinformatics cluster. One of the key initiatives supported by the South Moravian Innovation Centre is Gate2Biotech.com, a portal that aims to facilitate the communication inside and outside the country through networking and develop the biotechnology sector in the Czech Republic. Gate2Biotech has been created by South Moravian Innovation Centre with support of CzechInvest

http://www.gate2biotech.com/

Conclusion

To sum up, the approach which is to be implemented within the **BIOCentre project ranks among the most comprehensive** in comparison to the successful examples. The combination of incubation, education, business support, financial incentives and networking programmes is challenging but workable, as the example of the BioPartner Center Maastricht demonstrates. In order to implement such a comprehensive approach, **a complex network of researchers, engineers, business service providers, public and private financiers needs to be developed** and put into motion. Only such a network can guarantee a stream of projects that will generate strong positive economic and social outcomes and externalities.

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3.3.2. Competitive Structure, if existing or can be forecasted

Given the knowledge, time and other resources necessary to develop such a project, from its foundation onwards the BIOCentre is likely to have a **monopoly position** when it comes to biotechnology incubators in South East Europe. It is estimated that this is likely to last **at least five years** and possibly much longer. The possible future emergence of other incubators in South East Europe and other neighbouring countries may actually be a sign of positive trends in biotechnology development in the region and may thus even create positive externalities for the BIOCentre.

3.3.3. Success Factors

The BIOCentre success factors are related to the **supply of key inputs**, the quality and effectiveness of **project implementation**, as well as to the **demand for project outputs**.

One of the key reasons for locating the BIOCentre in Zagreb is because the **critical mass of researchers, service providers and active companies for sustaining the operations of the centre** is located here in the capital city. Research, product and process development, testing and up-scaling will be carried out at universities and research institutions, companies and large industry that are mainly located in Zagreb and surrounding area. To ensure a critical mass for the Centre in the field of biotechnology and life sciences, a large number of researchers must be available close to the Centre. Zagreb boasts two largest research institutions (the University of Zagreb and the Ruđer Bošković Institute) in Croatia that can provide **high quality research with a commercial potential**. Another set of critical success factors is related to **efficient project implementation** (which will be dealt with in more details in Chapter 7). These include technical and management expertise, as well as extra funding provided by the City of Zagreb and Bicro (to cover losses and additional investments during the project lifetime). Furthermore, the research laboratories of pharmaceutical companies, IP lawyers, banks and venture capital and private equity providers, the agencies for technology transfer, innovation and enterprise support and other actors also need to contribute to the project success. The research with a commercial potential should be identified, the associated IP rights need to be secured and **mechanisms that facilitate technology transfer and new technology based firm creation** should be in place. These include regulation, support structures at academic institutions and financial incentives and funds for new technology based firms. Another import success factor is access to a **network of international partners** – in terms of research collaborations, evaluation of commercial potential of specific projects, expert and financial participation in particular projects, and, particularly, the **demand for biotech products produced by companies developed at the BIOCentre** etc. Optimal socio-economic outcomes also require continuation of **positive trends in the biotechnology markets**, including the rising demand on the part of larger corporations that will seek to acquire firms or technologies developed within the BIOCentre.

3.4. Estimate on the Percentage of Potential Use

On the basis of aforementioned data, this study estimates is that **the Croatian R&D community is capable enough to annually generate 15-20 life sciences and/or biotechnology projects with a commercial potential**. At this moment, close to **900 basic and applied research projects** in the related areas are funded by the MSES alone (in 3-year cycles). So far, these projects have yielded an output of **60 patents**. If we assume that a half of these ideas which have translated into patents hold a commercial promise and can go towards product development, and if only one third of them take the commercialisation route in the form of a start-up company (which is less frequent than licensing

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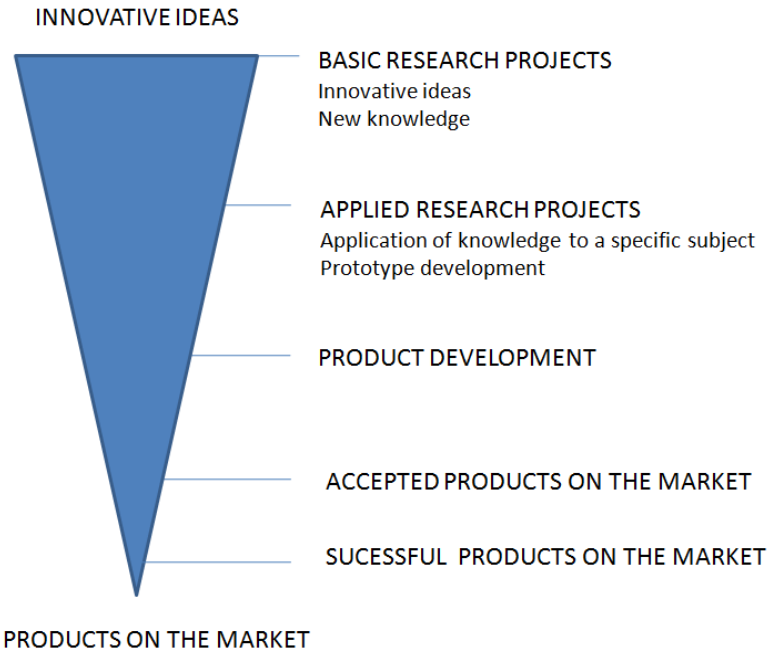
out technology to an established company), with appropriate funding mechanisms and infrastructure in place, there would already be **10 projects in the pre-commercial phase** to support.

In addition, BICRO's **RAZUM and IRCRO programmes are currently funding 4 out of 8 biotech start-up companies** (established in the last 3-4 years) in Croatia. As investments into R&D are set to increase, and biotechnology being one of the priority areas of research set out in the Croatian Science & Technology Policy, and with the constant improvement of technology transfer support environment, it is reasonable to expect **an increase in the R&D output in the next years**.

FIGURE 11: FROM GENERATING IDEAS TO EXPLOITATION



A good example of that increase in the R&D output with a commercial potential, when intermediaries are put in place and funding is available, are the developments taking place in the last two years at the Rudjer Boskovic Institute (IRB), the largest Croatian research institute. This was the result of setting establishment of a technology transfer company (Rudjer Innovations Ltd.) which is in charge of protecting and commercialising all research stemming from the Institute that holds market potential. The outcomes of that initiative so far have been:

- a greater number of IP and projects
- strong focus on commercialisation sales activities
- newly established relationships with industrial companies and SMEs
- 36 licensed inventions
- 26 innovations for which a patent application has been filled (16 PCT)
- 3 granted patents (Croatian, Europe and the US); all three in the field of biomedicine.

Out of the 22 new inventions for which Rudjer Innovations has been granted a license and for which a patent application has been filed, 8 are in the field of chemistry, 5 are pharmaceuticals, 3 are medical devices, 4 are software-related, 1 is in the field of medicine and 1 in the field of biology. It is

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reasonable to assume that similar outcomes can be replicated at other major Croatian universities, with the assistance of the recently-founded technology transfer offices. The **BIOCentre project can act as a catalyst whose active role in project development** (in accordance with the needs analysis and marketing strategy outlined above) **can facilitate a substantial project flow in the future**.

Demand Evaluation for the BIOFacility and BIOIncubation Programme

The main function of the BIOFacility is to offer infrastructure support (office and laboratory space, central laboratory equipment) to start-up companies, established as academic spin-offs in the field of biotechnology and life sciences. They build the main target group of the BIOFacility and consequently of the BIOIncubation. Additionally, the Centre is also targeting the existing SMEs in the field of biosciences helping them to develop faster through the benefit from the Centre's infrastructure and services.

The goals of the BIOCentre under BIOFacility for the next 4 years period can be summarized as follows:

TABLE 19: KEY OUTPUT INDICATORS FOR THE BIOFACILITY

	2012	2013	2014	2015
OCCUPANCY	25%	50%	60%	65%
No. of NEW START-UPS	2	3	2	2

Due to the results of the analysis, it is reasonable to assume that the R&D capacity and the R&D output in the field of biosciences in Croatia (predominantly the pre-commercial projects with high commercial potential) represented by the most significant R&D units, could provide **15 to 20 projects with commercial potential annually, resulting in 3 – 6 start-ups per annum, out of which approximately 2 – 3 will use BIOIncubation services**.

Together with other mentioned sources, like the Croatian scientific Diaspora and spin-outs from the existing industry (companies), there is a critical mass for the Centre which will be able to deliver **3-5 start-up companies per year, resulting in approximately 15-20 start-ups in the 4 years period**.

The existing SMEs, time based research projects for other R&D institutions and industries in Croatia and expected foreign investments, could provide the rest part of critical mass of companies/projects needed to guarantee the necessary occupancy of the Centre (in average 2 additional companies /projects that need Centre's infrastructure (office space and lab facility).

Demand Evaluation for Technology Transfer - BIOTransfer

Through the BIOTransfer, the Centre aims to offer the existing companies the possibility to use know-how and infrastructure of the BIOCentre (central lab, R&D services / process development on the lab scale) for their R&D activities, especially if they are looking for cooperation with research institutions, aiming at generating income and ensuring self-sustainability in the long run.

The goals of the BIOCentre under the BIOTransfer programme for the period between 2012 and 2015 can be summarized as follows:

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TABLE 20: KEY OUTPUT INDICATORS FOR THE BIOTRANSFER PROGRAMME

	2012	2013	2014	2015
No. of NEW PROCESS DEVELOPMENT PROJECTS	0	1	1	1
No. of NEW PROCESS DEVELOPMENT PROJECTS FROM THE COMPANIES in the Centre	0	0	0	1
No. of INITIATED NEW COOPERATION PROJECTS (using laboratory infrastructure of the Centre)	0	1	1	0

It can be assumed that **at least half of the companies in the BIOCentre will use the R&D services in connection with the central lab** of the Centre.

Considering the number of entities and projects that can be allocated to the whole target group, the international market potential of this service is far higher than the current targets (number of planned process development projects).

Demand Evaluation for BIOEducation Programme

Business development courses and product development courses that are tailored to the needs of biosciences and biotechnology businesses and offered by the BIOCentre in cooperation with the international experts, will represent a novelty on the Croatian market as well as in the South East Europe markets in general. They will address equally the research community and the business community and additionally the academic sector.

The target groups are primarily the employees of the start-ups, clients of the BIOCentre and all members of the BIONetwork. Taking into consideration the number of planned start-ups / incubatees, planned clients of the BIOCentre (R&D and companies) given through the number of initiated cooperation on the annual basis, as well as the dynamic of the new memberships in the Network, it can be assumed that the BIOCentre will be able to educate and train approximately 50 persons per annum (the number of R&D employees in Croatia in this sector is 800 in biotechnical sciences and over four thousand in biosciences in total).

The total number of Croatian and neighbouring South-eastern Europe companies, R&D institution, academic institutions and active clients in the biosciences that could profit from the trainings, shows a far higher potential than the current targets. This potential could be exploited to a wider extent in the further development of the BIOCentre.

Demand Evaluation for BIONetwork Programme

The goals of the BIOCentre under the BIONetwork programme for the period between 2012 and 2015 can be summarized as follows:

TABLE 21: KEY OUTPUT INDICATORS FOR THE BIONETWORK PROGRAMME

	2012	2013	2014	2015
No. of NEW BIONetwork MEMBERS	15	15	15	15

Taking into account the number of the existing research and business entities involved in the field of biosciences as well as emerging /establishing service providers in Croatia, including the new entities

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that are supposed to be established in Croatia through companies and foreign investments through the activities of the BIOCentre but also through other initiatives in the four year period from the beginning of the Centre's operations, reaching the goal of 15 new members each year appears realistic. But considering the efforts needed to attract the members and to gain the confidence of the potential members through services it could be difficult to reach this goal. A good programme of offerings is inevitable for the development of BIONetwork.

The function of the BIONetwork is to initiate cooperation between members. The number of cooperation projects between R&D institutes and domestic industry in the field of biosciences is not significant at the moment, but it seems reasonable to assume that, with the beginning of the Centre's activity, the number of collaborative projects will increase. It can be assumed that the providing specific technical infrastructure as prerequisite for the market accessibility for the R&D results will increase the interest of the both scientific and business community for entering collaborative projects with strong market orientation.

It is advisable to widen the target group to other geographical markets in the vicinity to Croatia and try to connect to existing networks and clusters in other countries.

Indicators

Based on the projects goals and the demand evaluation the following key performance indicators can be defined:

TABLE 22: KEY PERFORMANCE INDICATORS FOR BIOCENTRE IN YEARS 2012 - 2015

	2012	2013	2014	2015	Cumulative in the 4-year period
No. of NEW START UPS	2	3	2	2	9
No. of COMPANIES USING the CLU FACILITIES	0	1	1	1	3
No. of NEW HIGHLY EDUCATED EMPLOYEES	10	10	15	15	50
No. of NEW COMPANIES members of BIONetwork	15	15	15	15	60

3.4.1. Sales Forecasts for the Project

As it has been outlined, the BIOCentre aims to reach the following sales targets:

- In the construction and planning (start-up) phase **at least two (2) companies** should be attracted to the Centre so the BIOCentre can start operations immediately
- Every year **two to three (2-3) new biotechnology or life sciences companies** should be founded in the Centre and become a part of the BIOIncubation™ programme
- In the first year, 25% of CLU initial capacities will be sold and by the fourth year it will reach 65% CLU capacities (and then increase towards 85% in 2024)
- The start-up companies should stay at least 3 years in the BIOCentre, whereas the process development projects should have an average duration of 1 year.

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- Every year, **one (1) comprehensive education/training course** should be delivered as a part of the BIOEducation. The training focus and topics (business development, product and process development) can alternate from year to year. The courses will have several modules during the training year.

- The BIONetwork should grow continuously. Every year the network should gain at least **fifteen (15) new members**. After 7 years, the Croatian biosciences network should consist of more than 100 companies, research institutions and other organisations.

BIOFacility

Total area of office space intended for rent is 510m² with the price estimated to € 8.00 per square meter. Total area of laboratory space intended for rent is 1067 m² with the price estimated to € 12.00 per square meter. The occupancy rate in 2012 is assumed to be 25%. The rate is assumed to be increasing every year until it reaches 90% in the year 2030. Even at close-to-full occupancy, the occupancy rate should not be taken to exceed 90% due to companies leaving and moving in BIOCentre at different times. The utilities/running costs of the offices and laboratories will be borne by the tenants.

TABLE 23: BIOFACILITY REVENUE FORECAST, IN EUR

BIOFacility - Revenue	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Occupany rate	25%	50%	60%	65%	70%	72%	74%	76%	78%	80%
Renting of office space	12.240,00	24.480,00	29.376,00	31.824,00	34.272,00	35.251,20	36.230,40	37.209,60	38.188,80	39.168,00
Renting of laboratory space	38.412,00	76.824,00	92.188,80	99.871,20	107.553,60	110.626,56	113.699,52	116.772,48	119.845,44	122.918,40
Total revenue (€)	**50.652,00**	**101.304,00**	**121.564,80**	**131.695,20**	**141.825,60**	**145.877,76**	**149.929,92**	**153.982,08**	**158.034,24**	**162.086,40**

BIOFacility - Revenue	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Occupany rate	82%	84%	85%	85%	85%	85%	85%	85%	90%	90%
Renting of office space	40.147,20	41.126,40	41.616,00	41.616,00	41.616,00	41.616,00	41.616,00	41.616,00	44.064,00	44.064,00
Renting of laboratory space	125.991,36	129.064,32	130.600,80	130.600,80	130.600,80	130.600,80	130.600,80	130.600,80	138.283,20	138.283,20
Total revenue (€)	**166.138,56**	**170.190,72**	**172.216,80**	**172.216,80**	**172.216,80**	**172.216,80**	**172.216,80**	**172.216,80**	**182.347,20**	**182.347,20**

BIOIncubation

For the purpose of projecting revenue, the number of users is assumed at 2 users in 2012 and it is increasing every year until it reaches the maximum of 15 users in 2024. The BIOCentre will also offer business assistance and advisory services (supplied by its staff) that will accompany incubation. Price of business assistance and advisory services is estimated to € 5.000,00 per user annually.

TABLE 24: BIOINCUBATION REVENUE FORECAST, IN EUR

BIOIcubation - Revenue	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
No. of users	2	5	7	9	12	12	12	13	13	13
Total revenue (€)	**10.000,00**	**25.000,00**	**35.000,00**	**45.000,00**	**60.000,00**	**60.000,00**	**60.000,00**	**65.000,00**	**65.000,00**	**65.000,00**

BIOIcubation - Revenue	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Occupany rate	14	14	15	15	15	15	15	15	15	15
Total revenue (€)	**70.000,00**	**70.000,00**	**75.000,00**	**75.000,00**	**75.000,00**	**75.000,00**	**75.000,00**	**75.000,00**	**75.000,00**	**75.000,00**

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BIOTransfer

The revenues generated through the BIOTransfer are related to process development projects that are to be implemented at the Central Laboratory Unit of the BIOCentre. It is planned that both tenants and external companies use the CLU. The research projects will on average last for one year (varying in duration from 6 months to a couple of years). Given the highly competent staff, strong networking and reasonable pricing strategy (please see 3.2.2), it is expected that both **the number and the complexity of projects that are to be undertaken will increase gradually**. At full capacity, it is expected that, on average, 4 projects will be implemented every year.

TABLE 25: BIOTRANSFER REVENUE FORECAST, 2012 – 2031, IN EUR

BIOTransfer – REVENUE	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
R&D ACTIVITY	0	700.000	700.000	700.000	1.400.000	1.400.000	1.400.000	1.400.000	1.400.000	2.100.000

BIOTransfer – REVENUE	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
R&D ACTIVITY	2.100.000	2.100.000	2.100.000	2.100.000	2.100.000	2.800.000	2.800.000	2.800.000	2.800.000	2.800.000

BIOEducation

BIOEducation programme will provide a **comprehensive education/training course** every year that will enable its participants to upgrade their knowledge and skills. The topic of the training (business development vs. product and process development) is expected to alternate from year to year. The revenue generated through the training is expected to reach 6.000 Euros per participant, which is comparable to current costs of similar courses in Croatia.

TABLE 26: BIOEDUCATION REVENUE FORECAST, 2012 – 2031, IN EUR

BIOEducation - REVENUE 6000€ / per user	2013	2014	2015	2016	2017	2018	2019 – 2031*
Business training	60.000 (10)*		90.000 (15)		120.000 (20)		
Technical training		60.000 (10)		90.000 (15)		120.000 (20)	
Bus/Tech (20 students)							120.000
TOTAL	**60.000**	**60.000**	**90.000**	**90.000**	**120.000**	**120.000**	**120.000**

* Please note: After 2019 the revenue is considered to be constant

BIONetwork

The BIONetwork participants will pay a fee of 300 Euros per year, which will enable them to access knowledge, seek partners, participate in joint events, collaborate effectively and lobby for their interests. The network is expected to grow relatively strongly (15 new members each year) in the first 7 years, and more moderately (5 new members each year) thereafter, until 2027.

TABLE 27: BIONETWORK REVENUE FORECAST, 2012 – 2031, IN EUR

BIONetwork - REVENUE 300€/year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Database membership fee	4.500 (15)*	9.000 (30)	13.500 (45)	18.000 (60)	22.500 (75)	27.000 (90)	31.500 (105)	33.000 (110)	34.500 (115)	36.000 (120)
TOTAL	**4.500**	**9.000**	**13.500**	**18.000**	**22.500**	**27.000**	**31.500**	**33.000**	**34.500**	**36.000**

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BIONetwork - REVENUE 300€/year	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Database membership fee	37.500 (125)	39.000 (130)	40.500 (135)	42.000 (140)	43.500 (145)	45.000 (150)	45.000 (150)	45.000 (150)	45.000 (150)	45.000 (150)
TOTAL	**37.500**	**39.000**	**40.500**	**42.000**	**43.500**	**45.000**	**45.000**	**45.000**	**45.000**	**45.000**

* Please note: The number of network members is given in brackets.

The total revenues of the BIOCentre are given in the following table.

TABLE 28: BIOCENTRE REVENUE FORECAST 2012 – 2031, IN EUR

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
TOTAL REVENUE	65.152,00	895.304,00	930.064,80	984.695,20	1.714.325,60	1.752.877,76	1.761.429,92	1.771.982,08	1.777.534,24	2.483.086,40

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
TOTAL REVENUE	2.493.638,56	2.499.190,72	2.507.716,80	2.509.216,80	2.510.716,80	3.212.216,80	3.212.216,80	3.212.216,80	3.222.347,20	3.222.347,20

3.4.2. Market shares, coverage of the shares of various needs

At the moment of its foundation, the BIOCentre project will be **the only institution of its kind** within **Croatia** and **Southeast Europe**. Consequently, it is expected that during at least the first five years of operation it will occupy a market share of 100 per cent in the area of biotechnology incubators **in Croatia**. It will thus satisfy **all the needs of potential clients in the key target market (biotech start-ups that commercialise research undertaken in Croatia)**. As for the other target markets (industry projects in particular), it is expected that the BIOCentre will cover **between 30 and 40 per cent of the process development outsourced in Croatia**.

Potential competitors are likely to emerge only **when the BIOCentre project proves its viability**, and the **Croatian biotechnology industry becomes ready for a stronger expansion**. That will mean that BIOCentre becomes unable to fulfil the needs of biotechnology companies emerging in Croatia. Since the time necessary to develop and implement a similar project in Croatia or elsewhere in Southeast Europe is likely to be at least three years, we assume that **the next Croatian competitor in the area of biotechnology incubators will start functioning around 2020**. That will increase the competition for best projects and decrease the market share of the BIOCentre, but will not affect its viability.

Moreover, it can be expected that some future Croatian biotechnology start-ups will opt for foreign incubators - mainly due to stronger integration of European markets and larger resources pools available to start-up companies at foreign incubators. However, given the competitive process available at the BIOCentre, it is also likely that it will attract an increasing number of foreign clients as well.

3.4.3. Forecasting hypothesis and techniques

The sales forecast assumes that:

- **Croatian biotechnology industry cannot develop without an incubator** that will facilitate **technology transfer** and offer a **comprehensive set of services** to start-ups and existing companies

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- BIOCentre will serve as a **vehicle for industry development** that will serve all or most needs the needs of target groups in this first years of operation

- The systematic development of the BIOCentre activities (through the start-up stage of the project development and the first 3-4 years of operation) will lead to **gradually increasing demand for its services**, culminating in **close to full occupancy of its capacities within about 5 years**

- Eventual **excess capacity will be offered to larger companies and international clients**, which will be attracted by the **quality of services** and **competitive pricing**

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4. Technological Alternatives and Production Plan

4.1. Description of Significant Technological Alternatives

The BIOCentre is a **highly specific and innovative project**, whose design reflects the needs of the target groups related to infrastructure, know-how and networking necessary to develop biotechnology and life sciences start-ups. Although the BIOCentre comprises five distinct programmes, only the BIOFacility segment (infrastructure) is primarily defined by the technology used. Its aim is to provide an up-to-date process technology that will enable **the whole process development and product testing under the GLP conditions**, necessary for the transferring of the research results into the products, designed and developed for the market needs. **In this regard, the technology alternatives are limited and primarily defined by technology suppliers.**

4.2. Selection of Appropriate Technology

The BIOCentre project has been **designed to satisfy the needs of target groups** and address the aforementioned structural gaps by the means of a **comprehensive, but cost-effective solution.** This approach is reflected in the design of the BIOCentre project.

As outlined, the BIOCentre will comprise five programmes: BIOFacility, BIOIncubation, BIOTransfer, BIOEducation and BIONetwork. BIOCentre will enable **the whole process development and product testing under the GLP conditions.** Besides the general and specialized laboratory facilities, it will provide **biotech start-ups with flexible general infrastructure environment and support services that will enable their fast growth.**

The BIOFacility, as the technology core of the BIOCentre, will consist of two main segments. The first one, an equipped **Central laboratory unit (CLU)** will provide central laboratory services. Companies will be able to use the CLU or contract R&D. Currently no laboratory spaces with such high standard research equipment (which can be used by external users) are available in Croatia or the neighbouring countries.

The CLU is conceptualized to offer complete process development facilities, necessary for bio-product development in line with regulatory requirements necessary to develop, commercialize and register new products. The CLU will comprise a Cell banking unit (CBU), Cell culture laboratory (CCL), Microbial culture laboratory (MCL), Product recovery unit (PRU), Purification laboratory (PUL), Bio-analytical laboratory (BAL) and a Buffer and media preparation unit (BMU). Accompanying technical rooms and services (such as sterilisation, chemical waste handling, de-ionized water production, storage etc.) will be provided as well. The CLU shall be managed by the BIOCentre and staffed with appropriate technical personnel (up to 30-34 people will be able to work in the CLU, depending on the number of projects).

The specialized equipment of the CLU enables the companies to perform **lab scale process development** both **with mammalian**, **microbial** or **yeast cells**. The company supplies the laboratory with a cell line, which is used by the CLU to produce small cell banks for the clients. The Cell culture laboratory and the Microbial culture laboratory are two completely independent units ensuring that two projects can be run in parallel. Furthermore, the laboratory is planned in a way that the research projects use the individual lab units in a sequential manner. Therefore it is possible to conduct more than one research project simultaneously. Convenient laboratory conditions will be ensured by an entrance corridor which provides special air pressure conditions and a safe entrance from the other

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laboratories or offices. The equipped storage, wash and sterilization rooms are available to users of the CLU. These CLU facilities can be used by all tenants for process development and product development, but access is of course limited. Common large laboratory equipment as well as an ultra-centrifuges and deep-freezers are offered to all tenants. Individual specialized equipment in the central laboratory units is handled by trained technical staff of the BIOCentre.

The second segment of the BIOFacility will be **qualified laboratory space**, suitable for bio-chemical and microbiology development processes. Laboratories will be organised in 10 (20) modules per 100 (50) square meters (suitable to divide in 25 square meters labs if necessary) and, therefore, suitable for accommodation of 10-25 companies at any given time. Laboratories will only provide basic utilities (water, gas, lab benches, hood/digestor), whereas the tenants will need to provide their own equipment. The BIOFacility will also have available **office space** for 10-15 start-ups with up to 10 employees, with basic office equipment – a 'start-up kit' for new companies – telecommunications and hosted IT service, conference rooms – 3 smaller conference rooms for business meetings, equipped with AV links, projector and white boards.

4.3. Buildings and Plants

In total, the BIOCentre should have about 5.330 square meters of gross floor area and about 4.457 square meters of usable floor area. This should satisfy the requirements and enable good conditions for all the BIOCentre activities. Given the **specific technical requirements**, it is highly advisable to **build a new building**, rather than to adapt an existing one. The BIOCentre should be **large enough to act as a recognized biosciences Centre** and **small enough to gain a respectable occupancy rate**, which is a problem of many innovation and incubation Centres in Europe. The Centre is filled with innovative companies only in order to maximise occupancy of the laboratory spaces. Nevertheless, as external research partners or companies may also rent laboratory spaces, an adequate occupancy rate (85% - 90%) should be achieved over time. The spaces are planned with enough flexibility. After the planning period of the Centre, the allocation of the spaces may vary and be adapted to the final needs of the companies. Also, the fixed equipment for the rentable spaces is kept low in order to both offer the companies enough flexibility within their spaces, and to keep the initial investment costs for equipment in a reasonable size.

The floor space of the BIOCentre will be divided into four categories, according to use:

- **Laboratories for tenant companies**
- **Common laboratory** spaces – **Central laboratory unit** with storage rooms, sterilization and wash room
- **Offices for tenant companies**
- **Common** (office) s**paces** – Reception, administration area, conference rooms, social rooms

The total area of office and laboratory space that will be used by BIOFacility and BIOTransfer are given in the table below.

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TABLE 29: TOTAL AREA OF OFFICE AND LABORATORY SPACE (BIOFACILITY AND BIOTRANSFER)

Programme	Space	Area (m²)
BIOFacility	Laboratory space	1.067
BIOFacility	Office space	510
BIOTransfer	Laboratory space	607
BIOTransfer	Office space	303
Total area		**2.487**

Laboratories for Tenant Companies

The laboratories for rent shall include all installations such as electrical and HVAC installations. Except for the fixed laboratory furniture, like laboratory benches, sinks and ventilated hood spaces, no further laboratory equipment is included. As the BIOCentre will have a separate sterilization and washroom, no separate sterilization equipment is needed in the laboratories for the tenants. Due to the individual needs of the companies and the individual characteristics of the R&D projects, the provision of additional laboratory equipment, on top of that available in the common laboratory spaces, is not feasible.

The laboratories for the tenant companies are separated into **20 individual flexible modules** with 50 square meters each (can be further divided into smaller 25 square meter spaces with all utilities). This space should enable the companies to grow up to an average of 10 employees each.

The Central Laboratory Unit (CLU)

The Central Laboratory Unit (CLU) comprises of specialized bio-chemical laboratory units taking up around 600 square meters in total, storage rooms of about 50 square meters, wash and sterilization rooms with about 50 square meters, and around 75 square meters of office space for permanent technical staff.

The CLU consists of the following seven individual labs, all of biological safety level 2 that are connected by a safety entrance corridor:

- Cell banking unit (CBU)
- Cell culture laboratory (CCL)
- Microbial culture laboratory (MCL)
- Product recovery unit (PRU)
- Purification laboratory (PUL)
- Bio-analytical laboratory (BAL)
- Buffer and media preparation unit (BMU)

All of these labs should have their own safety entrance from the corridor and allow researchers to enter each lab individually. In total the CLU should cover about 600 square meters of usable floor area and be equipped with specialized research instruments and devices for optimum R&D activities in the field of biosciences for **a total investment sum of around € 3.750,000** (please see 4.8.3). The equipment (including the prices) was planned by a local biotechnology expert with extensive knowledge of process development.

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Offices for Tenant Companies

It is planned that a total usable space of 510 square meters is available for tenants, which can be split into 10-15 offices units with 30-45 square meters each (depending on the size and needs of the companies). Offices will include only basic equipment, like the described start-up kit for the tenants which are clients of the BIOIncubation programme.

Common Spaces

The common spaces are basically separated into administration and reception areas of about 250 square meters, conference rooms with about 150 square meters and cafeteria/social area of about 100 square meters of usable floor area. Five fully equipped offices with 15 square meters each are planned for the management and administration of the BIOCentre. The Centre will offer four smaller conference/meeting rooms, which can also be used for seminars and trainings in the BIOEducation programme. It is agreed with the architects that any so-called left over space, after the requirements for laboratory and space for offices for rent have been met, shall be put into additional conference/seminar facilities. The conference rooms should be suitable for company meetings and will also be equipped with video links, projectors, white boards etc. In addition, a central server, an IT /telephone service and social room/cafeteria will be provided by the BIOCentre. The minimal requirements for functionality are given; however the design of the BIOCentre should still be flexible enough to change or shift the size of spaces according to the demands of the tenants.

4.4. Physical Inputs for Production

The main physical inputs for production include the **laboratory and office equipment**, as well as the **technical equipment** that needs to be installed. These include electrical and technical installations, waste treatment, maintenance and communications equipment.

4.5. Personnel Requirements

During the project preparation stage, the project has been developed and managed by the **Project Implementation Unit** within BICRO**.** More details on its structure members can be found in the next chapter, which deals with human resources.

In April 2009, **Project Manager** (Mr. Gordan Leskovar) was employed within the BICRO. The project manager will coordinate liaisons with BICRO, companies undertaking construction, supervision, equipment provision, EC and other relevant stakeholders (including the owners – BICRO, University of Zagreb and the City of Zagreb). His particular responsibilities also include communication and networking activities, defining the strategy and planning of BIOCentre activities, as setting up foundations for all BIOCentre activities. BIOCentre is to be formally founded as Limited Liability Company at the beginning of 2010, and Mr. Leskovar will be its first employee.

Later on, the **Chief Executive Officer (CEO)** and **Chief Technology Officer** (**CTO**) will be recruited in 2011 and 2012 respectively. CEO will be responsible for overall strategy and operational business issues, whereas CTO will be responsible for the technology development issues. As the opening of the BIOCentre approaches, further employees will be hired and trained (please see below). For **full operation** (from 2016) the BIOCentre and its programmes will need **about 31 employees**. In addition to CEO and CTO, there will be three employees responsible for the individual programmes of the Centre, two employees for administration and additional two employees for maintenance.

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BIOTransfer will require about 22 additional employees (laboratory engineers and interns) for technology transfer and the operation of the CLU. Later on, the number of laboratory engineers and interns will increase further in accordance with the demand for the technology transfer services, reaching the maximum of 34 employees.

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FIGURE 12: BIOCENTRE RECRUITMENT PLAN

BIOCentar recruitment plan - initial faze 2009-2012

	2009												2010												2011												2012												2013											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Employment of the Project manager																																																												
Employment of CEO																																																												
Employment of CTO																																																												
Employment of Secretary																																																											
Employment of Maintenance																																																											
Employment of Department Manager																																																											
Employment of IT Officer																																																											
Employment of 8 Laboratory Engineers																																																										
Employment of 8 Interns																																																										

BIOCentar recruitment plan 2014-2018

	2014												2015												2016												2017												2018											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Employment of additional administrator-secretary																																																											
Employment of Junior Manager																																																											
Employment of Junior Manager																																																											
Employment of additional 3 Laboratory Engineers																																																										
Employment of additional 3 Interns																																																										
Employment of Junior Manager																																																										

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4.6. Energy Requirements

BIOCentre is not energy-intensive. BIOCentre will use the energy from renewable energy sources and **will not require any specific provisions**.

The BIOCentre facility has been designed as a very well isolated building of extremely low energy consumption. Only **up to 50 kWh/m² of heating energy will be used up annually.**

Renewable energy sources will be applied for heating and cooling, enabling the building not to need further conventional heating media like gas, oil or electricity.

4.7. Technology Providers

The technology providers will be selected through a **public tender**, which will be carried out in accordance with the PRAG guidelines and the Croatian laws on public procurement, which have already been harmonised with the *acquis*.

4.8. Investment Costs

In this section the investment costs are presented. This includes the costs of planning and know-how (4.8.1.), buildings (4.8.2.) and machinery and equipment (4.8.3.).

4.8.1. Planning and Know-how

The costs of planning are given in the table below. They do not include VAT.

TABLE 30: COSTS OF PLANNING

TYPE OF INVESTMENT	Total investment costs (EUR)	Financing by
1. FEASIBILITY STUDY	**21.291**	**BICRO**
2. DESIGN,ENGINEERING PROJECTS AND CONSULTING	**844.363**	
2.1. Land survey	4.109	BICRO
2.2. Geo-mechanical survey	13.738	BICRO
2.3. Urban architectural programme	38.703	BICRO
2.4. Concept, master and detail design	524.874	WB CONS
2.5. Energy efficiency project	150.000	BICRO
2.6. Consulting (lawyer)	56.875	BICRO
2.7. Expertise	58.064	BICRO
TOTAL COSTS OF PLANNING	**865.654**	

4.8.2. Buildings

The **construction costs are EUR 11.649.327 as it is** shown in the table below. The majority of the construction costs are to be financed through IPA, with the exception of the costs associated with

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securing the final use permit for the building. These costs, which amount to **EUR 1.892.841,** are to be borne by BICRO and City of Zagreb.

TABLE 31: ESTIMATED BUILDING COSTS (IN EUR)

A) LAND COSTS				**UNIT PRICE (EUR)**	**TOTAL COST (WITHOUT VAT)**
1) LAND AND BUILDINGS	1	CONSTRUCTION SITE	7362m²	0	0
		TOTAL A			0
B) STRUCTURE PREPARATION COSTS			**UNIT MEASURE**	**UNIT PRICE (EUR)**	**TOTAL COST (WITHOUT VAT)**
2) PLANNING AND PREPARATION COSTS	2.1	FEASIBILITY STUDY			21.291
	2.2	URBAN ARCHITECTURAL PROGRAMME			38.703
	2.3	LAND SURVEY			4.109
	2.4	GEOMECHANICAL SURVEY			13.738
	2.5	CONCEPT DESIGN			524.874
	2.6	LOCATION PERMIT			
	2.7	MASTER DESIGN			
	2.8	BUILDING PERMIT			
	2.9	REVISION			
	2.10	ENERGY EFFICIENCY PROJECT (Design)			150.000
	2.11	CONSULTING (Lawyer)			56.875
	2.12	EXPERT			56.064
		TOTAL 2			**865.654**
3) LOCAL AND WATER RATES	3.1	LOCAL RATE	25.385m³		521.609
	3.2	WATER RATE	25.385m³		43.468
	3.2.1	HOUSING			
	3.2.2	BUSINESS			
	3.2.3	OTHER			10.000
		TOTAL 3			**575.077**
4) UTILITIES CONNECTION	4.1	INSTALLATION ADJUSTMENTS			
	4.1.1	Water			48.000
	4.1.2	Gas			6.850
	4.1.3	Electricity			397.260
		TOTAL 4			**452.110**
		TOTAL B			**1.892.841**
C) CONSTRUCTION COSTS			**UNIT MEASURE**	**UNIT PRICE (EUR)**	**TOTAL COST (WITHOUT VAT)**
5) BUILDING WITH CONSTRUCTION	5.1	HOUSING (see Table 32)	5.330 m²	1.519	8.096.270
	5.2	GARAGES			
	5.3	ENERGY EFFICIENCY PROJECT	10 %		809.627
		TOTAL 5			**8.905.897**
		TOTAL C			**8.905.897**
D) SUPERVISION			**UNIT MEASURE**	**UNIT PRICE (EUR)**	**TOTAL COST (WITHOUT VAT)**
6) SUPERVISION DURING CONSTRUCTION	6.1	SUPERVISION	10 %		890.589
		TOTAL 6			**890.589**
		TOTAL D			**890.589**
E) RECAPITULATION					
RECAPITULATION	**A**	**LAND AND BUILDINGS**			**0**
	B	**STRUCTURE PREPARATIONS**			**1.892.841**
	C	**CONSTRUCTION**			**8.905.897**
	D	**SUPERVISION**			**890.589**
TOTAL					**11.649.327**

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The costs for office and laboratory space are based on Croatian and European standards and experiences. The basic costs per square meter of office space are assumed at around EUR 1519 (exclusive V.A.T.). The price is a reference price at the time of preparation of this FS as given by the benchmarking of six local similar investments and estimated by local architect.

TABLE 32: BENCHMARKS OF CONSTRUCTION COSTS

	Year of construction	Total area (m²)	Total costs (EUR)	Costs per unit (EUR/m²)
Analytical laboratory , Zagreb City Pharmacy	2009	2.500	3.000.000	1.200
"Food Technology Institute" Zagreb	2004	250	300.000	1.300
"Institute for Plant Protection" Zagreb	2009	3.200	4.800.000	1.500
Emergency Terminal Zagreb	2009	7.000	10.500.000	1.500
"PLIVA Biopharmaceutical department" Savski Marof	2008	6.400	10.000.000	1.563
Quality control lab. "Veterina Ltd." Zagreb	2008	500	1.200.000	2.400
WEIGHTED AVERAGE		**5.330**	**8.096.270**	**1.519**

4.8.3. Machinery and equipment

This part presents the costs of machinery, equipment and supervision be installed within the BIOCentre project. Given that the costs of Central Laboratory Unit account for the majority of costs of machinery and equipment, they are presented separately.

TABLE 33: ESTIMATED COSTS OF FURNITURE AND IT EQUIPMENT

Furniture for the common area and office space	524.657 EUR
IT Equipment for the office space	200.000 EUR
TOTAL for common area and office space	**724.657 EUR**
Laboratory furniture	393.000 EUR
TOTAL for laboratory	**393.000 EUR**

TABLE 34: ESTIMATED COSTS OF LABORATORY EQUIPMENT OF THE CENTRAL LABORATORY UNIT

1	Cell banking unit (CBU)	316.000 EUR
2	Cell culture laboratory (CCL)	650.000 EUR
3	Microbial culture laboratory (MCL)	793.000 EUR
4	Product recovery unit (PRU)	253.000 EUR
5	Purification laboratory (PUL)	397.000 EUR
6	Bio-analytical laboratory (BAL)	1.133.000 EUR
7	Buffer and media preparation unit (BMU)	208.000 EUR
	TOTAL for CENTRAL LABORATORY UNIT	**3.750.000 EUR**

TABLE 35: BENCHMARKS OF LABORATORY EQUIPMENT

	Supplier 1 (EUR)	Supplier 2 (EUR)	Estimated (EUR)
Steam sterilizer	121.000	134.000	**125.000**
HPLC system (3 pcs)	303.000	287.000	**300.000**
LC protein pur. system (4 pcs)	350.000	364.000	**355.000**
Bioreactors & fermentors (10 pcs)	765.000	780.000	**765.000**

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4.8.3.1. Supervision

The cost of supervision fee is approximately 5% of estimated costs for laboratory equipment, which amounts to **187.000 EUR.**

TABLE 36: ESTIMATED TOTAL COSTS OF EQUIPMENT AND SUPERVISION

1	FURNITURE AND IT EQUIPMENT	724.657 EUR
2	LABORATORY FURNITURE	393.000 EUR
3	LABORATORY EQUIPMENT	3.750.000 EUR
4	SUPERVISION	187.000 EUR
	TOTAL	**5.054.657 EUR**

Given the need to **replace particular parts of machinery and equipment**, these costs should also be taken into consideration. Office and IT equipment needs to be bought every five years (in years 6, 11, 16, and 21) at the cost of 724.657 EUR per each replacement. Laboratory equipment (including the CLU) needs to be replaced in year 11, which increases the value of the additional investment in year 11 (2022) to 4.867.657 EUR. As it can be observed, for the purpose of financial analysis, the prices are assumed to be fixed.

4.8.4. Other costs

This part presents the costs before full operation period.

TABLE 37: OTHER COSTS (PERIOD 2010-2012), IN EUR

	2010	**2011**	**2012** (until 01.07.2012)
PERSONNEL COSTS (Salaries)	**52.389**	**80.636**	**80.636**
Project manager	52.389	52.389	26.195
CEO		28.246	28.246
CTO			26.195
MATERIAL COSTS	**3.425**	**20.547**	**10.958**
INTELLECTUAL SERVICES	**37.670**	**24.654**	**17.805**
Legal services	27.397	13.696	9.587
Financial services	4.794	5.479	5.479
Translation services	5.479	5.479	2.739
OUTSOURCING (consultants, marketing etc.)	**68.493**	**68.493**	**41.095**
EDUCATION	**13.698**	**20.547**	**13.698**
TOTAL	**175.675**	**214.877**	**164.192**

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4.9. Production Plan over the Project Time Horizon

Given that the BIOCentre will provide services in accordance with the demand, its production plan will be defined correspondingly. Please refer to 3.4.1. for sales forecasts.

4.10. Combined Output Supply

BIOCentre will act in **partnership** with various organisations (including BICRO and academic institutions), but **its outputs will be mostly independently provided**. The outputs that will be provided in combination with other partners include BIOEducation and BIONetwork programmes, which will explicitly engage other providers.

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5. Human Resources

5.1. Organisational Structure and Organisational Diagram

5.1.1. Project Implementation Unit

The BIOCentre project has so far been developed within BICRO. In 2007 **Project Implementation Unit** has been established, with the responsibility for the preparation of documentation and project implementation. PIU is comprised of the following experts[29]:

- PIU Coordinator (Ms. Ivana Žorž)
- Biotechnology Expert (Mr. Ivo Friganović)
- Technology Infrastructure Expert (Dr. Ivana Nagy)
- Financial Expert (Mr. Krunoslav Tarandek)
- Project Manager – joined in April 2009 (Mr. Gordan Leskovar)

Brief CVs of PIU members are provided.

Ms. Ivana Žorž is Assistant Managing Director for EU project implementation. She holds a M.Eng. degree in Agricultural from the University of Zagreb. After gaining knowledge about EU funds within the SAPARD, she moved to BICRO and has been involved in preparation of Programming documents as well as Project implementation of different programme components (CARDS; PHARE; SAPARD/IPARD; IPA). She is a member of NSRF and RCOP working groups.

Mr. Ivo Friganović is RAZUM Programme Director and one of the initiators of the BIOCentre. He holds a Post-Graduate Degree from the Dept. of Molecular Biology, Faculty of Natural Sciences, University of Zagreb. Mr. Friganović has an extensive professional experience in the field of biotechnology, acquired during his 21-year long employment in PLIVA. Mr. Friganović was positioned as Biotechnology Expert Analyst in Pharmaceutical Operations, Strategic Marketing and Intelligence Management. In 2003 he joined BICRO as a Biotech Infrastructure and Biotech Development Coordinator. Since 2005 he has been working as RAZUM Programme Manager. He is a member of NSRF and RCOP working groups.

Dr. Ivana Nagy is TEHCRO Programme Director. She holds a PhD in Molecular Biology from the University of Zurich, Switzerland. She worked as a Research Associate at the Clinic for Otorhinolaryngology at the University Hospital Zurich. Four years ago Dr. Nagy joined BICRO and has gained an extensive experience in overall design, operations and management of the Technology Infrastructure Development Programme and also in appraisal of projects designed to establish science a technology parks, incubators and commercial R&D centres. She is a member of NSRF and RCOP working groups.

Mr. Krunoslav Tarandek is Financial Evaluator of the RAZUM programme. In addition to a BSc degree in Economics from the University of Zagreb, he is also Chartered Valuator and Chartered Investment Analyst. Within RAZUM, Mr. Tarandek has drafted a Guide on how to make business/investment plans. In addition to advising applicants about the business plan methodology, determining business

[29] When necessary, PIU also utilises the expertise of other in-house (BICRO) and external experts.

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models, financial and accounting policies, Mr. Tarandek evaluates projects and makes expert opinions as a member of a Management Board.

Mr. Gordan Leskovar, B.Sc. has joined BICRO as Project Manager in April 2009. He has been working for pharmaceutical company PLIVA for 20 years as Production Manager, Quality Manager and Project manager in Veterinary Drug Operations. Between 2003 and 2007, he managed the construction of a manufacturing plant for biological products and of an analytical laboratory for quality control.

5.1.2. BIOCentre

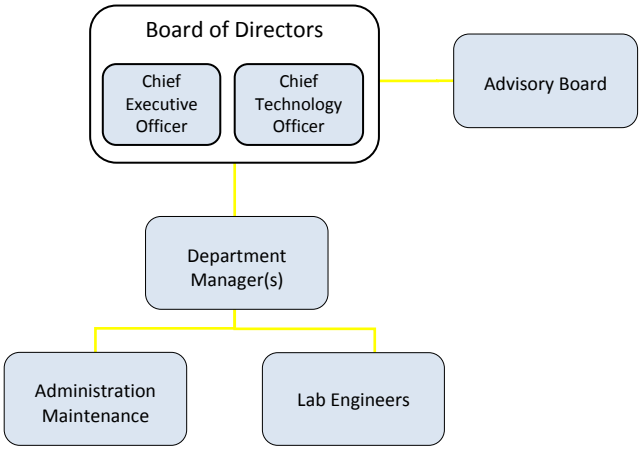
As the BIOCentre project implementation progresses, the responsibilities will gradually shift from the PIU established at BICRO to the professional BIOCentre staff. The process will be facilitated by technical assistance (please see 5.3).

The fully developed organizational structure of the BIOCentre will be as follows:

- It will involve **an independent Board of Directors** at the highest level of governance. The Board of Directors shall consist of non-executive and executive board members.
- The suggestion is to split the management between the Scientific (technology) director (**Chief Technology Officer**) - CTO and the Managing (executive) director (**Chief Executive Officer**) - CEO.
- **Department Managers** and the administrative and maintenance assistants are responsible for the individual programmes of the BIOCentre (BIOIncubation, BIOEducation and BIONetwork).
- The Board of Directors will be assisted by an **Advisory Board**, which will consist of internationally renowned technology and business experts. This board should also support the start-up companies with their business contacts, experience and knowledge (mentoring programme).
- The activities of the BIOCentre (and BIOTransfer in particular) will also include a significant number of **interns**, which will regularly work on a project basis. An **internship policy** will be defined, which will define their required qualifications, rights, obligations and procedures related to their work.

The organizational chart below shows the **planned structure of the BIOCentre in full-scale operation**.

FIGURE 13: ORGANISATIONAL CHART WITH PLANNED STRUCTURE OF BIOCENTRE AT FULL OPERATION



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5.2. List of Personnel and Salary Parameters

Although the BIOCentre will be in public ownership, it will pay all of its employees **salaries** defined in accordance with the **market parameters**. The annual costs are given under 5.6.

TABLE 38: LIST OF PERSONAL AND SALARY PARAMETERS

Working post	Gross salary (EUR)	Annual (EUR)
Project Manager PM	4.365,77	52.389,22
Chief Executive Officer CEO	4.707,65	56.491,81
Chief Technology Officer CTO	4.365,77	52.389,22
Department Manager DM	4.023,89	48.286,65
Laboratory Engineers	2.788,26	33.459,10
Junior Managers	2.827,30	33.927,60
Administration / Secretary	1.578,21	18.938,52
IT Maintenance	1.578,21	18.938,52
Maintenance	1.293,55	15.522,59

Besides laboratory engineers, BIOTransfer will also hire interns which will comprise 50% of total BIOTransfer staff. The University will cover the intern's salaries, but it is expected the BIOCentre will additionaly finance the interns (EUR 4.000 annualy per person).

5.3. External Services

During project implementation (**start-up stage** of the project), it is expected that external expertise (**technical assistance through IPA**) will be used for **capacity building**, **assisting in starting the BIOCentre operation**, defining its **operational procedures** and **marketing and public relations** activities.

Technical assistance will help to **develop business skills and capacity** of the end recipient and future management team of the BIOCentre project. The aim is to enable the BIOCentre team and BICRO to offer (beside infrastructure) additional services which will create distinctive benefits for its future tenants. In 2011, the team of experts in the area of **incubation management** will be engaged in performing different scope of activities to help the capacity building of the BIOCentre management. Employees of the BICRO and future BIOCentre will strengthen their capacity to become more efficient in offering a range of specialized business services, including business development assistance and mentorship and serve as a gateway to a network of support functions, such as seed and venture financing programs, accounting, intellectual property and other legislative issues.

Technical assistance is to strengthen the effectiveness and efficiency in service provision of all BIOCentre programmes, which should lead to excellence in service provision and successful facilitation of biotechnology start-ups throughout their development (from pre-incubation through incubation to graduation). Assistance is to cover the **preparation of BIOCentre operational procedures (including selection and graduation criteria**), **curricula development, business advisory and education services.** A particular attention will be given to the **development and implementation of the marketing strategy of the BIOCentre.** The **costs of implementation of marketing and public relations activities** will also be **included in the budget of the operation** (as incidental expenditures)**.**

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TABLE 39: EXTERNAL SERVICE EXPENDITURES, IN EUR

	2011	2012
Technical assistance	426.504	106.626
Marketing and promotional activities	81.239	20.309
TOTAL	**507.743**	**126.935**

During the **operational stage** of its functioning, the BIOCentre will rely on a wide variety of **external service providers**, but they will work on a **project** basis. These projects will need to be self-financed – i.e. they will not impose additional financial burden upon the BIOCentre.

5.4. Hiring Procedures

The BIOCentre staff will be hired by the means of a **public tender**, in accordance with the EU and Croatian regulations.

5.5. Training Procedures

Managerial, professional and technical staff hired by the BIOCentre will be expected to display **sufficient track record, credentials and skills** necessary to successfully carry out their duties and responsibilities. In other words, it will not be necessary for them to undertake structured training apart from the technical assistance described under 5.3. Given the gradual nature of project development and expansion of the BIOCentre activities and programmes, it is expected that the selected managers and professionals will acquire additional knowledge and competences that will facilitate efficient project implementation. However, when and where necessary, the BIOCentre will enable its employees to undertake further training in order to keep up with the developments in the field.

On the other hand, **interns** will primarily receive **on-the-job training**, but the internship policy may also define additional training they may also receive prior to starting their work at the BIOCentre.

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5.6. Annual Costs (Annual staff expenditures/before and after project start-up)

Annual staff expenditures are given in the following table. The project start-up occurs in year 2012. The expansion of the BIOCentre activities is followed by new hiring. This calculation includes only the costs of permanent staff. It does not include the costs of external associates (e.g. guest lecturers within the BIOEducation programme).

TABLE 40: BIOCENTRE STAFF EXPENDITURES, IN EUR

BIOCentre	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Project Manager PM	41.343									
Chief Executive Officer CEO	28.246	56.492	56.492	56.492	56.492	56.492	56.492	56.492	56.492	56.492
Chief Technology Officer CTO	26.195	52.389	52.389	52.389	52.389	52.389	52.389	52.389	52.389	52.389
Department Manager DM	28.167	48.287	48.287	48.287	48.287	48.287	48.287	48.287	48.287	48.287
Laboratory Engineers		267.673	267.673	267.673	368.050	368.050	368.050	368.050	368.050	468.427
Junior Managers			33.928	67.855	67.855	101.783	101.783	101.783	101.783	101.783
Administration / Secretary	14.204	18.939	37.877	37.877	37.877	37.877	37.877	37.877	37.877	37.877
IT Maintenance	11.047	18.939	18.939	18.939	18.939	18.939	18.939	18.939	18.939	18.939
Maintenance	11.642	15.523	15.523	15.523	15.523	15.523	15.523	15.523	15.523	15.523
Interns		32.000	32.000	32.000	44.000	44.000	44.000	44.000	44.000	56.000
TOTAL	**160.844**	**510.240**	**563.106**	**597.034**	**709.411**	**743.339**	**743.339**	**743.339**	**743.339**	**855.716**
Total - Administration	160.844	210.567	263.433	297.361	297.361	331.289	331.289	331.289	331.289	331.289
Total - Laborotory Engineers	0	267.673	267.673	267.673	368.050	368.050	368.050	368.050	368.050	468.427
Total - Interns	0	32.000	32.000	32.000	44.000	44.000	44.000	44.000	44.000	56.000

BIOCentre	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Project Manager PM										
Chief Executive Officer CEO	56.492	56.492	56.492	56.492	56.492	56.492	56.492	56.492	56.492	56.492
Chief Technology Officer CTO	52.389	52.389	52.389	52.389	52.389	52.389	52.389	52.389	52.389	52.389
Department Manager DM	48.287	48.287	48.287	48.287	48.287	48.287	48.287	48.287	48.287	48.287
Laboratory Engineers	468.427	468.427	468.427	468.427	468.427	568.805	568.805	568.805	568.805	568.805
Junior Managers	101.783	101.783	101.783	101.783	101.783	101.783	101.783	101.783	101.783	101.783
Administration / Secretary	37.877	37.877	37.877	37.877	37.877	37.877	37.877	37.877	37.877	37.877
IT Maintenance	18.939	18.939	18.939	18.939	18.939	18.939	18.939	18.939	18.939	18.939
Maintenance	15.523	15.523	15.523	15.523	15.523	15.523	15.523	15.523	15.523	15.523
Interns	56.000	56.000	56.000	56.000	56.000	68.000	68.000	68.000	68.000	68.000
TOTAL	**855.716**	**855.716**	**855.716**	**855.716**	**855.716**	**968.093**	**968.093**	**968.093**	**968.093**	**968.093**
Total - Administration	**331.289**	**331.289**	**331.289**	**331.289**	**331.289**	**331.289**	**331.289**	**331.289**	**331.289**	**331.289**
Total - Laborotory Engineers	**468.427**	**468.427**	**468.427**	**468.427**	**468.427**	**568.805**	**568.805**	**568.805**	**568.805**	**568.805**
Total - Interns	**56.000**	**56.000**	**56.000**	**56.000**	**56.000**	**68.000**	**68.000**	**68.000**	**68.000**	**68.000**

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6. Location

6.1. Ideal Requirements for the Location

An ideal location for the BIOCentre should fulfil the following requirements:

- **Critical mass of researchers, service providers and active companies for sustaining the operations of the centre**

The chosen location needs to have research, product and process development, testing and up-scaling need to be carried out at universities and research institutions, companies and large industry. That includes a significantly large number of researchers and research institutions in the surrounding area. The location should attract innovative firms, a potential for SME creation and development, as well as some larger firms that can provide support, generate business opportunities or enable extension of capabilities through networking. Moreover, the business support services and finance should be readily accessible.

- **Efficient administration and support of the local and central government**

As the success of the BIOCentre project depends upon networking and sharing of knowledge and other resources among various partners, it is necessary that the government provides full support to the project. This is necessary for an efficient project implementation. Moreover, given the need to provide investment and cover some operational losses, the support of the government also needs to be reflected in financial terms.

- **The quality of infrastructure and facilitating environment**

The project should be implemented in a location that enables a good quality infrastructure and a facilitating environment. This includes transport connections, location attractiveness, and the availability of material inputs necessary for project implementation.

6.2. Alternative Options

Given the fact that **in Croatia only Zagreb can provide a critical mass of researchers, service providers and active companies** for sustaining the operations of the BIOCentre, alternative options regarding macro location (i.e. other cities) have not been considered. Therefore, Zagreb with two largest research institutions – the University of Zagreb and the Ruđer Bošković Institute (IRB) – is the most convenient place for this Centre. This has been additionally supported by other factors (the quality of infrastructure and support of the local government).

As for the micro location, after thoughtful consideration it has been concluded that **the new university campus provides a much better option** (i.e. an option that will create much stronger synergies with the research community) **than any other potential location in Zagreb**. Given the government support in the provision of land, this site has been selected as the best option for the BIOCentre.

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6.3. Choice of Site and its Characteristics

The location of the BIOCentre in Zagreb seems to be the optimum location for a biosciences Centre in Croatia. Zagreb is the Centre point of biotechnology in Croatia with 62 per cent of R&D institutions related to the scientific field of biosciences. The city can be reached easily from all parts of the country that are considered to domicile potential partners of the BIOCentre. Furthermore, for international partners the traffic access through the airport of Zagreb and international train connections is better than in all the other cities and regions of Croatia.

The possibility to establish the Centre next to the new University Campus comprising the faculties related to biosciences is the main advantage of the planned location in the Eastern part of Zagreb. Due to this proximity the core facilities like the laboratory can also be used by the university. Furthermore a direct exchange of employees of the companies and university staff is promoted.

6.3.1. Climatic Conditions, Environmental Aspects

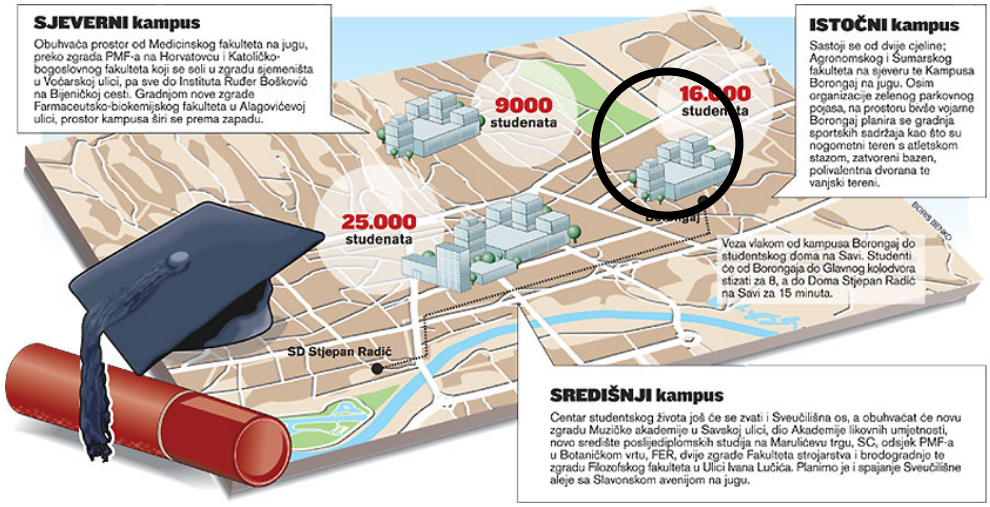
The climactic conditions and environmental aspects do not significantly affect the choice of site or the future operation of the BIOCentre. The land plot was previously used by the military. It is clean of land pollutants, and the implementation of the BIOCentre will ensure that the site is managed in accordance with the highest standards of environmental management.

6.3.2. Site or Territory

The BIOCentre is to be located in **Zagreb**, Croatia. As the capital of Croatia the city of Zagreb is centrally located in Croatia and is a major regional centre within Southeast Europe.

The BIOCentre is planned location is in the **eastern part of the city**, called Borongaj, at the site of the former army barracks and airport, now the designated site for the **University campus –east**.

FIGURE 14: PLANNED LOCATION OF BIOCENTRE WITHIN ZAGREB AND THE UNIVERSITY INFRASTRUCTURE



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At the planned location the BIOCentre will benefit from its integration and cooperation with its immediate environment. The University of Zagreb started building a new University campus at the selected location, which BIOCentre is an integrated part of. On site are also the Faculty of Food Technology and Biotechnology and the Faculty of Chemical Engineering, the Faculty of Agronomy is nearby. The University of Zagreb is the oldest and largest university in South-Eastern Europe. The University has been continually growing and currently comprises 29 faculties with a student body of more than 45 000. By being located within the University campus the BIOCentre will be surrounded by a young vibrant academic atmosphere and keep in close cooperation with the science base. Incoming tenant companies of BIOCentre will also benefit from the academic environment, and vice-versa, the academics may feel enthused by the business-oriented culture created by BIOCentre and its tenants.

6.3.3. Transport and Communications

This location has good traffic connections (major road) as it is located close to the highway and therefore easily accessible from outside Zagreb. The railway station Zagreb East is situated next to the planned BIOCentre, public transportation connections are also available. The BIOCentre offers good traffic connections from the city Centre and the highways. The establishment of the University Campus may further improve the traffic connections to this part of the city (an additional road next to the Centre is already considered to be built in by the City). As the land is well disaggregated, offers enough possibilities for expansion and is owned by the Ministry of Science, Education and Sports – the land is offered as an additional in-kind contribution to the Centre – also the sustainability and possible expansion of the BIOCentre is guaranteed at this location.

6.3.4. Water and Electricity Provisioning

The site has been supplied with water, electricity, gas and other utilities. Their provisioning is secure and guaranteed.

6.3.5. Waste Disposal

The site has been served by the local waste disposal services provider, which will take care of the **communal waste** of the BIOCentre.

When the BIOCentre becomes fully operational, any **biological waste** created in laboratories will be neutralised on site and consequently disposed of in accordance with the regulations (by an authorised company).

6.3.6. Government Regulations

The design, construction and operation of the BIOCentre are subject to the Croatian legislation. The permits necessary for the BIOCentre to start operating are given within the section 2.2.4.

6.3.7. Policies of the Local Authorities

- In order to define urban planning parameters for the plot of land, an **Urban-Architectural Programme** (UAP) had to be prepared and validated by the City Council in Zagreb. BICRO

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initiated and contracted preparation of the UAP in spring 2008; the UAP was validated by the **City council** in May 2008.

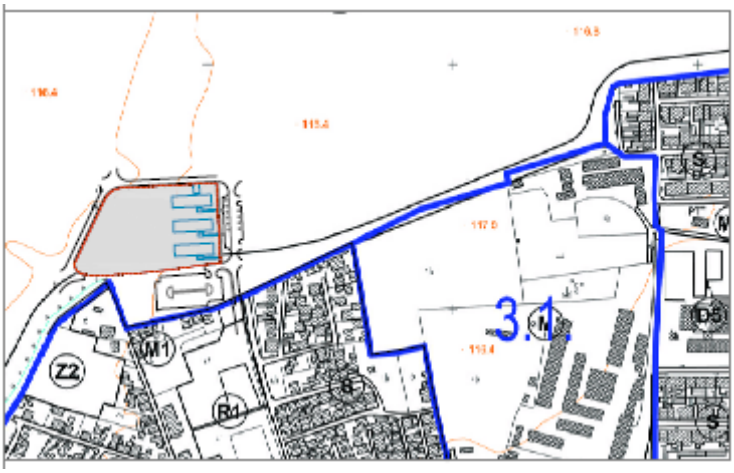
- The UAP was as adopted as part of the **general strategy for the new University campus** by the **Board for the Planning and Construction of the University Campus** at Borongaj consisting of University and Ministry officials.
- The City of Zagreb has supported the BIOCentre project through a **letter of intent** signed on July 19 2007 jointly with BICRO and the University of Zagreb. The parties have jointly accepted the responsibility to enable setting up of the BIOCentre, which was already expected to be co-financed through IPA.
- The Location Permit (No. 251-13-21/122-09-18) was issued by the City of Zagreb in July 2009

6.3.8. Description of the Pre-chosen Site

Plot and Ownership

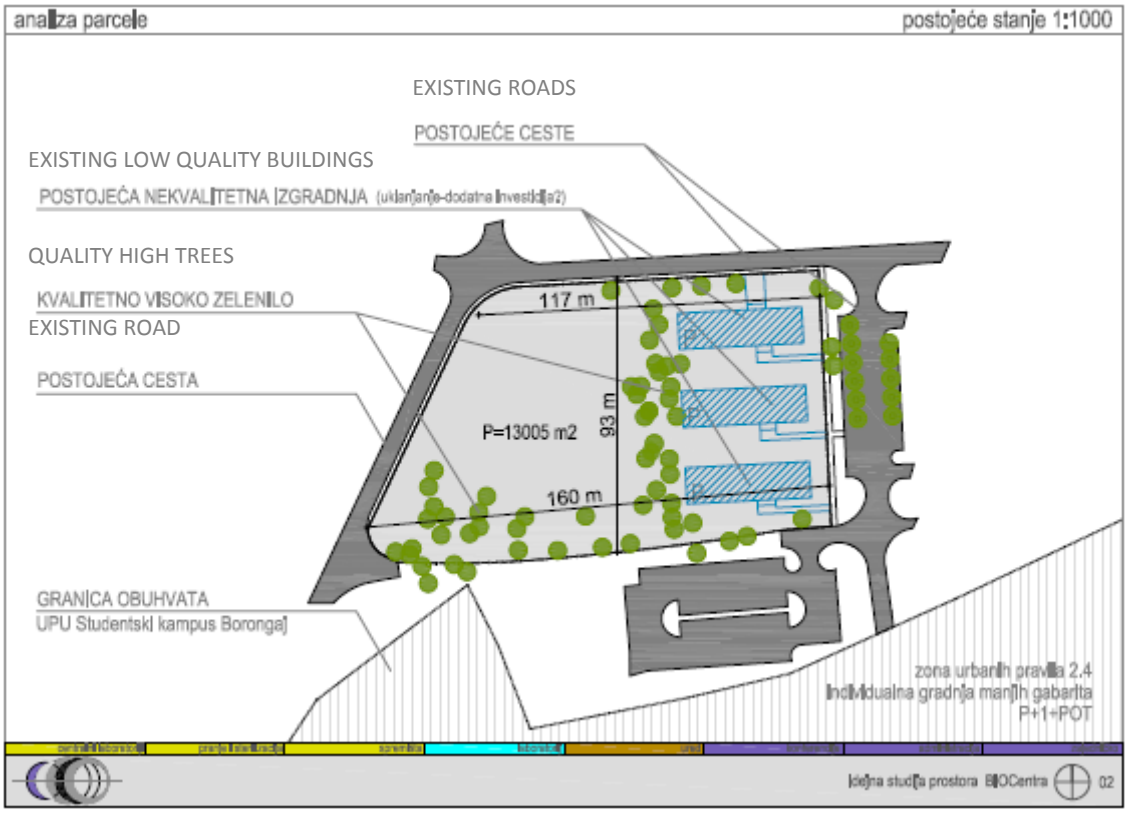
The plot of land available for the BIOCentre covers **7.412 square meters**. It is a part of the much larger complex, formerly military airport and army headquarters and barracks. The entire portion of land **is owned by the Republic of Croatia** (Ministry of Defence of the Republic of Croatia) and has been dedicated by Government decision to the Ministry of Science, Education and Sports to pursue educational and scientific purposes. As already mentioned, the MSES has chosen to dedicate the largest portion to the University of Zagreb as the site of the new university campus. The plot of land located at the first (south-west) entrance to the complex (Savudrijska bb) **is granted by the Republic of Croatia** (by way of MSES) **to BICRO, as the beneficiary, free of charge** for the purpose of building the BIOCentre.

FIGURE 15: LAND LAYOUT ON THE MAP OF URBAN REGULATIONS (SHOWN IN RED)



BICRO shall not assume ownership of the land which will remain in the hands of the Republic of Croatia.

FIGURE 16: ANALYSIS OF THE PLOT OF LAND DESIGNATED FOR THE BIOCENTRE



The detailed architectural and engineering designs for the building are financed through BICRO by The World Bank (BICRO-CONS-05). The services contract includes conceptual design (site plan, floor plan etc.), basic engineering (building construction design etc.) and detailed implementation design (architectural design, electrical design etc.), accompanied by technical projects and bills of quantities for works and supplies (equipment).

6.4. Cost of Land, Site Preparation and Site Availability

The **plot of land** has been granted by the **Republic of Croatia (by way of MSES)** to BICRO, as the beneficiary, free of charge, for the purpose of building the BIOCentre.

All eventual costs of **site preparation** will be subsumed under the **construction contract**.

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7. Implementation

7.1. Analysis of Construction/Start-up Times (project cycle)

The **construction and start-up times** for the BIOCentre are defined by the action plan.

- It is expected that the **building permit** will be issued by July 2010. Detailed design (including the Bill of Quantities) will be ready by the end of May 2010.
- Following the approval of the **Major Project Application** by the European Commission and preparation of the **tender documentation**, it is expected that call for proposals for supervision (an IPA services contract) will be launched in July 2010. The call for proposals for construction (an IPA works contracts) will be launched in October 2010, respectively, **contracting** completed and activities ready to be implemented by April 2011, respectively.
- That would enable construction to start in May 2011. With the planned **construction time of up to 18 months** (which includes a contingency time reserve), **construction** is to be **completed** by the **October 2012**. **Supervision**, including maintenance period is to end one month after that, by **November 2012** (contract details under 7.1.4.)
- The **procurement of supplies** should end by the **October 2012** (supported by IPA supplies contract, details under 7.1.3.).
- That would enable the **BIOCentre to start-up the full range of its activities in November 2012,** at the latest.

This **timeframe is considered to be achievable** and realistic. The planned time frames for the execution of particular activities have been based on the professional standards, observable experiences and include contingency time reserves where applicable.

7.1.1. Selection of Management Group for the Project

Project manager, Mr. Gordan Leskovar has been selected by public tender in April 2009 and will be engaged until the end of October 2012, i.e. until the BIOCentre is ready for a full scale start-up. The project manager needs to combine general management and technology expertise (which are necessary for the development of BIOCentre activities during the start-up phase of its operation) with project management competences (which are necessary for overseeing building and procurement and the related pre-start-up activities).

In coordination with the BICRO, project manager will lead the **selection of the BIOCentre management**. All of the managers will be selected in the process of **public tendering, although the group of potential candidates may be expanded through referrals, including the assistance of headhunting agencies**. The management of the BIOCentre will be divided between the CEO, who will be responsible for overall strategy and operational business issues (to be engaged in July 2011), and CTO (Chief Technology Officer), who will be responsible for technology development (to be hired in January 2012).

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The BIOCentre Management is expected to be recruited from the ranks of **pharmaceutical company managers, entrepreneurs or experts** in the field who also possess management competence.

7.1.2. Definition of Information System

The BIOCentre implementation will be carried out using enterprise resource planning software that will be decided upon by the contractors.

As for the information system necessary for functioning of the BIOCentre, it will be designed and defined in the course of equipment supply (please see under 7.1.3.).

7.1.3. Negotiations for the Purchase of Know-how and Machinery

The machinery and know-how are to be purchased through the IPA financed supplies contract (**BIOCentre Supply Contract**), which will be executed as follows:

- **Preparation of tender documents** and submission for ex-ante control (by the end of February 2011); Responsibility: MSES/BICRO; Output: tender documentation prepared;
- **Publishing Call for Tenders** (March 2011); Responsibility: CFCA; Output: Call for tenders implemented;
- **Evaluation and Selection** (June – September 2011); Responsibility: CFCA; Output: contractor selected;
- **Contracting** (September 2011); Responsibility: CFCA; Output: contract signed;
- **Implementation** (September 2011 – October 2012); Responsibility: Contractor; Output: supplies delivered and made functional.

7.1.4. Building Planning and Contract Scheduling

Building planning and contract scheduling are going to be executed as follows.

Building permit and detailed design:

- Issuance of the **building permit:** July 2010
- **Detailed building design** (including the Bill of Quantities): May 2010

BIOCentre Works contract (construction):

- **Preparation of tender** documents and submission for ex-ante control (by September 2010); Responsibility: MSES/BICRO; Output: Tender documentation prepared
- **Publishing Call for Tenders** (October 2010); Responsibility: CFCA; Output: Call for tenders implemented
- **Evaluation and Selection** (January - April 2011); Responsibility: CFCA; Output: Contractor selected
- **Contracting** (end of April 2011); Responsibility: CFCA; Output: contract signed

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- **Implementation** (May 2011 – October 2012); Responsibility: Contractor; Output: construction completed and building made functional

BIOCentre Service Contract (construction supervision):

- **Preparation of tender documents** and submission for ex-ante control (by June 2010); Responsibility: MSES/BICRO; Output: tender documentation prepared
- **Publishing Call for Tenders** (July 2010); Responsibility: CFCA; Output: call for tenders implemented
- **Evaluation and Selection** (January – March 2011); Responsibility: CFCA; Output: contractor selected
- **Contracting** (March 2011); Responsibility: CFCA; Output: contract signed
- **Implementation** (April 2011 – November 2012); Responsibility: Contractor; Output: construction supervision completed

BIOCentre Service Contract (technical assistance):

- **Preparation of tender documents** and submission for ex-ante control (by September 2010); Responsibility: MSES/BICRO; Output: tender documentation prepared
- **Publishing Call for Tenders** (October 2010); Responsibility: CFCA; Output: call for tenders implemented
- **Evaluation and Selection** (March – May 2011); Responsibility: CFCA; Output: contractor selected
- **Contracting** (May 2011); Responsibility: CFCA; Output: contract signed
- **Implementation** (May 2011 – November 2012); Responsibility: Contractor; Output: technical assistance completed

7.1.5. Financing Negotiations

The structure of BIOCentre project **financing is to be defined before project implementation** (through a combination of domestic and EU sources). Furthermore, project implementation does not entail financing through loans or leasing. Consequently, **no major financing negotiations** have been envisaged during the project implementation.

7.1.6. Acquisition of Land and Licences

The **plot of land has been granted** by the Republic of Croatia (by way of MSES) to BICRO, as the beneficiary, free of charge, for the purpose of building the BIOCentre.

The location permit (No. 251-13-21/122-09-18) was issued by the Zagreb City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport in July 2009.

The licenses are to be issued as follows:

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- BIOCentre is to be **registered** by the Commercial Court in Zagreb – expected by March 2010
- **Building permit** is to be issued by the Zagreb City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport – expected by July 2010
- **Operational (use) permit** is to be issued by the Zagreb City Office for Physical Planning, Environmental Protection, Construction of the City, Construction, Utility Services and Transport – expected by December 2012

7.1.7. Organisational Structure

Project implementation will be coordinated by **project manager**, who will enjoy operational support from BICRO.

CEO and CTO will be recruited in 2011 and 2012 respectively. They will **build the organisational structure** of the BIOCentre in accordance with the structure outlined under 5.1., in order to enable the start-up of the full range of the BIOCentre activities.

7.1.8. Staff Hiring

CEO and CTO will be responsible for staff hiring, which will proceed in accordance with the action plan. The BIOCentre staff will include:

- Department Manager (1 person from June 2012)
- Junior Managers (1 person from January 2014, 1 additional person from January 2015, 1 additional person from January 2017)
- IT Officer (from June 2012)
- Administrators (1 person from April 2012, 1 additional person from January 2014)
- Laboratory Engineers (8 persons from January 2013, additional 3 persons in January 2016, and additional 3 persons in 2021 and 2027)
- Maintenance unit (from April 2012) – 1 person
- Interns (8 persons prom January 2013, additional 3 persons in January 2016, and additional 3 persons in 2021 and 2027)

7.1.9. Personnel Hiring and Training

CEO and CTO will be responsible for personnel hiring and training. Please see under 7.1.8.

7.1.10. Supply Agreements

The major part of supplies, including the technology core of the BIOCentre (CLU) will be contracted through **IPA supplies contract** (please see 7.1.3.).

From its start-up, the BIOCentre will be served by **utilities suppliers** who will be contracted in accordance with the Croatian public procurement regulations.

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7.1.11. Distribution Agreements

There are **no specific distribution arrangements** that need to be reached during project implementation. What will come in their place are various **partnership agreements** (with universities and other academic institutions, companies, technology transfer organisations etc.), which will support the work of the BIOCentre and/or become its clients.

A particular role in this regard needs to be served by the **BIONetwork**, which needs to engage a wide array of BIOCentre partners and clients.

7.2. Bar Graph (or PERT chart) of the main phases

The activities of the BIOCentre can be divided into two main phases:

- **Phase 1** – the **preparation, planning and building phase** or the phase of the **start-up operation**
- **Phase 2** – **operational phase** of the fully built, equipped and staffed centre

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8. Financial Analysis

8.1. Basic Assumptions of the Financial Analysis

8.1.1. Time Horizon

Chosen time horizon is 20 years. It is determined with economic life of the main assets. After 20 years, there is still residual value of main assets and they still produce economic values.

According to instructions from "Guide to C/B analysis – 16.06.2008", our project can be associated to '*Industrial zones and technological parks, The setting up of new companies and supporting existing ones in a technological park*' (p. 125)… '*The time horizon for project analysis is usually around 20 years'* (p. 126).

Implementation (preproduction) period is 3,5 years (2009-2012). Production period is 20 years (2012-2031). In the year 2012, there is only six months of production period.

8.1.2. Prices of Productive Factors and Project Outputs

All the prices are in euros (EUR), without VAT, founded as market prices at the present time. All prices are steady/constant prices, general inflation and relative price changes were overlapping and set-off.

8.1.3. Financial Discount Rate

The methodology used in this study for the determination of the financial return is the Discounted Cash Flow (DCF) approach. Financial discount rate is set to 7%. Please see chapter 8.13. for more clarification.

8.1.4. Cash Flows

All Cash Flows are based on the incremental approach. Only cash inflows and outflows are considered (depreciation, reserves and other accounting items which do not correspond to actual flows are disregarded).

8.1.5. Investment project methodology

In the preparation of this Financial Analysis we were directed by instructions from the "EUROPEAN COMMISSION GUIDE TO C/B ANALYSIS – 16.06.2008".

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8.1.6. Summary of the financial analysis

8.1.6.1 Main financial indicators

TABLE 41: MAIN FINANCIAL INDICATORS

Main financial indicators	
Discounted Net Revenue	-861.609,59 EUR
Financial GAP "R"	100,00%
FNPV "C"	-16.490.276,55 EUR
FRR "C"	-3,97%
FNPV "K"	-3.446.588,60 EUR
FRR "K"	1,24%

8.1.6.2 Main investments overview

TABLE 42: MAIN INVESTMENTS OVERVIEW

Investment needs	Fixed Assets	Start-up costs	Net working capital	Inv. to cover losses	**Total**
Preproduction period	13.773.554,00	4.159.852,00	-	-	**17.933.406,00**
Production period	6.316.971,00	-	2.118.099,72	2.368.739,96	**10.803.810,68**

Investment sources	IPA EU Contribution	IPA Cro Part	World Bank & Bicro	BICRO doo	City of Zagreb	**Total**
Preproduction period	11.614.365,75	3.871.455,25	865.654,00	277.372,00	1.304.559,00	**17.933.406,00**
Production period	-	-	-	5.401.905,34	5.401.905,34	**10.803.810,68**

Net investment costs/sources	IPA Community	IPA Cro Part	World Bank & Bicro	BICRO doo	City of Zagreb
Preproduction period	11.614.365,75	3.871.455,25	865.654,00	277.372,00	1.304.559,00
Production period (Table 84)	-	-	-	2.320.500,64	2.320.500,64
Cash Flow at the end of the period (Table 72)				-7.662.175,82	-7.662.175,82

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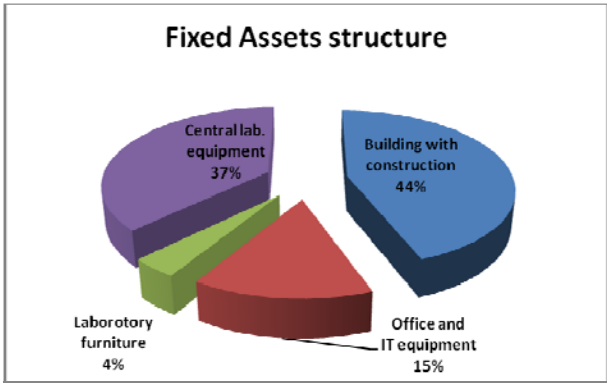
8.2. Fixed Investments

TABLE 43: INVESTMENT IN FIXED ASSETS, IN EUR

Year	Investment in Fixed Assets				Total investment (EUR)
	(from table 31)	(from table 33)	(from table 33)	(from table 34)	
	Building with construction	Office and IT equipment	Laboratory furniture	Central laboratory equipment	
"-3 (2009)					0,00
"-2 (2010)					0,00
"-1 (2011)	5.000.000,00			1.000.000,00	6.000.000,00
"0 (2012)	3.905.897,00	724.657,00	393.000,00	2.750.000,00	7.773.554,00
1 (2012)					0,00
2 (2013)					0,00
3 (2014)					0,00
4 (2015)					0,00
5 (2016)					0,00
6 (2017)		724.657,00			724.657,00
7 (2018)					0,00
8 (2019)					0,00
9 (2020)					0,00
10 (2021)					0,00
11 (2022)		724.657,00	393.000,00	3.750.000,00	4.867.657,00
12 (2023)					0,00
13 (2024)					0,00
14 (2025)					0,00
15 (2026)					0,00
16 (2027)		724.657,00			724.657,00
17 (2028)					0,00
18 (2029)					0,00
19 (2030)					0,00
20 (2031)					0,00
Investment in preproduction period	8.905.897,00	724.657,00	393.000,00	3.750.000,00	13.773.554,00
Sources	Eligible to IPA				
in%	64,66%	5,26%	2,85%	27,23%	100,00%
Investment in production period	0,00	2.173.971,00	393.000,00	3.750.000,00	6.316.971,00
Sources	Non eligible to Bicro & City Zagreb				
in%	0,00%	34,41%	6,22%	59,36%	100,00%
Total investment in fixed assets	8.905.897,00	2.898.628,00	786.000,00	7.500.000,00	20.090.525,00
Structure in %	44,33%	14,43%	3,91%	37,33%	100,00%
Eligible costs (preproduction period)					13.773.554,00
Non eligible costs (production period)					6.316.971,00

Please note: *All data were transferred from chapters 4.8.2 (Table 31) and 4.8.3 (Tables 33, 34). Preproduction period ends in June 2012. Production period starts in July 2012. Building calculation per m²: 1519m².*

FIGURE 17: FIXED ASSETS STRUCTURE



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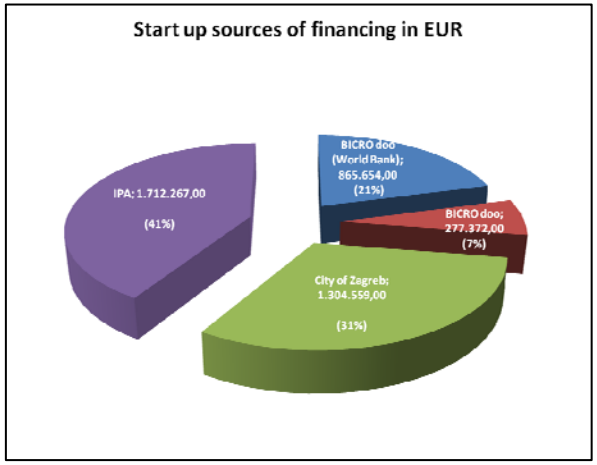
8.3. Expenses before Production

TABLE 44: START UP COSTS, IN EUR

No.	Description	TOTAL	"-3 (2009)	"-2 (2010)	"-1 (2011)	0 (2012)	Structure in %	Economic life in years	Eligible / Non-eligible	Financing by	Cumulative Financing by
1	Planning & Preparation Costs I part (from table 31)	**865.654,00**	865.654,00				20,81%	20	**N**	BICRO doo (World Bank)	**865.654,00**
2	Planning & Preparation Costs II part (from table 37)	**554.744,00**		175.675,00	214.877,00	164.192,00			**N**	BICRO doo & City of Zagreb (50:50)	**554.744,00**
3	Local & Water Rates (from table 31)	**575.077,00**		575.077,00			13,82%	20	**N**	City of Zagreb	**1.027.187,00**
4	Utilities Connections (from table 31)	**452.110,00**				452.110,00	10,87%	20	**N**	City of Zagreb	
5	Supervision during construction (from table 31)	**890.589,00**			445.294,50	445.294,50	21,41%	20	**E**	IPA	**1.712.267,00**
6	Technical assistance and publicity (from table 39, chapter 5.3)	**634.678,00**			507.743,00	126.935,00	15,26%	20	**E**	IPA	
7	Supervision for Equipment (from table 36)	**187.000,00**			93.500,00	93.500,00	4,50%	20	**E**	IPA	
	TOTAL:	**4.159.852,00**	**865.654,00**	**750.752,00**	**1.261.414,50**	**1.282.031,50**	**86,66%**				**4.159.852,00**
	Eligible:	**1.712.267,00**		0,00	1.046.537,50	665.729,50					
	Non-eligible:	**2.447.585,00**	865.654,00	750.752,00	214.877,00	616.302,00					

Please note: *All data were transferred from chapters 4.8.2 (Table 31), 4.8.3.1 (Table 36), 4.8.4 (Table 37) and chapter 5.3 (Table 39). Preproduction period ends in June 2012. Production period starts in July 2012.*

FIGURE 18: START-UP COSTS



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8.4. Working Capital

TABLE 45: WORKING CAPITAL NEEDS (YEAR = 365 SAYS); IN EUR

Year	*Working Capital needs - Base line projection*					*Total W.C needs (EUR)*
	BIOFacility - OR	*BIOIncubation - OR*	*BIOTransfer - OR*	*BIOEducation - OR*	*BIONetwork - OR*	
days:	*30*	*60*	*100*	*30*	*60*	
variation:	*12,17*	*6,08*	*3,65*	*12,17*	*6,08*	
1 (2012)	4.163,18	1.643,84	0,00	0,00	739,73	**6.546,74**
2 (2013)	8.326,36	4.109,59	191.780,82	4.931,51	1.479,45	**210.627,73**
3 (2014)	9.991,63	5.753,42	191.780,82	4.931,51	2.219,18	**214.676,56**
4 (2015)	10.824,26	7.397,26	191.780,82	7.397,26	2.958,90	**220.358,51**
5 (2016)	11.656,90	9.863,01	383.561,64	7.397,26	3.698,63	**416.177,45**
6 (2017)	11.989,95	9.863,01	383.561,64	9.863,01	4.438,36	**419.715,98**
7 (2018)	12.323,01	9.863,01	383.561,64	9.863,01	5.178,08	**420.788,76**
8 (2019)	12.656,06	10.684,93	383.561,64	9.863,01	5.424,66	**422.190,31**
9 (2020)	12.989,12	10.684,93	383.561,64	9.863,01	5.671,23	**422.769,94**
10 (2021)	13.322,17	10.684,93	575.342,47	9.863,01	5.917,81	**615.130,39**
11 (2022)	13.655,22	11.506,85	575.342,47	9.863,01	6.164,38	**616.531,94**
12 (2023)	13.988,28	11.506,85	575.342,47	9.863,01	6.410,96	**617.111,57**
13 (2024)	14.154,81	12.328,77	575.342,47	9.863,01	6.657,53	**618.346,59**
14 (2025)	14.154,81	12.328,77	575.342,47	9.863,01	6.904,11	**618.593,16**
15 (2026)	14.154,81	12.328,77	575.342,47	9.863,01	7.150,68	**618.839,74**
16 (2027)	14.154,81	12.328,77	767.123,29	9.863,01	7.397,26	**810.867,13**
17 (2028)	14.154,81	12.328,77	767.123,29	9.863,01	7.397,26	**810.867,13**
18 (2029)	14.154,81	12.328,77	767.123,29	9.863,01	7.397,26	**810.867,13**
19 (2030)	14.987,44	12.328,77	767.123,29	9.863,01	7.397,26	**811.699,77**
20 (2031)	14.987,44	12.328,77	767.123,29	9.863,01	7.397,26	**811.699,77**

Please note: *All data were transferred from chapter 8.6 (Tables 49, 51, 53, 55, 57). Preproduction period ends in June 2012. Production period starts in July 2012.*

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TABLE 46: WORKING CAPITAL CALCULATION

Year	Working Capital Calculation										Investment in NWC
	needs to fund			—	sources of funds				+	Net Working Capital	
	Total W.C. needs (Table 45)	Collection ratio in %	Increase variation	Current Assets	Account Payables	Payment period (days)	Variation (Year =365 d.)	Overdue Collection	Current Liability		
1 (2012)	6.546,74	85,00%	1,15	7.528,75	343.782,15	50	7,300	0,00	47.093,45	**-39.564,69**	**-39.564,69**
2 (2013)	210.627,73	85,00%	1,15	242.221,88	1.351.116,11	50	7,300	982,01	186.066,41	**56.155,48**	**16.590,78**
3 (2014)	214.676,56	85,00%	1,15	246.878,04	1.439.269,70	50	7,300	31.594,16	228.754,39	**18.123,65**	**1.532,87**
4 (2015)	220.358,51	85,00%	1,15	253.412,29	1.515.341,49	50	7,300	32.201,48	239.782,51	**13.629,78**	**12.096,91**
5 (2016)	416.177,45	85,00%	1,15	478.604,06	1.814.862,59	50	7,300	33.053,78	281.665,09	**196.938,97**	**184.842,07**
6 (2017)	419.715,98	95,00%	1,05	440.701,78	1.877.047,10	60	6,083	62.426,62	370.982,31	**69.719,47**	**-115.122,59**
7 (2018)	420.788,76	95,00%	1,05	441.828,20	1.885.304,62	60	6,083	20.985,80	330.898,89	**110.929,31**	**-4.193,28**
8 (2019)	422.190,31	95,00%	1,05	443.299,82	1.894.562,14	60	6,083	21.039,44	332.474,31	**110.825,51**	**106.632,23**
9 (2020)	422.769,94	95,00%	1,05	443.908,43	1.900.819,66	60	6,083	21.109,52	333.573,02	**110.335,41**	**3.703,18**
10 (2021)	615.130,39	95,00%	1,05	645.886,91	2.181.454,48	60	6,083	21.138,50	379.733,75	**266.153,16**	**262.449,97**
11 (2022)	616.531,94	97,00%	1,03	635.027,89	2.190.711,99	60	6,083	30.756,52	390.873,56	**244.154,33**	**-18.295,64**
12 (2023)	617.111,57	97,00%	1,03	635.624,91	2.196.969,51	60	6,083	18.495,96	379.641,63	**255.983,28**	**237.687,65**
13 (2024)	618.346,59	97,00%	1,03	636.896,98	2.203.598,27	60	6,083	18.513,35	380.748,68	**256.148,30**	**18.460,66**
14 (2025)	618.593,16	97,00%	1,03	637.150,96	2.204.598,27	60	6,083	18.550,40	380.950,11	**256.200,84**	**237.740,18**
15 (2026)	618.839,74	97,00%	1,03	637.404,93	2.205.598,27	60	6,083	18.557,79	381.121,89	**256.283,03**	**18.542,85**
16 (2027)	810.867,13	97,00%	1,03	835.193,15	2.480.975,57	60	6,083	18.565,19	426.396,79	**408.796,36**	**390.253,50**
17 (2028)	810.867,13	97,00%	1,03	835.193,15	2.480.975,57	60	6,083	24.326,01	432.157,61	**403.035,53**	**12.782,03**
18 (2029)	810.867,13	97,00%	1,03	835.193,15	2.480.975,57	60	6,083	24.326,01	432.157,61	**403.035,53**	**390.253,50**
19 (2030)	811.699,77	97,00%	1,03	836.050,76	2.494.119,37	60	6,083	24.326,01	434.318,24	**401.732,52**	**11.479,02**
20 (2031)	811.699,77	97,00%	1,03	836.050,76	2.494.119,37	60	6,083	24.350,99	434.343,22	**401.707,55**	**390.228,53**
Accumulated											**2.118.099,72**

Please note: *Negative Net Working Capital means that the calculation release tied operating capital due to sources of working capital (current liability) is greater than needs, resulting in less investment needs.* The *real gap between Current Liability and Current Assets is different calculation to cover losses which is done in Profit & Loss Account. In the year 2012, only 6 months of business activity was included.*

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8.5. Total Investments & Sources of Financing

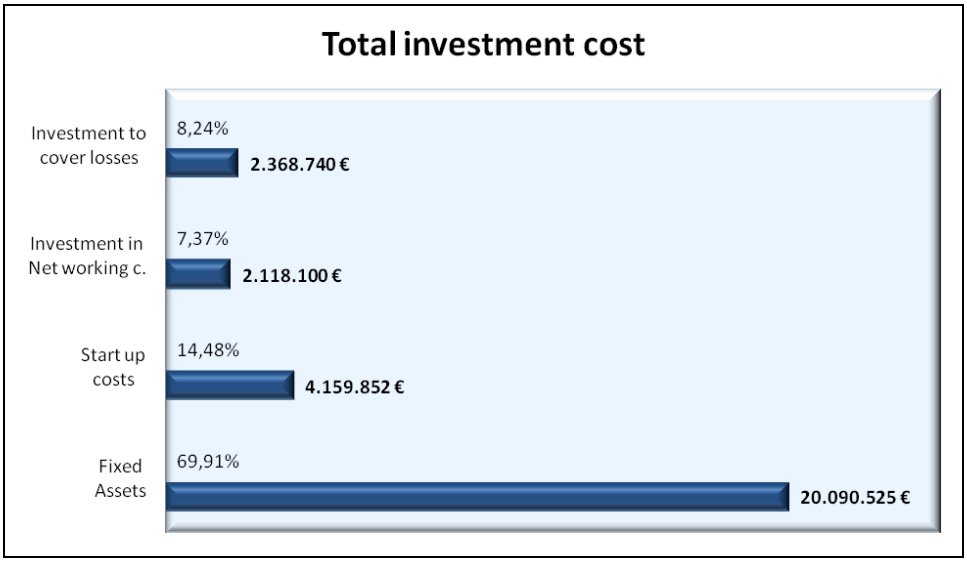
8.5.1. Total Investments, in EUR

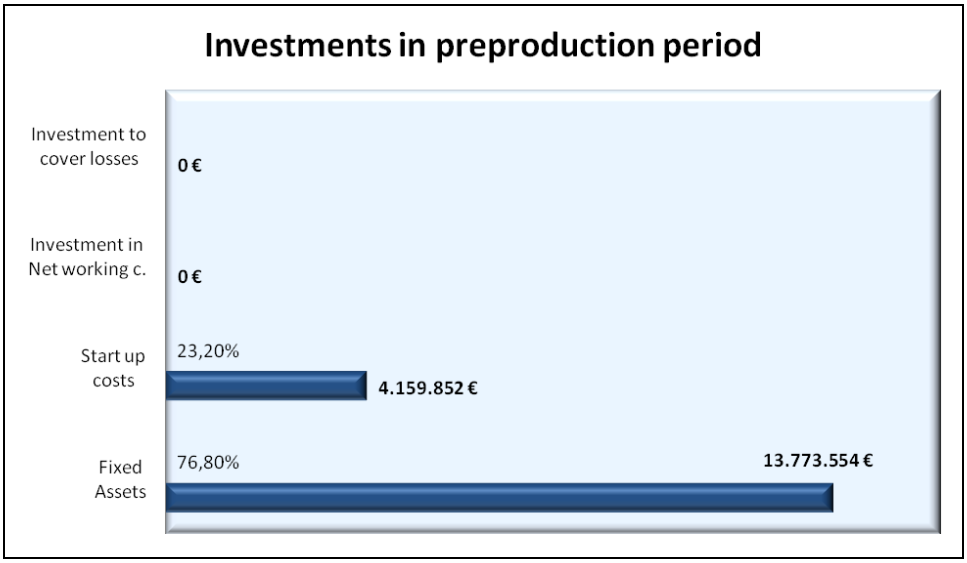
TABLE 47: TOTAL INVESTMENT COSTS, IN EUR

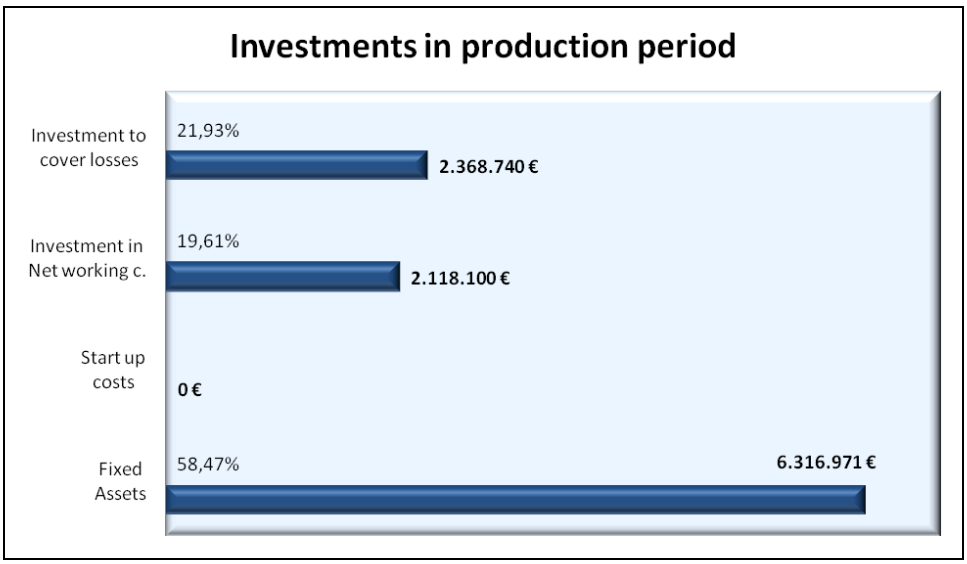
Year	*Total investment costs*				*Total investment (EUR)*
	Fixed Assets	*Start up costs*	*Investment in Net working capital*	*Investment to cover losses*	
"-3 (2009)	0,00	865.654,00			**865.654,00**
"-2 (2010)	0,00	750.752,00			**750.752,00**
"-1 (2011)	6.000.000,00	1.261.414,50			**7.261.414,50**
"-0 (2012)	7.773.554,00	1.282.031,50			**9.055.585,50**
1 (2012)	0,00		-39.564,69	278.630,15	**239.065,46**
2 (2013)	0,00		16.590,78	455.812,11	**472.402,89**
3 (2014)	0,00		1.532,87	509.204,90	**510.737,77**
4 (2015)	0,00		12.096,91	530.646,29	**542.743,20**
5 (2016)	0,00		184.842,07	100.536,99	**285.379,05**
6 (2017)	724.657,00		-115.122,59	124.169,34	**733.703,75**
7 (2018)	0,00		-4.193,28	123.874,70	**119.681,42**
8 (2019)	0,00		106.632,23	122.580,06	**229.212,29**
9 (2020)	0,00		3.703,18	123.285,42	**126.988,60**
10 (2021)	0,00		262.449,97	0,00	**262.449,97**
11 (2022)	4.867.657,00		-18.295,64	0,00	**4.849.361,36**
12 (2023)	0,00		237.687,65	0,00	**237.687,65**
13 (2024)	0,00		18.460,66	0,00	**18.460,66**
14 (2025)	0,00		237.740,18	0,00	**237.740,18**
15 (2026)	0,00		18.542,85	0,00	**18.542,85**
16 (2027)	724.657,00		390.253,50	0,00	**1.114.910,50**
17 (2028)	0,00		12.782,03	0,00	**12.782,03**
18 (2029)	0,00		390.253,50	0,00	**390.253,50**
19 (2030)	0,00		11.479,02	0,00	**11.479,02**
20 (2031)	0,00		390.228,53	0,00	**390.228,53**
Investment in preproduction period	**13.773.554,00**	**4.159.852,00**	**0,00**	**0,00**	**17.933.406,00**
Sources	**IPA (EU Contribution)**	**IPA/Founders**	**-**	**-**	
in%	**76,80%**	**23,20%**			**100,00%**
Investment in production period	**6.316.971,00**	**0,00**	**2.118.099,72**	**2.368.739,96**	**10.803.810,68**
Sources	**Founders**	**-**	**Founders**	**Founders**	
in%	**58,47%**		**19,61%**	**21,93%**	**100,00%**
Total investment costs	**20.090.525,00**	**4.159.852,00**	**2.118.099,72**	**2.368.739,96**	**28.737.216,68**
Structure in %	**69,91%**	**14,48%**	**7,37%**	**8,24%**	**100,00%**

Please note: *Founders of the BIOCentre will be BICRO, University of Zagreb and City of Zagreb. Preproduction period ends in June 2012. Production period starts in July 2012.*

FIGURE 19: TOTAL INVESTMENT COST STRUCTURE







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8.5.2. Total Sources

TABLE 48: SOURCES OF FINANCING + ANNUAL FINANCING PLAN, IN EUR

Year	*Sources of financing*				*Total sources(EUR)*
		Founders		*Bicro (WB)*	
	IPA	*Bicro doo*	*City of Zagreb*	*World Bank l.*	
"-3 (2009)	0,00	0,00	0,00	865.654,00	**865.654,00**
"-2 (2010)	0,00	87.837,50	662.914,50		**750.752,00**
"-1 (2011)	7.046.537,50	107.438,50	107.438,50		**7.261.414,50**
"-0 (2012)	8.439.283,50	82.096,00	534.206,00		**9.055.585,50**
1 (2012)		119.532,73	119.532,73		**239.065,46**
2 (2013)		236.201,44	236.201,44		**472.402,89**
3 (2014)		255.368,88	255.368,88		**510.737,77**
4 (2015)		271.371,60	271.371,60		**542.743,20**
5 (2016)		142.689,53	142.689,53		**285.379,05**
6 (2017)		366.851,87	366.851,87		**733.703,75**
7 (2018)		59.840,71	59.840,71		**119.681,42**
8 (2019)		114.606,14	114.606,14		**229.212,29**
9 (2020)		63.494,30	63.494,30		**126.988,60**
10 (2021)		131.224,99	131.224,99		**262.449,97**
11 (2022)		2.424.680,68	2.424.680,68		**4.849.361,36**
12 (2023)		118.843,82	118.843,82		**237.687,65**
13 (2024)		9.230,33	9.230,33		**18.460,66**
14 (2025)		118.870,09	118.870,09		**237.740,18**
15 (2026)		9.271,43	9.271,43		**18.542,85**
16 (2027)		557.455,25	557.455,25		**1.114.910,50**
17 (2028)		6.391,01	6.391,01		**12.782,03**
18 (2029)		195.126,75	195.126,75		**390.253,50**
19 (2030)		5.739,51	5.739,51		**11.479,02**
20 (2031)		195.114,26	195.114,26		**390.228,53**
Investment in preproduction period	**15.485.821,00**	**277.372,00**	**1.304.559,00**	**865.654,00**	**17.933.406,00**
in %	**86,35%**	**1,55%**	**7,27%**	**4,83%**	**100,00%**
Investment in production period	**0,00**	**5.401.905,34**	**5.401.905,34**	**0,00**	**10.803.810,68**
in %	**0,00%**	**50,00%**	**50,00%**	**0,00%**	**100,00%**
Total investment sources	**15.485.821,00**	**5.679.277,34**	**6.706.464,34**	**865.654,00**	**28.737.216,68**
Structure in %	**53,89%**	**19,76%**	**23,34%**	**3,01%**	**100,00%**

Please note: *Founders of the BIOCentre will be BICRO, University of Zagreb and City of Zagreb. Preproduction period ends in June 2012. Production period starts in July 2012.*

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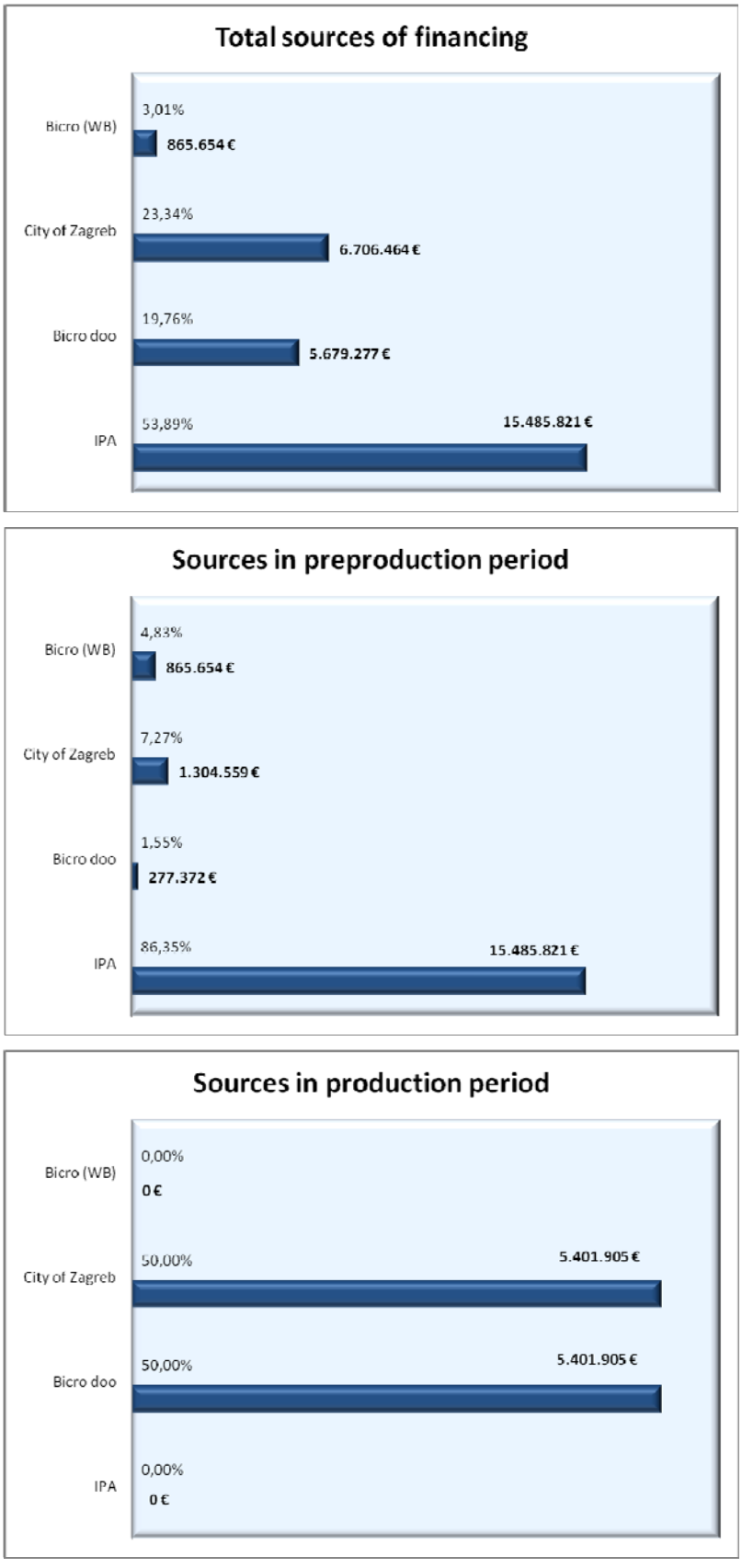
FIGURE 20: TOTAL SOURCES OF FINANCING STRUCTURE



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8.6. Sales & Costs by categories

8.6.1. BIOFacility

TABLE 49: OPERATING REVENUE – BIOFACILITY, IN EUR[2]

Year	BIOFacility - OR					Total revenue (EUR)
	Renting of offices			Renting of lab space		
	Total space in m²: 510			Total space in m²: 1067		
	Price: 8,00 EUR /m²			12,00 EUR /m²		
	Occupancy rate	m²	Income (EUR)	m²	Income (EUR)	
1 (2012)	25%	128	12.240,00	267	38.412,00	50.652,00
2 (2013)	50%	255	24.480,00	534	76.824,00	101.304,00
3 (2014)	60%	306	29.376,00	640	92.188,80	121.564,80
4 (2015)	65%	332	31.824,00	694	99.871,20	131.695,20
5 (2016)	70%	357	34.272,00	747	107.553,60	141.825,60
6 (2017)	72%	367	35.251,20	768	110.626,56	145.877,76
7 (2018)	74%	377	36.230,40	790	113.699,52	149.929,92
8 (2019)	76%	388	37.209,60	811	116.772,48	153.982,08
9 (2020)	78%	398	38.188,80	832	119.845,44	158.034,24
10 (2021)	80%	408	39.168,00	854	122.918,40	162.086,40
11 (2022)	82%	418	40.147,20	875	125.991,36	166.138,56
12 (2023)	84%	428	41.126,40	896	129.064,32	170.190,72
13 (2024)	85%	434	41.616,00	907	130.600,80	172.216,80
14 (2025)	85%	434	41.616,00	907	130.600,80	172.216,80
15 (2026)	85%	434	41.616,00	907	130.600,80	172.216,80
16 (2027)	85%	434	41.616,00	907	130.600,80	172.216,80
17 (2028)	85%	434	41.616,00	907	130.600,80	172.216,80
18 (2029)	85%	434	41.616,00	907	130.600,80	172.216,80
19 (2030)	90%	459	44.064,00	960	138.283,20	182.347,20
20 (2031)	90%	459	44.064,00	960	138.283,20	182.347,20
Accumulated			737.337,60		2.313.938,88	3.051.276,48

***Please note**: All data are transferred from chapter 3.4.1 (Table 23). Preproduction period starts in June 2012 and production period starts in July 2012.*

TABLE 50: DIRECT COSTS – BIOFACILITY, IN EUR

Year	BIOFacility - DOC			Total costs (EUR)
	Occupancy rate	Direct Operating Costs		
		Total space in m²: 1577		
		Cost / m² / year: 105,70 EUR		
		m²	Cost (EUR)	
1 (2012)	25%	394	41.672,23	41.672,23
2 (2013)	50%	789	83.344,45	83.344,45
3 (2014)	60%	946	100.013,34	100.013,34
4 (2015)	65%	1.025	108.347,79	108.347,79
5 (2016)	70%	1.104	116.682,23	116.682,23
6 (2017)	72%	1.135	120.016,01	120.016,01
7 (2018)	74%	1.167	123.349,79	123.349,79
8 (2019)	76%	1.199	126.683,56	126.683,56
9 (2020)	78%	1.230	130.017,34	130.017,34
10 (2021)	80%	1.262	133.351,12	133.351,12
11 (2022)	82%	1.293	136.684,90	136.684,90
12 (2023)	84%	1.325	140.018,68	140.018,68
13 (2024)	85%	1.340	141.685,57	141.685,57
14 (2025)	85%	1.340	141.685,57	141.685,57
15 (2026)	85%	1.340	141.685,57	141.685,57
16 (2027)	85%	1.340	141.685,57	141.685,57
17 (2028)	85%	1.340	141.685,57	141.685,57
18 (2029)	85%	1.340	141.685,57	141.685,57
19 (2030)	90%	1.419	150.020,01	150.020,01
20 (2031)	90%	1.419	150.020,01	150.020,01
Accumulated			2.510.334,83	2.510.334,83

***Please note**: All data are transferred from chapter 3.4.1 (Table 23) and chapter 8.6.9 (Table 60). Preproduction period starts in June 2012 and production period starts in July 2012.*

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8.6.2. BIOIncubation

TABLE 51: OPERATING REVENUE – BIOINCUBATION, IN EUR

Year	BIOIncubation - OR		Total revenue (EUR)
	Business assistance and advisory services 5.000,00 EUR /user/year		
	No. of users	Income (EUR)	
1 (2012)	2	10.000,00	10.000,00
2 (2013)	5	25.000,00	25.000,00
3 (2014)	7	35.000,00	35.000,00
4 (2015)	9	45.000,00	45.000,00
5 (2016)	12	60.000,00	60.000,00
6 (2017)	12	60.000,00	60.000,00
7 (2018)	12	60.000,00	60.000,00
8 (2019)	13	65.000,00	65.000,00
9 (2020)	13	65.000,00	65.000,00
10 (2021)	13	65.000,00	65.000,00
11 (2022)	14	70.000,00	70.000,00
12 (2023)	14	70.000,00	70.000,00
13 (2024)	15	75.000,00	75.000,00
14 (2025)	15	75.000,00	75.000,00
15 (2026)	15	75.000,00	75.000,00
16 (2027)	15	75.000,00	75.000,00
17 (2028)	15	75.000,00	75.000,00
18 (2029)	15	75.000,00	75.000,00
19 (2030)	15	75.000,00	75.000,00
20 (2031)	15	75.000,00	75.000,00
Accumulated		1.230.000,00	1.230.000,00

***Please note**: All data are transferred from chapter 3.4.1 (Table 24). Preproduction period starts in June 2012 and production period starts in July 2012.*

TABLE 52: DIRECT COSTS – BIOINCUBATION, IN EUR

Year	BIOIncubation - DOC		Total costs (EUR)
	Direct operating costs 3.000,00 EUR /user/year		
	No. of users	Cost (EUR)	
1 (2012)	2	6.000,00	6.000,00
2 (2013)	5	15.000,00	15.000,00
3 (2014)	7	21.000,00	21.000,00
4 (2015)	9	27.000,00	27.000,00
5 (2016)	12	36.000,00	36.000,00
6 (2017)	12	36.000,00	36.000,00
7 (2018)	12	36.000,00	36.000,00
8 (2019)	13	39.000,00	39.000,00
9 (2020)	13	39.000,00	39.000,00
10 (2021)	13	39.000,00	39.000,00
11 (2022)	14	42.000,00	42.000,00
12 (2023)	14	42.000,00	42.000,00
13 (2024)	15	45.000,00	45.000,00
14 (2025)	15	45.000,00	45.000,00
15 (2026)	15	45.000,00	45.000,00
16 (2027)	15	45.000,00	45.000,00
17 (2028)	15	45.000,00	45.000,00
18 (2029)	15	45.000,00	45.000,00
19 (2030)	15	45.000,00	45.000,00
20 (2031)	15	45.000,00	45.000,00
Accumulated		738.000,00	738.000,00

***Please note**: Average annual costs of consultancy services are estimated to 3.000 € per user. Preproduction period starts in June 2012 and production period starts in July 2012.*

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8.6.3. BIOTransfer

TABLE 53: OPERATING REVENUE – BIOTRANSFER, IN EUR

Year	BIOTransfer - OR		Total revenue (EUR)
	Number of transfers/year 700.000,00 EUR /transfer		
	No. of transf.	Income (EUR)	
1 (2012)	0	0,00	**0,00**
2 (2013)	1	700.000,00	**700.000,00**
3 (2014)	1	700.000,00	**700.000,00**
4 (2015)	1	700.000,00	**700.000,00**
5 (2016)	2	1.400.000,00	**1.400.000,00**
6 (2017)	2	1.400.000,00	**1.400.000,00**
7 (2018)	2	1.400.000,00	**1.400.000,00**
8 (2019)	2	1.400.000,00	**1.400.000,00**
9 (2020)	2	1.400.000,00	**1.400.000,00**
10 (2021)	3	2.100.000,00	**2.100.000,00**
11 (2022)	3	2.100.000,00	**2.100.000,00**
12 (2023)	3	2.100.000,00	**2.100.000,00**
13 (2024)	3	2.100.000,00	**2.100.000,00**
14 (2025)	3	2.100.000,00	**2.100.000,00**
15 (2026)	3	2.100.000,00	**2.100.000,00**
16 (2027)	4	2.800.000,00	**2.800.000,00**
17 (2028)	4	2.800.000,00	**2.800.000,00**
18 (2029)	4	2.800.000,00	**2.800.000,00**
19 (2030)	4	2.800.000,00	**2.800.000,00**
20 (2031)	4	2.800.000,00	**2.800.000,00**
Accumulated		**35.700.000,00**	**35.700.000,00**

***Please note**: All data are transferred from chapter 3.4.1 (Table 25). Preproduction period starts in June 2012 and production period starts in July 2012.*

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TABLE 54: DIRECT OPERATING COSTS – BIOTRANSFER, IN EUR

Year	BIO Transfer - DOC											Total costs (€)
	Total space in m2: 910 Cost / m2 / year: 105,70 €		Hired satff			Interns			Other costs related to labour			
	m^2	Cost (€)	#	unit cost	Cost (€)	#	unit cost	Cost (€)	#	unit cost	Cost (€)	
1 (2012)	228 m2	24.046,75	0	33.459,10	0,00	0	4.000,00	0,00	0	27.000,00	0,00	**24.046,75**
2 (2013)	455 m2	48.093,50	8	33.459,10	267.672,80	8	4.000,00	32.000,00	16	27.000,00	432.000,00	**779.766,30**
3 (2014)	546 m2	57.712,20	8	33.459,10	267.672,80	8	4.000,00	32.000,00	16	27.000,00	432.000,00	**789.385,00**
4 (2015)	592 m2	62.521,55	8	33.459,10	267.672,80	8	4.000,00	32.000,00	16	27.000,00	432.000,00	**794.194,35**
5 (2016)	637 m2	67.330,90	11	33.459,10	368.050,10	11	4.000,00	44.000,00	22	27.000,00	594.000,00	**1.073.381,00**
6 (2017)	655 m2	69.254,64	11	33.459,10	368.050,10	11	4.000,00	44.000,00	22	27.000,00	594.000,00	**1.075.304,74**
7 (2018)	673 m2	71.178,38	11	33.459,10	368.050,10	11	4.000,00	44.000,00	22	27.000,00	594.000,00	**1.077.228,48**
8 (2019)	692 m2	73.102,12	11	33.459,10	368.050,10	11	4.000,00	44.000,00	22	27.000,00	594.000,00	**1.079.152,22**
9 (2020)	710 m2	75.025,86	11	33.459,10	368.050,10	11	4.000,00	44.000,00	22	27.000,00	594.000,00	**1.081.075,96**
10 (2021)	728 m2	76.949,60	14	33.459,10	468.427,40	14	4.000,00	56.000,00	28	27.000,00	756.000,00	**1.357.377,00**
11 (2022)	746 m2	78.873,34	14	33.459,10	468.427,40	14	4.000,00	56.000,00	28	27.000,00	756.000,00	**1.359.300,74**
12 (2023)	764 m2	80.797,08	14	33.459,10	468.427,40	14	4.000,00	56.000,00	28	27.000,00	756.000,00	**1.361.224,48**
13 (2024)	774 m2	81.758,95	14	33.459,10	468.427,40	14	4.000,00	56.000,00	28	27.000,00	756.000,00	**1.362.186,35**
14 (2025)	774 m2	81.758,95	14	33.459,10	468.427,40	14	4.000,00	56.000,00	28	27.000,00	756.000,00	**1.362.186,35**
15 (2026)	774 m2	81.758,95	14	33.459,10	468.427,40	14	4.000,00	56.000,00	28	27.000,00	756.000,00	**1.362.186,35**
16 (2027)	774 m2	81.758,95	17	33.459,10	568.804,70	17	4.000,00	68.000,00	34	27.000,00	918.000,00	**1.636.563,65**
17 (2028)	774 m2	81.758,95	17	33.459,10	568.804,70	17	4.000,00	68.000,00	34	27.000,00	918.000,00	**1.636.563,65**
18 (2029)	774 m2	81.758,95	17	33.459,10	568.804,70	17	4.000,00	68.000,00	34	27.000,00	918.000,00	**1.636.563,65**
19 (2030)	819 m2	86.568,30	17	33.459,10	568.804,70	17	4.000,00	68.000,00	34	27.000,00	918.000,00	**1.641.373,00**
20 (2031)	819 m2	86.568,30	17	33.459,10	568.804,70	17	4.000,00	68.000,00	34	27.000,00	918.000,00	**1.641.373,00**
Accumulated		**1.448.576,22**			**8.297.856,80**			**992.000,00**			**13.392.000,00**	**24.130.433,02**

Remark:

Interns unit cost of 4.000 € per year is minimum costs for basic needs.

Chemicals	5.000,00
Consumables (*)	15.000,00
EHS and work protection	500,00
Calibration and qualification	4.500,00
Other	2.000,00
Total other costs:	27.000,00

(*) include chromatography columns, ELISA plates, labaratory materials like tubes, pipettes, tubing, etc.

***Please note**: All data are transferred from chapter 8.6.9 (Table 60), chapter 5.2 (Table 38) and chapter 5.6 (Table 40). Preproduction period starts in June 2012 and production period starts in July 2012.*

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8.6.4. BIOEducation

TABLE 55: OPERATING REVENUE – BIOEDUCATION, IN EUR

Year	BIOEducation - OR				Total revenue (EUR)
	Business training 6.000,00 EUR /trainee		Technical training 6.000,00 EUR /trainee		
	trainees	Income (EUR)	trainees	Income (EUR)	
1 (2012)	0	0,00	0	0,00	**0,00**
2 (2013)	10	60.000,00	0	0,00	**60.000,00**
3 (2014)	0	0,00	10	60.000,00	**60.000,00**
4 (2015)	15	90.000,00	0	0,00	**90.000,00**
5 (2016)	0	0,00	15	90.000,00	**90.000,00**
6 (2017)	20	120.000,00	0	0,00	**120.000,00**
7 (2018)	0	0,00	20	120.000,00	**120.000,00**
8 (2019)	20	120.000,00	0	0,00	**120.000,00**
9 (2020)	0	0,00	20	120.000,00	**120.000,00**
10 (2021)	20	120.000,00	0	0,00	**120.000,00**
11 (2022)	0	0,00	20	120.000,00	**120.000,00**
12 (2023)	20	120.000,00	0	0,00	**120.000,00**
13 (2024)	0	0,00	20	120.000,00	**120.000,00**
14 (2025)	20	120.000,00	0	0,00	**120.000,00**
15 (2026)	0	0,00	20	120.000,00	**120.000,00**
16 (2027)	20	120.000,00	0	0,00	**120.000,00**
17 (2028)	0	0,00	20	120.000,00	**120.000,00**
18 (2029)	20	120.000,00	0	0,00	**120.000,00**
19 (2030)	0	0,00	20	120.000,00	**120.000,00**
20 (2031)	20	120.000,00	0	0,00	**120.000,00**
Accumulated	185	**1.110.000,00**	165	**990.000,00**	**2.100.000,00**

***Please note**: All data are transferred from chapter 3.4.1 (Table 26). Preproduction period starts in June 2012 and production period starts in July 2012.*

TABLE 56: DIRECT COSTS – BIOEDUCATION, IN EUR

Year	BIOEducation - DOC				Total costs (EUR)
	Business training 4.000,00 EUR /trainee		Technical training 4.000,00 EUR /trainee		
	trainees	Cost (EUR)	trainees	Cost (EUR)	
1 (2012)	0	0,00	0	0,00	**0,00**
2 (2013)	10	40.000,00	0	0,00	**40.000,00**
3 (2014)	0	0,00	10	40.000,00	**40.000,00**
4 (2015)	15	60.000,00	0	0,00	**60.000,00**
5 (2016)	0	0,00	15	60.000,00	**60.000,00**
6 (2017)	20	80.000,00	0	0,00	**80.000,00**
7 (2018)	0	0,00	20	80.000,00	**80.000,00**
8 (2019)	20	80.000,00	0	0,00	**80.000,00**
9 (2020)	0	0,00	20	80.000,00	**80.000,00**
10 (2021)	20	80.000,00	0	0,00	**80.000,00**
11 (2022)	0	0,00	20	80.000,00	**80.000,00**
12 (2023)	20	80.000,00	0	0,00	**80.000,00**
13 (2024)	0	0,00	20	80.000,00	**80.000,00**
14 (2025)	20	80.000,00	0	0,00	**80.000,00**
15 (2026)	0	0,00	20	80.000,00	**80.000,00**
16 (2027)	20	80.000,00	0	0,00	**80.000,00**
17 (2028)	0	0,00	20	80.000,00	**80.000,00**
18 (2029)	20	80.000,00	0	0,00	**80.000,00**
19 (2030)	0	0,00	20	80.000,00	**80.000,00**
20 (2031)	20	80.000,00	0	0,00	**80.000,00**
Accumulated	185	**740.000,00**	165	**660.000,00**	**1.400.000,00**

***Please note**: Average annual costs of external trainers are estimated at 4.000 € per participant. Preproduction period starts in June 2012 and production period starts in July 2012.*

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8.6.5. BIONetwork

TABLE 57: OPERATING REVENUE– BIONETWORK, IN EUR

Year	BIONetwork - OR		Total revenue (EUR)
	Network members 300,00 EUR /member		
	members	Income (EUR)	
1 (2012)	15	4.500,00	4.500,00
2 (2013)	30	9.000,00	9.000,00
3 (2014)	45	13.500,00	13.500,00
4 (2015)	60	18.000,00	18.000,00
5 (2016)	75	22.500,00	22.500,00
6 (2017)	90	27.000,00	27.000,00
7 (2018)	105	31.500,00	31.500,00
8 (2019)	110	33.000,00	33.000,00
9 (2020)	115	34.500,00	34.500,00
10 (2021)	120	36.000,00	36.000,00
11 (2022)	125	37.500,00	37.500,00
12 (2023)	130	39.000,00	39.000,00
13 (2024)	135	40.500,00	40.500,00
14 (2025)	140	42.000,00	42.000,00
15 (2026)	145	43.500,00	43.500,00
16 (2027)	150	45.000,00	45.000,00
17 (2028)	150	45.000,00	45.000,00
18 (2029)	150	45.000,00	45.000,00
19 (2030)	150	45.000,00	45.000,00
20 (2031)	150	45.000,00	45.000,00
Accumulated		657.000,00	657.000,00

***Please note**: All data are transferred from chapter 3.4.1 (Table 27). Preproduction period starts in June 2012 and production period starts in July 2012.*

TABLE 58: DIRECT COSTS – BIONETWORK, IN EUR

Year	BIONetwork - DOC		Total costs (EUR)
	Direct operating costs 200,00 EUR /member		
	members	Cost (EUR)	
1 (2012)	15	3.000,00	3.000,00
2 (2013)	30	6.000,00	6.000,00
3 (2014)	45	9.000,00	9.000,00
4 (2015)	60	12.000,00	12.000,00
5 (2016)	75	15.000,00	15.000,00
6 (2017)	90	18.000,00	18.000,00
7 (2018)	105	21.000,00	21.000,00
8 (2019)	110	22.000,00	22.000,00
9 (2020)	115	23.000,00	23.000,00
10 (2021)	120	24.000,00	24.000,00
11 (2022)	125	25.000,00	25.000,00
12 (2023)	130	26.000,00	26.000,00
13 (2024)	135	27.000,00	27.000,00
14 (2025)	140	28.000,00	28.000,00
15 (2026)	145	29.000,00	29.000,00
16 (2027)	150	30.000,00	30.000,00
17 (2028)	150	30.000,00	30.000,00
18 (2029)	150	30.000,00	30.000,00
19 (2030)	150	30.000,00	30.000,00
20 (2031)	150	30.000,00	30.000,00
Accumulated		438.000,00	438.000,00

***Please note**: Average annual costs of BIONetwork activities (events, meetings, lecturers etc,) are estimated to 200 € per member. Preproduction period starts in June 2012 and production period starts in July 2012.*

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8.6.6. Fixed Costs

TABLE 59: FIXED COSTS, IN EUR

Year	*Administrative personnel costs*	*General operating costs (Infrastructure FEE, Waste Treatment Maintenance, Security, Insurance)*	***Total costs (EUR)***
	Cost (EUR)	*Cost (EUR)*	
1 (2012)	160.844,00	108.219,18	**269.063,18**
2 (2013)	210.567,00	216.438,36	**427.005,36**
3 (2014)	263.433,00	216.438,36	**479.871,36**
4 (2015)	297.361,00	216.438,36	**513.799,36**
5 (2016)	297.361,00	216.438,36	**513.799,36**
6 (2017)	331.288,00	216.438,36	**547.726,36**
7 (2018)	331.288,00	216.438,36	**547.726,36**
8 (2019)	331.288,00	216.438,36	**547.726,36**
9 (2020)	331.288,00	216.438,36	**547.726,36**
10 (2021)	331.288,00	216.438,36	**547.726,36**
11 (2022)	331.288,00	216.438,36	**547.726,36**
12 (2023)	331.288,00	216.438,36	**547.726,36**
13 (2024)	331.288,00	216.438,36	**547.726,36**
14 (2025)	331.288,00	216.438,36	**547.726,36**
15 (2026)	331.288,00	216.438,36	**547.726,36**
16 (2027)	331.288,00	216.438,36	**547.726,36**
17 (2028)	331.288,00	216.438,36	**547.726,36**
18 (2029)	331.288,00	216.438,36	**547.726,36**
19 (2030)	331.288,00	216.438,36	**547.726,36**
20 (2031)	331.288,00	216.438,36	**547.726,36**
Accumulated	**6.198.886,00**	**4.220.547,95**	**10.419.433,95**

***Please note**: All data are transferred from chapter 5.6 (Table 40) and chapter 8.6.10 (Table 61). Preproduction period starts in June 2012 and production period starts in July 2012.*

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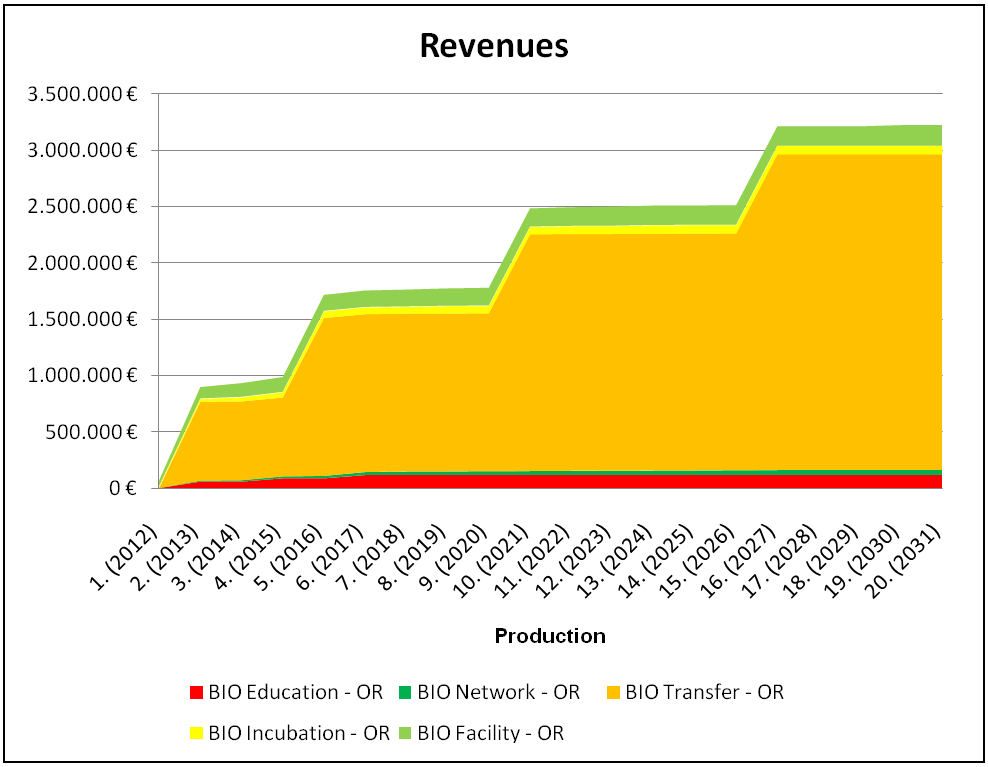
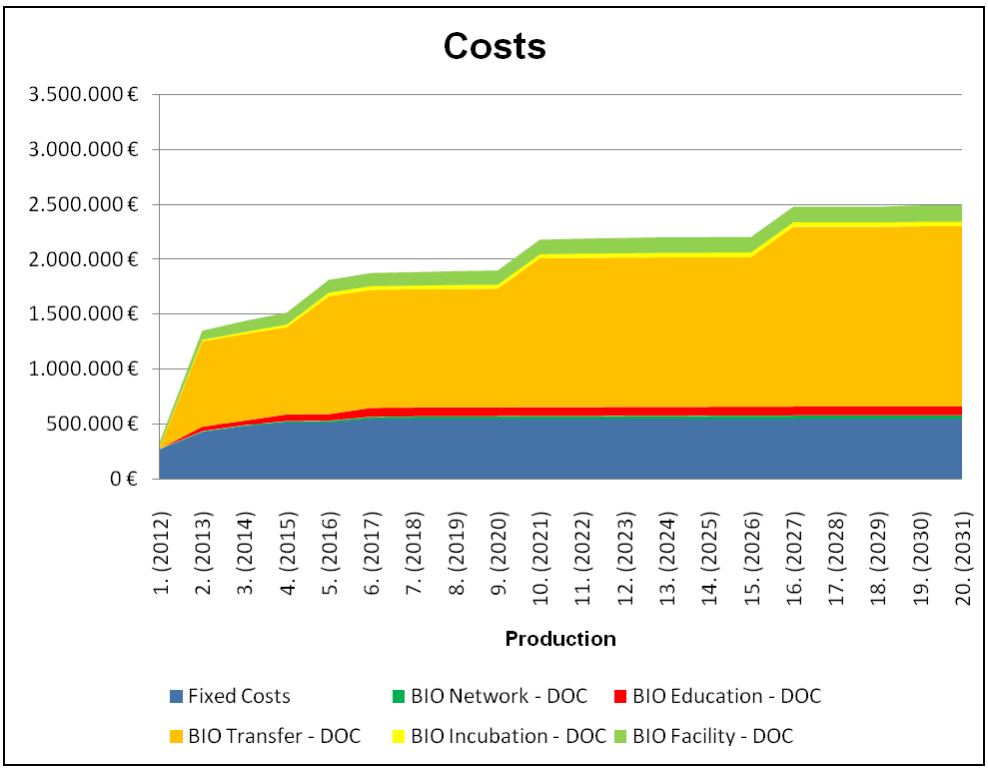
8.6.7. All BIORevenues

FIGURE 21: ALL BIOREVENUES



8.6.8. All BIOExpenses

FIGURE 22: ALL BIOEXPENSES



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8.6.9. Direct operating costs per m²

TABLE 60: CALCULATION OF THE ANNUAL DIRECT OPERATING COSTS PER M², IN EUR

Type of cost	Annual amount (2.487 m²)	Annual amount (m²)
Heating / Cooling	98.494,00	39,60
Water	16.438,00	6,61
Light	8.219,00	3,30
Cleaning	106.849,00	42,96
PW, Waste water and gases	32.876,00	13,22
TOTAL	**262.876,00**	**105,70**

8.6.10. General operating costs

TABLE 61: CALCULATION OF THE ANNUAL GENERAL OPERATING COSTS, IN EUR

Type of cost	Annual amount
Infrastructure FEE	32.876,71
Waste Treatment	16.438,36
Maintenance	41.095,89
Security	57.534,25
Insurance	68.493,15
TOTAL	**216.438,36**

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8.7. Operating Revenue and Costs

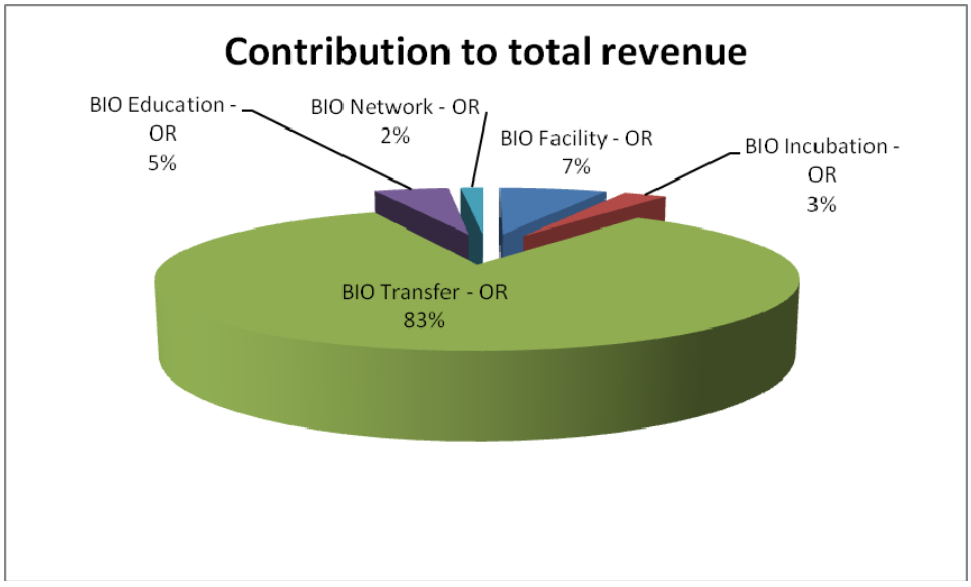
8.7.1. Operating Revenue – Base line projection

TABLE 62: ACCUMULATED OPERATING REVENUE, IN EUR

Year	*Operating Revenue*					*Total revenue (EUR) Base scenario*
	BIOFacility - OR	*BIOIncubation - OR*	*BIOTransfer - OR*	*BIOEducation - OR*	*BIONetwork - OR*	
variation:	*1*	*1*	*1*	*1*	*1*	
1 (2012)	50.652,00	10.000,00	0,00	0,00	4.500,00	**65.152,00**
2 (2013)	101.304,00	25.000,00	700.000,00	60.000,00	9.000,00	**895.304,00**
3 (2014)	121.564,80	35.000,00	700.000,00	60.000,00	13.500,00	**930.064,80**
4 (2015)	131.695,20	45.000,00	700.000,00	90.000,00	18.000,00	**984.695,20**
5 (2016)	141.825,60	60.000,00	1.400.000,00	90.000,00	22.500,00	**1.714.325,60**
6 (2017)	145.877,76	60.000,00	1.400.000,00	120.000,00	27.000,00	**1.752.877,76**
7 (2018)	149.929,92	60.000,00	1.400.000,00	120.000,00	31.500,00	**1.761.429,92**
8 (2019)	153.982,08	65.000,00	1.400.000,00	120.000,00	33.000,00	**1.771.982,08**
9 (2020)	158.034,24	65.000,00	1.400.000,00	120.000,00	34.500,00	**1.777.534,24**
10 (2021)	162.086,40	65.000,00	2.100.000,00	120.000,00	36.000,00	**2.483.086,40**
11 (2022)	166.138,56	70.000,00	2.100.000,00	120.000,00	37.500,00	**2.493.638,56**
12 (2023)	170.190,72	70.000,00	2.100.000,00	120.000,00	39.000,00	**2.499.190,72**
13 (2024)	172.216,80	75.000,00	2.100.000,00	120.000,00	40.500,00	**2.507.716,80**
14 (2025)	172.216,80	75.000,00	2.100.000,00	120.000,00	42.000,00	**2.509.216,80**
15 (2026)	172.216,80	75.000,00	2.100.000,00	120.000,00	43.500,00	**2.510.716,80**
16 (2027)	172.216,80	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.212.216,80**
17 (2028)	172.216,80	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.212.216,80**
18 (2029)	172.216,80	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.212.216,80**
19 (2030)	182.347,20	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.222.347,20**
20 (2031)	182.347,20	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.222.347,20**
Accumulated	**3.051.276,48**	**1.230.000,00**	**35.700.000,00**	**2.100.000,00**	**657.000,00**	**42.738.276,48**
Contrib. in %	**7,14%**	**2,88%**	**83,53%**	**4,91%**	**1,54%**	**100,00%**

Note: *Variation 1 represents Base line projection. Variation 1,2 represents sales increase of 20%. Variation 0.8 represents sales decrease of 20%. In the year 2012, only 6 months of business activity was included.*

FIGURE 23: CONTRIBUTION TO TOTAL REVENUE – BASE LINE PROJECTION



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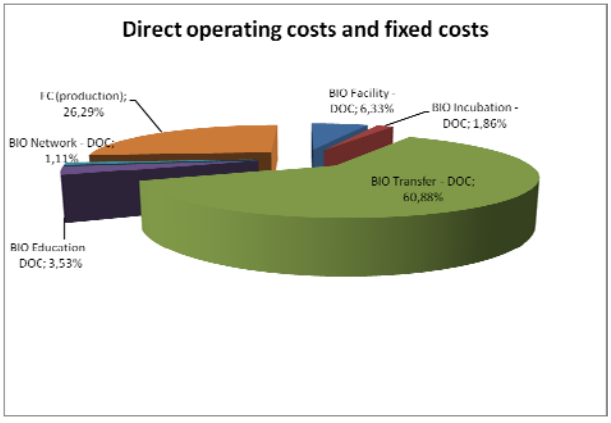
8.7.2. Operating Cost

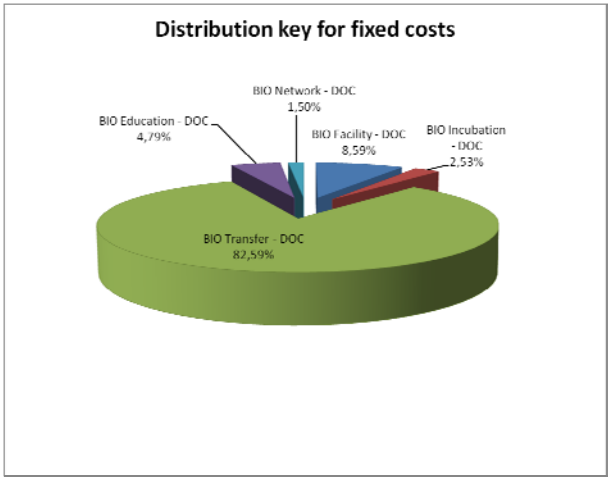
TABLE 63: OPERATING COSTS (DIRECT AND INDIRECT PRODUCTION COSTS), IN EUR

Year	Operating Costs					Fixed costs (FC)	Total costs (EUR)
	Direct operating costs (Variable costs)						
	BIOFacility - DOC	BIOIncubation - DOC	BIOTransfer - DOC	BIOEducation - DOC	BIONetwork - DOC	FC (production)	
	1	1	1	1	1		
1 (2012)	41.672,23	6.000,00	24.046,75	0,00	3.000,00	269.063,18	**343.782,15**
2 (2013)	83.344,45	15.000,00	779.766,30	40.000,00	6.000,00	427.005,36	**1.351.116,11**
3 (2014)	100.013,34	21.000,00	789.385,00	40.000,00	9.000,00	479.871,36	**1.439.269,70**
4 (2015)	108.347,79	27.000,00	794.194,35	60.000,00	12.000,00	513.799,36	**1.515.341,49**
5 (2016)	116.682,23	36.000,00	1.073.381,00	60.000,00	15.000,00	513.799,36	**1.814.862,59**
6 (2017)	120.016,01	36.000,00	1.075.304,74	80.000,00	18.000,00	547.726,36	**1.877.047,10**
7 (2018)	123.349,79	36.000,00	1.077.228,48	80.000,00	21.000,00	547.726,36	**1.885.304,62**
8 (2019)	126.683,56	39.000,00	1.079.152,22	80.000,00	22.000,00	547.726,36	**1.894.562,14**
9 (2020)	130.017,34	39.000,00	1.081.075,96	80.000,00	23.000,00	547.726,36	**1.900.819,66**
10 (2021)	133.351,12	39.000,00	1.357.377,00	80.000,00	24.000,00	547.726,36	**2.181.454,48**
11 (2022)	136.684,90	42.000,00	1.359.300,74	80.000,00	25.000,00	547.726,36	**2.190.711,99**
12 (2023)	140.018,68	42.000,00	1.361.224,48	80.000,00	26.000,00	547.726,36	**2.196.969,51**
13 (2024)	141.685,57	45.000,00	1.362.186,35	80.000,00	27.000,00	547.726,36	**2.203.598,27**
14 (2025)	141.685,57	45.000,00	1.362.186,35	80.000,00	28.000,00	547.726,36	**2.204.598,27**
15 (2026)	141.685,57	45.000,00	1.362.186,35	80.000,00	29.000,00	547.726,36	**2.205.598,27**
16 (2027)	141.685,57	45.000,00	1.636.563,65	80.000,00	30.000,00	547.726,36	**2.480.975,57**
17 (2028)	141.685,57	45.000,00	1.636.563,65	80.000,00	30.000,00	547.726,36	**2.480.975,57**
18 (2029)	141.685,57	45.000,00	1.636.563,65	80.000,00	30.000,00	547.726,36	**2.480.975,57**
19 (2030)	150.020,01	45.000,00	1.641.373,00	80.000,00	30.000,00	547.726,36	**2.494.119,37**
20 (2031)	150.020,01	45.000,00	1.641.373,00	80.000,00	30.000,00	547.726,36	**2.494.119,37**
Accumulated DOC	**2.510.334,83**	**738.000,00**	**24.130.433,02**	**1.400.000,00**	**438.000,00**	**10.419.433,95**	**39.636.201,80**
Contrib. in %	**6,33%**	**1,86%**	**60,88%**	**3,53%**	**1,11%**	**26,29%**	**100,00%**
FC distribution key	**8,59%**	**2,53%**	**82,59%**	**4,79%**	**1,50%**		**100,00%**
Distributed FC	895.248,51	263.189,35	8.605.519,07	499.275,20	156.201,81		
Accum. DOC + FC	**3.405.583,35**	**1.001.189,35**	**32.735.952,09**	**1.899.275,20**	**594.201,81**		

Please note: *Characteristic of those fixed costs is to be related with production and sales and excluded other accounting fixed costs like interest, depreciation, reserves etc. Operating costs consist of variable and fixed costs with the purpose to cover operating routines which are production and sales. In the year 2012, only 6 months of business activity was included.*

FIGURE 24: DIRECT OPERATING COSTS AND FIXED COST; DISTRIBUTION KEY FOR FIXED COSTS





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8.7.3. Total operating revenue & operating costs

FIGURE 25: TOTAL OPERATING REVENUE AND COSTS

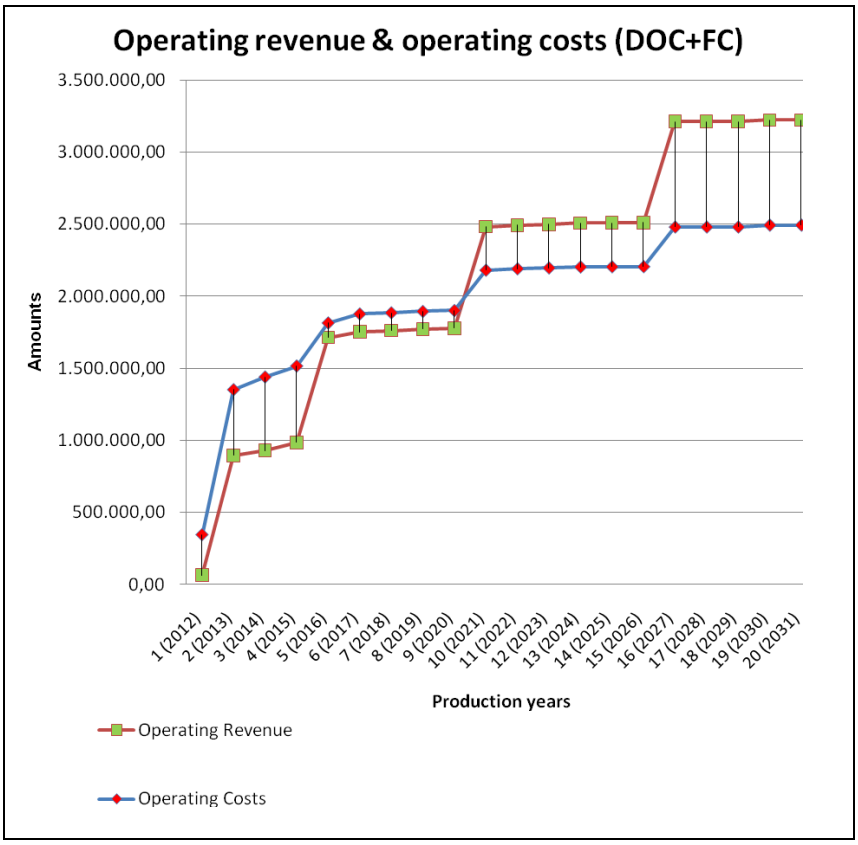
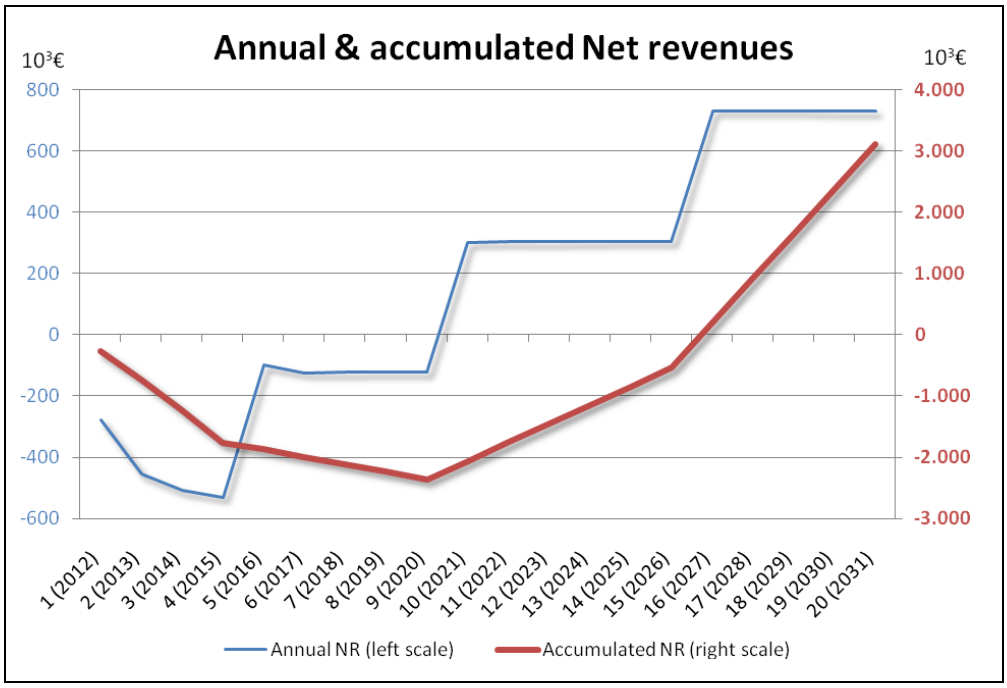


FIGURE 26: ANNUAL AND ACCUMULATED NET REVENUES



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8.8. Financial Plan

8.8.1. Discounted values to calculate Funding gap

TABLE 64: DISCOUNTED VALUES TO CALCULATE FUNDING GAP, IN EUR

Year	Discounted values to calculate Funding gap				
	Years	*Discount factors*	*Discounted initial investment costs*	*Discounted O. Revenues*	*Discounted O. Costs + reinvestments*
"-3 (2009)	0	1	865.654,00		
"-2 (2010)	1	0,934579439	701.637,38		
"-1 (2011)	2	0,873438728	6.342.400,65		
"-0 (2012)	3	0,816297877	7.392.055,22		
1 (2012)	3	0,816297877		53.183,44	248.332,07
2 (2013)	4	0,762895212		683.023,13	1.043.417,04
3 (2014)	5	0,712986179		663.123,35	1.027.272,32
4 (2015)	6	0,666342224		656.143,99	1.017.796,70
5 (2016)	7	0,622749742		1.067.595,82	1.245.315,56
6 (2017)	8	0,582009105		1.020.190,82	1.447.213,08
7 (2018)	9	0,543933743		958.101,17	1.023.199,93
8 (2019)	10	0,508349292		900.785,84	1.017.305,74
9 (2020)	11	0,475092796		844.493,71	904.825,08
10 (2021)	12	0,444011959		1.102.520,06	1.085.122,80
11 (2022)	13	0,414964448		1.034.771,35	2.921.380,15
12 (2023)	14	0,387817241		969.229,25	944.202,02
13 (2024)	15	0,36244602		908.911,97	805.376,41
14 (2025)	16	0,338734598		849.958,54	827.304,53
15 (2026)	17	0,31657439		794.828,64	704.106,12
16 (2027)	18	0,295863916		950.379,04	1.063.892,94
17 (2028)	19	0,276508333		888.204,71	689.544,76
18 (2029)	20	0,258419003		830.097,86	741.980,15
19 (2030)	21	0,241513087		778.239,02	605.134,80
20 (2031)	22	0,225713165		727.326,19	651.035,29
Accumulated			**15.301.747,25**	**16.681.107,90**	**20.013.757,49**

Please note: *Discounted operating costs, including reinvestments, are according to Cash flows "FNPV(C)" Table 73, column Operating costs + Investment costs in production period. Guide to CBA 200, page 242, ANNEX I, Determination of EU Grant.*

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8.8.2. Funding gap calculation

TABLE 65: FUNDING GAP CALCULATION (E.1.2.), IN EUR

	Main elements and parameters	VALUE Not discounted	VALUE Discounted (Net Present Value)
1	Reference period (years) = 3 + 20		
2	Financial discount rate (%) =	7,00%	
3	Total initial investment cost (in euro, not discounted)	17.933.406,00	
4	Total initial investment cost (in euro, discounted)(**DIC**)		15.301.747,25
5	Residual value (in euro, not discounted)	10.947.699,93	
6	Residual value (in euro, discounted) (**DRV**)		2.471.040,00
7	Revenues (in euro, discounted)(**DR**)		16.681.107,90
8	Operating costs (in euro, discounted)(**DOC,** with reinvestment)		20.013.757,49

1. step

R *According to Guide to CBA July 2008, Annex I, page 242, funding gap rate is the share of the discounted cost of the initial investment (DIC) not covered by the discounted net revenue (DNR) of the project.*

R(3)= *(DIC - DNR)/DIC, where:*

DNR= *discounted revenue (DR) - discounted operating cost (DOC) + discounted residual value (DRV), where:*

Cash flows: *used in this calculation are the ones included in the calculation of the profitability of investment - "FNPV(C)" (Table 73), in particular:*

a) *Financial revenues generated by the project, and not a the sources of financing, are used for the calculation of net revenues; (in Table 73, as financial revenues generated by the project we calculate only operating revenue, Sales inflow column)*

b) *Re investments are not included in the investment cost but in the operational costs (in Table 73, Operating costs were added to Investment costs, where they end as Cash outflow. This is why we have DOC with reinvestment).*

DNR= *DR - DOC +DRV=* -861.609,59

R(3)= *(DIC - DNR)/DIC =* 105,63%

Because DNR is negative and max. funding gap rate is 100% we assume:

R= ***100,00%***

8.8.3. Decision amount calculation

2. step

DA *Decision amount is the amount to which the co-financing rate for the priority axis applies.*

Decision amount (DA) is defined as eligible cost (EC) multiplied by funding gap rate (R).

DA= *EC*R*

EC= *Eligible cost was calculated in Table 64: Cost breakdown.*

R= *100,00%*

EC= *16.376.410,70 EUR*

DA= ***16.376.410,70 EUR***

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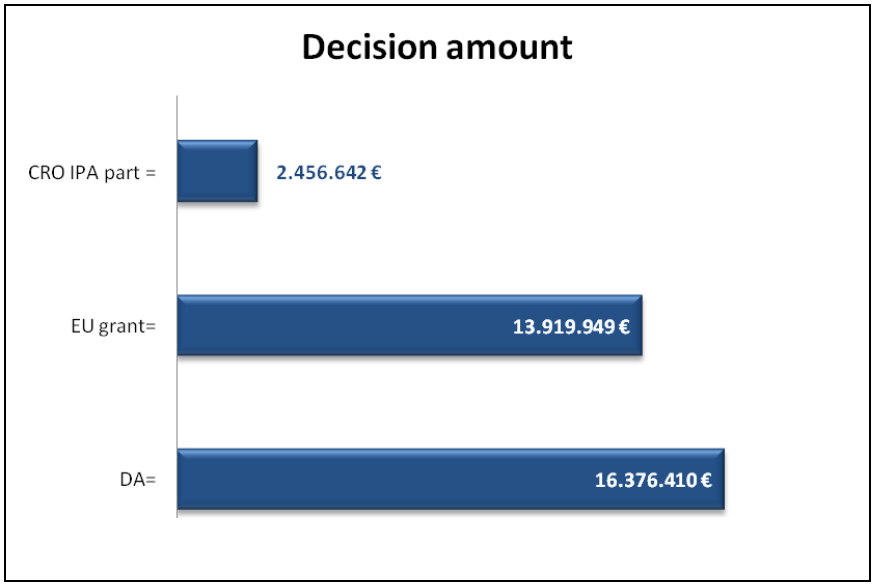
FIGURE 27: DECISION AMOUNT

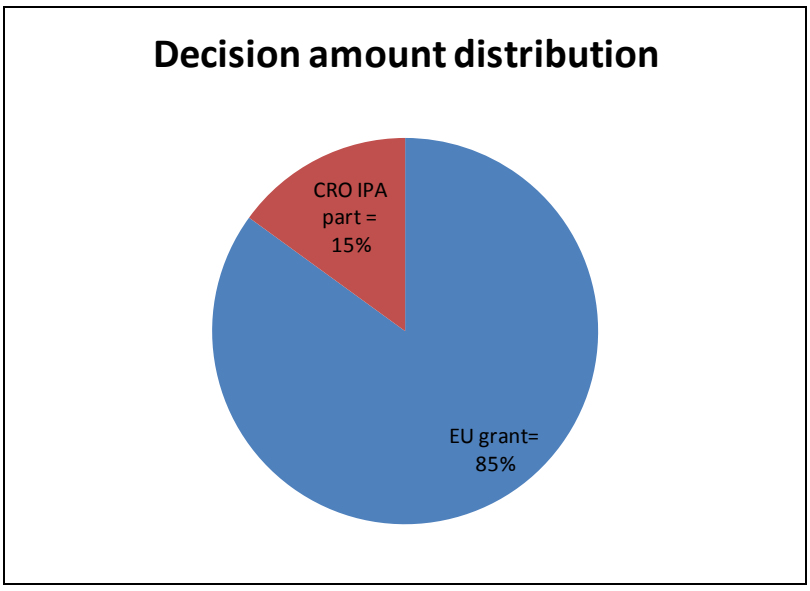


8.8.4. Decision amount distribution

3. step	***EU grant***	*Maximum EU grant is equal to the decision amount (DA) multiplied by maximum co funding rate (Max CRpa).*
	EU grant=	DA * Max CRpa
	Max CRpa=	*85%*
	EU grant=	***13.919.949,10 EUR***

CRO IPA part =	***2.456.461,61 EUR***

FIGURE 28: DECISION AMOUNT DISTRIBUTION



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8.8.5. Costs Breakdown

TABLE 66: COST BREAKDOWN (H.1)

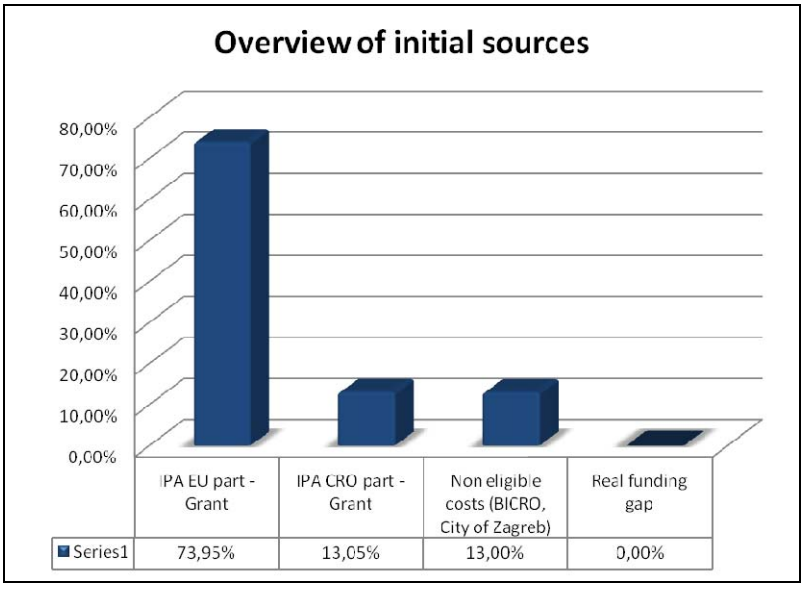
	Euro	TOTAL PROJECT COSTS (A)	NON ELIGIBLE COSTS (B)	ELIGIBLE COSTS C=A-B
1	START UP costs (Table 44; No. 1-4)	2.447.585,00	2.447.585,00	
2	Land purchase			
3	Building and construction (Table 43)	8.905.897,00		8.905.897,00
4	Plant and machinery (Table 43)	4.867.657,00		4.867.657,00
5	Technical assistance (Table 44; No. 6)	533.130,00		533.130,00
6	Publicity (Table 44; No. 6)	101.548,00		101.548,00
7	Supervision I & II (Table 44; No. 5 & No. 7))	1.077.589,00		1.077.589,00
8	**Sub-TOTAL**	**17.933.406,00**		**15.485.821,00**
9	Contingencies on Build.&Const. (max 10%)	890.589,70		890.589,70
10	**TOTAL**	**18.823.995,70**		**16.376.410,70**

8.8.6. Overview – of initial sources

TABLE 67: OVERVIEW OF SOURCES OF FINANCING IN INITIAL INVESTMENT PHASE

	Overview of investment sources		%
1	IPA EU part - Grant	13.919.949,10	73,95%
2	IPA CRO part - Grant	2.456.461,61	13,05%
3	Non eligible costs (BICRO, City of Zagreb)	2.447.585,00	13,00%
4	Real funding gap	0,00	0,00%
5	Control to total initial project costs	18.823.995,70	100,00%

FIGURE 29: OVERVIEW OF INITIAL SOURCES



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8.9. Balance Sheet

TABLE 68: BALANCE SHEET, IN EUR

Year	Assets					Capital & Liabilities						
	Investments Long & Short A.	To cover losses	Net accounts receivable	Depreciation	**Total Assets**	IPA	Founders	Depreciation allowance	Retain profit (loss)	Total Capital	Total liabilities	**Capital & Liabilities**
"-3 (2009)	865.654,00				**865.654,00**	0,00	865.654,00			865.654,00	0,00	**865.654,00**
"-2 (2010)	750.752,00				**1.616.406,00**	0,00	750.752,00			1.616.406,00	0,00	**1.616.406,00**
"-1 (2011)	7.261.414,50				**8.877.820,50**	7.046.537,50	214.877,00			8.877.820,50	0,00	**8.877.820,50**
"-0 (2012)	9.055.585,50				**17.933.406,00**	8.439.283,50	616.302,00			17.933.406,00	0,00	**17.933.406,00**
1 (2012)	239.065,46	-278.630,15		-989.871,43	**7.848.384,38**		239.065,46	-989.871,43	-278.630,15	7.848.384,38	0,00	**7.848.384,38**
2 (2013)	472.402,89	-455.812,11		-989.871,43	**6.875.103,74**		472.402,89	-989.871,43	-455.812,11	6.875.103,74	0,00	**6.875.103,74**
3 (2014)	510.737,77	-509.204,90		-989.871,43	**5.886.765,18**		510.737,77	-989.871,43	-509.204,90	5.886.765,18	0,00	**5.886.765,18**
4 (2015)	542.743,20	-530.646,29		-989.871,43	**4.908.990,66**		542.743,20	-989.871,43	-530.646,29	4.908.990,66	0,00	**4.908.990,66**
5 (2016)	285.379,05	-100.536,99		-989.871,43	**4.103.961,31**		285.379,05	-989.871,43	-100.536,99	4.103.961,31	0,00	**4.103.961,31**
6 (2017)	733.703,75	-124.169,34		-989.871,43	**3.723.624,29**		733.703,75	-989.871,43	-124.169,34	3.723.624,29	0,00	**3.723.624,29**
7 (2018)	119.681,42	-123.874,70		-989.871,43	**2.729.559,58**		119.681,42	-989.871,43	-123.874,70	2.729.559,58	0,00	**2.729.559,58**
8 (2019)	229.212,29	-122.580,06		-989.871,43	**1.846.320,38**		229.212,29	-989.871,43	-122.580,06	1.846.320,38	0,00	**1.846.320,38**
9 (2020)	126.988,60	-123.285,42		-989.871,43	**860.152,14**		126.988,60	-989.871,43	-123.285,42	860.152,14	0,00	**860.152,14**
10 (2021)	262.449,97		301.631,92	-989.871,43	**434.362,61**		262.449,97	-989.871,43	301.631,92	434.362,61	0,00	**434.362,61**
11 (2022)	4.849.361,36		302.926,57	-989.871,43	**4.596.779,12**		4.849.361,36	-989.871,43	302.926,57	4.596.779,12	0,00	**4.596.779,12**
12 (2023)	237.687,65		302.221,21	-989.871,43	**4.146.816,54**		237.687,65	-989.871,43	302.221,21	4.146.816,54	0,00	**4.146.816,54**
13 (2024)	18.460,66		304.118,53	-989.871,43	**3.479.524,31**		18.460,66	-989.871,43	304.118,53	3.479.524,31	0,00	**3.479.524,31**
14 (2025)	237.740,18		304.618,53	-989.871,43	**3.032.011,59**		237.740,18	-989.871,43	304.618,53	3.032.011,59	0,00	**3.032.011,59**
15 (2026)	18.542,85		305.118,53	-989.871,43	**2.365.801,55**		18.542,85	-989.871,43	305.118,53	2.365.801,55	0,00	**2.365.801,55**
16 (2027)	1.114.910,50		731.241,23	-989.871,43	**3.222.081,86**		1.114.910,50	-989.871,43	731.241,23	3.222.081,86	0,00	**3.222.081,86**
17 (2028)	12.782,03		731.241,23	-989.871,43	**2.976.233,69**		12.782,03	-989.871,43	731.241,23	2.976.233,69	0,00	**2.976.233,69**
18 (2029)	390.253,50		731.241,23	-989.871,43	**3.107.857,00**		390.253,50	-989.871,43	731.241,23	3.107.857,00	0,00	**3.107.857,00**
19 (2030)	11.479,02		728.227,83	-989.871,43	**2.857.692,43**		11.479,02	-989.871,43	728.227,83	2.857.692,43	0,00	**2.857.692,43**
20 (2031)	390.228,53		728.227,83	-989.871,43	**7.439.225,86**		390.228,53	-989.871,43	728.227,83	7.439.225,86	0,00	**7.439.225,86**
Residual				**4.452.948,50**				**4.452.948,50**				

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8.10. Profit and Loss Account & Table of Depreciation

8.10.1. Profit and Loss Account

TABLE 69: PROFIT AND LOSS ACCOUNT, IN EUR

Year	Profit and Loss Account								
	Sales revenue	*Operating costs*	*Operational margin*	*Gross profit from operations*	*Depreciation and other ind. costs*	*Gross profit (loss)*	*Income tax 20%*	*Net profit (loss)*	*Retained profit*
1 (2012)	65.152,00	343.782,15	-4,28	-278.630,15	0,00	-278.630,15	0,00	-278.630,15	0,00
2 (2013)	895.304,00	1.351.116,11	-0,51	-455.812,11	0,00	-455.812,11	0,00	-455.812,11	0,00
3 (2014)	930.064,80	1.439.269,70	-0,55	-509.204,90	0,00	-509.204,90	0,00	-509.204,90	0,00
4 (2015)	984.695,20	1.515.341,49	-0,54	-530.646,29	0,00	-530.646,29	0,00	-530.646,29	0,00
5 (2016)	1.714.325,60	1.814.862,59	-0,06	-100.536,99	0,00	-100.536,99	0,00	-100.536,99	0,00
6 (2017)	1.752.877,76	1.877.047,10	-0,07	-124.169,34	0,00	-124.169,34	0,00	-124.169,34	0,00
7 (2018)	1.761.429,92	1.885.304,62	-0,07	-123.874,70	0,00	-123.874,70	0,00	-123.874,70	0,00
8 (2019)	1.771.982,08	1.894.562,14	-0,07	-122.580,06	0,00	-122.580,06	0,00	-122.580,06	0,00
9 (2020)	1.777.534,24	1.900.819,66	-0,07	-123.285,42	0,00	-123.285,42	0,00	-123.285,42	0,00
10 (2021)	2.483.086,40	2.181.454,48	0,88	301.631,92	0,00	301.631,92	60.326,38	241.305,54	241.305,54
11 (2022)	2.493.638,56	2.190.711,99	0,88	302.926,57	0,00	302.926,57	60.585,31	242.341,25	242.341,25
12 (2023)	2.499.190,72	2.196.969,51	0,88	302.221,21	0,00	302.221,21	60.444,24	241.776,97	241.776,97
13 (2024)	2.507.716,80	2.203.598,27	0,88	304.118,53	0,00	304.118,53	60.823,71	243.294,82	243.294,82
14 (2025)	2.509.216,80	2.204.598,27	0,88	304.618,53	0,00	304.618,53	60.923,71	243.694,82	243.694,82
15 (2026)	2.510.716,80	2.205.598,27	0,88	305.118,53	0,00	305.118,53	61.023,71	244.094,82	244.094,82
16 (2027)	3.212.216,80	2.480.975,57	0,77	731.241,23	0,00	731.241,23	146.248,25	584.992,98	584.992,98
17 (2028)	3.212.216,80	2.480.975,57	0,77	731.241,23	0,00	731.241,23	146.248,25	584.992,98	584.992,98
18 (2029)	3.212.216,80	2.480.975,57	0,77	731.241,23	0,00	731.241,23	146.248,25	584.992,98	584.992,98
19 (2030)	3.222.347,20	2.494.119,37	0,77	728.227,83	0,00	728.227,83	145.645,57	582.582,27	582.582,27
20 (2031)	3.222.347,20	2.494.119,37	0,77	728.227,83	0,00	728.227,83	145.645,57	582.582,27	582.582,27
Accumulated	**42.738.276,48**	**39.636.201,80**	**0,93**	**3.102.074,68**		**3.102.074,68**	**948.517,36**	**2.007.911,75**	**4.376.651,71**

Please note: *Since all the assets are financed with grants, depreciation is an income at the first moment (deferred period income, RRIF publication 2005, delayed recognition of revenue from state aid (294), page 466), and in a very next step expense (cost). So there is a cost category Depreciation that equals 0. All Retained profit will be reinvested.*

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8.10.2. Table of Depreciation & Residual Value

TABLE 70: DEPRECIATION & RESIDUAL VALUE, IN EUR

No.		Economic life in years	In %	1 (2012)	2 (2013)	3 (2014)	4 (2015)	5 (2016)	6 (2017)	7 (2018)	8 (2019)	9 (2020)	10 (2021)
1	**Building with construction**	40	2,50%	**8.905.897,00**	8.683.249,58	8.460.602,15	8.237.954,73	8.015.307,30	7.792.659,88	7.570.012,45	7.347.365,03	7.124.717,60	6.902.070,18
1.1	*Depreciation amount*			*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*
2	**Office and IT equipment**	5	20,00%	**724.657,00**	579.725,60	434.794,20	289.862,80	144.931,40	**724.657,00**	579.725,60	434.794,20	289.862,80	144.931,40
2.1	*Depreciation amount*			*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*
3	**Laboratory furniture**	10	10,00%	**393.000,00**	353.700,00	314.400,00	275.100,00	235.800,00	196.500,00	157.200,00	117.900,00	78.600,00	39.300,00
3.1	*Depreciation amount*			*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*
4	**Central lab. equipment**	10	10,00%	**3.750.000,00**	3.375.000,00	3.000.000,00	2.625.000,00	2.250.000,00	1.875.000,00	1.500.000,00	1.125.000,00	750.000,00	375.000,00
4.1	*Depreciation amount*			375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00
5	**Intangible assets (start up)**	20	5,00%	**4.159.852,00**	3.951.859,40	3.743.866,80	3.535.874,20	3.327.881,60	3.119.889,00	2.911.896,40	2.703.903,80	2.495.911,20	2.287.918,60
5.1	*Depreciation amount*			207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60
	Depreciation over years			**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**

No.		Economic life in	In %	11 (2022)	12 (2023)	13 (2024)	14 (2025)	15 (2026)	16 (2027)	17 (2028)	18 (2029)	19 (2030)	20 (2031)	Residual Value
1	**Building with construction**	40	2,50%	6.679.422,75	6.456.775,33	6.234.127,90	6.011.480,48	5.788.833,05	5.566.185,63	5.343.538,20	5.120.890,78	4.898.243,35	4.675.595,93	4.452.948,50
1.1	*Depreciation amount*			*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	*222.647,43*	
2	**Office and IT equipment**	5	20,00%	**724.657,00**	579.725,60	434.794,20	289.862,80	144.931,40	**724.657,00**	579.725,60	434.794,20	289.862,80	144.931,40	0,00
2.1	*Depreciation amount*			*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	*144.931,40*	
3	**Laboratory furniture**	10	10,00%	**393.000,00**	353.700,00	314.400,00	275.100,00	235.800,00	196.500,00	157.200,00	117.900,00	78.600,00	39.300,00	0,00
3.1	*Depreciation amount*			*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	*39.300,00*	
4	**Central lab. Equipment**	10	10,00%	**3.750.000,00**	3.375.000,00	3.000.000,00	2.625.000,00	2.250.000,00	1.875.000,00	1.500.000,00	1.125.000,00	750.000,00	375.000,00	0,00
4.1	*Depreciation amount*			375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	375.000,00	
5	**Intangible assets (start up)**	20	5,00%	2.079.926,00	1.871.933,40	1.663.940,80	1.455.948,20	1.247.955,60	1.039.963,00	831.970,40	623.977,80	415.985,20	207.992,60	-0,00
5.1	*Depreciation amount*			207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	207.992,60	
	Depreciation over years			**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**989.871,43**	**4.452.948,50**

Net Working Capital at the end:	2.118.099,72
Retained profit:	4.376.651,71
Total Residual value:	**10.947.699,93**

Please note: *The Residual value consists of the rest of the fixed assets after depreciation for all years shown in the table above, the amount of Net Working Capital at the end of observation period (Chapter 8.4, Table 46) and retained profits at the end of observation period (Chapter 8.10, Table 69).*

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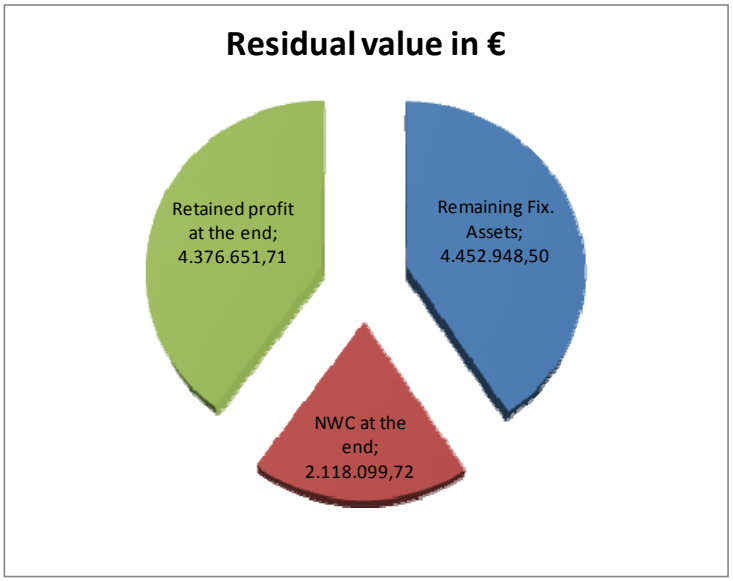
TABLE 71: OFFICIAL TABLE OF DEPRECIATION ISSUED BY CROATIAN MINISTRY OF FINANCE

No.	Name or group of funds	Economic life	Annual rate (%)
1	2	3	4
I	**BUILDINGS**		
1.	**Residential and commercial property**		
	concrete, metal, stone and brick	80	1,25
	wood and other materials	20	5
2.	**Roads, railways and similar buildings**	**25**	**4**
3.	**Other buildings**	**20**	**5**
II			
1.	**Office equipment and furniture**		
	computers and computer equipment	4	25
	office furniture	8	12,5
	Other office equipment	5	20
2.	**Communication equipment**	**5**	**20**
	communication devices	5	20
	mobile communication devices	2	50
3.	**Equipment maintenance and protection**	**5**	**20**
4.	**Medical and laboratory equipment**	**5**	**20**
VII	**INTANGIBLE ASSETS**		
	patents, franchises, licenses, right to use others' resources, multi-year lease and so	according to the duration of the contract	

***Please note**: By the choice of the taxpayer, the above rates can be doubled*
URL: www.mfin.hr/adminmax/docs/Amortizacija.xls

FIGURE 30: RESIDUAL VALUE IN EUR



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8.11. Determine the Net Cash Flow and Discounted Cash Flow

8.11.1. Cash Flow to calculate financial sustainability

TABLE 72: CASH FLOW OF SUSTAINABILITY

Year	Cash Flow of sustainability								Base line
	Cash Inflow			Cash Outflow					
	IPA, Founders Eq. (Table 48, Total sources)	Sales inflow	**Total Cash inflow**	Total investment costs (Table 47) Remark	Operating Costs	Corporate tax	**Total Cash outflow**	Surplus or deficit	**Cumulative Cash Balance**
"-3 (2009)	865.654,00		**865.654,00**	865.654,00			**865.654,00**	0,00	**0,00**
"-2 (2010)	750.752,00		**750.752,00**	750.752,00			**750.752,00**	0,00	**0,00**
"-1 (2011)	7.261.414,50		**7.261.414,50**	7.261.414,50			**7.261.414,50**	0,00	**0,00**
"-0 (2012)	9.055.585,50		**9.055.585,50**	9.055.585,50			**9.055.585,50**	0,00	**0,00**
1 (2012)	239.065,46	65.152,00	**304.217,46**	-39.564,69	343.782,15	0,00	**304.217,46**	0,00	**0,00**
2 (2013)	472.402,89	895.304,00	**1.367.706,89**	16.590,78	1.351.116,11	0,00	**1.367.706,89**	0,00	**0,00**
3 (2014)	510.737,77	930.064,80	**1.440.802,57**	1.532,87	1.439.269,70	0,00	**1.440.802,57**	0,00	**0,00**
4 (2015)	542.743,20	984.695,20	**1.527.438,40**	12.096,91	1.515.341,49	0,00	**1.527.438,40**	0,00	**0,00**
5 (2016)	285.379,05	1.714.325,60	**1.999.704,65**	184.842,07	1.814.862,59	0,00	**1.999.704,65**	0,00	**0,00**
6 (2017)	733.703,75	1.752.877,76	**2.486.581,51**	609.534,41	1.877.047,10	0,00	**2.486.581,51**	0,00	**0,00**
7 (2018)	119.681,42	1.761.429,92	**1.881.111,34**	-4.193,28	1.885.304,62	0,00	**1.881.111,34**	0,00	**0,00**
8 (2019)	229.212,29	1.771.982,08	**2.001.194,37**	106.632,23	1.894.562,14	0,00	**2.001.194,37**	0,00	**0,00**
9 (2020)	126.988,60	1.777.534,24	**1.904.522,84**	3.703,18	1.900.819,66	0,00	**1.904.522,84**	0,00	**0,00**
10 (2021)	262.449,97	2.483.086,40	**2.745.536,37**	262.449,97	2.181.454,48	60.326,38	**2.504.230,83**	241.305,54	**241.305,54**
11 (2022)	4.849.361,36	2.493.638,56	**7.342.999,92**	4.849.361,36	2.190.711,99	60.585,31	**7.100.658,67**	242.341,25	**483.646,79**
12 (2023)	237.687,65	2.499.190,72	**2.736.878,37**	237.687,65	2.196.969,51	60.444,24	**2.495.101,40**	241.776,97	**725.423,76**
13 (2024)	18.460,66	2.507.716,80	**2.526.177,46**	18.460,66	2.203.598,27	60.823,71	**2.282.882,64**	243.294,82	**968.718,58**
14 (2025)	237.740,18	2.509.216,80	**2.746.956,98**	237.740,18	2.204.598,27	60.923,71	**2.503.262,16**	243.694,82	**1.212.413,40**
15 (2026)	18.542,85	2.510.716,80	**2.529.259,65**	18.542,85	2.205.598,27	61.023,71	**2.285.164,83**	244.094,82	**1.456.508,23**
16 (2027)	1.114.910,50	3.212.216,80	**4.327.127,30**	1.114.910,50	2.480.975,57	146.248,25	**3.742.134,32**	584.992,98	**2.041.501,21**
17 (2028)	12.782,03	3.212.216,80	**3.224.998,83**	12.782,03	2.480.975,57	146.248,25	**2.640.005,85**	584.992,98	**2.626.494,19**
18 (2029)	390.253,50	3.212.216,80	**3.602.470,30**	390.253,50	2.480.975,57	146.248,25	**3.017.477,32**	584.992,98	**3.211.487,18**
19 (2030)	11.479,02	3.222.347,20	**3.233.826,22**	11.479,02	2.494.119,37	145.645,57	**2.651.243,95**	582.582,27	**3.794.069,44**
20 (2031)	390.228,53	3.222.347,20	**3.612.575,73**	390.228,53	2.494.119,37	145.645,57	**3.029.993,46**	582.582,27	**4.376.651,71**
Scrap								10.947.699,93	**15.324.351,64**

***Please note**: In the Cash Flow for measurement of sustainability from „Total Investment Costs", the category „losses" should be deducted as a cash outflow. The losses are already calculated as a sales inflow less operating costs. Otherwise, they would be a subject to double calculation. Retained profit is accumulated in „Cumulative Cash Balance", as a result of the same sales and operating cost calculation.*

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8.11.2. Discounted Cash Flow to calculate return on total investment

TABLE 73: DISCOUNTED CASH FLOW TO CALCULATE TOTAL RETURN ON THE INVESTMENT

Year	Discounted Cash Flow "C"										
	Cash Inflow		Cash Outflow				Net Cash Flow	Cumulative Net Cash Flow	Discount factor	DNCF value	Base Line Cumulative Net Present Value
	Sales inflow	Total Cash inflow	Total investment costs (Table 47) Remark	Operating Costs	Corporate tax	Total Cash outflow					
"-3 (2009)			865.654,00			865.654,00	-865.654,00	-865.654,00	1,0000	-865.654,00	-865.654,00
"-2 (2010)			750.752,00			750.752,00	-750.752,00	-1.616.406,00	0,9346	-701.637,38	-1.567.291,38
"-1 (2011)			7.261.414,50			7.261.414,50	-7.261.414,50	-8.877.820,50	0,8734	-6.342.400,65	-7.909.692,03
"-0 (2012)			9.055.585,50			9.055.585,50	-9.055.585,50	-17.933.406,00	0,8163	-7.392.055,22	-15.301.747,25
1 (2012)	65.152,00	65.152,00	-39.564,69	343.782,15	0,00	304.217,46	-239.065,46	-18.172.471,46	0,8163	-195.148,63	-15.496.895,87
2 (2013)	895.304,00	895.304,00	16.590,78	1.351.116,11	0,00	1.367.706,89	-472.402,89	-18.644.874,35	0,7629	-360.393,90	-15.857.289,77
3 (2014)	930.064,80	930.064,80	1.532,87	1.439.269,70	0,00	1.440.802,57	-510.737,77	-19.155.612,11	0,7130	-364.148,97	-16.221.438,74
4 (2015)	984.695,20	984.695,20	12.096,91	1.515.341,49	0,00	1.527.438,40	-542.743,20	-19.698.355,31	0,6663	-361.652,71	-16.583.091,45
5 (2016)	1.714.325,60	1.714.325,60	184.842,07	1.814.862,59	0,00	1.999.704,65	-285.379,05	-19.983.734,36	0,6227	-177.719,73	-16.760.811,18
6 (2017)	1.752.877,76	1.752.877,76	609.534,41	1.877.047,10	0,00	2.486.581,51	-733.703,75	-20.717.438,11	0,5820	-427.022,26	-17.187.833,45
7 (2018)	1.761.429,92	1.761.429,92	-4.193,28	1.885.304,62	0,00	1.881.111,34	-119.681,42	-20.837.119,53	0,5439	-65.098,76	-17.252.932,21
8 (2019)	1.771.982,08	1.771.982,08	106.632,23	1.894.562,14	0,00	2.001.194,37	-229.212,29	-21.066.331,82	0,5083	-116.519,91	-17.369.452,11
9 (2020)	1.777.534,24	1.777.534,24	3.703,18	1.900.819,66	0,00	1.904.522,84	-126.988,60	-21.193.320,42	0,4751	-60.331,37	-17.429.783,48
10 (2021)	2.483.086,40	2.483.086,40	262.449,97	2.181.454,48	60.326,38	2.504.230,83	-21.144,43	-21.214.464,86	0,4440	-9.388,38	-17.439.171,86
11 (2022)	2.493.638,56	2.493.638,56	4.849.361,36	2.190.711,99	60.585,31	7.100.658,67	-4.607.020,11	-25.821.484,97	0,4150	-1.911.749,56	-19.350.921,42
12 (2023)	2.499.190,72	2.499.190,72	237.687,65	2.196.969,51	60.444,24	2.495.101,40	4.089,32	-25.817.395,65	0,3878	1.585,91	-19.349.335,51
13 (2024)	2.507.716,80	2.507.716,80	18.460,66	2.203.598,27	60.823,71	2.282.882,64	224.834,16	-25.592.561,48	0,3624	81.490,25	-19.267.845,26
14 (2025)	2.509.216,80	2.509.216,80	237.740,18	2.204.598,27	60.923,71	2.503.262,16	5.954,64	-25.586.606,84	0,3387	2.017,04	-19.265.828,22
15 (2026)	2.510.716,80	2.510.716,80	18.542,85	2.205.598,27	61.023,71	2.285.164,83	225.551,97	-25.361.054,87	0,3166	71.403,98	-19.194.424,24
16 (2027)	3.212.216,80	3.212.216,80	1.114.910,50	2.480.975,57	146.248,25	3.742.134,32	-529.917,52	-25.890.972,39	0,2959	-156.783,47	-19.351.207,72
17 (2028)	3.212.216,80	3.212.216,80	12.782,03	2.480.975,57	146.248,25	2.640.005,85	572.210,95	-25.318.761,44	0,2765	158.221,10	-19.192.986,62
18 (2029)	3.212.216,80	3.212.216,80	390.253,50	2.480.975,57	146.248,25	3.017.477,32	194.739,48	-25.124.021,96	0,2584	50.324,38	-19.142.662,24
19 (2030)	3.222.347,20	3.222.347,20	11.479,02	2.494.119,37	145.645,57	2.651.243,95	571.103,25	-24.552.918,71	0,2415	137.928,91	-19.004.733,33
20 (2031)	3.222.347,20	3.222.347,20	390.228,53	2.494.119,37	145.645,57	3.029.993,46	192.353,74	-24.360.564,97	0,2257	43.416,77	-18.961.316,56
Scrap							10.947.699,93	-13.412.865,04		2.471.040,00	-16.490.276,55

FINANCIAL NET PRESENT VALUE (FNPV "C") at 7%	-16.490.276,55
FINANCIAL RATE OF RETURN (FRR "C")	-3,97%

***Please note**: In the Cash Flow for measurement of sustainability from „Total Investment Costs" the category „losses" should be deducted as a cash outflow. The losses are already calculated as a sales inflow less operating costs. Otherwise, they would be a subject to double calculation. Retained profit is accumulated in „Cumulative Cash Balance" as a result of the same sales and operating cost calculation.*

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8.11.3. Discounted Cash Flow to calculate return on national Capital

TABLE 74: DISCOUNTED CASH FLOW TO CALCULATE RETURN ON NATIONAL CAPITAL

Year	Discounted Cash Flow "K"										Base line Cumulative Net Present Value
	Cash Inflow		Cash Outflow				Net Cash Flow	Cumulative Net Cash Flow	Discount factor	Net present value	
	Sales inflow	Total Cash inflow	National capital (Bicro, C.Z., WB)	Operating Costs	Corporate tax	Total Cash outflow					
"-3 (2009)			865.654,00			865.654,00	-865.654,00	-865.654,00	1,0000	-865.654,00	-865.654,00
"-2 (2010)			750.752,00			750.752,00	-750.752,00	-1.616.406,00	0,9346	-701.637,38	-1.567.291,38
"-1 (2011)			214.877,00			214.877,00	-214.877,00	-1.831.283,00	0,8734	-187.681,89	-1.754.973,28
"-0 (2012)			616.302,00			616.302,00	-616.302,00	-2.447.585,00	0,8163	-503.086,01	-2.258.059,29
1 (2012)	65.152,00	65.152,00	-39.564,69	343.782,15	0,00	304.217,46	-239.065,46	-2.070.348,46	0,8163	-195.148,63	-2.453.207,92
2 (2013)	895.304,00	895.304,00	16.590,78	1.351.116,11	0,00	1.367.706,89	-472.402,89	-2.542.751,35	0,7629	-360.393,90	-2.813.601,82
3 (2014)	930.064,80	930.064,80	1.532,87	1.439.269,70	0,00	1.440.802,57	-510.737,77	-3.053.489,11	0,7130	-364.148,97	-3.177.750,79
4 (2015)	984.695,20	984.695,20	12.096,91	1.515.341,49	0,00	1.527.438,40	-542.743,20	-3.596.232,31	0,6663	-361.652,71	-3.539.403,50
5 (2016)	1.714.325,60	1.714.325,60	184.842,07	1.814.862,59	0,00	1.999.704,65	-285.379,05	-3.881.611,36	0,6227	-177.719,73	-3.717.123,23
6 (2017)	1.752.877,76	1.752.877,76	609.534,41	1.877.047,10	0,00	2.486.581,51	-733.703,75	-4.615.315,11	0,5820	-427.022,26	-4.144.145,49
7 (2018)	1.761.429,92	1.761.429,92	-4.193,28	1.885.304,62	0,00	1.881.111,34	-119.681,42	-4.734.996,53	0,5439	-65.098,76	-4.209.244,25
8 (2019)	1.771.982,08	1.771.982,08	106.632,23	1.894.562,14	0,00	2.001.194,37	-229.212,29	-4.964.208,82	0,5083	-116.519,91	-4.325.764,16
9 (2020)	1.777.534,24	1.777.534,24	3.703,18	1.900.819,66	0,00	1.904.522,84	-126.988,60	-5.091.197,42	0,4751	-60.331,37	-4.386.095,53
10 (2021)	2.483.086,40	2.483.086,40	262.449,97	2.181.454,48	60.326,38	2.504.230,83	-21.144,43	-5.112.341,86	0,4440	-9.388,38	-4.395.483,91
11 (2022)	2.493.638,56	2.493.638,56	4.849.361,36	2.190.711,99	60.585,31	7.100.658,67	-4.607.020,11	-9.719.361,97	0,4150	-1.911.749,56	-6.307.233,46
12 (2023)	2.499.190,72	2.499.190,72	237.687,65	2.196.969,51	60.444,24	2.495.101,40	4.089,32	-9.715.272,65	0,3878	1.585,91	-6.305.647,56
13 (2024)	2.507.716,80	2.507.716,80	18.460,66	2.203.598,27	60.823,71	2.282.882,64	224.834,16	-9.490.438,48	0,3624	81.490,25	-6.224.157,31
14 (2025)	2.509.216,80	2.509.216,80	237.740,18	2.204.598,27	60.923,71	2.503.262,16	5.954,64	-9.484.483,84	0,3387	2.017,04	-6.222.140,27
15 (2026)	2.510.716,80	2.510.716,80	18.542,85	2.205.598,27	61.023,71	2.285.164,83	225.551,97	-9.258.931,87	0,3166	71.403,98	-6.150.736,29
16 (2027)	3.212.216,80	3.212.216,80	1.114.910,50	2.480.975,57	146.248,25	3.742.134,32	-529.917,52	-9.788.849,39	0,2959	-156.783,47	-6.307.519,76
17 (2028)	3.212.216,80	3.212.216,80	12.782,03	2.480.975,57	146.248,25	2.640.005,85	572.210,95	-9.216.638,44	0,2765	158.221,10	-6.149.298,66
18 (2029)	3.212.216,80	3.212.216,80	390.253,50	2.480.975,57	146.248,25	3.017.477,32	194.739,48	-9.021.898,96	0,2584	50.324,38	-6.098.974,28
19 (2030)	3.222.347,20	3.222.347,20	11.479,02	2.494.119,37	145.645,57	2.651.243,95	571.103,25	-8.450.795,71	0,2415	137.928,91	-5.961.045,37
20 (2031)	3.222.347,20	3.222.347,20	390.228,53	2.494.119,37	145.645,57	3.029.993,46	192.353,74	-8.258.441,97	0,2257	43.416,77	-5.917.628,60
Scrap							10.947.699,93	2.689.257,96		2.471.040,00	-3.446.588,60

FINANCIAL NET PRESENT VALUE (FNPV "K") at 7%	-3.446.588,60
FINANCIAL RATE OF RETURN (FRR "K")	1,24%

***Please note**: In the Cash Flow for measurement of sustainability from „Total Investment Costs" the category „losses" should be deducted as a cash outflow. The losses are already calculated as a sales inflow less operating costs. Otherwise, they would be a subject to two times calculation! Retained profit is accumulated in „Cumulative Cash Balance", as a result of the same sales and operating cost calculation.*

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8.12. Scenario Analysis

The foundation for the scenario analysis is variation in sales. The best-case scenario represents a sale increase of 20%, while the worst-case scenario represents a sale decrease of 20%. Direct operating costs or variable costs change in proportion to variation in revenues. Fixes costs remain unchanged in all scenarios. Scenario analyses shows results in main financial parameters for the variation.

8.12.1. BASE case scenario

TABLE 75: ACCUMULATED OPERATING REVENUE – BASE CASE SCENARIO, IN EUR

Year	*Operating Revenue*					*Total revenue (EUR) Base scenario*
	BIOFacility - OR	*BIOIncubation - OR*	*BIOTransfer - OR*	*BIOEducation - OR*	*BIONetwork - OR*	
variation:	*1*	*1*	*1*	*1*	*1*	
1 (2012)	50.652,00	10.000,00	0,00	0,00	4.500,00	**65.152,00**
2 (2013)	101.304,00	25.000,00	700.000,00	60.000,00	9.000,00	**895.304,00**
3 (2014)	121.564,80	35.000,00	700.000,00	60.000,00	13.500,00	**930.064,80**
4 (2015)	131.695,20	45.000,00	700.000,00	90.000,00	18.000,00	**984.695,20**
5 (2016)	141.825,60	60.000,00	1.400.000,00	90.000,00	22.500,00	**1.714.325,60**
6 (2017)	145.877,76	60.000,00	1.400.000,00	120.000,00	27.000,00	**1.752.877,76**
7 (2018)	149.929,92	60.000,00	1.400.000,00	120.000,00	31.500,00	**1.761.429,92**
8 (2019)	153.982,08	65.000,00	1.400.000,00	120.000,00	33.000,00	**1.771.982,08**
9 (2020)	158.034,24	65.000,00	1.400.000,00	120.000,00	34.500,00	**1.777.534,24**
10 (2021)	162.086,40	65.000,00	2.100.000,00	120.000,00	36.000,00	**2.483.086,40**
11 (2022)	166.138,56	70.000,00	2.100.000,00	120.000,00	37.500,00	**2.493.638,56**
12 (2023)	170.190,72	70.000,00	2.100.000,00	120.000,00	39.000,00	**2.499.190,72**
13 (2024)	172.216,80	75.000,00	2.100.000,00	120.000,00	40.500,00	**2.507.716,80**
14 (2025)	172.216,80	75.000,00	2.100.000,00	120.000,00	42.000,00	**2.509.216,80**
15 (2026)	172.216,80	75.000,00	2.100.000,00	120.000,00	43.500,00	**2.510.716,80**
16 (2027)	172.216,80	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.212.216,80**
17 (2028)	172.216,80	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.212.216,80**
18 (2029)	172.216,80	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.212.216,80**
19 (2030)	182.347,20	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.222.347,20**
20 (2031)	182.347,20	75.000,00	2.800.000,00	120.000,00	45.000,00	**3.222.347,20**
Accumulated	**3.051.276,48**	**1.230.000,00**	**35.700.000,00**	**2.100.000,00**	**657.000,00**	**42.738.276,48**
Contrib. in %	**7,14%**	**2,88%**	**83,53%**	**4,91%**	**1,54%**	**100,00%**

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TABLE 76: OPERATING COSTS (DIRECT AND INDIRECT PRODUCTION COSTS) – BASE CASE SCENARIO, IN EUR

Year	Operating Costs						Total costs (EUR)
	Direct operating costs (Variable costs)					Fixed costs (FC)	
	BIOFacility - DOC 1	BIOIncubation - DOC 1	BIOTransfer - DOC 1	BIOEducation - DOC 1	BIONetwork - DOC 1	FC (production)	
1 (2012)	41.672,23	6.000,00	24.046,75	0,00	3.000,00	269.063,18	**343.782,15**
2 (2013)	83.344,45	15.000,00	779.766,30	40.000,00	6.000,00	427.005,36	**1.351.116,11**
3 (2014)	100.013,34	21.000,00	789.385,00	40.000,00	9.000,00	479.871,36	**1.439.269,70**
4 (2015)	108.347,79	27.000,00	794.194,35	60.000,00	12.000,00	513.799,36	**1.515.341,49**
5 (2016)	116.682,23	36.000,00	1.073.381,00	60.000,00	15.000,00	513.799,36	**1.814.862,59**
6 (2017)	120.016,01	36.000,00	1.075.304,74	80.000,00	18.000,00	547.726,36	**1.877.047,10**
7 (2018)	123.349,79	36.000,00	1.077.228,48	80.000,00	21.000,00	547.726,36	**1.885.304,62**
8 (2019)	126.683,56	39.000,00	1.079.152,22	80.000,00	22.000,00	547.726,36	**1.894.562,14**
9 (2020)	130.017,34	39.000,00	1.081.075,96	80.000,00	23.000,00	547.726,36	**1.900.819,66**
10 (2021)	133.351,12	39.000,00	1.357.377,00	80.000,00	24.000,00	547.726,36	**2.181.454,48**
11 (2022)	136.684,90	42.000,00	1.359.300,74	80.000,00	25.000,00	547.726,36	**2.190.711,99**
12 (2023)	140.018,68	42.000,00	1.361.224,48	80.000,00	26.000,00	547.726,36	**2.196.969,51**
13 (2024)	141.685,57	45.000,00	1.362.186,35	80.000,00	27.000,00	547.726,36	**2.203.598,27**
14 (2025)	141.685,57	45.000,00	1.362.186,35	80.000,00	28.000,00	547.726,36	**2.204.598,27**
15 (2026)	141.685,57	45.000,00	1.362.186,35	80.000,00	29.000,00	547.726,36	**2.205.598,27**
16 (2027)	141.685,57	45.000,00	1.636.563,65	80.000,00	30.000,00	547.726,36	**2.480.975,57**
17 (2028)	141.685,57	45.000,00	1.636.563,65	80.000,00	30.000,00	547.726,36	**2.480.975,57**
18 (2029)	141.685,57	45.000,00	1.636.563,65	80.000,00	30.000,00	547.726,36	**2.480.975,57**
19 (2030)	150.020,01	45.000,00	1.641.373,00	80.000,00	30.000,00	547.726,36	**2.494.119,37**
20 (2031)	150.020,01	45.000,00	1.641.373,00	80.000,00	30.000,00	547.726,36	**2.494.119,37**
Accumulated DOC	**2.510.334,83**	**738.000,00**	**24.130.433,02**	**1.400.000,00**	**438.000,00**	**10.419.433,95**	**39.636.201,80**
Contrib. in %	**6,33%**	**1,86%**	**60,88%**	**3,53%**	**1,11%**	**26,29%**	**100,00%**
FC distribution key	**8,59%**	**2,53%**	**82,59%**	**4,79%**	**1,50%**		**100,00%**
Distributed FC	895.248,51	263.189,35	8.605.519,07	499.275,20	156.201,81		
Accum. DOC + FC	**3.405.583,35**	**1.001.189,35**	**32.735.952,09**	**1.899.275,20**	**594.201,81**		

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8.12.2. WORST case scenario

TABLE 77: ACCUMULATED OPERATING REVENUE – WORST CASE SCENARIO, IN EUR

Year	Operating Revenue					Total revenue (EUR)
	BIOFacility - OR	BIOIncubation - OR	BIOTransfer - OR	BIOEducation - OR	BIONetwork - OR	
variation:	0,8	0,8	0,8	0,8	0,8	Base scenario
1 (2012)	40.521,60	8.000,00	0,00	0,00	3.600,00	**52.121,60**
2 (2013)	81.043,20	20.000,00	560.000,00	48.000,00	7.200,00	**716.243,20**
3 (2014)	97.251,84	28.000,00	560.000,00	48.000,00	10.800,00	**744.051,84**
4 (2015)	105.356,16	36.000,00	560.000,00	72.000,00	14.400,00	**787.756,16**
5 (2016)	113.460,48	48.000,00	1.120.000,00	72.000,00	18.000,00	**1.371.460,48**
6 (2017)	116.702,21	48.000,00	1.120.000,00	96.000,00	21.600,00	**1.402.302,21**
7 (2018)	119.943,94	48.000,00	1.120.000,00	96.000,00	25.200,00	**1.409.143,94**
8 (2019)	123.185,66	52.000,00	1.120.000,00	96.000,00	26.400,00	**1.417.585,66**
9 (2020)	126.427,39	52.000,00	1.120.000,00	96.000,00	27.600,00	**1.422.027,39**
10 (2021)	129.669,12	52.000,00	1.680.000,00	96.000,00	28.800,00	**1.986.469,12**
11 (2022)	132.910,85	56.000,00	1.680.000,00	96.000,00	30.000,00	**1.994.910,85**
12 (2023)	136.152,58	56.000,00	1.680.000,00	96.000,00	31.200,00	**1.999.352,58**
13 (2024)	137.773,44	60.000,00	1.680.000,00	96.000,00	32.400,00	**2.006.173,44**
14 (2025)	137.773,44	60.000,00	1.680.000,00	96.000,00	33.600,00	**2.007.373,44**
15 (2026)	137.773,44	60.000,00	1.680.000,00	96.000,00	34.800,00	**2.008.573,44**
16 (2027)	137.773,44	60.000,00	2.240.000,00	96.000,00	36.000,00	**2.569.773,44**
17 (2028)	137.773,44	60.000,00	2.240.000,00	96.000,00	36.000,00	**2.569.773,44**
18 (2029)	137.773,44	60.000,00	2.240.000,00	96.000,00	36.000,00	**2.569.773,44**
19 (2030)	145.877,76	60.000,00	2.240.000,00	96.000,00	36.000,00	**2.577.877,76**
20 (2031)	145.877,76	60.000,00	2.240.000,00	96.000,00	36.000,00	**2.577.877,76**
Accumulated	**2.441.021,18**	**984.000,00**	**28.560.000,00**	**1.680.000,00**	**525.600,00**	**34.190.621,18**
Contrib. in %	**7,14%**	**2,88%**	**83,53%**	**4,91%**	**1,54%**	**100,00%**

TABLE 78: OPERATING COSTS (DIRECT AND INDIRECT PRODUCTION COSTS) – WORST CASE SCENARIO, IN EUR

Year	Operating Costs						Total costs (EUR)
	Direct operating costs (Variable costs)					Fixed costs (FC)	
	BIOFacility - DOC	BIOIncubation - DOC	BIOTransfer - DOC	BIOEducation - DOC	BIONetwork - DOC	FC (production)	
	0,8	0,8	0,8	0,8	0,8		
1 (2012)	33.337,78	4.800,00	19.237,40	0,00	2.400,00	269.063,18	**328.838,36**
2 (2013)	66.675,56	12.000,00	623.813,04	32.000,00	4.800,00	427.005,36	**1.166.293,96**
3 (2014)	80.010,67	16.800,00	631.508,00	32.000,00	7.200,00	479.871,36	**1.247.390,03**
4 (2015)	86.678,23	21.600,00	635.355,48	48.000,00	9.600,00	513.799,36	**1.315.033,06**
5 (2016)	93.345,78	28.800,00	858.704,80	48.000,00	12.000,00	513.799,36	**1.554.649,94**
6 (2017)	96.012,81	28.800,00	860.243,79	64.000,00	14.400,00	547.726,36	**1.611.182,95**
7 (2018)	98.679,83	28.800,00	861.782,78	64.000,00	16.800,00	547.726,36	**1.617.788,97**
8 (2019)	101.346,85	31.200,00	863.321,78	64.000,00	17.600,00	547.726,36	**1.625.194,98**
9 (2020)	104.013,87	31.200,00	864.860,77	64.000,00	18.400,00	547.726,36	**1.630.201,00**
10 (2021)	106.680,90	31.200,00	1.085.901,60	64.000,00	19.200,00	547.726,36	**1.854.708,85**
11 (2022)	109.347,92	33.600,00	1.087.440,59	64.000,00	20.000,00	547.726,36	**1.862.114,87**
12 (2023)	112.014,94	33.600,00	1.088.979,58	64.000,00	20.800,00	547.726,36	**1.867.120,88**
13 (2024)	113.348,45	36.000,00	1.089.749,08	64.000,00	21.600,00	547.726,36	**1.872.423,89**
14 (2025)	113.348,45	36.000,00	1.089.749,08	64.000,00	22.400,00	547.726,36	**1.873.223,89**
15 (2026)	113.348,45	36.000,00	1.089.749,08	64.000,00	23.200,00	547.726,36	**1.874.023,89**
16 (2027)	113.348,45	36.000,00	1.309.250,92	64.000,00	24.000,00	547.726,36	**2.094.325,73**
17 (2028)	113.348,45	36.000,00	1.309.250,92	64.000,00	24.000,00	547.726,36	**2.094.325,73**
18 (2029)	113.348,45	36.000,00	1.309.250,92	64.000,00	24.000,00	547.726,36	**2.094.325,73**
19 (2030)	120.016,01	36.000,00	1.313.098,40	64.000,00	24.000,00	547.726,36	**2.104.840,76**
20 (2031)	120.016,01	36.000,00	1.313.098,40	64.000,00	24.000,00	547.726,36	**2.104.840,76**
Accumulated DOC	**2.008.267,87**	**590.400,00**	**19.304.346,42**	**1.120.000,00**	**350.400,00**	**10.419.433,95**	**33.792.848,23**
Contrib. in %	**5,94%**	**1,75%**	**57,13%**	**3,31%**	**1,04%**	**30,83%**	**100,00%**
FC distribution key	**8,59%**	**2,53%**	**82,59%**	**4,79%**	**1,50%**		**100,00%**
Distributed FC	895.248,51	263.189,35	8.605.519,07	499.275,20	156.201,81		
Accum. DOC + FC	**2.903.516,38**	**853.589,35**	**27.909.865,49**	**1.619.275,20**	**506.601,81**		

***Please note**: Variation 1 represents Base line projection. Variation 0,8 represents the 20% decrease.*

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8.12.3. BEST case scenario

TABLE 79: ACCUMULATED OPERATING REVENUE – BEST CASE SCENARIO, IN EUR

Year	Operating Revenue					Total revenue (EUR)
	BIOFacility - OR	BIOIncubation - OR	BIOTransfer - OR	BIOEducation - OR	BIONetwork - OR	
variation:	1,2	1,2	1,2	1,2	1,2	Base scenario
1 (2012)	60.782,40	12.000,00	0,00	0,00	5.400,00	**78.182,40**
2 (2013)	121.564,80	30.000,00	840.000,00	72.000,00	10.800,00	**1.074.364,80**
3 (2014)	145.877,76	42.000,00	840.000,00	72.000,00	16.200,00	**1.116.077,76**
4 (2015)	158.034,24	54.000,00	840.000,00	108.000,00	21.600,00	**1.181.634,24**
5 (2016)	170.190,72	72.000,00	1.680.000,00	108.000,00	27.000,00	**2.057.190,72**
6 (2017)	175.053,31	72.000,00	1.680.000,00	144.000,00	32.400,00	**2.103.453,31**
7 (2018)	179.915,90	72.000,00	1.680.000,00	144.000,00	37.800,00	**2.113.715,90**
8 (2019)	184.778,50	78.000,00	1.680.000,00	144.000,00	39.600,00	**2.126.378,50**
9 (2020)	189.641,09	78.000,00	1.680.000,00	144.000,00	41.400,00	**2.133.041,09**
10 (2021)	194.503,68	78.000,00	2.520.000,00	144.000,00	43.200,00	**2.979.703,68**
11 (2022)	199.366,27	84.000,00	2.520.000,00	144.000,00	45.000,00	**2.992.366,27**
12 (2023)	204.228,86	84.000,00	2.520.000,00	144.000,00	46.800,00	**2.999.028,86**
13 (2024)	206.660,16	90.000,00	2.520.000,00	144.000,00	48.600,00	**3.009.260,16**
14 (2025)	206.660,16	90.000,00	2.520.000,00	144.000,00	50.400,00	**3.011.060,16**
15 (2026)	206.660,16	90.000,00	2.520.000,00	144.000,00	52.200,00	**3.012.860,16**
16 (2027)	206.660,16	90.000,00	3.360.000,00	144.000,00	54.000,00	**3.854.660,16**
17 (2028)	206.660,16	90.000,00	3.360.000,00	144.000,00	54.000,00	**3.854.660,16**
18 (2029)	206.660,16	90.000,00	3.360.000,00	144.000,00	54.000,00	**3.854.660,16**
19 (2030)	218.816,64	90.000,00	3.360.000,00	144.000,00	54.000,00	**3.866.816,64**
20 (2031)	218.816,64	90.000,00	3.360.000,00	144.000,00	54.000,00	**3.866.816,64**
Accumulated	**3.661.531,78**	**1.476.000,00**	**42.840.000,00**	**2.520.000,00**	**788.400,00**	**51.285.931,78**
Contrib. in %	**7,14%**	**2,88%**	**83,53%**	**4,91%**	**1,54%**	**100,00%**

TABLE 80: OPERATING COSTS (DIRECT AND INDIRECT PRODUCTION COSTS) – BEST CASE SCENARIO, IN EUR

Year	Operating Costs						Total costs (EUR)
	Direct operating costs (Variable costs)					Fixed costs (FC)	
	BIOFacility - DOC	BIOIncubation - DOC	BIOTransfer - DOC	BIOEducation - DOC	BIONetwork - DOC	FC (production)	
	1,2	1,2	1,2	1,2	1,2		
1 (2012)	50.006,67	7.200,00	28.856,10	0,00	3.600,00	269.063,18	**358.725,95**
2 (2013)	100.013,34	18.000,00	935.719,56	48.000,00	7.200,00	427.005,36	**1.535.938,26**
3 (2014)	120.016,01	25.200,00	947.262,00	48.000,00	10.800,00	479.871,36	**1.631.149,36**
4 (2015)	130.017,34	32.400,00	953.033,22	72.000,00	14.400,00	513.799,36	**1.715.649,92**
5 (2016)	140.018,68	43.200,00	1.288.057,20	72.000,00	18.000,00	513.799,36	**2.075.075,23**
6 (2017)	144.019,21	43.200,00	1.290.365,69	96.000,00	21.600,00	547.726,36	**2.142.911,25**
7 (2018)	148.019,74	43.200,00	1.292.674,18	96.000,00	25.200,00	547.726,36	**2.152.820,28**
8 (2019)	152.020,28	46.800,00	1.294.982,66	96.000,00	26.400,00	547.726,36	**2.163.929,30**
9 (2020)	156.020,81	46.800,00	1.297.291,15	96.000,00	27.600,00	547.726,36	**2.171.438,32**
10 (2021)	160.021,34	46.800,00	1.628.852,40	96.000,00	28.800,00	547.726,36	**2.508.200,10**
11 (2022)	164.021,88	50.400,00	1.631.160,89	96.000,00	30.000,00	547.726,36	**2.519.309,12**
12 (2023)	168.022,41	50.400,00	1.633.469,38	96.000,00	31.200,00	547.726,36	**2.526.818,14**
13 (2024)	170.022,68	54.000,00	1.634.623,62	96.000,00	32.400,00	547.726,36	**2.534.772,65**
14 (2025)	170.022,68	54.000,00	1.634.623,62	96.000,00	33.600,00	547.726,36	**2.535.972,65**
15 (2026)	170.022,68	54.000,00	1.634.623,62	96.000,00	34.800,00	547.726,36	**2.537.172,65**
16 (2027)	170.022,68	54.000,00	1.963.876,38	96.000,00	36.000,00	547.726,36	**2.867.625,41**
17 (2028)	170.022,68	54.000,00	1.963.876,38	96.000,00	36.000,00	547.726,36	**2.867.625,41**
18 (2029)	170.022,68	54.000,00	1.963.876,38	96.000,00	36.000,00	547.726,36	**2.867.625,41**
19 (2030)	180.024,01	54.000,00	1.969.647,60	96.000,00	36.000,00	547.726,36	**2.883.397,97**
20 (2031)	180.024,01	54.000,00	1.969.647,60	96.000,00	36.000,00	547.726,36	**2.883.397,97**
Accumulated DOC	**3.012.401,80**	**885.600,00**	**28.956.519,62**	**1.680.000,00**	**525.600,00**	**10.419.433,95**	**45.479.555,37**
Contrib. in %	**6,62%**	**1,95%**	**63,67%**	**3,69%**	**1,16%**	**22,91%**	**100,00%**
FC distribution key	**8,59%**	**2,53%**	**82,59%**	**4,79%**	**1,50%**		**100,00%**
Distributed FC	895.248,51	263.189,35	8.605.519,07	499.275,20	156.201,81		
Accum. DOC + FC	**3.907.650,31**	**1.148.789,35**	**37.562.038,69**	**2.179.275,20**	**681.801,81**		

Please note: *Variation 1 represents Base line projection. Variation 1,2 represents the 20% increase.*

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8.12.4. Operating margin – Cruise speed operation

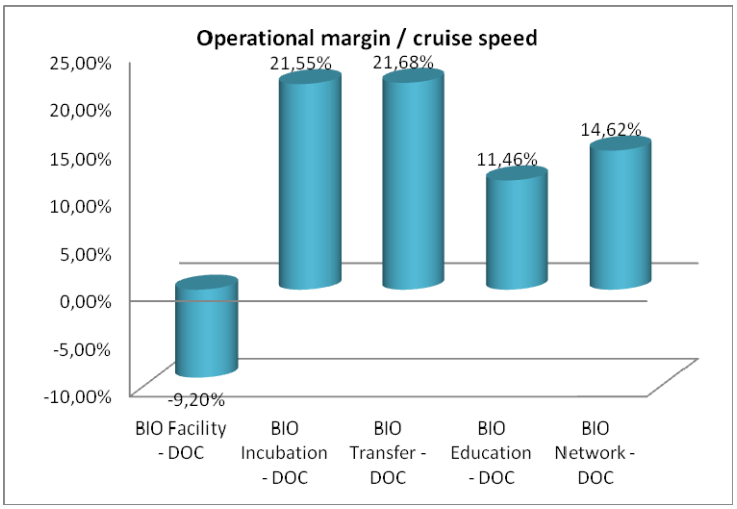
8.12.4.1. Operating margin – BASE line projection

TABLE 81: OPERATING MARGIN BY CATEGORIES / CRUISE SPEED OPERATION – BASE LINE PROJECTION, IN EUR

Categories	Operating Margin					Total BASE
	BIOFacility - DOC	BIOIncubation - DOC	BIOTransfer - DOC	BIOEducation - DOC	BIONetwork - DOC	
Total revenue	1.397.995,20	600.000,00	20.300.000,00	960.000,00	351.000,00	23.608.995,20
Variable costs	1.150.153,41	360.000,00	12.278.996,00	640.000,00	234.000,00	14.663.149,41
Fixed costs of production	376.489,71	110.682,21	3.618.983,24	209.966,25	65.689,44	4.381.810,85
Operating income	-128.647,92	129.317,79	4.402.020,76	110.033,75	51.310,56	4.564.034,94
Operating margin	**-9,20%**	**21,55%**	**21,68%**	**11,46%**	**14,62%**	**19,33%**

Please note: *It is a measurement of what proportion of a company's revenue is left over, before taxes and other indirect costs (depreciation, interest...) and after paying for all costs related to sales (costs of production, wages, raw materials, material costs etc.) A good operating margin is needed for a company to be able to pay for its other indirect costs. Cruise speed operation represents a part of projected years necessary to achieve a sustained profitable operation. It is from year 13 (2024) up to the last year 20 (2031). BIOCentre Operating margin is low, due to high operating costs. Small proportion of the companies' revenue is left over before taxes and other indirect costs. The most successful sales is BIOTransfer, where 21,68% of sales is left over for other indirect costs.*

FIGURE 31: OPERATING MARGIN / CRUISE SPEED OPERATION – BASE LINE PROJECTION



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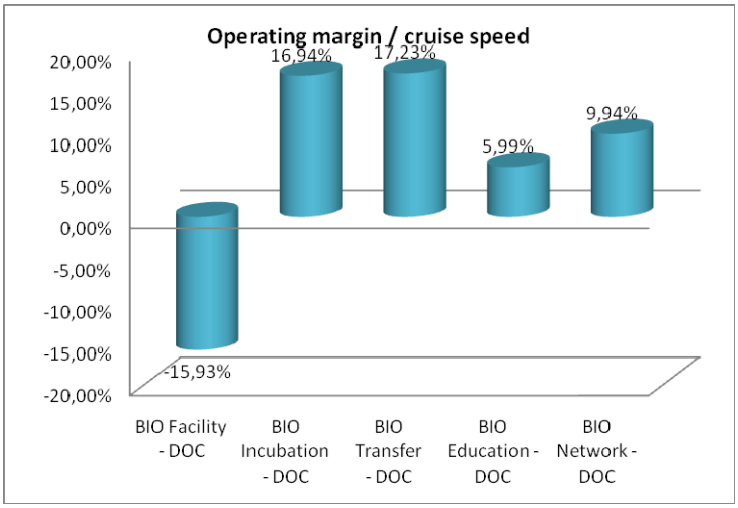
8.12.4.2. Operating margin – WORST case scenario

TABLE 82: OPERATING MARGIN BY CATEGORIES / CRUISE SPEED OPERATION – WORST CASE SCENARIO, IN EUR

Categories	Operating Margin					Total WORST
	BIO Facility - DOC	BIO Incubation - DOC	BIO Transfer - DOC	BIO Education - DOC	BIO Network - DOC	
Total revenue	1.118.396,16 €	480.000,00 €	16.240.000,00 €	768.000,00 €	280.800,00 €	18.887.196,16 €
Variable costs	920.122,73 €	288.000,00 €	9.823.196,80 €	512.000,00 €	187.200,00 €	11.730.519,53 €
Fixed costs of production	376.489,71 €	110.682,21 €	3.618.983,24 €	209.966,25 €	65.689,44 €	4.381.810,85 €
Operating income	-178.216,28 €	81.317,79 €	2.797.819,96 €	46.033,75 €	27.910,56 €	2.774.865,78 €
Operating margin	**-15,93%**	**16,94%**	**17,23%**	**5,99%**	**9,94%**	**14,69%**

FIGURE 32: OPERATING MARGIN / CRUISE SPEED OPERATION – WORST CASE SCENARIO

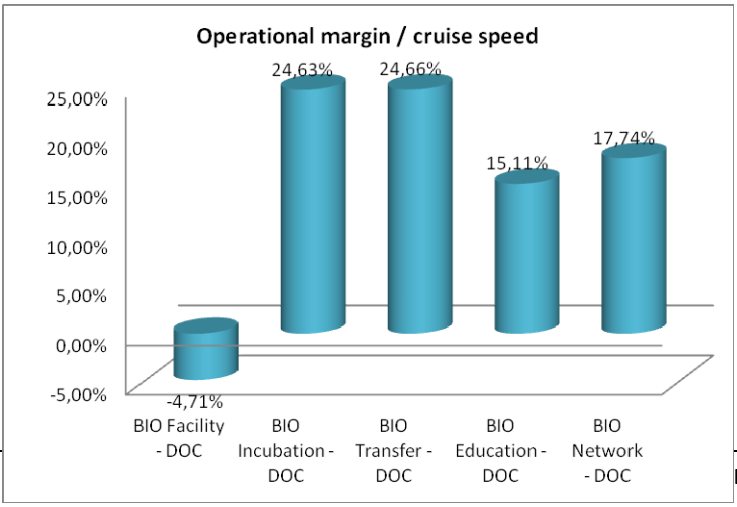


8.12.4.3. Operating margin – BEST case scenario

TABLE 83: OPERATING MARGIN BY CATEGORIES / CRUISE SPEED OPERATION – BEST CASE SCENARIO, IN EUR

Categories	Operating Margin					Total BASE
	BIOFacility - DOC	BIOIncubation - DOC	BIOTransfer - DOC	BIOEducation - DOC	BIONetwork - DOC	
Total revenue	1.677.594,24	720.000,00	24.360.000,00	1.152.000,00	421.200,00	28.330.794,24
Variable costs	1.380.184,09	432.000,00	14.734.795,20	768.000,00	280.800,00	17.595.779,29
Fixed costs of production	376.489,71	110.682,21	3.618.983,24	209.966,25	65.689,44	4.381.810,85
Operating income	-79.079,56	177.317,79	6.006.221,56	174.033,75	74.710,56	6.353.204,10
Operating margin	**-4,71%**	**24,63%**	**24,66%**	**15,11%**	**17,74%**	**22,43%**

FIGURE 33: OPERATING MARGIN / CRUISE SPEED OPERATION – BEST CASE SCENARIO



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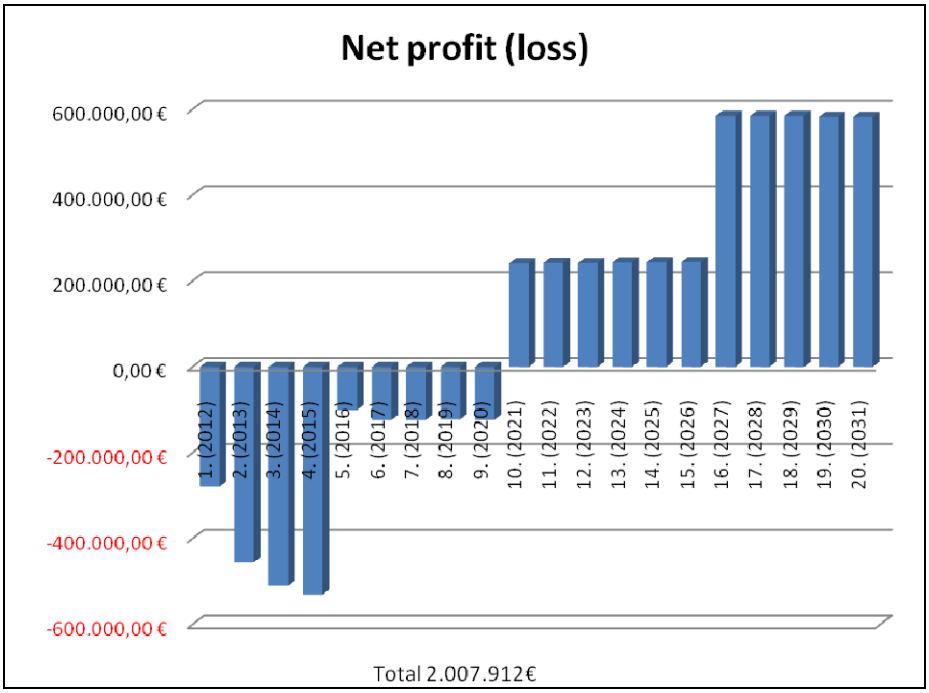
8.12.5. Profit and Loss Account

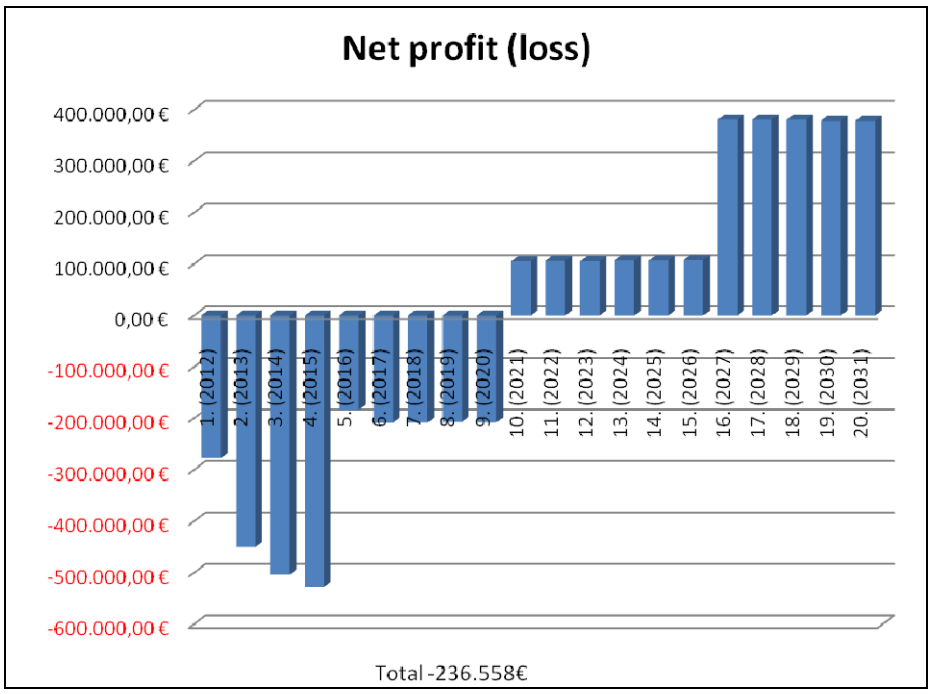
8.12.5.1 Profit and Loss Account – BASE line projection

FIGURE 34: NET PROFIT (LOSS) – BASE LINE PROJECTION



8.12.5.2 Profit and Loss Account – WORST case scenario

FIGURE 35: NET PROFIT (LOSS) – WORST CASE SCENARIO



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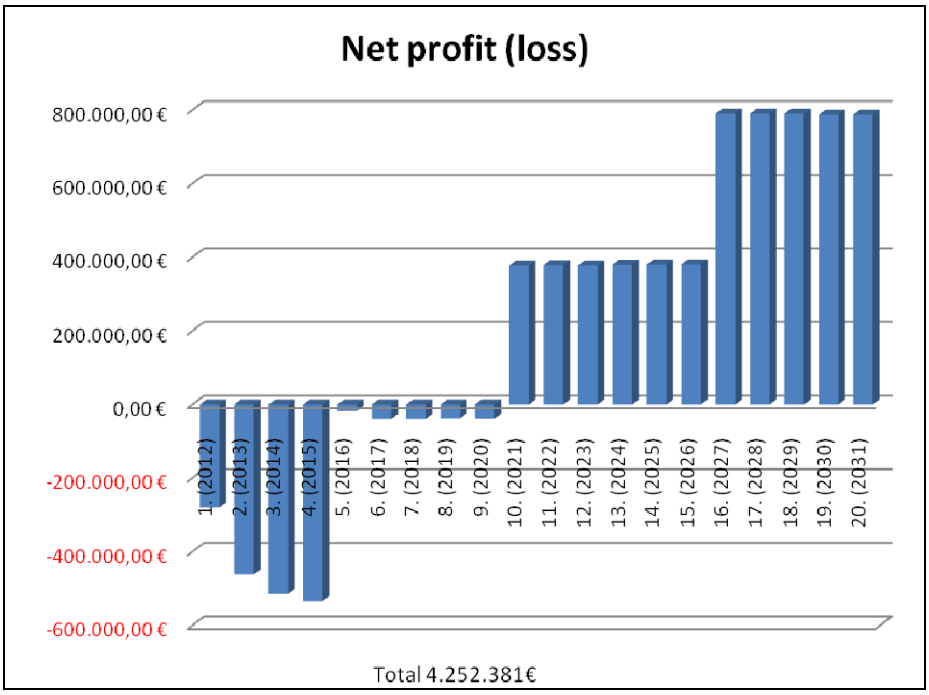
8.12.5.3. Profit and Loss Account – BEST case scenario

FIGURE 36: NET PROFIT (LOSS) – BEST CASE SCENARIO



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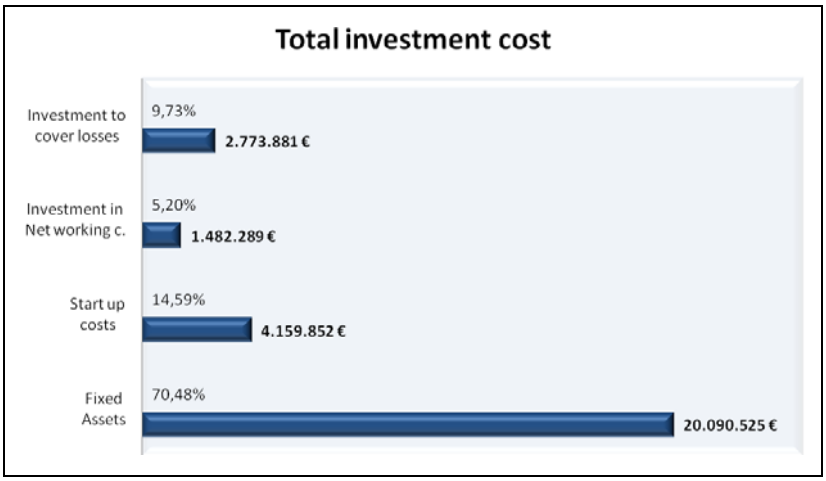
8.12.6. Investment and Sources

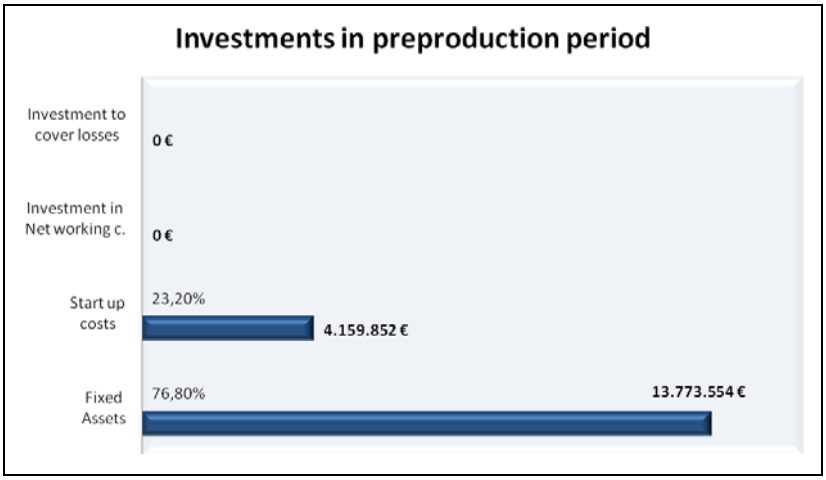
8.12.6.1. Investment and Sources BASE line

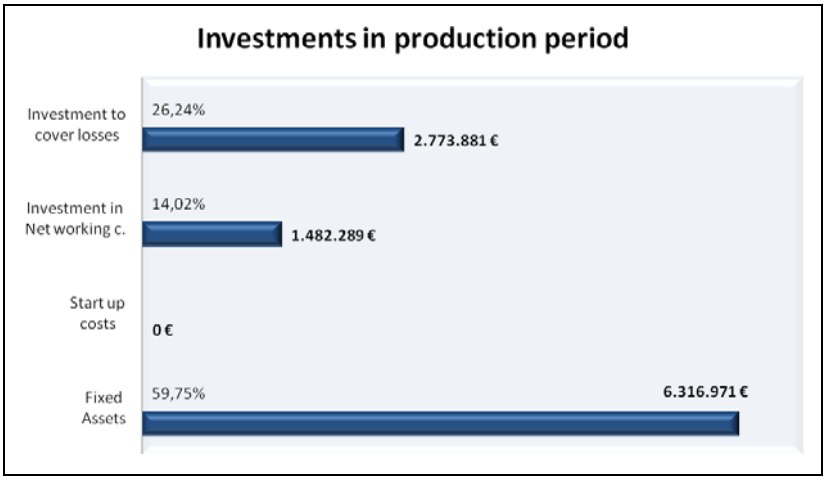
For the baseline projection please see section 8.5.2: Total sources, tables and figures.

8.13.6.2. Investment and Sources WORST case scenario

FIGURE 37: INVESTMENT AND SOURCES WORST CASE SCENARIO







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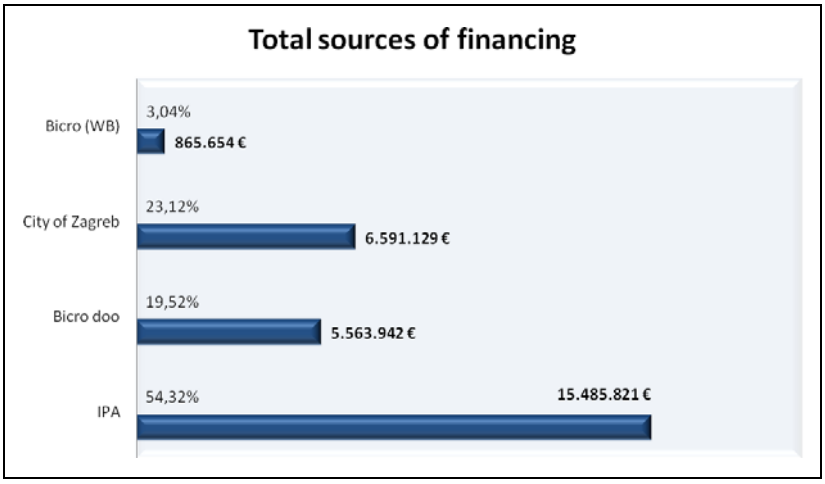

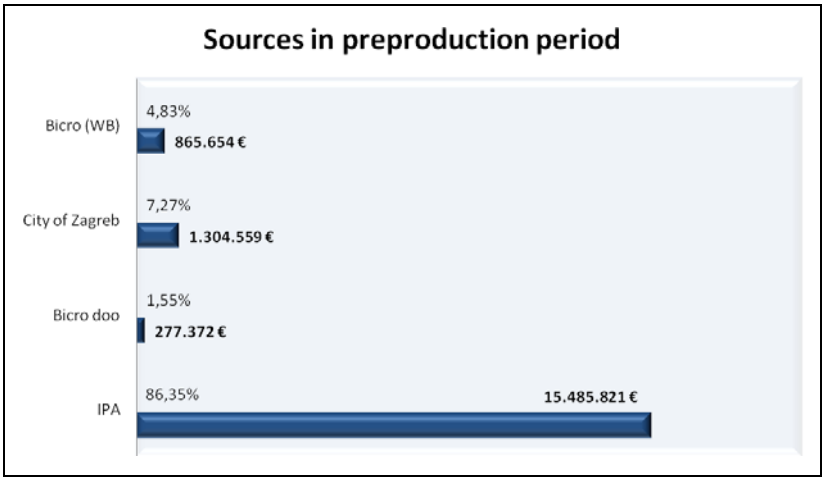

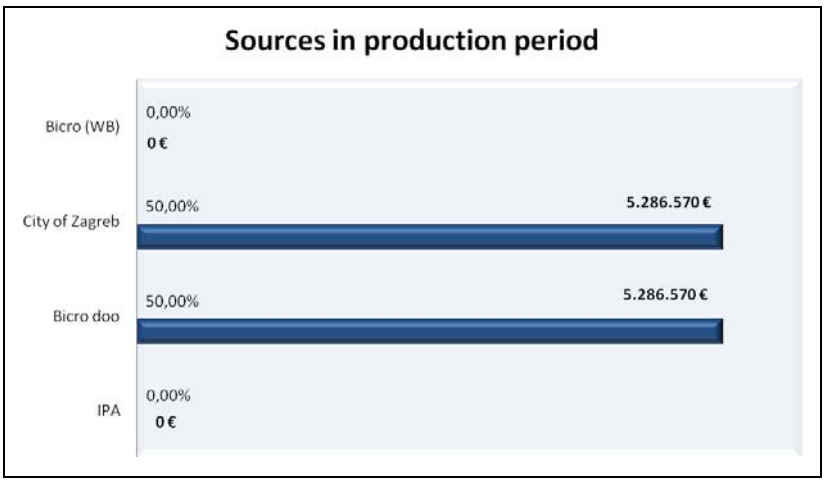

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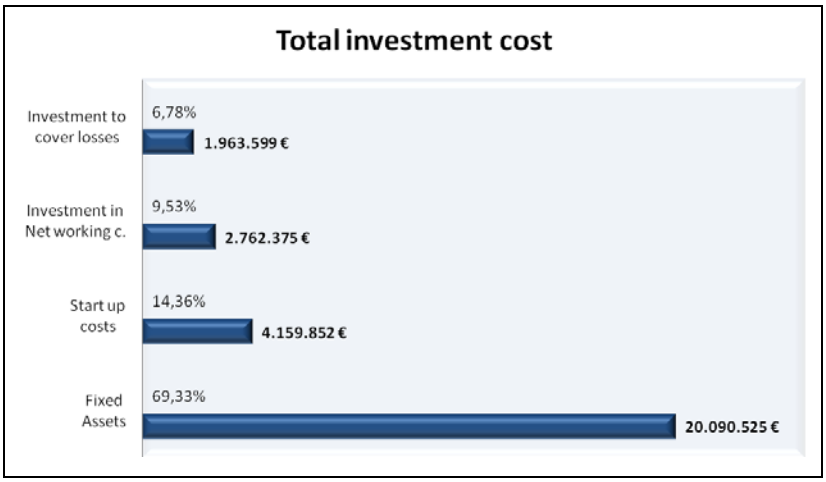
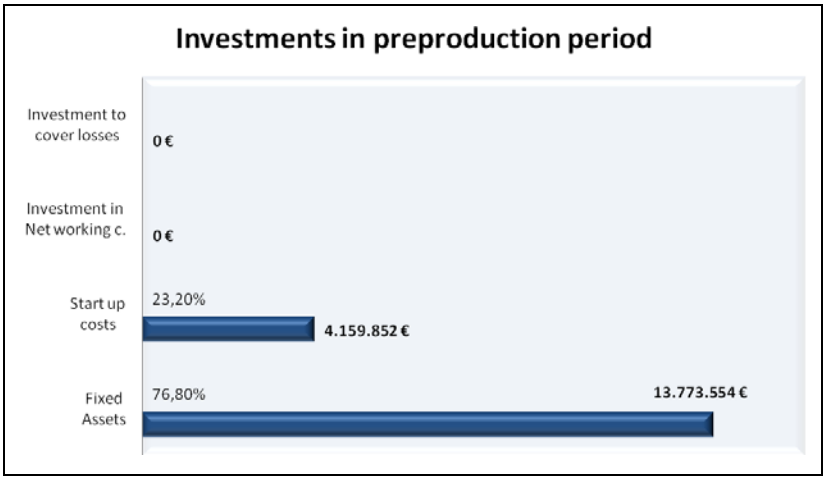
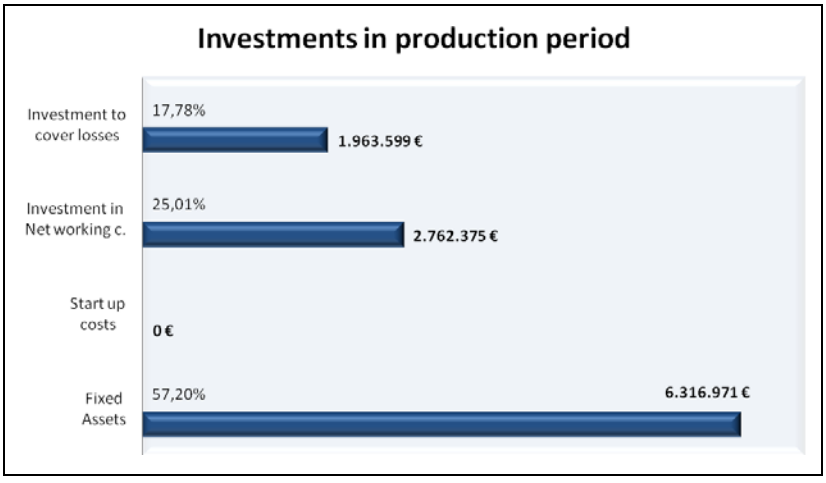
8.12.6.2. Investment and Sources BEST case scenario

FIGURE 38: INVESTMENT AND SOURCES, BEST CASE SCENARIO







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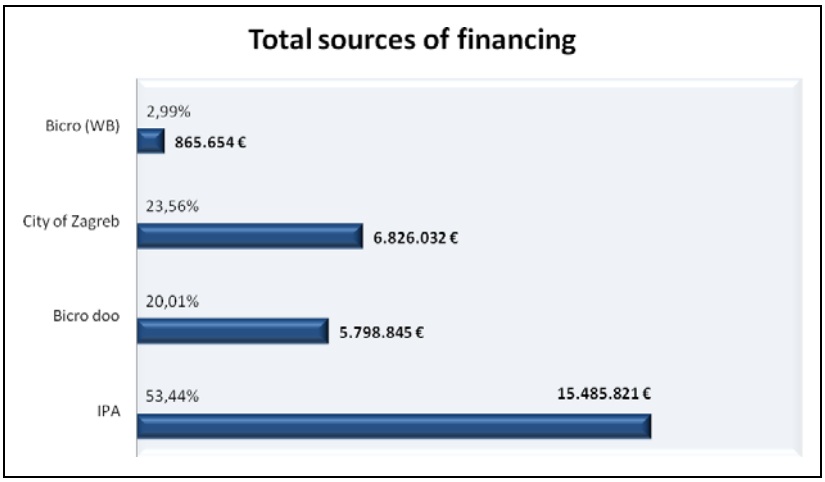

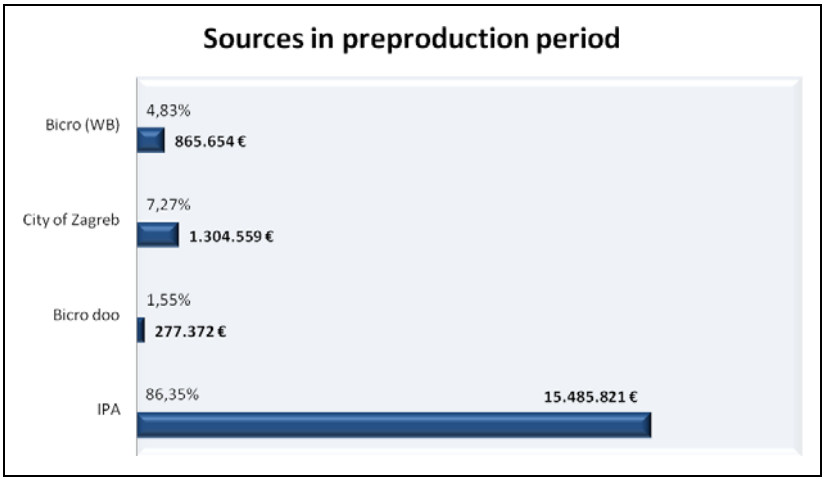

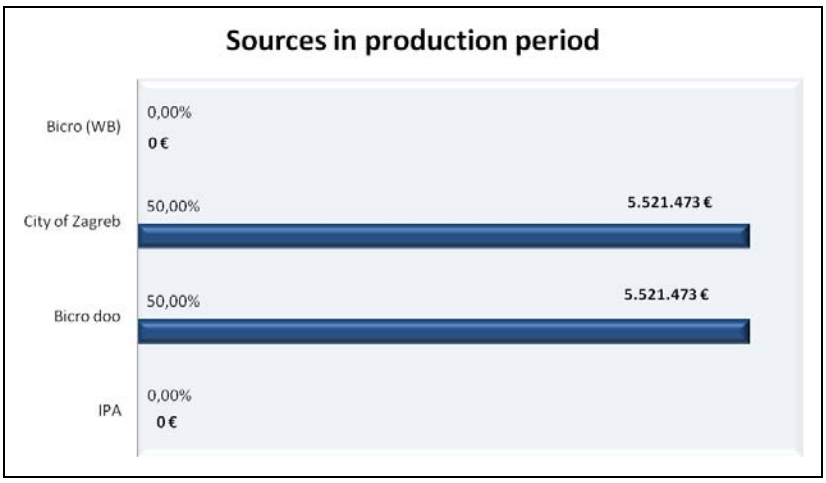

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8.12.7. Financial Sustainability

TABLE 84: NET INVESTMENT COST IN PRODUCTION PERIOD

Year	Net Investment costs to secure financial sustainability (Investment costs to secure financial sustainability - retain profit from previous year)				
	BASE case scenario	WORST case scenario		BEST case scenario	
	Net Investment	Net Investment	Increment	Net Investment	Increment
1 (2012)	-39.564,69	-39.023,35	541,35	-40.106,04	-541,35
2 (2013)	16.590,78	-5.797,75	-22.388,53	38.979,31	22.388,53
3 (2014)	1.532,87	-4.445,99	-5.978,86	-4.083,77	-5.616,64
4 (2015)	12.096,91	-7.618,86	-19.715,76	26.348,66	14.251,75
5 (2016)	184.842,07	135.855,63	-48.986,44	224.054,80	39.212,73
6 (2017)	609.534,41	626.569,51	17.035,11	602.273,01	-7.261,40
7 (2018)	-4.193,28	-27.351,48	-23.158,20	28.738,62	32.931,91
8 (2019)	106.632,23	43.301,49	-63.330,74	122.259,44	15.627,21
9 (2020)	3.703,18	26.959,40	23.256,22	28.150,50	24.447,32
10 (2021)	262.449,97	167.955,68	-94.494,29	309.240,73	46.790,75
11 (2022)	4.608.055,82	4.771.609,13	163.553,31	4.492.206,05	-115.849,77
12 (2023)	-4.653,61	71.182,05	75.835,66	-55.010,26	-50.356,65
13 (2024)	-223.316,31	-96.292,99	127.023,31	-375.818,63	-152.502,32
14 (2025)	-5.554,64	70.461,23	76.015,87	-56.091,50	-50.536,86
15 (2026)	-225.151,97	-97.761,52	127.390,45	-378.021,43	-152.869,46
16 (2027)	870.815,68	916.488,88	45.673,20	850.621,49	-20.194,19
17 (2028)	-572.210,95	-375.408,71	196.802,24	-794.492,21	-222.281,25
18 (2029)	-194.739,48	-80.886,64	113.852,83	-297.706,53	-102.967,06
19 (2030)	-573.513,96	-376.451,12	197.062,85	-786.327,00	-212.813,03
20 (2031)	-192.353,74	-78.978,05	113.375,69	-289.979,24	-97.625,50
Accumulated	**4.641.001,28**	**5.640.366,54**	**999.365,26**	**3.645.236,01**	**-995.765,27**
In %			**21,53%**		**-21,46%**

Please note: *Investment cost to secure financial sustainability is a calculation of needs for equipment replacement, Net working capital and investment to cover losses. It is a result of calculation in Table 72, part of Total investment costs minus Surplus which is retain profit to be reinvested the very next year.*

Negative Net investment means there is still unspent capital, either from working capital or from retained profit.

All investment costs to secure financial sustainability will be provided by the founders.

8.12.8. Discounted Cash Flow on total investment

8.12.8.1. Discounted Cash Flow on total investment – BASE line projection

For DCF on total investment, base line projection, please see 8.11.2., Table 73.

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8.12.8.2. Discounted Cash Flow on total investment – WORST case scenario

TABLE 85: DISCOUNTED CASH FLOW ON TOTAL INVESTMENT – WORST CASE SCENARIO

Year	Discounted Cash Flow "C"										
	Cash Inflow		Cash Outflow								WORST C.
	Sales inflow	Total Cash inflow	Total investment costs (Table 47) Remark	Operating Costs	Corporate tax	Total Cash outflow	Net Cash Flow	Cumulative Net Cash Flow	Discount factor	DNCF value	Cumulative Net Present Value
"-3 (2009)			865.654,00			865.654,00	-865.654,00	-865.654,00	1,0000	-865.654,00	-865.654,00
"-2 (2010)			750.752,00			750.752,00	-750.752,00	-1.616.406,00	0,9346	-701.637,38	-1.567.291,38
"-1 (2011)			7.261.414,50			7.261.414,50	-7.261.414,50	-8.877.820,50	0,8734	-6.342.400,65	-7.909.692,03
"-0 (2012)			9.055.585,50			9.055.585,50	-9.055.585,50	-17.933.406,00	0,8163	-7.392.055,22	-15.301.747,25
1 (2012)	52.121,60	52.121,60	-39.023,35	328.838,36	0,00	289.815,01	-237.693,41	-18.171.099,41	0,8163	-194.028,62	-15.495.775,87
2 (2013)	716.243,20	716.243,20	-5.797,75	1.166.293,96	0,00	1.160.496,21	-444.253,01	-18.615.352,42	0,7629	-338.918,49	-15.834.694,37
3 (2014)	744.051,84	744.051,84	-4.445,99	1.247.390,03	0,00	1.242.944,04	-498.892,20	-19.114.244,62	0,7130	-355.703,25	-16.190.397,61
4 (2015)	787.756,16	787.756,16	-7.618,86	1.315.033,06	0,00	1.307.414,20	-519.658,04	-19.633.902,67	0,6663	-346.270,10	-16.536.667,71
5 (2016)	1.371.460,48	1.371.460,48	135.855,63	1.554.649,94	0,00	1.690.505,57	-319.045,09	-19.952.947,75	0,6227	-198.685,24	-16.735.352,95
6 (2017)	1.402.302,21	1.402.302,21	626.569,51	1.611.182,95	0,00	2.237.752,47	-835.450,26	-20.788.398,01	0,5820	-486.239,66	-17.221.592,61
7 (2018)	1.409.143,94	1.409.143,94	-27.351,48	1.617.788,97	0,00	1.590.437,49	-181.293,55	-20.969.691,56	0,5439	-98.611,68	-17.320.204,29
8 (2019)	1.417.585,66	1.417.585,66	43.301,49	1.625.194,98	0,00	1.668.496,47	-250.910,81	-21.220.602,37	0,5083	-127.550,33	-17.447.754,62
9 (2020)	1.422.027,39	1.422.027,39	26.959,40	1.630.201,00	0,00	1.657.160,40	-235.133,01	-21.455.735,38	0,4751	-111.710,00	-17.559.464,62
10 (2021)	1.986.469,12	1.986.469,12	167.955,68	1.854.708,85	26.352,05	2.049.016,59	-62.547,47	-21.518.282,84	0,4440	-27.771,82	-17.587.236,44
11 (2022)	1.994.910,85	1.994.910,85	4.877.017,35	1.862.114,87	26.559,20	6.765.691,41	-4.770.780,56	-26.289.063,40	0,4150	-1.979.704,32	-19.566.940,76
12 (2023)	1.999.352,58	1.999.352,58	177.418,84	1.867.120,88	26.446,34	2.070.986,06	-71.633,48	-26.360.696,89	0,3878	-27.780,70	-19.594.721,46
13 (2024)	2.006.173,44	2.006.173,44	9.492,36	1.872.423,89	26.749,91	1.908.666,16	97.507,28	-26.263.189,61	0,3624	35.341,12	-19.559.380,34
14 (2025)	2.007.373,44	2.007.373,44	177.460,87	1.873.223,89	26.829,91	2.077.514,67	-70.141,23	-26.333.330,83	0,3387	-23.759,26	-19.583.139,60
15 (2026)	2.008.573,44	2.008.573,44	9.558,12	1.874.023,89	26.909,91	1.910.491,92	98.081,52	-26.235.249,31	0,3166	31.050,10	-19.552.089,50
16 (2027)	2.569.773,44	2.569.773,44	1.024.128,53	2.094.325,73	95.089,54	3.213.543,80	-643.770,36	-26.879.019,67	0,2959	-190.468,42	-19.742.557,92
17 (2028)	2.569.773,44	2.569.773,44	4.949,46	2.094.325,73	95.089,54	2.194.364,73	375.408,71	-26.503.610,96	0,2765	103.803,64	-19.638.754,28
18 (2029)	2.569.773,44	2.569.773,44	299.471,53	2.094.325,73	95.089,54	2.488.886,80	80.886,64	-26.422.724,31	0,2584	20.902,65	-19.617.851,64
19 (2030)	2.577.877,76	2.577.877,76	3.907,05	2.104.840,76	94.607,40	2.203.355,22	374.522,54	-26.048.201,77	0,2415	90.452,10	-19.527.399,54
20 (2031)	2.577.877,76	2.577.877,76	299.451,54	2.104.840,76	94.607,40	2.498.899,71	78.978,05	-25.969.223,71	0,2257	17.826,39	-19.509.573,15
Scrap							8.472.560,41	-17.496.663,31		1.912.368,43	-17.597.204,73

FINANCIAL NET PRESENT VALUE (FNPV "C") at 7%	-17.597.204,73
FINANCIAL RATE OF RETURN (FRR "C")	-5,88%

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8.12.8.3. Discounted Cash Flow on total investment – BEST case scenario

TABLE 86: DISCOUNTED CASH FLOW ON TOTAL INVESTMENT – BEST CASE SCENARIO

Year	Discounted Cash Flow "C"										
	Cash Inflow		Cash Outflow								BEST C.
	Sales inflow	Total Cash inflow	Total investment costs (Table 47) Remark	Operating Costs	Corporate tax	Total Cash outflow	Net Cash Flow	Cumulative Net Cash Flow	Discount factor	DNCF value	Cumulative Net Present Value
"-3 (2009)			865.654,00			865.654,00	-865.654,00	-865.654,00	1,0000	-865.654,00	-865.654,00
"-2 (2010)			750.752,00			750.752,00	-750.752,00	-1.616.406,00	0,9346	-701.637,38	-1.567.291,38
"-1 (2011)			7.261.414,50			7.261.414,50	-7.261.414,50	-8.877.820,50	0,8734	-6.342.400,65	-7.909.692,03
"-0 (2012)			9.055.585,50			9.055.585,50	-9.055.585,50	-17.933.406,00	0,8163	-7.392.055,22	-15.301.747,25
1 (2012)	78.182,40	78.182,40	-40.106,04	358.725,95	0,00	318.619,91	-240.437,51	-18.173.843,51	0,8163	-196.268,63	-15.498.015,87
2 (2013)	1.074.364,80	1.074.364,80	38.979,31	1.535.938,26	0,00	1.574.917,56	-500.552,76	-18.674.396,27	0,7629	-381.869,31	-15.879.885,18
3 (2014)	1.116.077,76	1.116.077,76	-4.083,77	1.631.149,36	0,00	1.627.065,60	-510.987,84	-19.185.384,11	0,7130	-364.327,27	-16.244.212,45
4 (2015)	1.181.634,24	1.181.634,24	26.348,66	1.715.649,92	0,00	1.741.998,58	-560.364,34	-19.745.748,45	0,6663	-373.394,42	-16.617.606,87
5 (2016)	2.057.190,72	2.057.190,72	224.054,80	2.075.075,23	0,00	2.299.130,04	-241.939,32	-19.987.687,76	0,6227	-150.667,65	-16.768.274,51
6 (2017)	2.103.453,31	2.103.453,31	602.273,01	2.142.911,25	0,00	2.745.184,26	-641.730,95	-20.629.418,71	0,5820	-373.493,26	-17.141.767,77
7 (2018)	2.113.715,90	2.113.715,90	28.738,62	2.152.820,28	0,00	2.181.558,90	-67.842,99	-20.697.261,71	0,5439	-36.902,09	-17.178.669,86
8 (2019)	2.126.378,50	2.126.378,50	122.259,44	2.163.929,30	0,00	2.286.188,73	-159.810,24	-20.857.071,94	0,5083	-81.239,42	-17.259.909,28
9 (2020)	2.133.041,09	2.133.041,09	28.150,50	2.171.438,32	0,00	2.199.588,82	-66.547,73	-20.923.619,68	0,4751	-31.616,35	-17.291.525,63
10 (2021)	2.979.703,68	2.979.703,68	309.240,73	2.508.200,10	94.300,72	2.911.741,54	67.962,14	-20.855.657,54	0,4440	30.176,00	-17.261.349,63
11 (2022)	2.992.366,27	2.992.366,27	4.869.408,92	2.519.309,12	94.611,43	7.483.329,47	-4.490.963,20	-25.346.620,74	0,4150	-1.863.590,06	-19.124.939,69
12 (2023)	2.999.028,86	2.999.028,86	323.435,46	2.526.818,14	94.442,14	2.944.695,75	54.333,12	-25.292.287,62	0,3878	21.071,32	-19.103.868,37
13 (2024)	3.009.260,16	3.009.260,16	1.949,95	2.534.772,65	94.897,50	2.631.620,10	377.640,06	-24.914.647,56	0,3624	136.874,14	-18.966.994,24
14 (2025)	3.011.060,16	3.011.060,16	323.498,51	2.535.972,65	95.017,50	2.954.488,66	56.571,50	-24.858.076,07	0,3387	19.162,72	-18.947.831,52
15 (2026)	3.012.860,16	3.012.860,16	2.048,58	2.537.172,65	95.137,50	2.634.358,73	378.501,43	-24.479.574,64	0,3166	119.823,86	-18.828.007,66
16 (2027)	3.854.660,16	3.854.660,16	1.231.171,49	2.867.625,41	197.406,95	4.296.203,86	-441.543,70	-24.921.118,33	0,2959	-130.636,85	-18.958.644,50
17 (2028)	3.854.660,16	3.854.660,16	-4.864,41	2.867.625,41	197.406,95	3.060.167,95	794.492,21	-24.126.626,13	0,2765	219.683,72	-18.738.960,79
18 (2029)	3.854.660,16	3.854.660,16	496.785,67	2.867.625,41	197.406,95	3.561.818,04	292.842,12	-23.833.784,00	0,2584	75.675,97	-18.663.284,82
19 (2030)	3.866.816,64	3.866.816,64	3.300,80	2.883.397,97	196.683,73	3.083.382,50	783.434,14	-23.050.349,86	0,2415	189.209,60	-18.474.075,22
20 (2031)	3.866.816,64	3.866.816,64	496.755,70	2.883.397,97	196.683,73	3.576.837,40	289.979,24	-22.760.370,62	0,2257	65.452,13	-18.408.623,09
Scrap							13.431.303,86	-9.329.066,76		3.031.622,11	-15.377.000,98

FINANCIAL NET PRESENT VALUE (FNPV "C") at 7%	-15.377.000,98
FINANCIAL RATE OF RETURN (FRR "C")	-2,49%

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8.12.9. Discounted Cash Flow on national capital

8.12.9.1. Discounted Cash Flow on national capital – BASE line projection

For DCF on national capital, base line projection, please see section 8.12.3., Table 74.

8.12.9.2. Discounted Cash Flow on national capital – WORST case scenario

TABLE 87: DISCOUNTED CASH FLOW ON NATIONAL CAPITAL – WORST CASE SCENARIO

Year	Discounted Cash Flow "K"										WORST C.
	Cash Inflow		Cash Outflow								
	Sales inflow	Total Cash inflow	National capital (Bicro, C.Z., WB)	Operating Costs	Corporate tax	Total Cash outflow	Net Cash Flow	Cumulative Net Cash Flow	Discount factor	Net present value	Cumulative Net Present Value
"-3 (2009)			865.654,00			865.654,00	-865.654,00	-865.654,00	1,0000	-865.654,00	-865.654,00
"-2 (2010)			750.752,00			750.752,00	-750.752,00	-1.616.406,00	0,9346	-701.637,38	-1.567.291,38
"-1 (2011)			214.877,00			214.877,00	-214.877,00	-1.831.283,00	0,8734	-187.681,89	-1.754.973,28
"-0 (2012)			616.302,00			616.302,00	-616.302,00	-2.447.585,00	0,8163	-503.086,01	-2.258.059,29
1 (2012)	52.121,60	52.121,60	-39.023,35	328.838,36	0,00	289.815,01	-237.693,41	-2.068.976,41	0,8163	-194.028,62	-2.452.087,92
2 (2013)	716.243,20	716.243,20	-5.797,75	1.166.293,96	0,00	1.160.496,21	-444.253,01	-2.513.229,42	0,7629	-338.918,49	-2.791.006,41
3 (2014)	744.051,84	744.051,84	-4.445,99	1.247.390,03	0,00	1.242.944,04	-498.892,20	-3.012.121,62	0,7130	-355.703,25	-3.146.709,66
4 (2015)	787.756,16	787.756,16	-7.618,86	1.315.033,06	0,00	1.307.414,20	-519.658,04	-3.531.779,67	0,6663	-346.270,10	-3.492.979,75
5 (2016)	1.371.460,48	1.371.460,48	135.855,63	1.554.649,94	0,00	1.690.505,57	-319.045,09	-3.850.824,75	0,6227	-198.685,24	-3.691.665,00
6 (2017)	1.402.302,21	1.402.302,21	626.569,51	1.611.182,95	0,00	2.237.752,47	-835.450,26	-4.686.275,01	0,5820	-486.239,66	-4.177.904,65
7 (2018)	1.409.143,94	1.409.143,94	-27.351,48	1.617.788,97	0,00	1.590.437,49	-181.293,55	-4.867.568,56	0,5439	-98.611,68	-4.276.516,33
8 (2019)	1.417.585,66	1.417.585,66	43.301,49	1.625.194,98	0,00	1.668.496,47	-250.910,81	-5.118.479,37	0,5083	-127.550,33	-4.404.066,67
9 (2020)	1.422.027,39	1.422.027,39	26.959,40	1.630.201,00	0,00	1.657.160,40	-235.133,01	-5.353.612,38	0,4751	-111.710,00	-4.515.776,66
10 (2021)	1.986.469,12	1.986.469,12	167.955,68	1.854.708,85	26.352,05	2.049.016,59	-62.547,47	-5.416.159,84	0,4440	-27.771,82	-4.543.548,49
11 (2022)	1.994.910,85	1.994.910,85	4.877.017,35	1.862.114,87	26.559,20	6.765.691,41	-4.770.780,56	-10.186.940,40	0,4150	-1.979.704,32	-6.523.252,81
12 (2023)	1.999.352,58	1.999.352,58	177.418,84	1.867.120,88	26.446,34	2.070.986,06	-71.633,48	-10.258.573,89	0,3878	-27.780,70	-6.551.033,51
13 (2024)	2.006.173,44	2.006.173,44	9.492,36	1.872.423,89	26.749,91	1.908.666,16	97.507,28	-10.161.066,61	0,3624	35.341,12	-6.515.692,38
14 (2025)	2.007.373,44	2.007.373,44	177.460,87	1.873.223,89	26.829,91	2.077.514,67	-70.141,23	-10.231.207,83	0,3387	-23.759,26	-6.539.451,64
15 (2026)	2.008.573,44	2.008.573,44	9.558,12	1.874.023,89	26.909,91	1.910.491,92	98.081,52	-10.133.126,31	0,3166	31.050,10	-6.508.401,54
16 (2027)	2.569.773,44	2.569.773,44	1.024.128,53	2.094.325,73	95.089,54	3.213.543,80	-643.770,36	-10.776.896,67	0,2959	-190.468,42	-6.698.869,96
17 (2028)	2.569.773,44	2.569.773,44	4.949,46	2.094.325,73	95.089,54	2.194.364,73	375.408,71	-10.401.487,96	0,2765	103.803,64	-6.595.066,33
18 (2029)	2.569.773,44	2.569.773,44	299.471,53	2.094.325,73	95.089,54	2.488.886,80	80.886,64	-10.320.601,31	0,2584	20.902,65	-6.574.163,68
19 (2030)	2.577.877,76	2.577.877,76	3.907,05	2.104.840,76	94.607,40	2.203.355,22	374.522,54	-9.946.078,77	0,2415	90.452,10	-6.483.711,58
20 (2031)	2.577.877,76	2.577.877,76	299.451,54	2.104.840,76	94.607,40	2.498.899,71	78.978,05	-9.867.100,71	0,2257	17.826,39	-6.465.885,20
Scrap							8.472.560,41	-1.394.540,31		1.912.368,43	-4.553.516,77

FINANCIAL NET PRESENT VALUE (FNPV "K") at 7%	-4.553.516,77
FINANCIAL RATE OF RETURN (FRR "K")	-1,38%

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8.12.9.3. Discounted Cash Flow on national capital – BEST case scenario

TABLE 88: DISCOUNTED CASH FLOW ON NATIONAL CAPITAL – BEST CASE SCENARIO

Year	Discounted Cash Flow "K"										
	Cash Inflow		Cash Outflow								
	Sales inflow	***Total Cash inflow***	*National capital (Bicro ,C.Z., WB)*	*Operating Costs*	*Corporate tax*	***Total Cash outflow***	*Net Cash Flow*	*Cumulative Net Cash Flow*	*Discount factor*	*Net present value*	**BEST C. *Cumulative Net Present Value***
"-3 (2009)			865.654,00			**865.654,00**	-865.654,00	-865.654,00	1,0000	-865.654,00	**-865.654,00**
"-2 (2010)			750.752,00			**750.752,00**	-750.752,00	-1.616.406,00	0,9346	-701.637,38	**-1.567.291,38**
"-1 (2011)			214.877,00			**214.877,00**	-214.877,00	-1.831.283,00	0,8734	-187.681,89	**-1.754.973,28**
"-0 (2012)			616.302,00			**616.302,00**	-616.302,00	-2.447.585,00	0,8163	-503.086,01	**-2.258.059,29**
1 (2012)	78.182,40	**78.182,40**	-40.106,04	358.725,95	0,00	**318.619,91**	-240.437,51	-2.071.720,51	0,8163	-196.268,63	**-2.454.327,92**
2 (2013)	1.074.364,80	**1.074.364,80**	38.979,31	1.535.938,26	0,00	**1.574.917,56**	-500.552,76	-2.572.273,27	0,7629	-381.869,31	**-2.836.197,23**
3 (2014)	1.116.077,76	**1.116.077,76**	-4.083,77	1.631.149,36	0,00	**1.627.065,60**	-510.987,84	-3.083.261,11	0,7130	-364.327,27	**-3.200.524,49**
4 (2015)	1.181.634,24	**1.181.634,24**	26.348,66	1.715.649,92	0,00	**1.741.998,58**	-560.364,34	-3.643.625,45	0,6663	-373.394,42	**-3.573.918,91**
5 (2016)	2.057.190,72	**2.057.190,72**	224.054,80	2.075.075,23	0,00	**2.299.130,04**	-241.939,32	-3.885.564,76	0,6227	-150.667,65	**-3.724.586,56**
6 (2017)	2.103.453,31	**2.103.453,31**	602.273,01	2.142.911,25	0,00	**2.745.184,26**	-641.730,95	-4.527.295,71	0,5820	-373.493,26	**-4.098.079,81**
7 (2018)	2.113.715,90	**2.113.715,90**	28.738,62	2.152.820,28	0,00	**2.181.558,90**	-67.842,99	-4.595.138,71	0,5439	-36.902,09	**-4.134.981,91**
8 (2019)	2.126.378,50	**2.126.378,50**	122.259,44	2.163.929,30	0,00	**2.286.188,73**	-159.810,24	-4.754.948,94	0,5083	-81.239,42	**-4.216.221,33**
9 (2020)	2.133.041,09	**2.133.041,09**	28.150,50	2.171.438,32	0,00	**2.199.588,82**	-66.547,73	-4.821.496,68	0,4751	-31.616,35	**-4.247.837,68**
10 (2021)	2.979.703,68	**2.979.703,68**	309.240,73	2.508.200,10	94.300,72	**2.911.741,54**	67.962,14	-4.753.534,54	0,4440	30.176,00	**-4.217.661,67**
11 (2022)	2.992.366,27	**2.992.366,27**	4.869.408,92	2.519.309,12	94.611,43	**7.483.329,47**	-4.490.963,20	-9.244.497,74	0,4150	-1.863.590,06	**-6.081.251,74**
12 (2023)	2.999.028,86	**2.999.028,86**	323.435,46	2.526.818,14	94.442,14	**2.944.695,75**	54.333,12	-9.190.164,62	0,3878	21.071,32	**-6.060.180,42**
13 (2024)	3.009.260,16	**3.009.260,16**	1.949,95	2.534.772,65	94.897,50	**2.631.620,10**	377.640,06	-8.812.524,56	0,3624	136.874,14	**-5.923.306,28**
14 (2025)	3.011.060,16	**3.011.060,16**	323.498,51	2.535.972,65	95.017,50	**2.954.488,66**	56.571,50	-8.755.953,07	0,3387	19.162,72	**-5.904.143,56**
15 (2026)	3.012.860,16	**3.012.860,16**	2.048,58	2.537.172,65	95.137,50	**2.634.358,73**	378.501,43	-8.377.451,64	0,3166	119.823,86	**-5.784.319,70**
16 (2027)	3.854.660,16	**3.854.660,16**	1.231.171,49	2.867.625,41	197.406,95	**4.296.203,86**	-441.543,70	-8.818.995,33	0,2959	-130.636,85	**-5.914.956,55**
17 (2028)	3.854.660,16	**3.854.660,16**	-4.864,41	2.867.625,41	197.406,95	**3.060.167,95**	794.492,21	-8.024.503,13	0,2765	219.683,72	**-5.695.272,83**
18 (2029)	3.854.660,16	**3.854.660,16**	496.785,67	2.867.625,41	197.406,95	**3.561.818,04**	292.842,12	-7.731.661,00	0,2584	75.675,97	**-5.619.596,86**
19 (2030)	3.866.816,64	**3.866.816,64**	3.300,80	2.883.397,97	196.683,73	**3.083.382,50**	783.434,14	-6.948.226,86	0,2415	189.209,60	**-5.430.387,26**
20 (2031)	3.866.816,64	**3.866.816,64**	496.755,70	2.883.397,97	196.683,73	**3.576.837,40**	289.979,24	-6.658.247,62	0,2257	65.452,13	**-5.364.935,13**
Scrap							13.431.303,86	6.773.056,24		3.031.622,11	**-2.333.313,03**

FINANCIAL NET PRESENT VALUE (FNPV "K") at 7%	**-2.333.313,03**
FINANCIAL RATE OF RETURN (FRR "K")	**3,28%**

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8.12.10. Overview of variations

TABLE 89: OVERVIEW OF SALES VARIATIONS, IN EUR

Sales variation	Total operating revenue	Total variable costs	Total fixed costs	Total Net profit (loss)	Net Investment costs (sustainability)	FNPV"C" FRR"C"	FNPV"K" FRR"K"
BASE case scenario	42.738.276,48	29.216.767,85	10.419.433,95	2.007.911,75	4.641.001,28	-16.490.276,55	-3.446.588,60
	100%	100%	100%	100%	100%	-3,97%	1,24%
WORST case scenario (sales decrease 20%)	34.190.621,18	23.373.414,28	10.419.433,95	-236.557,79	5.640.366,54	-17.597.204,73	-4.553.516,77
	80,00%	80,00%	100%	-112%	121,53%	-5,88%	-1,38%
BEST case scenario (sales increase 20%)	51.285.931,78	35.060.121,42	10.419.433,95	4.252.381,30	3.645.236,01	-15.377.000,98	-2.333.313,03
	120,00%	120,00%	100%	212%	78,54%	-2,49%	3,28%

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8.13. Financial discount rate

The financial discount rate (FDR) is set to 7%, which is higher in 2% than the generalist rate of 5% recommended by applicable guidance, [30] in order to appropriately reflect the project's inherent risk, as it relates to infrastructure to be made available, and services to be provided, to biotechnology entrepreneurs, start-ups and development projects, which hold themselves a particularly high survival risk. Once there is no evidence about either discount rates used for similar projects in the same region/country, or specific guidance or concrete determinations issued by the Government of Croatia, this FDR of 7% is fully compliant to applicable rules, as it varies from the 5% benchmark on the grounds of the sector concerned. [31]

[30] European Commission, Directorate General Regional Policy (2006), p. 8
[31] idem, ibidem

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9. Socio-economic Cost-Benefit Analysis

EU Cohesion Policy regulations require a cost-benefit analysis of all major investment projects applying for assistance. The legal threshold for the definition of the 'major' investment is €50 million in general, but these limits can also be lower - for environmental projects it is €25 million and for IPA assisted projects, €10 million (EC, 2008). Given that the BIOCentre project reaches the €10 million threshold, a socio-economic cost-benefit analysis should be performed.

9.1. Accounting and Discount Unit for the Cost-Benefit Analysis

Accounting unit is the unit of account that makes it possible to add and subtract unlike items. **Euro** is the unit of account for the appraisal of EU financed projects.

All the **discounted values** are also expressed in euros.

In accordance with the cost-benefit methodology, CBA 'money' should just be viewed as a convenient welfare metric.

9.2. Social Cost Analysis

Croatia has not yet developed its CBA guidelines focusing on the estimation of a set of national parameters, including key shadow prices or conversion factors.

Where not noted otherwise, standard conversion factor (SCF) is assumed to be 1.

9.2.1. Output Price Distortions

The social costs of the project are affected by some departures of observed prices from marginal costs for internationally non-tradable goods and border prices for internationally tradable goods. The BIOCentre project displays some possible price distortions. In this section key investment costs are analysed in order to discern these distortions.

- The **plot of land** (7.362 m²) is provided free of charge by the government. Its market value is estimated at 350 euro per square meter (please see). However, urban planning regulations in the selected area allow only public use buildings. Consequently, there is no foregone value stemming from an alternative use of the plot of land for commercial purposes (e.g. housing, offices, or industrial buildings that could be sold or earn a rent). And the BIOCentre project is expected to yield stronger returns to the society than an alternative public use building that could be built on that plot of land within the University of Zagreb campus.

- The **planning costs** are incurred under free market competition. The tasks are undertaken by a team of highly skilled engineers. The market wage reflects the opportunity cost to the economy. It is consequently assumed that there are no price distortions.

- The **construction costs** are incurred under free market competition. The materials that are going to be used originate from Croatia and the EU. In accordance with the Stabilisation and

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Association Agreements, there are no import tariffs on construction materials imported from the EU. The workforce used in construction includes both skilled and non-skilled workers. The engineers and skilled workers are in short supply. Moreover, Croatia imports non-skilled construction workers from neighbouring countries. It can thus be assumed that wages also reflect opportunity costs to the economy. That might possibly change if unemployment in the sector increased during an economic downturn, but there is no reliable information that can guide such assumptions.

- The **supervision costs** are incurred under free market competition. The tasks are undertaken by a team of highly skilled engineers. Their market wages reflect the opportunity cost to the economy. It is consequently assumed that there are no price distortions.
- The **equipment** costs are incurred under free market competition. The materials that are going to be used originate from Croatia and the EU. In accordance with the Stabilisation and Association Agreements, there are no import tariffs on laboratory equipment imported from the EU.

Operational costs are incurred without significant price distortions.

9.2.2. Salary Distortions

Most of the BIOCentre workers are to be highly skilled managers and engineers, and all are to receive market-based salaries. Interns working at the CLU will receive the salary from the University; their costs to the BIOCentre reflects the market value of their contribution. Even the less skilled workers (e.g. maintenance workers) are expected to come from similar activities, rather than unemployment or informal economy.

9.2.3. Fiscal Aspects

There are no major fiscal aspects of social costs incurred by the BIOCentre project

9.2.4. External Costs

There are no major external social costs incurred by the BIOCentre project.

9.2.5. Non-monetary Costs, including Environmental Aspects

There are no major non-monetary social costs incurred by the BIOCentre project.

The **environmental impact** is limited. The costs of waste disposal are included in investment and operational costs. There are no further environmental externalities.

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9.3. Analysis of social benefits

9.3.1. Output Price Distortions

The BIOCentre will generate the following sources of revenue:

- Renting of **office and laboratory space:** based on current market conditions and opportunity costs, it is estimated that tenants will receive implicit subsidies of **20%.** The office rental is valued at EUR 10 per square meter, whereas tenants will pay EUR 8 per square meter. Laboratory space is valued at 15-16 EUR per square meter, whereas tenants will pay EUR 12 per square meter.

- **Business assistance and advisory services**: The price of business assistance and advisory services is estimated at EUR 5.000,00 per user annually. It is assumed that the price fully reflects marginal costs. The incubated companies will be able to obtain such services from all other providers outside of the BIOCentre.

- **Product development**: based on current market conditions and opportunity costs, it is estimated that users of will receive implicit subsidies of about **30%**. The total costs per engineer are usually calculated as double costs of his/her salary. In the case of the BIOCentre, this roughly amounts to EUR 70.000 per person (laboratory engineer – pease see Table 40) annually. Their services will be sold for EUR 700.000 for an average project (8 FTE researchers working for a year), whereas international open market prices are close to EUR 100.000 per person annually.

- **Education and training**: based on current market conditions and opportunity costs, tenants and other clients will receive implicit subsidies of at least **25%**. The cost of similar business training is from EUR 8.000 onwards, whereas the costs of technical training can only be estimated after the design of this programme (it is likely to be higher than the cost of business training).

- **Networking:** It is assumed that the price fully reflects marginal costs.

These **implicit subsidies enable lower prices for the clients** of the BIOCentre. The effects of lower prices on the volume of services provided (and on the corresponding income and socio-economic benefits) depend upon the price elasticity of demand. As these are **highly specialised services**, they are highly likely to have a **high price elasticity of demand** (greater than 1) - cf. EC (2008). The fact that these services do not have substitutes in Croatia does not lead to lower price elasticity; higher prices would simply make the services too costly to many potential clients and lower the demand.

This means tha**t lower prices will stimulate demand** for the BIOCentre services, thus leading to **higher income** and **higher socio-economic benefits**. To put it differently, higher prices could actually lead to a situation where investments with high (long term) profitability could be postponed or not be made at all – thereby creating large opportunity costs. Consequently, these **implicit subsidies** that characterise the pricing strategy of the BIOCentre actually **reduce opportunity costs** for the society.

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9.3.2. Social Benefits from Increased Employment

The contribution of the biotechnology to employment is mainly seen in the creation of highly qualified jobs, due to the higher level of qualification and training often necessary to develop and deal with biotechnology products and processes and to apply them. BIOCentre management and staff will take an active role in facilitating and monitoring job creation related to its activities.

In accordance with the methodology we only estimate **direct employment effects** of the BIOCentre - i.e. employment that is generated within and through the BIOCentre. In addition to the BIOCentre employees (whose salaries are in the cost-benefit analysis treated as costs), the project will generate significant direct employment effects – both in **incubated firms** and through jobs created **through the internship programme**. For the purpose of economic analysis we use a **conservative estimate of economic effect of the jobs** created. The gross salaries of laboratory engineers at the BIOCentre (EUR 33.459 per annum) are used as benchmarks for estimating the social benefits from the jobs created.

As for the **incubated companies**, the demand analysis (please see 3.4) indicates that up to 15 start-up companies will be incubated in the BIOCentre at any given time. In accordance with the BIOCentre design and graduation policy, the companies will leave the BIOCentre when they reach about 15 employees. The number of employees in incubated companies is expected to vary between 4-5 (at entry) to 14-15 (at graduation)[32]. So it can be assumed that average number of employees will be 9. As for the growth of the number of jobs, two periods can be discerned. Until 2016, the number of newly incubated companies is 2-3 per annum, which strongly contributes to the pace of job creation. From 2016 onwards, the number of incubated companies will grow slowly, as some companies will also graduate and leave. So the direct employment effect of the Centre will be up to **135 highly qualified jobs in incubated companies per year** (please see the table below). Taking into account that the BIOCentre also provides sustainable and high-quality employment the Centre shall become a solid employer in Croatia. Given the high risk of biotechnology projects, it is likely that some projects will be suspended before successful completion, but others will come into their place. Given that these jobs are to be created through a network of academic institutions, financiers and other facilitators, it is estimated that the proportion of socio-economic benefits that can be attributed to the BIOCentre is **25% of the total**.

TABLE 90: BENEFITS FROM EMPLOYMENT IN INCUBATED FIRMS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of jobs	18	45	63	81	108	108	108	117	117	117
Total benefits	602.262	1.505.655	2.107.917	2.710.179	3.613.572	3.613.572	3.613.572	3.914.703	3.914.703	3.914.703
BIOCentre benefits (25%)	150.566	376.414	526.979	677.545	903.393	903.393	903.393	978.676	978.676	978.676

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of jobs	126	126	135	135	135	135	135	135	135	135
Total benefits	4.215.834	4.215.834	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965
BIOCentre benefits (25%)	1.053.959	1.053.959	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241

Other important source of job creation will be the **internship programme** implemented within the BIOTransfer programme. Following an internship that will, on average, last for one year, former interns will gain knowledge and skills that will significantly increase their employability in

[32] Please see data on biotechnology start-ups (e.g. PCA, 2006; The University City Science Center, 2009).

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biotechnology research and industry and enable them to get a job. It is estimated that **a half of all interns get a job following their internship**. Support will be provided to ex-interns in getting a job (through active job search and networking towards possible employers through the BIONetwork programme). Most of the new jobs steming from these transfer projects would never be created (at least in Croatia) if BioCentre would not exist. However, the share of BIOCentre benefits should decline over years, as the ex-interns gain additional knowledge through their new jobs. Therefore it is assumed that the BIOCentre share in benefits declines over four years after the interns complete their internship and get a job; the respective shares are 50%, 37,5%, 25% and 12,5%. Some of the interns may be initially recruited by the BIOCentre (rather than by the firms) and some benefits should also be attributed to other actors in the internship process (e.g. University, clients of the BIOTransfer programme). The gross salaries of laboratory engineers at the BIOCentre (EUR 33.459 per annum) are used as benchmarks for estimating the social benefits from the jobs created.

TABLE 91: BENEFITS FROM EMPLOYMENT OF EX-INTERNS

Job creation	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
First year (50%)	-	-	4	4	4	5,5	5,5	5,5	5,5	5,5
Second year (37,5%)	-	-	-	4	4	4	5,5	5,5	5,5	5,5
Third year (25%)	-	-	-	-	4	4	4	5,5	5,5	5,5
Fourth year (12,5%)	-	-	-	-	-	4	4	4	5,5	5,5
BIOCentre benefits	0	0	66.918	117.107	150.566	192.389	211.210	223.757	230.031	230.031

Job creation	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
First year (50%)	7	7	7	7	7	7	8,5	8,5	8,5	8,5
Second year (37,5%)	5,5	7	7	7	7	7	7	8,5	8,5	8,5
Third year (25%)	5,5	5,5	7	7	7	7	7	7	8,5	8,5
Fourth year (12,5%)	5,5	5,5	5,5	7	7	7	7	7	7	8,5
BIOCentre benefits	255.125	273.946	286.493	292.766	292.766	292.766	317.861	336.681	349.228	355.502

9.3.3. Fiscal Aspects

The key fiscal benefits include **taxes paid into the state and local budgets**, which stem directly from the project. Given that CBA methodology stipulates that all inputs and outputs should be considered net of VAT and other indirect taxes, we focus on the **profit** and **capital gains tax**.

Estimating the possible benefits from profit tax it is rather difficult. A new biotech drug takes up to 10 years to develop. Out of every ten products developed, only one successfully completes the clinical trials and can take up to 6 more years to reach the market. Agricultural products can spend almost as many years in research, field trials, and product development. Moreover, given the **long time-to-market** period and relatively low survival rate, it is also likely that many companies that will develop within the BIOCentre or use its services will not pay profit tax during their business relationships with the BIOCentre.

However, given the **high value added and profit potential** of biotechnology start-ups, we estimate that some companies will indeed survive and create value for their investors in the following ways:

- generate **profits** and/or
- undergo **IPO** (initial public offering) or **trade sales** to larger companies.

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As for the **profits**, it is estimated that the first incubated company will become profitable in 2020. From then onwards, there will be **a gradual increase in the number of profitable companies** (as some companies will need a longer period to become profitable) and in **average profits** (because the most successful companies will be able to grow strongly). More details can be found in table below.

Although Croatia currently does not have a capital gains tax, it is highly likely that such tax will be introduced by the time the first BIOCentre-incubated company undergoes an **IPO**. We assume that such a tax will be equal to the profit tax (20%). The **observed cases of successful initial public offering** of shares of biotechnology companies (e.g. in the USA, Western Europe and Israel) value such deals at **USD 100-300 million**. However, such events should be treated as **potential additional benefits**. Their inclusion into the calculation could be viewed as a consequence of optimism bias, as the probability of such events cannot be easily discerned. Therefore, this is omitted from the calculation. As for **trade sales**, it is assumed that they predominantly increase the resources available to the company for further development – therefore we estimate their effects under external benefits (9.3.4.). Such trade sales may also enable initial (VC) investors to recoup their investment and their capital gains may be liable for taxation, but these effects are considered to uncertain to be estimated and are thus excluded from the analysis.

TABLE 92: BENEFITS FROM INCREASED FISCAL REVENUES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of profit-generating companies	-	-	-	-	-	-	-	-	1	2
Average profits	-	-	-	-	-	-	-	-	250.000	300.000
Profit tax (20%)	-	-	-	-	-	-	-	-	50.000	120.000

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of profit-generating companies	2	3	4	5	6	8	10	12	14	16
Average profits	350.000	400.000	500.000	600.000	600.000	650.000	700.000	750.000	800.000	850.000
Profit tax (20%)	140.000	240.000	400.000	600.000	720.000	1.040.000	1.400.000	1.800.000	2.240.000	2.720.000

9.3.4. External Benefits

Biotechnology and life science are not only engines of innovation but also engines of regional economic growth. Due to the BIOCentre, significant flows of capital to finance research will be drawn into the local economy, which will, in turn, be reinvested through wages and purchases from local businesses.

The external benefits of the BIOCentre may include **increased demand for the services of companies that will serve the companies operating within the BIOCentre**. These may include technology and business development consultants, educators, intellectual property rights attorneys, venture capital providers etc. There are no direct benchmarks related to external benefits. However, **a study of biotechnology start-ups incubated at the The University City Science Center (in Greater Philadelphia) estimated the regional employment multiplier at 5.67**[33] (cf. The University City Science Center, 2009). The study of American science and technology parks estimated that, on average, for every R&D job within a park[34] 2.57 jobs are generated in the economy (AURP, 2007).

[33] For each employee at a Science Center-incubated biotech start-up organization, another 4.67 indirect and induced jobs are created in the region, for a total increase in regional employment of 5.67 jobs.
[34] Jobs of the support staff have been excluded from the calculation.

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Although not directly applicable, it is reasonable to claim that these multipliers result from additional demand for the services sold to incubated companies.

Given the long development cycle, these companies are rarely profitable: their expenditures are focused on research and development. Operating costs of these companies are likely to be proportional to their number of employees. **As these companies grow in size, they generate a stronger demand for external services.** Therefore, it is reasonable to assume that their growth will result in external benefits. External benefits can be divided into two sections:

- benefits of **incubated firms**
- benefits of **BIOCentre graduates that successfully raise capital in the second round** of financing

The first section can be approximated as a fraction (**10%**) of the **average total cost** per employee (**70.000 EUR** per annum) in the incubated companies and multiply that by **the number of jobs created or maintained** during any given year.

The second section can be approximated as a **fraction (10%) of the total annual expenditures of BIOCentre graduates that move to the years 4-7 of the typical development path** (outlined in Figure 4). Only some of the companies will be successful in this process, thereby raising capital through trade sales, strategic alliances, IPO or follow-on rounds. It is conservatively estimated that the capital raised and spent annualy[35] will grow from EUR 2,5 million in 2016 to EUR 8 million from 2024 onwards[36]. These resources will be used to finance further product development, which is likely to occur at a pilot plant (expected to be developed within the BIOCentre). As the BIOCentre will not only play a fundamental role in their initial development, but will also continue to serve many needs of these young innovative companies (please see 3.1.7.), a fraction of these expenditures should be included in the BIOCentre externalities. Other, less successful companies may continue to develop slowly using their own resources, but they may also be sold at a fraction of the initial valuation or even liquidated. External benefits of their activities are therefore excluded from the calculation.

TABLE 93: EXTERNAL BENEFITS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of jobs in incubated firms	18	45	63	81	108	108	108	117	117	117
Benefits - incubated firms	602.262	1.505.655	2.107.917	2.710.179	3.613.572	3.613.572	3.613.572	3.914.703	3.914.703	3.914.703
Benefits – second round of financing	-	-	-	-	2.500.000	2.500.000	2.500.000	4.000.000	4.000.000	4.000.000
Total benefits	602.262	1.505.655	2.107.917	2.710.179	6.113.572	6.113.572	6.113.572	7.914.703	7.914.703	7.914.703
BIOCentre benefits (10%)	60.226	150.566	210.792	271.018	611.357	611.357	611.357	791.470	791.470	791.470

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of jobs in incubated firms	126	126	135	135	135	135	135	135	135	135
Benefits - incubated firms	4.274.928	4.274.928	4.580.280	4.580.280	4.580.280	4.580.280	4.580.280	4.580.280	4.580.280	4.580.280
Benefits – second round of financing	6.000.000	6.000.000	8.000.000	8.000.000	8.000.000	8.000.000	8.000.000	8.000.000	8.000.000	8.000.000
Total benefits	10.274.928	10.274.928	12.580.280	12.580.280	12.580.280	12.580.280	12.580.280	12.580.280	12.580.280	12.580.280
BIOCentre benefits (10%)	1.027.493	1.027.493	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028

[35] It is expected that capital raised in the second round will be spent over 3-4 years, in accordance with Figures 3 and 4.

[36] A comparable value of an acquisition deal in Hungary was USD 14 million (cf. PCA, 2006). Deals in Western Europe and the USA usually achieve much higher valuations.

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9.3.5. Non-monetary Benefits, including Environmental Aspects

The major non-monetary social benefits generated by the BIOCentre project include:

- technological improvements
- educational effects (diffusion of entrepreneurial knowledge and skills among the beneficiary companies)
- environmental effects
- reputational and promotional effects

These effects are now analysed in further detail.

Technological improvements

Biotechnological inventions require high capital investment, long development cycles and comprehensive regulatory approval. Structurally, biotechnology SMEs are very capital-intensive, and investments have long payback periods. For a single company this investment at high risk is almost not affordable**.** In this environment, the lifeblood of the industry is knowledge, specialized labour, and access to specialized technical infrastructure and capital for enduring the time-consuming and risky process of taking a product to the market. Most products are developed on the basis of strong patent portfolios and other intellectual property rights. These portfolios are necessary in order to attract risk capital. At these early stages, government support is essential.

There is a need for a **common specific infrastructure and service portfolio that will support biotech start-up business in the most critical phase of the development cycle,** thereby minimizing the risk of investment for entrepreneurs and investors and open the access to the commercial exploitation of the scientific results with biggest market potential.

The technical infrastructure and service portfolio that are planned to be established in the BIOCentre constitute the most cost intensive part in the early stage development of the biotech start-ups. The capital investments for specialized laboratory equipment as well as the broad know-how and service portfolio needed for the running the biotech business could impossibly be covered and financed by a single start up itself. Moreover different technical infrastructure and know-how is needed in different stages of the product and process development. It can be assumed that infrastructure and service portfolio which could be used by start-ups for free will encourage the entrepreneurship within the scientific community and encourage the investments by private persons, VC and industry in the biotech business.

Educational Effects

The BIOCentre implicates a **strong educational and training effect for all the different stakeholders of the Centre**. From the beginning on the employees of the BIOCentre themselves (management, technicians etc.) will experience an educational push. For running and managing the Centre properly the employees need to have specific know-how which they further provide the tenants and other external partners within projects, coaching etc. For tenants (mainly the BIOIncubation programme) should have a strong influence on their educational development. Besides the training courses they benefit from a mentoring system and their advisory boards. With the BIOTransfer programme additional education can be offered also to externals like university researchers or researchers from external companies. Practical training can be assured because of the specialized research equipment in the central laboratory unit. Further indirect educational effects can be achieved through the

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biosciences network and the exchange of experiences between the researchers (also from international cooperation). The most obvious education effect can be ensured with the BIOEducation programme. Here all participating companies and their employees are trained by experts in the biotech-related technical and business issues, providing knowledge of the European "state of art" in process and production technologies.

Recapitulating, with all its different programs the BIOCentre offers strong educational efforts and training possibilities for Zagreb, and Croatia as a whole. – mainly through the following impacts:

- Increasing and strengthening the Croatian knowledge base and practical knowledge in the field of biosciences
- Increasing the business / entrepreneurial knowledge and strengthening awareness in entrepreneurship within the scientific community

Environmental effects

Life sciences and biotechnology have a major impact on several important industrial sectors, primary on pharmaceutical industry, agriculture, food and drink production, pulp and paper and chemical industry. These industries are generally known are using and producing harmful substances for their production process and contributing to environment pollution to large extent. Besides that they are one of the main consumers of natural resources. Those industries build a considerable part of the Croatian economy. Modern biotechnology contributes via a variety of applications to the sustainable development, in terms of **environment protection and public health**. New ways to protect and improve the environment are offered by biotechnology including bioremediation of polluted air, soil, water and waste as well as development of cleaner industrial products and processes, e.g. based on use of enzymes (biocatalysis). Industrial biotechnology, along with applications in primary production and agro-food targeting production efficiency, reduces use of resources and emissions. The energy savings offered by these applications and the potential to replace fossil fuels by renewable sources (bioethanol) address challenges such as global warming and security of energy supply and provide an opportunity to break the link between economic growth and pressure on the environment.

In order to improve their own **production efficiency** and respond to the **regulatory requirements** in terms of environmental protection the mentioned industry sectors in the EU are increasingly adopting the biotechnology applications. According to the last JRC reference Report "Consequences, Opportunities and Challenges of Modern Biotechnology for Europe" the adoption rates of biotechnology-based products and processes in EU in the field of industrial manufacturing, modern biotechnology adoption vary from 10% in pulp and paper, 30% in detergents and to up to 100% in the production of specific fine chemicals. Finally, in the agro food sector modern biotechnology is estimated to directly contribute 13%-23% to the overall turnover of the input sectors, such as breeding or feed additive production, while the use of these biotechnology-based inputs affects about 32%- 38% of the agro-food sector's total turnover.

In order to stay compatible on the global markets in the long term the mentioned industry sectors in Croatia will have to adopt their manufacturing processes towards biotechnology based processes. The access to the necessary technologies and infrastructure could accelerate and facilitate this process. This development will bring direct benefit to the society: reducing the use of crucial inputs like energy, water or chemicals in production processes increasing the efficiency of the industry, consequently, reducing greenhouse gas emissions, waste generations and the use of non-renewable resources.

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Reputational and promotional effects

Establishing the BIOCentre will contribute to the building an image of Croatia as a high-tech site in general, that is able to provide the necessary environment for the companies, investors and suppliers. The image factor should not be underestimated. It has a considerable impact for attracting foreign investments, top researchers and other high qualified staff to Croatia and for preventing from brain drain.

Through the image factor the establishment of the BIOCentre will increase the attractiveness of local market for high-tech investments, suppliers and VC companies, as well as to contribute to the prevention of "brain drain" and possible increases in "brain gain".

A conservative estimate of the non-monetary benefits can be reached if we approximate it as a fraction (**5%**) of the **average total cost** per employee (**70.000 EUR** per annum) in the incubated companies and multiply that by **the number of jobs created or maintained** within the BIOCentre during any given year. The rationale is the same as in the case of external benefits (9.3.4.) Given the long development cycle, these companies are rarely profitable: their expenditures are focused on research and development. Operating costs of these companies are likely to be proportional to their number of employees. **As these companies grow in size, they generate a stronger demand for external services.** Therefore, it is reasonable to assume that their growth will result in non-monetary benefits.

TABLE 94: NON-MONETARY BENEFITS

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Number of jobs	18	45	63	81	108	108	108	117	117	117
Total benefits	602.262	1.505.655	2.107.917	2.710.179	3.613.572	3.613.572	3.613.572	3.914.703	3.914.703	3.914.703
BIOCentre benefits (5%)	30.113	75.283	105.396	135.509	180.679	180.679	180.679	195.735	195.735	195.735

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Number of jobs	126	126	135	135	135	135	135	135	135	135
Total benefits	4.215.834	4.215.834	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965	4.516.965
BIOCentre benefits (5%)	210.792	210.792	225.848	225.848	225.848	225.848	225.848	225.848	225.848	225.848

9.3.6. Positive externalities

The total positive externalities of the BIOCentre consist of:

- Increased employment through incubation
- Increased employment of former BIOtransfer interns
- External benefits
- Fiscal benefits
- Non-monetary benefits

The benefits are summarised in the table below.

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TABLE 95: POSITIVE EXTERNALITIES

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Increased employment (incubation)	150.566	376.414	526.979	677.545	903.393	903.393	903.393	978.676	978.676	978.676
Increased employment (ex-interns)	0	0	66.918	117.107	150.566	192.389	211.210	223.757	230.031	230.031
External benefits	60.226	150.566	210.792	271.018	611.357	611.357	611.357	791.470	791.470	791.470
Fiscal benefits	-	-	-	-	-	-	-	-	50.000	120.000
Non-monetary benefits	30.113	75.283	105.396	135.509	180.679	180.679	180.679	195.735	195.735	195.735
Total	**240.905**	**602.262**	**910.085**	**1.201.078**	**1.845.994**	**1.887.818**	**1.906.639**	**2.189.638**	**2.245.912**	**2.315.912**

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Increased employment	1.053.959	1.053.959	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241	1.129.241
Increased employment (ex-interns)	255.125	273.946	286.493	292.766	292.766	292.766	317.861	336.681	349.228	355.502
External benefits	1.027.493	1.027.493	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028	1.258.028
Fiscal benefits	140.000	240.000	400.000	600.000	720.000	1.040.000	1.400.000	1.800.000	2.240.000	2.720.000
Non-monetary benefits	210.792	210.792	225.848	225.848	225.848	225.848	225.848	225.848	225.848	225.848
Total	**2.696.232**	**2.815.053**	**3.309.107**	**3.515.381**	**3.635.381**	**3.955.381**	**4.340.475**	**4.759.296**	**5.211.843**	**5.698.117**

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9.4. Economic Rate of Return or Net Present Value of the Project in Monetary Terms

The time horizon for project analysis is **20 years**, whereas the applicable **social discount rate is 5.5%**, which is in accordance with EC (2008). With the economic costs and benefits included, the calculation for the baseline scenario shows that the **net present value of the project** in monetary terms **(ENPV)** is EUR **7.526.725,71**. The corresponding **economic rate of return** (**ERR**) is **8,30%**. The results of the economic analysis are shown in the following table.

TABLE 96: ECONOMIC ANALYSIS

Year	Economic Analysis									
	Cash Inflow		Cash Outflow			Net Cash Flow	Positive externalities	Net Economic Flow	Discount factor	DNEF value
	Sales inflow	Total Cash inflow	Total investment costs (Table 47) Remark	Operating Costs	Total Cash outflow					
"-3 (2009)			865.654,00		865.654,00	-865.654,00		-865.654,00	1	-865.654,00
"-2 (2010)			750.752,00		750.752,00	-750.752,00		-750.752,00	0,947867299	-711.613,27
"-1 (2011)			7.261.414,50		7.261.414,50	-7.261.414,50		-7.261.414,50	0,898452416	-6.524.035,40
"-0 (2012)			9.055.585,50		9.055.585,50	-9.055.585,50		-9.055.585,50	0,851613664	-7.711.860,35
1 (2012)	65.152,00	65.152,00	-39.564,69	343.782,15	304.217,46	-239.065,46	240.905	1.839,14	0,807216743	1.484,58
2 (2013)	895.304,00	895.304,00	16.590,78	1.351.116,11	1.367.706,89	-472.402,89	602.263	129.859,61	0,765134354	99.360,05
3 (2014)	930.064,80	930.064,80	1.532,87	1.439.269,70	1.440.802,57	-510.737,77	910.085	399.347,33	0,725245833	289.624,99
4 (2015)	984.695,20	984.695,20	12.096,91	1.515.341,49	1.527.438,40	-542.743,20	1.201.178	658.435,00	0,687436809	452.632,46
5 (2016)	1.714.325,60	1.714.325,60	184.842,07	1.814.862,59	1.999.704,66	-285.379,06	1.845.994	1.560.615,04	0,651598871	1.016.895,00
6 (2017)	1.752.877,76	1.752.877,76	609.534,41	1.877.047,10	2.486.581,51	-733.703,75	1.887.818	1.154.114,10	0,617629261	712.814,64
7 (2018)	1.761.429,92	1.761.429,92	-4.193,28	1.885.304,62	1.881.111,34	-119.681,42	1.906.639	1.786.957,12	0,585430579	1.046.139,34
8 (2019)	1.771.982,08	1.771.982,08	106.632,23	1.894.562,14	2.001.194,37	-229.212,29	2.189.638	1.960.425,67	0,554910502	1.087.860,79
9 (2020)	1.777.534,24	1.777.534,24	3.703,18	1.900.819,66	1.904.522,84	-126.988,60	2.245.912	2.118.922,93	0,525981518	1.114.514,30
10 (2021)	2.483.086,40	2.483.086,40	262.449,97	2.181.454,48	2.443.904,45	39.181,95	2.315.912	2.355.093,48	0,498560681	1.174.157,01
11 (2022)	2.493.638,56	2.493.638,56	4.849.361,36	2.190.711,99	7.040.073,35	-4.546.434,79	2.696.232	-1.850.202,82	0,472569366	-874.349,17
12 (2023)	2.499.190,72	2.499.190,72	237.687,65	2.196.969,51	2.434.657,16	64.533,56	2.815.053	2.879.586,22	0,447933048	1.289.861,83
13 (2024)	2.507.716,80	2.507.716,80	18.460,66	2.203.598,27	2.222.058,93	285.657,87	3.309.107	3.594.765,31	0,424581088	1.526.269,37
14 (2025)	2.509.216,80	2.509.216,80	237.740,18	2.204.598,27	2.442.338,45	66.878,35	3.515.381	3.582.259,35	0,402446529	1.441.667,84
15 (2026)	2.510.716,80	2.510.716,80	18.542,85	2.205.598,27	2.224.141,12	286.575,68	3.635.381	3.921.956,68	0,381465904	1.496.092,75
16 (2027)	3.212.216,80	3.212.216,80	1.114.910,50	2.480.975,57	3.595.886,07	-383.669,27	3.955.381	3.571.711,73	0,361579056	1.291.456,16
17 (2028)	3.212.216,80	3.212.216,80	12.782,03	2.480.975,57	2.493.757,60	718.459,20	4.340.475	5.058.934,45	0,342728963	1.733.843,36
18 (2029)	3.212.216,80	3.212.216,80	390.253,50	2.480.975,57	2.871.229,07	340.987,73	4.759.296	5.100.283,67	0,324861577	1.656.886,19
19 (2030)	3.222.347,20	3.222.347,20	11.479,02	2.494.119,37	2.505.598,39	716.748,81	5.211.843	5.928.591,87	0,307925665	1.825.565,60
20 (2031)	3.222.347,20	3.222.347,20	390.228,53	2.494.119,37	2.884.347,90	337.999,30	5.698.117	6.036.115,93	0,291872668	1.761.777,26
Scrap								10.947.699,93		3.195.334,39

ECONOMIC NET PRESENT VALUE at 5,5%	7.526.725,71
ECONOMIC RATE OF RETURN	8,30%

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TABLE 97: BENEFIT – COST RATIO

Year	Benefits				Costs		Discount factor
	Total Cash inflow	Positive externalities	Total benefits	Discounted value	Total costs	Discounted value	
"-3 (2009)					865.654,00	**865.654,00**	1
"-2 (2010)					750.752,00	**711.613,27**	0,947867299
"-1 (2011)					7.261.414,50	**6.524.035,40**	0,898452416
"-0 (2012)					9.055.585,50	**7.711.860,35**	0,851613664
1 (2012)	65.152,00	240.905	306.056,60	**247.054,01**	304.217,46	**245.569,43**	0,807216743
2 (2013)	895.304,00	602.263	1.497.566,50	**1.145.839,58**	1.367.706,89	**1.046.479,53**	0,765134354
3 (2014)	930.064,80	910.085	1.840.149,90	**1.334.561,05**	1.440.802,57	**1.044.936,06**	0,725245833
4 (2015)	984.695,20	1.201.178	2.185.873,40	**1.502.649,83**	1.527.438,40	**1.050.017,38**	0,687436809
5 (2016)	1.714.325,60	1.845.994	3.560.319,70	**2.319.900,30**	1.999.704,66	**1.303.005,30**	0,651598871
6 (2017)	1.752.877,76	1.887.818	3.640.695,61	**2.248.600,14**	2.486.581,51	**1.535.785,50**	0,617629261
7 (2018)	1.761.429,92	1.906.639	3.668.068,46	**2.147.399,44**	1.881.111,34	**1.101.260,10**	0,585430579
8 (2019)	1.771.982,08	2.189.638	3.961.620,04	**2.198.344,57**	2.001.194,37	**1.110.483,77**	0,554910502
9 (2020)	1.777.534,24	2.245.912	4.023.445,77	**2.116.258,11**	1.904.522,84	**1.001.743,82**	0,525981518
10 (2021)	2.483.086,40	2.315.912	4.798.997,93	**2.392.591,67**	2.443.904,45	**1.218.434,67**	0,498560681
11 (2022)	2.493.638,56	2.696.232	5.189.870,54	**2.452.573,83**	7.040.073,35	**3.326.923,00**	0,472569366
12 (2023)	2.499.190,72	2.815.053	5.314.243,38	**2.380.425,24**	2.434.657,16	**1.090.563,40**	0,447933048
13 (2024)	2.507.716,80	3.309.107	5.616.824,24	**2.384.797,35**	2.222.058,93	**943.444,20**	0,424581088
14 (2025)	2.509.216,80	3.515.381	6.024.597,80	**2.424.578,47**	2.442.338,45	**982.910,63**	0,402446529
15 (2026)	2.510.716,80	3.635.381	6.146.097,80	**2.344.526,76**	2.224.141,12	**848.434,00**	0,381465904
16 (2027)	3.212.216,80	3.955.381	7.167.597,80	**2.591.653,25**	3.595.886,07	**1.300.197,09**	0,361579056
17 (2028)	3.212.216,80	4.340.475	7.552.692,05	**2.588.526,32**	2.493.757,60	**854.682,96**	0,342728963
18 (2029)	3.212.216,80	4.759.296	7.971.512,74	**2.589.638,20**	2.871.229,07	**932.752,00**	0,324861577
19 (2030)	3.222.347,20	5.211.843	8.434.190,26	**2.597.103,65**	2.505.598,39	**771.538,05**	0,307925665
20 (2031)	3.222.347,20	5.698.117	8.920.463,83	**2.603.639,58**	2.884.347,90	**841.862,32**	0,291872668
Scrap			10.947.699,93	**3.195.334,39**			
TOTAL:				**45.890.911,93**		**38.364.186,22**	

B/C RATIO:	**1,20**

The present value of the total benefits is EUR **45.890.911,93**, whereas the present value of the total costs is EUR **38.364.186,22**. That leads to the **B/C** (benefit/cost**) ratio** of **1,20**.

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9.5. Additional Appraisal Criteria

9.5.1. Presentation of Results in terms of General Objectives of European Union Policies

The **renewed Lisbon strategy** (EC, 2005) aims to base future economic growth on knowledge and innovation. This means that Europe should increase and improve investment in research and development, facilitate innovation, the use of ICT and the sustainable use of resources, as well as to contribute to a strong European industrial base. In order to stimulate R&D and innovation, increased and more effective public expenditures should be complemented with more favourable framework conditions and powerful incentives for companies.

The BIOCentre project corresponds to these objectives. It uses **public funds** to create **framework conditions** for the **development of biotechnology industry in Croatia** and Southeast Europe. In other words, the project provides **powerful incentives to researchers, entrepreneurs and private investors** to pool their resources and develop a population of profitable biotechnology projects and companies. Biotechnology provides a platform for **technology renewal of the industrial base** (i.e. other, more traditional industrial sectors), which increases its positive externalities (which have been deliberately analysed rather conservatively, in order to overcome any optimism bias).

9.5.2. Increase in EU Social Income

The increase of social income is going to occur through **employment, taxes** and **profits generated by firms** developed within or in collaboration with the BIOCentre. The BIOCentre is to create significant employment effects in incubated firms. It has been conservatively estimated that its activities will be directly responsible for **up to 135 jobs** at any given moment. If we take into account that some of the firms, following their leaving of the BIOCentre will continue to grow, indirect employment effects can be rather sizable. However, these potentials have deliberately been omitted from the analysis in order to avoid unrealistic scenarios. **Taxes collected from the companies (several taxes, including profit tax), their employees (income taxes) and company owners (capital gains tax)** will also contribute to the social income. Finally, **profits generated through business activity (including trade sales and IPOs)** will also bring about economic benefits.

9.5.3. Reduction in the Disparities with regard to per capita GDP between EU regions

As a country with GDP per capita well below the EU27 average (please see 2.1.4.), **Croatia is in need of projects that can spur economic growth** and thus **reduce these disparities**. Although the BIOCentre will be located in Zagreb, it will be the focal point for biotechnology initiatives from all over Croatia. All Croatian regions will benefit from the BIONetwork as a national cooperation platform. Its network will include partners from all Croatian NUTS 2 regions, including those with lowest GDP per capita. Regional cooperation between the Croatian universities and research institutes as well as trans-regional R&D cooperation will improve. Moreover, **the effects of activities of the companies developed within the BIOCentre will be distributed throughout Croatia and Southeast Europe, as well as the wider EU market**. That will contribute to regional development and cohesion policy objectives.

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9.5.4. Increase in Employment and Equality of Opportunity

The BIOCentre will **strongly contribute to employment.** As it has been mentioned, up to 135 jobs at any given moment will be created within the BIOCentre and in its partner companies. These jobs will be highly skilled and will produce high value added. The indirect employment effects may include tenants that leave the BIOCentre due to their growth and/or internationalization efforts, service providers, clients and partners outside of the BIOCentre. Some jobs are likely to be created within industries that are to use biotechnology products. For more details, please see under 9.3.2.

Biosciences are an industry where qualified women professionals account for a significant proportion of all employees. Therefore, **equal opportunities** for both genders can be guaranteed. Technical sectors tend to have a lower share of female graduates, but in the areas that are the basis for biosciences (chemistry, biology, biochemistry etc.) the number of female students, professors and researchers is relatively higher. The increase in the number of biosciences projects will also entail new opportunities for female biosciences professionals. Moreover, the project is to be implemented in accordance with the general principles of **equal opportunity and non-discrimination**.

9.5.5. Improvement in the Quality of the Environment

The project is to be implemented in an **environmentally friendly** manner. The land plot, which has previously been used by the military, is clean from soil pollutants. The contribution of the BIOCentre project to the quality of the environment will be achieved through safe and efficient waste disposal, as well as through applications of biotechnology products created at the BIOCentre to **production efficiency** (including the reduced use of resources and lower emissions) of the industrial base, also making it easier to respond to the **regulatory requirements**.

9.5.6. Other Objectives of the Commission, Regional and National Authorities

In the **Accession Partnership 2006** (Council Decision 2006/145/EC)**,** the EC defined the short and mid-term priorities for Croatia, including further improvement in conditions for the creation and development of private enterprises and FDI and continued implementation of the European Charter for Small Enterprises. The EC's **Multi Annual Planning Document** (MIPD) (Commission Decision C(2007)2566) set out major areas of intervention and priorities on which IPA assistance in Croatia is to be focused. These include promoting technological development, research and innovation, including through cooperation with tertiary education and research institutions and with research and technology centres, and business networks and clusters. These objectives are then also reflected in the **Regional Competitiveness Operational Programme**.

The relevant **national policy priorities** are consistent with objectives of the Commission. They are primarily stipulated in the Science-Technology Policy of the Republic of Croatia 2006 – 2010, as well as in the Strategic Development Framework 2006 – 2013. The policymakers aim to ensure adequate budgetary funds for the establishment of the infrastructure needed for technology transfer and for the start-up and incubation of spin-off enterprises from university and research institutions, as well as to encourage the creation of alternative sources of financing for innovative technological projects.

BIOCentre fully corresponds to these Commission and national objectives, as it aims to develop and/or bring together infrastructural, technical, human, organisational and financial resources in order to leverage research excellence and contribute to the development of the biotechnology industry in Croatia. Moreover, the BIOCentre could be established as a good practice project for the whole South Eastern Europe and thus additionally contribute to regional cooperation.

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10. Risk Assessment

10.1. Critical Variables and Risk Mitigation

In accordance with EC (2008), a **risk assessment** is required for major infrastructure and productive investment projects (Article 40 1083/2006 EU Regulations). A risk assessment consists of studying the probability that a project will achieve a satisfactory performance. In this section we aim to determine critical variables whose variations (positive or negative) have the greatest impact on BIOCentre's performance in financial and economic terms.

10.1.1. Preliminary analysis

Supply/Demand Variables

The demand for BIOCentre services and the corresponding **sales revenue** is a **critical variable** which needs to be included in the sensitivity analysis. Namely, both the financial performance and the economic performance depend upon a sufficient number of biotechnology projects that will be successfully implemented over time using services of the BIOCentre. The impact of sales revenues variations (with corresponding variations in variable costs) on FNPV has been analysed above (please see 8.12.10) and has been demonstrated to be significant.

Output Variables

The variables related to project outputs (e.g. **quality of services offered**) are important, but it can be assumed that these variables can be controlled through efficient project implementation and risk mitigation measures (e.g. control over investment and operating costs, effective BIOCentre management).

Human Resources

The **availability and performance of key BIOCentre staff** is also quite important for the project success. The trends in the biotechnology and the related industries (e.g. pharmaceutical industry) indicate good availability of high quality staff. Appropriate staff is recruited, educated and motivated to reach project objectives and sales targets. It can be assumed that the human resources variables can be controlled through efficient project implementation and risk mitigation measures.

Time and Implementation Variables

The BIOCentre project involves construction of a new building and provision of high technology and equipment. The project implementation is both long and costly, which could turn project variables related to implementation (including **timing**, **costs** and **functional capability** of the BIOCentre**)** into possible candidates for critical variables. Efficient execution of the action plan will result in cost control, adherence to time limitations and functionality standards.

Financial Variables

The project does not include loan financing, which means that **costs of financing** are not an issue. The key financial variable is thus related to **operating costs** related to functioning of the BIOCentre.

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These costs are divided into fixed and variable costs. From 2013 onwards, the share of fixed costs in total costs declines from 31,6% (in 2013) to 22% (in 2031), which means fixed costs have a relatively low importance which also diminishes over time. On the other hand, **variable costs** are directly linked to sales revenues, which means that they cannot be viewed as an independent variable.

Economic Variables

The BIOCentre project may be somewhat sensitive to **macroeconomic variables** (e.g. GDP growth rate, inflation rate) only indirectly – through their influence on the price of inputs or on the demand for the BIOCentre services. However, neither the direction nor the size of this influence cannot be adequately envisaged. Based on the likely macroeconomic scenarios which foresee a gradual recovery after the current global crisis, it is reasonable to assume that macroeconomic variables will stay within the range that will not influence the project viability to a significant extent.

Positive externalities

Given that the financial net present value of the project is negative, the feasibility of the BIOCentre project depends upon sufficient **positive externalities** (based on job creation, fiscal revenues, external benefits and non-monetary benefits). Positive externalities also depend upon effective partnering with stakeholders and upon the performance of BIOCentre clients, upon which BIOCentre staff can only have an indirect influence. Positive externalities are in part related to sales revenues of the BIOCentre: they are created through the activities of incubated firms and the BIOCentre itself. Consequently, **they should be analysed within scenarios related to variations in sales revenues and operating costs, rather than as an independent variable**.

10.1.2. Risk mitigation measures

On the basis of preliminary analysis of variables, it is possible to define the basic set of risk mitigation measures and estimate their effects. Risk mitigation measures should be implemented in order to limit exposure to risks, control costs and ensure benefits arising from the BIOCentre project.

Risk mitigation measures are to cover:

- Timing, costs and functional capability of the BIOCentre
- Sales revenues and strength of the project pipeline
- Operating costs
- Quality of BIOCentre services
- Availability and performance of BIOCentre staff
- Positive externalities

More details can be found in the table below.

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TABLE 98: RISK MITIGATION MEASURES

VARIABLES	RISK MITIGATION MEASURES	IMPACT OF MEASURES
Timing, costs and functional capability of the BIOCentre	• Efficient project implementation in accordance with all relevant procedures and applicable standards (facilitated by supervision and technical assistance) • Provision of contingencies	• Prevention of delays in project implementation • Prevention of cost overruns • Reaching the designed functional capability of the BIOCentre and its services
Sales revenues (and strength of the project pipeline)	• Building a strong network of partners (academic institutions, TTO, investors etc.) • Active involvement the Board of Directors and the Advisory Board in project sourcing • Marketing and PR activities aimed at potential start-ups (facilitated by technical assistance) • Targeting additional customers (start-ups outside of Croatia; young innovative companies, SMEs, corporations)	• Increased visibility of the BIOCentre in target markets • Strong relationships with partners and stakeholders • Stronger project pipeline (start-ups) and increased sales
Operating costs	• Efficient management accountable to the Board of Directors • Implementation of controlling systems in order to facilitate strategy implementation and curtail costs	• Cost control • Efficient resource management
Quality of BIOCentre services	• Efficient project implementation (facilitated by supervision and technical assistance)	• High quality of services in each of the BIOCentre programmes
Availability and performance of BIOCentre staff	• Attractive job design and market-based salaries • Effective performance management and career development planning • Continuous training of BIOCentre staff (formal, on-the-job)	• Recruitment and retention of high quality staff • High quality performance of the BIOCentre staff • Job satisfaction
Positive externalities	• Efficiency and high quality of process development services • Provision of education, networking and business support services to incubated companies • Analysis of actual job creation (incubated firms, ex-interns) • Support provided to ex-interns in getting a job (active job search, active networking towards possible employers) • Support to incubated and graduated companies seeking investors (through BIONetwork, events and other means)	• Efficient development of start-ups in a facilitating environment (thereby maximising the probability of positive externalities) • Maximisation of the job creation (as a key source of positive externalities) • Maximisation of survival and growth potential of incubated and graduated companies

10.2. Best and Worst Case Scenario Simulation

Best and worst case scenario simulation are based on the analysis undertaken above (please see 8.12.). The two scenarios have been built by analysing the impacts of 20% increase and 20% decrease in sales. Keeping investment costs and fixed costs constant, and assuming a linear relationship between sales and variable costs, it has been shown that FNPV and FRR vary strongly in accordance with sales variations. The results are summarised in the following table.

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TABLE 99: IMPACT OF SALES VARIATIONS ON FNPV AND FRR, IN EUR

Sales variation	FNPV"C" FRR"C"	FNPV"K" FRR"K"
BASE case scenario	-16.490.276,55 -3,97%	-3.446.588,60 1,24%
WORST case scenario (sales decrease 20%)	-17.597.204,73 -5,88%	-4.553.516,77 -1,38%
BEST case scenario (sales increase 20%)	-15.377.000,98 -2,49%	-2.333.313,03 3,28%

Given that estimates of sales have been rather conservative, the **baseline scenario** can be viewed as realistic and given the **50% probability** of occurring. The sales forecasts take into consideration the long duration necessary to build a client base and achieve growth in revenues. Provided that investment and operating costs are contained within the defined limits, the BIOCentre has set relatively modest sales targets that should be reached, thereby fulfilling the conditions of the baseline scenario.

If, however, the number and size of incubated firms and the accompanying demand for the BIOCentre services grow more slowly than expected, the **worst case scenario** may come into existence. If demand grow more strongly than expected, the **best case scenario** may become reality. In order to keep the forecasts conservative, **the worst case scenario is envisaged to have a somewhat higher probability of occurring than the best case scenario. The respective probabilities are 30% and 20%**.

As for the **socio-economic benefits**, it can be assumed that **they vary in accordance with sales** variations, and that the **relationship is linear**. Therefore, the scenario analysis also includes variations in economic benefits that are increased 20% and decreased 20% for the best and worst scenario, respectively.

The following tables show the implications of these scenarios on economic analysis.

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Best case scenario

TABLE 100: ECONOMIC ANALYSIS : BEST CASE SCENARIO

Economic Analysis										
Year	***Cash Inflow***		***Cash Outflow***							
	Sales inflow	***Total Cash inflow***	*Total investment costs (Table 47) Remark*	*Operating Costs*	***Total Cash outflow***	***Net Cash Flow***	***Positive externalities***	***Net Economic Flow***	*Discount factor*	*DNEF value*
"-3 (2009)			865.654,00		**865.654,00**	-865.654,00		-865.654,00	1	-865.654,00
"-2 (2010)			750.752,00		**750.752,00**	-750.752,00		-750.752,00	0,947867299	-711.613,27
"-1 (2011)			7.261.414,50		**7.261.414,50**	-7.261.414,50		-7.261.414,50	0,898452416	-6.524.035,40
"-0 (2012)			9.055.585,50		**9.055.585,50**	-9.055.585,50		-9.055.585,50	0,851613664	-7.711.860,35
1 (2012)	78.182,40	**78.182,40**	-40.106,04	358.725,95	**318.619,91**	-240.437,51	289.085,52	48.648,01	0,807216743	39.269,49
2 (2013)	1.074.364,80	**1.074.364,80**	38.979,31	1.535.938,26	**1.574.917,56**	-500.552,76	722.715,00	222.162,24	0,765134354	169.983,96
3 (2014)	1.116.077,76	**1.116.077,76**	-4.083,77	1.631.149,36	**1.627.065,60**	-510.987,84	1.092.102,12	581.114,28	0,725245833	421.450,71
4 (2015)	1.181.634,24	**1.181.634,24**	26.348,66	1.715.649,92	**1.741.998,58**	-560.364,34	1.441.413,84	881.049,50	0,687436809	605.665,86
5 (2016)	2.057.190,72	**2.057.190,72**	224.054,80	2.075.075,23	**2.299.130,04**	-241.939,32	2.215.192,92	1.973.253,60	0,651598871	1.285.769,82
6 (2017)	2.103.453,31	**2.103.453,31**	602.273,01	2.142.911,25	**2.745.184,26**	-641.730,95	2.265.381,42	1.623.650,47	0,617629261	1.002.814,04
7 (2018)	2.113.715,90	**2.113.715,90**	28.738,62	2.152.820,28	**2.181.558,90**	-67.842,99	2.287.966,25	2.220.123,25	0,585430579	1.299.728,04
8 (2019)	2.126.378,50	**2.126.378,50**	122.259,44	2.163.929,30	**2.286.188,73**	-159.810,24	2.627.565,56	2.467.755,32	0,554910502	1.369.383,34
9 (2020)	2.133.041,09	**2.133.041,09**	28.150,50	2.171.438,32	**2.199.588,82**	-66.547,73	2.695.093,83	2.628.546,10	0,525981518	1.382.566,67
10 (2021)	2.979.703,68	**2.979.703,68**	309.240,73	2.508.200,10	**2.817.440,83**	162.262,85	2.779.093,83	2.941.356,68	0,498560681	1.466.444,79
11 (2022)	2.992.366,27	**2.992.366,27**	4.869.408,92	2.519.309,12	**7.388.718,04**	-4.396.351,77	3.235.478,37	-1.160.873,40	0,472569366	-548.593,21
12 (2023)	2.999.028,86	**2.999.028,86**	323.435,46	2.526.818,14	**2.850.253,60**	148.775,26	3.378.063,20	3.526.838,45	0,447933048	1.579.787,50
13 (2024)	3.009.260,16	**3.009.260,16**	1.949,95	2.534.772,65	**2.536.722,60**	472.537,56	3.970.928,93	4.443.466,48	0,424581088	1.886.611,84
14 (2025)	3.011.060,16	**3.011.060,16**	323.498,51	2.535.972,65	**2.859.471,16**	151.589,00	4.218.457,20	4.370.046,20	0,402446529	1.758.709,92
15 (2026)	3.012.860,16	**3.012.860,16**	2.048,58	2.537.172,65	**2.539.221,23**	473.638,93	4.362.457,20	4.836.096,13	0,381465904	1.844.805,78
16 (2027)	3.854.660,16	**3.854.660,16**	1.231.171,49	2.867.625,41	**4.098.796,91**	-244.136,75	4.746.457,20	4.502.320,45	0,361579056	1.627.944,78
17 (2028)	3.854.660,16	**3.854.660,16**	-4.864,41	2.867.625,41	**2.862.761,00**	991.899,16	5.208.570,30	6.200.469,46	0,342728963	2.125.080,47
18 (2029)	3.854.660,16	**3.854.660,16**	496.785,67	2.867.625,41	**3.364.411,09**	490.249,07	5.711.155,13	6.201.404,20	0,324861577	2.014.597,95
19 (2030)	3.866.816,64	**3.866.816,64**	3.300,80	2.883.397,97	**2.886.698,77**	980.117,87	6.254.211,68	7.234.329,55	0,307925665	2.227.635,74
20 (2031)	3.866.816,64	**3.866.816,64**	496.755,70	2.883.397,97	**3.380.153,67**	486.662,97	6.837.739,95	7.324.402,92	0,291872668	2.137.793,03
Scrap								10.947.699,93		3.195.334,39

ECONOMIC NET PRESENT VALUE at 5,5%	**13.079.621,89**
ECONOMIC RATE OF RETURN	**10,10%**

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TABLE 101: BENEFIT – COST RATIO: BEST CASE SCENARIO

Year	Benefits				Costs		Discount factor
	Total Cash inflow	*Positive externalities*	***Total benefits***	***Discounted value***	***Total Cash outflow***	***Discounted value***	*Discount factor*
"-3 (2009)					865.654,00	**865.654,00**	1
"-2 (2010)					750.752,00	**711.613,27**	0,947867299
"-1 (2011)					7.261.414,50	**6.524.035,40**	0,898452416
"-0 (2012)					9.055.585,50	**7.711.860,35**	0,851613664
1 (2012)	78.182,40	289.085,52	367.267,92	**296.464,81**	318.619,91	**257.195,32**	0,807216743
2 (2013)	1.074.364,80	722.715,00	1.797.079,80	**1.375.007,49**	1.574.917,56	**1.205.023,53**	0,765134354
3 (2014)	1.116.077,76	1.092.102,12	2.208.179,88	**1.601.473,26**	1.627.065,60	**1.180.022,55**	0,725245833
4 (2015)	1.181.634,24	1.441.413,84	2.623.048,08	**1.803.179,80**	1.741.998,58	**1.197.513,94**	0,687436809
5 (2016)	2.057.190,72	2.215.192,92	4.272.383,64	**2.783.880,35**	2.299.130,04	**1.498.110,53**	0,651598871
6 (2017)	2.103.453,31	2.265.381,42	4.368.834,73	**2.698.320,17**	2.745.184,26	**1.695.506,13**	0,617629261
7 (2018)	2.113.715,90	2.287.966,25	4.401.682,15	**2.576.879,33**	2.181.558,90	**1.277.151,29**	0,585430579
8 (2019)	2.126.378,50	2.627.565,56	4.753.944,05	**2.638.013,48**	2.286.188,73	**1.268.630,14**	0,554910502
9 (2020)	2.133.041,09	2.695.093,83	4.828.134,92	**2.539.509,73**	2.199.588,82	**1.156.943,07**	0,525981518
10 (2021)	2.979.703,68	2.779.093,83	5.758.797,51	**2.871.110,01**	2.817.440,83	**1.404.665,22**	0,498560681
11 (2022)	2.992.366,27	3.235.478,37	6.227.844,64	**2.943.088,59**	7.388.718,04	**3.491.681,80**	0,472569366
12 (2023)	2.999.028,86	3.378.063,20	6.377.092,06	**2.856.510,28**	2.850.253,60	**1.276.722,78**	0,447933048
13 (2024)	3.009.260,16	3.970.928,93	6.980.189,09	**2.963.656,28**	2.536.722,60	**1.077.044,44**	0,424581088
14 (2025)	3.011.060,16	4.218.457,20	7.229.517,36	**2.909.494,17**	2.859.471,16	**1.150.784,24**	0,402446529
15 (2026)	3.012.860,16	4.362.457,20	7.375.317,36	**2.813.432,11**	2.539.221,23	**968.626,32**	0,381465904
16 (2027)	3.854.660,16	4.746.457,20	8.601.117,36	**3.109.983,90**	4.098.796,91	**1.482.039,12**	0,361579056
17 (2028)	3.854.660,16	5.208.570,30	9.063.230,46	**3.106.231,58**	2.862.761,00	**981.151,11**	0,342728963
18 (2029)	3.854.660,16	5.711.155,13	9.565.815,29	**3.107.565,84**	3.364.411,09	**1.092.967,89**	0,324861577
19 (2030)	3.866.816,64	6.254.211,68	10.121.028,32	**3.116.524,37**	2.886.698,77	**888.888,64**	0,307925665
20 (2031)	3.866.816,64	6.837.739,95	10.704.556,59	**3.124.367,49**	3.380.153,67	**986.574,47**	0,291872668
Scrap			10.947.699,93	**3.195.334,39**			
TOTAL:				**54.430.027,44**		**41.350.405,55**	

B/C RATIO:	**1,32**

In the best case scenario, **ENPV** equals **EUR 13.079.621,89**, whereas **ERR** equals **10,10%.** Both values are strongly acceptable.

The present value of the total benefits is EUR **54.430.027,44**, whereas the present value of the total costs is EUR **41.350.405,55**. That leads to the **B/C** (benefit/cost**) ratio** of **1,32**.

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Worst case scenario

TABLE 102: ECONOMIC ANALYSIS – WORST CASE SCENARIO

Year	Economic Analysis									
	Cash Inflow		Cash Outflow			Net Cash Flow	Positive externalities	Net Economic Flow	Discount factor	DNEF value
	Sales inflow	Total Cash inflow	Total investment costs (Table 47) Remark	Operating Costs	Total Cash outflow					
"-3 (2009)			865.654,00		**865.654,00**	-865.654,00		-865.654,00	1	-865.654,00
"-2 (2010)			750.752,00		**750.752,00**	-750.752,00		-750.752,00	0,947867299	-711.613,27
"-1 (2011)			7.261.414,50		**7.261.414,50**	-7.261.414,50		-7.261.414,50	0,898452416	-6.524.035,40
"-0 (2012)			9.055.585,50		**9.055.585,50**	-9.055.585,50		-9.055.585,50	0,851613664	-7.711.860,35
1 (2012)	52.121,60	**52.121,60**	-39.023,35	328.838,36	**289.815,01**	-237.693,41	192.723,68	-44.969,73	0,807216743	-36.300,32
2 (2013)	716.243,20	**716.243,20**	-5.797,75	1.166.293,96	**1.160.496,21**	-444.253,01	481.810,00	37.556,99	0,765134354	28.736,14
3 (2014)	744.051,84	**744.051,84**	-4.445,99	1.247.390,03	**1.242.944,04**	-498.892,20	728.068,08	229.175,88	0,725245833	166.208,85
4 (2015)	787.756,16	**787.756,16**	-7.618,86	1.315.033,06	**1.307.414,20**	-519.658,04	960.942,56	441.284,52	0,687436809	303.355,22
5 (2016)	1.371.460,48	**1.371.460,48**	135.855,63	1.554.649,94	**1.690.505,57**	-319.045,09	1.476.795,28	1.157.750,19	0,651598871	754.388,72
6 (2017)	1.402.302,21	**1.402.302,21**	626.569,51	1.611.182,95	**2.237.752,47**	-835.450,26	1.510.254,28	674.804,02	0,617629261	416.778,71
7 (2018)	1.409.143,94	**1.409.143,94**	-27.351,48	1.617.788,97	**1.590.437,49**	-181.293,55	1.525.310,83	1.344.017,28	0,585430579	786.828,81
8 (2019)	1.417.585,66	**1.417.585,66**	43.301,49	1.625.194,98	**1.668.496,47**	-250.910,81	1.751.710,37	1.500.799,56	0,554910502	832.809,44
9 (2020)	1.422.027,39	**1.422.027,39**	26.959,40	1.630.201,00	**1.657.160,40**	-235.133,01	1.796.729,22	1.561.596,21	0,525981518	821.370,75
10 (2021)	1.986.469,12	**1.986.469,12**	167.955,68	1.854.708,85	**2.022.664,53**	-36.195,41	1.852.729,22	1.816.533,81	0,498560681	905.652,33
11 (2022)	1.994.910,85	**1.994.910,85**	4.877.017,35	1.862.114,87	**6.739.132,21**	-4.744.221,36	2.156.985,58	-2.587.235,78	0,472569366	-1.222.648,37
12 (2023)	1.999.352,58	**1.999.352,58**	177.418,84	1.867.120,88	**2.044.539,72**	-45.187,14	2.252.042,13	2.206.854,99	0,447933048	988.523,28
13 (2024)	2.006.173,44	**2.006.173,44**	9.492,36	1.872.423,89	**1.881.916,25**	124.257,19	2.487.285,95	2.611.543,14	0,424581088	1.108.811,83
14 (2025)	2.007.373,44	**2.007.373,44**	177.460,87	1.873.223,89	**2.050.684,76**	-43.311,32	2.652.304,80	2.608.993,48	0,402446529	1.049.980,37
15 (2026)	2.008.573,44	**2.008.573,44**	9.558,12	1.874.023,89	**1.883.582,01**	124.991,43	2.748.304,80	2.873.296,23	0,381465904	1.096.064,55
16 (2027)	2.569.773,44	**2.569.773,44**	1.024.128,53	2.094.325,73	**3.118.454,25**	-548.680,81	3.004.304,80	2.455.623,99	0,361579056	887.902,20
17 (2028)	2.569.773,44	**2.569.773,44**	4.949,46	2.094.325,73	**2.099.275,19**	470.498,25	3.312.380,20	3.782.878,45	0,342728963	1.296.502,01
18 (2029)	2.569.773,44	**2.569.773,44**	299.471,53	2.094.325,73	**2.393.797,25**	175.976,19	3.647.436,75	3.823.412,94	0,324861577	1.242.079,95
19 (2030)	2.577.877,76	**2.577.877,76**	3.907,05	2.104.840,76	**2.108.747,82**	469.129,94	4.009.474,45	4.478.604,39	0,307925665	1.379.077,24
20 (2031)	2.577.877,76	**2.577.877,76**	299.451,54	2.104.840,76	**2.404.292,31**	173.585,45	4.398.493,30	4.572.078,75	0,291872668	1.334.464,83
Scrap								2.471.040,00		

ECONOMIC NET PRESENT VALUE at 5,5%	**1.522.757,91**
ECONOMIC RATE OF RETURN	**6,06%**

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TABLE 103: BENEFIT – COST RATIO – WORST CASE SCENARIO

Year	Benefits				Costs		Discount factor
	Total Cash inflow	*Positive externalities*	***Total benefits***	***Discounted value***	***Total Cash outflow***	***Discounted value***	*Discount factor*
"-3 (2009)					865.654,00	**865.654,00**	1
"-2 (2010)					750.752,00	**711.613,27**	0,947867299
"-1 (2011)					7.261.414,50	**6.524.035,40**	0,898452416
"-0 (2012)					9.055.585,50	**7.711.860,35**	0,851613664
1 (2012)	**52.121,60**	192.723,68	244.845,28	**197.643,21**	289.815,01	**233.943,53**	0,807216743
2 (2013)	**716.243,20**	481.810,00	1.198.053,20	**916.671,66**	1.160.496,21	**887.935,52**	0,765134354
3 (2014)	**744.051,84**	728.068,08	1.472.119,92	**1.067.648,84**	1.242.944,04	**901.439,99**	0,725245833
4 (2015)	**787.756,16**	960.942,56	1.748.698,72	**1.202.119,87**	1.307.414,20	**898.764,65**	0,687436809
5 (2016)	**1.371.460,48**	1.476.795,28	2.848.255,76	**1.855.920,24**	1.690.505,57	**1.101.531,52**	0,651598871
6 (2017)	**1.402.302,21**	1.510.254,28	2.912.556,49	**1.798.880,11**	2.237.752,47	**1.382.101,40**	0,617629261
7 (2018)	**1.409.143,94**	1.525.310,83	2.934.454,77	**1.717.919,55**	1.590.437,49	**931.090,74**	0,585430579
8 (2019)	**1.417.585,66**	1.751.710,37	3.169.296,03	**1.758.675,65**	1.668.496,47	**925.866,21**	0,554910502
9 (2020)	**1.422.027,39**	1.796.729,22	3.218.756,61	**1.693.006,49**	1.657.160,40	**871.635,74**	0,525981518
10 (2021)	**1.986.469,12**	1.852.729,22	3.839.198,34	**1.914.073,34**	2.022.664,53	**1.008.421,01**	0,498560681
11 (2022)	**1.994.910,85**	2.156.985,58	4.151.896,43	**1.962.059,06**	6.739.132,21	**3.184.707,44**	0,472569366
12 (2023)	**1.999.352,58**	2.252.042,13	4.251.394,71	**1.904.340,19**	2.044.539,72	**915.816,91**	0,447933048
13 (2024)	**2.006.173,44**	2.647.285,95	4.653.459,39	**1.975.770,85**	1.881.916,25	**799.026,05**	0,424581088
14 (2025)	**2.007.373,44**	2.812.304,80	4.819.678,24	**1.939.662,78**	2.050.684,76	**825.290,96**	0,402446529
15 (2026)	**2.008.573,44**	2.908.304,80	4.916.878,24	**1.875.621,40**	1.883.582,01	**718.522,31**	0,381465904
16 (2027)	**2.569.773,44**	3.164.304,80	5.734.078,24	**2.073.322,60**	3.118.454,25	**1.127.567,75**	0,361579056
17 (2028)	**2.569.773,44**	3.472.380,20	6.042.153,64	**2.070.821,05**	2.099.275,19	**719.482,41**	0,342728963
18 (2029)	**2.569.773,44**	3.807.436,75	6.377.210,19	**2.071.710,56**	2.393.797,25	**777.652,75**	0,324861577
19 (2030)	**2.577.877,76**	4.169.474,45	6.747.352,21	**2.077.682,92**	2.108.747,82	**649.337,57**	0,307925665
20 (2031)	**2.577.877,76**	4.558.493,30	7.136.371,06	**2.082.911,66**	2.404.292,31	**701.747,21**	0,291872668
Scrap			10.947.699,93	**3.195.334,39**			
TOTAL:				**37.877.691,07**		**35.375.044,68**	

B/C RATIO:	**1,06**

In the worst case scenario, **ENPV** equals **EUR 1.522.757,91** whereas **ERR** equals **6,06%**, which is still acceptable. However, the risk of the project needs to be systematically mitigated; risk mitigation measures have been outlined in Table 98.

The present value of the total benefits is EUR **37.877.691,07**, whereas the present value of the total costs is EUR **35.375.044,68**. That leads to the **B/C ratio** of **1,06**.

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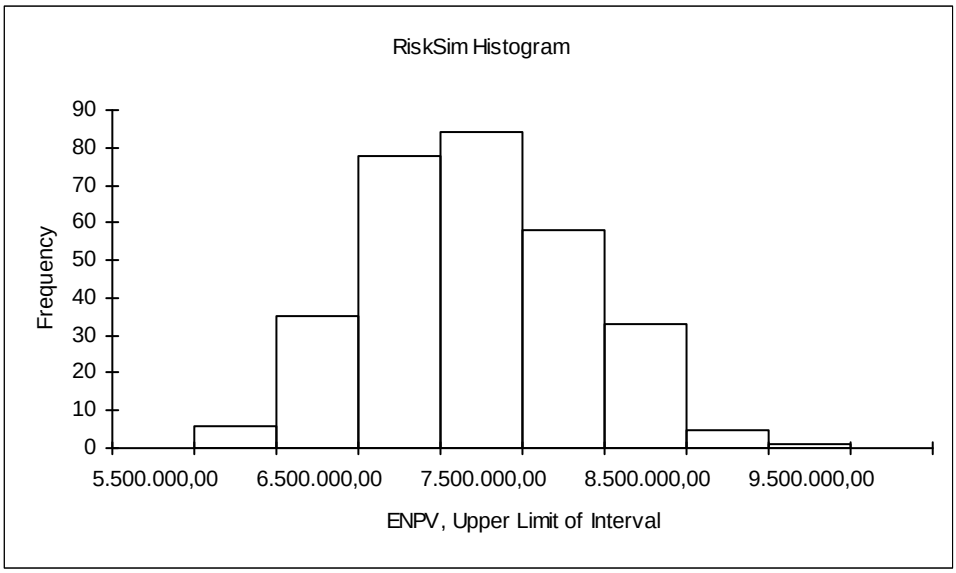
Expected values of ENPV, ERR and B/C ratio

The expected ENPV is calculated by taking into account the respective ENPV values and probabilities in each of the three scenarios. The **expected ENPV** is **EUR 6.836.114,61.** The corresponding **expected value of ERR is 7,99.** The expected present value of the total benefits is EUR **45.037.000,38**, whereas the expected present value of the total costs is EUR **38.064.687,62**. That leads to the **expected B/C ratio** of **1,18**.

10.3. Risk analysis

Once the critical variable (**sales revenues**[37]) has been identified, then, in order to determine the nature of their uncertainty, a probability distributions should be defined. In accordance with the scenarios outlined above, it is assumed that the sales revenues is a discrete variable that fluctuates between 80 % and 120% of the baseline scenario estimate. It is assumed that the pessimistic scenario has a 30% probability, whereas the optimistic scenario has a 20% probability. Baseline scenario is assumed to have a 50% probability. These values are used to perform a Monte Carlo simulation with 300 cases. The Monte Carlo simulation is performed through using a Risk Sim software add-in to MS Excel. The results (a histogram and a cumulative probability chart) are given below. The analysis shows that **ENPV is most likely to fluctuate between EUR 6,5 milion and EUR 8 million**.

FIGURE 39: RISKSIM HISTOGRAM



[37] Positive externalities also play a rather important role, but they are not independent of sales revenues.

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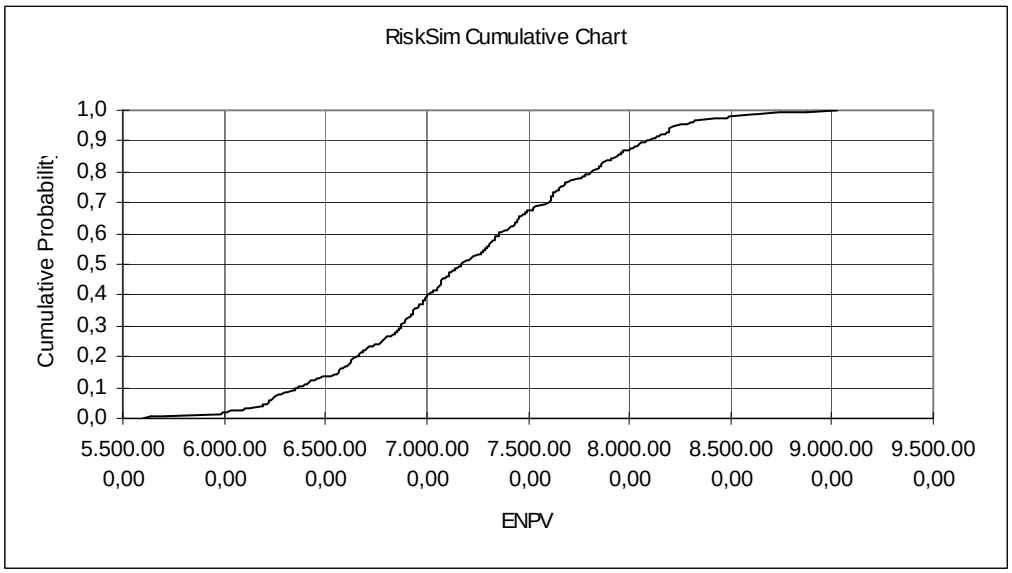
FIGURE 40: RISKSIM CUMULATIVE PROBABILITY CHART



Mean	7.216.510,43
St. Dev.	640.966,79
Mean St. Error	37.006,23
Minimum	5.598.393,97
First Quartile	6.778.031,31
Median	7.172.686,06
Third Quartile	7.656.076,31
Maximum	9.027.837,61
Skewness	0,1047

10.4. Concluding remarks

It has been demonstrated that when it comes to **socio-economic effects**, **the BIOCentre project is able to generate significant benefits at reasonable levels of risk**. This is mainly due to **high probability of large positive effects** in the areas of employment, as well as external and fiscal benefits.

However, it should also be emphasised that **the project itself is not financially self-sustainable**. It needs not only **EU assistance prior to its start-up**, but also **assistance provided by its founders that will cover operational losses** in the initial years.

Therefore, **efficient project implementation** and **risk mitigation measures** are of utmost importance; the same applies to **monitoring and evaluation**. The sufficient size and quality (commercial potential) of the project pipeline should be facilitated by **marketing and networking activities**, as well as through **commitment and contributions of all project stakeholders** from academic, public and private sectors.

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References

Aralica, Z. Račić, D. and Redžepagić, D. (2007) *Knowledge transfer accompanying FDI (in Croatian)*. Mimeo. Zagreb: The Institute of Economics.

Battelle (2006): *Growing The Nation's Biotech Sector: A Regional Perspective*. Washington, DC: Biotechnology Industry Organization.

CEPOR (2006) *Global Entrepreneurship Monitor 2002-2005 for Croatia*, CEPOR, Zagreb. Available at: http://www.gemhrvatska.org/gembrosura2006.pdf

EC (2005): *Working together for growth and jobs: A new start for the Lisbon Strategy*. COM (2005) 24. Bruxelles: European Commission.

EC (2008): *Guide To COST-BENEFIT ANALYSIS of investment projects: Structural Funds, Cohesion Fund and Instrument for Pre-Accession*. Bruxelles: European Commission, DG Regional Policy.

Government of Croatia (2006): *Strategic Development Framework 2006 - 2013*.

Government of Croatia (2007) *Regional* Competitiveness *Operational Programme 2007 – 2009, 2007HR16IPO001 - Instrument For Pre-Accession Assistance*.
Available at:

www.strategija.hr/lgs.axd?t=16&id=517

Lejour et al. (2008). *The Economic Effects of the Lisbon Target on Croatia*. Background paper for the Croatia EU Convergence report. Zagreb: The World Bank – Croatia Country Office.

Ministry of Science, Education and Sports (2006) *Science and Technology Policy of the Republic of Croatia 2006 – 2010.* Available at:

public.mzos.hr/lgs.axd?t=16&id=11958

Ministry of Science, Education and Sports (2007) *Akcijski plan 2007. - 2010. - Znanstvena i tehnologijska politika Republike Hrvatske.* Available at:

public.mzos.hr/lgs.axd?t=16&id=12955

PCA (2006) *Biotechnology in Hungary: Unfolding potentials – An Industry Review*. Budapest : PCA Capital Advisors in Cooperation with Hungarian Biotechnology Association.

Račić, D. et al. (2005) *Innovation in Croatian Enterprises 2001 – 2003*. Zagreb: The Institute of Economics.

The University City Science Center (2009) *The University City Science Center: An Engine of Economic Growth for Greater Philadelphia*. Philadelphia: The University City Science Center.

Young, A.E., Cvijanović, V., (2006) 'The Market for Venture Capital in Croatia' In Besler W., (ed.), *Börsen, Banken und Kapitalmärkte. Festschrift für Hartmut Schmidt zum 65. Geburtstag,* Duncker & Humblot, Berlin.

Internet sources:

Business Innovation Centre of Croatia http://www.bicro.hr/

Central Bureau of Statistics http://www.dzs.hr/default_e.htm

Central Office for Development Strategy and Coordination of EU Funds http://www.strategija.hr/

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Appendix I

Logframe with a detailed overview of the project objectives, expected results, activities, assumptions and risks

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Overall Objective	Objective Verifiable Indicators[38]	Means / sources of verification	Assumptions, Risks
build technology transfer capacities of academic institutions in order to facilitate biotechnology / life science industry, innovation, competitiveness and regional development	▪ Gross value added in biotechnology / life science industry will increase by 20% by 2020 (currently: n.a.) ▪ Improvement of Croatia's position in 2017 Global Competitiveness Index rankings by about 5 places (GCI rank in 2008: 61) ▪ Reaching Summary Innovation Index (SII) of 0,4 by 2017 (SII in 2008: 0,297) ▪ All universities and major research institutes will have fully functioning technology transfer offices by 2015 (currently: 4 TTO) ▪ The regional inequalities in GDP per capita in NUTS 3 regions in Croatia will decrease by 10 percent in 2020 (currently: n.a.)	▪ Statistical Yearbook of Croatia ▪ Global Competitiveness Report ▪ European Innovation Scoreboard ▪ Annual reports published by universities and major research institutes ▪ Statistical Yearbook of Croatia	

[38] OVI must be "SMART" (Specific, measurable, achievable, Realistic, and timed) and "QQT" (quantitative, qualitative and timed)

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Specific Project Objectives	Objective Verifiable Indicators	Means / sources of verification	Assumptions, Risks
1. Development of common technical infrastructure and service portfolio that will support biotech start up businesses (as a precondition of specific activities of the BIOCentre)	▪ Successfully implement services, works and supplies contracts and make BIOCentre operational by the beginning of 2012	▪ Issuance of use permit ▪ Progress reports submitted by the project manager	**Assumptions** Macroeconomic conditions (inflation rate, GDP growth rate, public finance) remain relatively favourable.
	• Developing the service portfolio and hire key staff by the beginning of 2012	▪ Ex-ante evaluation reports for each of the BIOCentre services	The reform of academic institutions gradually brings about conditions facilitating technology transfer and academic entrepreneurship.
	• The volume and quality of Implemented marketing and networking activities that will facilitate demand	▪ Progress report submitted by the project manager	BICRO, University of Zagreb and the City of Zagreb remain committed and provide the necessary support to the BIOCentre.
2. Development of biotech start-ups through incubation, process development and associated services	▪ Number of incubated companies at the end of each year (from 2012 onwards)	▪ Annual report of the BIOCentre and external evaluation reports	**Risks**
	▪ Number of jobs created and/or preserved through the BIOCentre (including incubated companies and former interns)	▪ Annual report of the BIOCentre and external evaluation reports	Significant changes in prices of works or equipment
	▪ Number and total value of process development projects provided within a year (from 2013 onwards)	▪ Annual report of the BIOCentre and external evaluation reports	Inadequate understanding, commitment or cooperation of different stakeholders Adverse trends in biotechnology markets

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	▪ Number of education programmes and participants within a year (from 2012 onwards) ▪ Number of BIONetwork members at the end of each year	▪ Annual report of the BIOCentre and external evaluation reports ▪ Education materials ▪ Annual report of the BIOCentre and external evaluation reports	Slow reform of academic institutions leading to insufficient project pipeline The lack of competent staff or financial resources in incubated companies

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Expected results	Objective Verifiable Indicators	Means / sources of verification	Assumptions, Risks
1. Construction, equipment procurement and setting-up of the BIOCentre	▪ Successful completion of the start-up phase of the BIOCentre project (equipped incubation facilities with office space, laboratory space and central laboratory unit are fully operational)	▪ Use permit ▪ Progress reports	**Assumptions** Ability of BIOCentre to successfully complete its start-up stage and implement its activities. The academic institutions produce research leading to a sufficient project pipeline.
2. New firm creation within the BIOCentre	▪ Number of incubated companies at the end of each year ▪ Number of jobs created and/or preserved at the BIOCentre (including incubated companies and former interns)	▪ Annual report of the BIOCentre	Liaisons with academic institutions, companies and other partners are strong and effective. There is sufficient demand for the BIOCentre services
3. Effective utilisation of the capacities of the Central Laboratory Unit	▪ The number and value of process development projects of Growth from one BioTransfer project in 2013 to four projects in 2027	▪ Annual report of the BIOCentre	Adequate provisions from founders cover operational losses. Dissemination and promotional activities towards target audiences are effective.
4. Effective delivery of education and training services	▪ At least one comprehensive (business or technical) training course delivered each year ▪ The number and satisfaction of participants with the services provided	▪ Annual report of the BIOCentre ▪ Participant evaluation sheets ▪ Education materials	**Risks** Weaker project pipeline than expected Longer time-to-market periods for

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			products of companies using the services of the BIOCentre
5. Sustained growth of BIONetwork	▪ Number of new members and the total number of members	▪ Annual report of the BIOCentre ▪ Member evaluation sheets	Insufficient demand for some of the services provided by the BIOCentre
6. New product development	▪ Number of new products licensed for production	▪ Annual report of the BIOCentre ▪ Company reports	
7. Dissemination of project results	▪ Number of people visiting the BIOCentre web portal (number of hits)	▪ Monitoring report of the web portal	
	▪ Number of people attending promotional events and receiving information materials	▪ Lists of participants ▪ Participant evaluation sheets ▪ Annual report of the BIOCentre	
	▪ Number of people reached by public relations and marketing activities	▪ Marketing research ▪ Press release ▪ Promotion campaign material	

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Project main activities	Inputs	Sources of verification	Assumptions
1. Tendering and contracting of supervision, construction and equipment / supplies 2. Registration of the BIOCentre 3. Elaboration of the business plan for the start-up stage by the project manager (including marketing and networking activities) 4. Implementation of the service contract – supervision over the construction and associated activities 5. Implementation of the works contract – construction of the BIOCentre building 6. Implementation of the supplies contract – procurement of equipment 7. Implementation of the service contract – technical assistance 8. Establishing liaisons with technology transfer offices of major academic institutions 9. Establishing liaisons with Science and Innovation Investment Fund (also implemented within IPA IIIC – Regional Competitiveness Operational Programme) 10. Publicity and promotion activities (financed within the Regional Competitiveness Operational Programme Communication Action Plan) 11. Hiring of the key BIOCentre staff 12. Elaboration of the business plan for years 2012-2017 13. Selection of the first potential projects (to be incubated at the BIOCentre) and elaboration of their business plans	• **IPA Project Budget : 15.485.821 €** - Construction: 8.905.897 € - Equipment: 4.867.657 € - Supervision during construction: 1.077.589 € - Technical assistance: 634.678 € • IPA Project duration: 24 months • Additional resources provided by BICRO and the City of Zagreb	Action progress should be verified through: Time sheets of Experts signed by TL & Beneficiary Inception, Progress, final Reports agreed by Steering Committee Expert reports agreed by TL and Beneficiary Breakdown of the budget / progress costs involved Annual report of the BIOCentre Press releases Evaluation reports	External conditions (e.g. market trends, resource availability etc.) do not significantly affect the project. Project risks are effectively mitigated. BIOCentre staff is effectively selected and motivated to attain project objectives. All stakeholders (including academic institutions, industry, local government, business associations etc.) contribute to the project implementation. Project results are effectively communicated to the target audiences.

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14. BIOCentre start-up 15. Implementation of the BIOFacility programme 16. Implementation of the BIOIncubation programme 17. Implementation of the BIOTransfer programme 18. Implementation of the BIOEducation programme 19. Implementation of the BIONetwork programme *20.* Monitoring and evaluation			

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Appendix II

The Most Relevant Research Institutions in the Field of Bioscience

University of Zagreb, Zagreb

The University of Zagreb with 29 faculties, three art academies and the Centre for Croatian Studies is the biggest scientific and high educational institution in Croatia, as well asthe oldest and biggest university in South-Eastern Europe. With its comprehensive programmes and over 50,000 full-time undergraduate and postgraduate students, the University is the strongest teaching institution in Croatia. It offers a wide range of academic degree courses leading to Bachelor's, Master's and Doctoral degrees in the fields of Arts, Biomedicine, Biotechnology, Engineering, Humanities, Natural and Social Sciences. It is also strongly research-oriented institution, contributing with over 50 percent to the total research output of the country. In 2007, 48,8% of the total national budget for scientific projects were allocated to the R&D projects at the University of Zagreb (Source: University of Zagreb).

40% of the total academic staff, over 45% of active projects, and 50% of the total project volume at the University of Zagreb can be allocated to one of the scientific areas in the field of biosciences.

TABLE 104: STATISTICS ON BIOSCIENCES-RELATED R&D AT THE UNIVERSITY OF ZAGREB

No. od Scientific entities (Faculties) in the field of biosciences	9
% of the Total scientific entities at the University	31
No. od Scientific/academic staff in the field of biosciences	2.684
% of the Total academic staff at the University	40,80
No. of Active projects in the related scientific fields	482
% of the Total scientific projects at the University	48,90
No. of Active projects financed by the EU in the related scientifikc fields	8

Source: Official statistics of the University of Zagreb

Medical Faculty / School of Medicine, Zagreb

Among the relevant scientific entities (units) at the University of Zagreb, the Medical School has the biggest scientific output (fundamental and applied research) in the field of Biosciences. Several projects with strong application character and high commercial potential, resulting from the Medical School can be identified.

Research orientation and scientific output

The majority of research projects are financed by the MSES. State support has been given to 87 projects; 51 of them in clinical research, 29 in basic research and 7 in public health. This Ministry also subsidizes three interdisciplinary projects and one project on long-term research in neurobiology which unites 17 projects offered by various research institutions in Croatia. Another group of important projects are offered conjointly with the pharmaceutical industry, whereas a significant level of mobility is attained through joint research with the Republic of Slovenia. Additionally, 15 projects for stimulating research in the young academic faculty are financed by the MSES.

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Significant research work and research groups are in the areas of: neurosurgery, diagnostic ultrasound, transplantation medicine, biological regeneration of tissues, clinical biochemistry.

The most productive fields are: research in regeneration and repair of bone, cartilage and kidney by bone morphogenetic proteins, biology of the cell, clinical endocrinology and diabetes, environmental medicine, gynaecologic ultrasound, hematological malignancies, human reproduction, immunology, metabolic congenital diseases, neuroanatomy, neuropsychobiology.

The number of scientific papers published in international journals is one of the best indicators of the scientific output of any academic or scientific institution. In this respect, the University of Zagreb Medical School best serves national interests in the field of medicine. During the 2000-2004 period, authors affiliated to the School published 848 papers in journals covered by Current Contents. Among these there are 162 papers published in co-authorship with foreign researchers, mainly from the USA, Great Britain and Germany. Researchers of the Zagreb Medical School participate in various multi-centred research projects which resulted in 44 papers in the above period. The most prominent research highlights are: cell biology, neuroanatomy, haematological malignancies, congenital metabolic diseases, bone morphogenetic proteins, clinical endocrinology and diabetes and gynaecologic ultrasound.

TABLE 105: STATISTICS ON BIOSCIENCES-RELATED R&D AT THE MEDICAL SCHOOL ZAGREB

No. of Academic staff	775
No. of Active R&D projects	87
No. of Active R&D projects in fundamental research	29
No. of Active projects in applied research	51
No. of Active projects in the field of public health	2

Faculty of Natural Sciences, Zagreb

The Faculty of Natural Sciences of the University of Zagreb was established in 1946. Today the Faculty has 7 departments with 24 institutes and 5 computer centres. The Faculty of Science employs a total of 189 full professors, associate professor and assistant professors and 244 assistants, affiliate research associates and junior researchers. In the school year 2005/2006 there was 4.512 undergraduate students, studying in 19 fields of study. From the graduate studies foundation in 1960 up to now, 2.302 candidates defended their doctoral thesis.

There are 7 faculty Departments. Among the departments the Department of Chemistry has the biggest relevancy for research in biosciences.

Faculty of Food Technology and Biotechnology, Zagreb

The Faculty of Food Technology and Biotechnology at Zagreb University was founded 25 years ago, although the studies of technology and biotechnology have a much longer tradition which goes back to the year 1921. The curricula reflect everlasting efforts to provide a good ratio between basic (chemistry and biology) and engineering sciences. Professor Vera Johanides, the Head of Laboratory for Industrial Microbiology, Biochemical Engineering and Brewing Science, initiated the creation of biotechnology undergraduate and postgraduate curricula, and led the fundamental and applied research in many relevant fields of biotechnology like antibiotic and enzyme production, brewing, organic acids and vitamins, as well as environmental biotechnology. Furthermore, a collaborative research project on Streptomyces genetics was launched in sixties together with PLIVA Company.

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Within several years, a small group of enthusiasts gathered around Professor Marija Alačević achieved international recognition and reputation offering a model for collaboration between academic institutions and industry, the fundamental and the applied research.

TABLE 106: STATISTICS ON BIOSCIENCES-RELATED R&D AT THE FACULTY OF FOOD TECHNOLOGY AND BIOTECHNOLOGY IN ZAGREB

No. of Relevant departments: Department of Bicoemical Engineering Department of Chemistry and Biochemistry	2
No. of specialized laboratories	12
No. of academic staff (2 divisions)	104
No. of active R&D projects in fundamental research	31
No. of Active projects in applied research	7

Research Orientation:

The main research fields are food materials, new technologies, new biotechnology processes and engineering as well as human nutrition.

Faculty of Pharmacy and Biochemistry, Zagreb

Faculty of Pharmacy and Biochemistry is the only Croatian institution dedicated entirely to research and teaching in pharmacy and pharmaceutical sciences, as well as in medical biochemistry. Known for its excellence in pharmaceutical, and medical biochemical education on graduate and postgraduate level, and for its contribution to science, the Faculty is an expert source of medical and biochemical knowledge. A multidisciplinary programme of Medical Biochemistry enables not only a detailed understanding of the causes and identification of human diseases, but also entails the principles and applications of diagnostic science that support professional practice in the clinical laboratories. Throughout scientific and research projects, the Faculty has established a long-lasting tradition of cooperation with other faculties on national and international level, as well as with research institutes, pharmaceutical industry, and medical-biomedical profession.

Research Orientation:

Throughout courses students are involved in all aspects of drug research and development, biochemical aspects of cause and diagnosis of diseases. During the final year of education, students work on a major project that allows them to carry out an original investigation into a specialised area of biomedical sciences.

The Ruđer Bošković Institute (IRB), Zagreb

The Ruđer Bošković Institute (RBI) in Zagreb is the largest Croatian research centre for basic and applied sciences, participating also in science applications and higher education. The multidisciplinary character of the Institute is reflected through the different research fields in physics, chemistry, oceanography (including marine and environmental research and geosciences), biology, biomedicine, computer science and electronics/engineering. The academic staff of the RBI includes 513 persons, including 296 researchers, 189 Ph.D. students and 28 postdoctoral fellows. The Ruđer Bošković Institute consists of twelve divisions, 4 of them are dedicated to the Life Sciences.

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RBI is a national institution dedicated to research, higher education and provision of support to the academic community, to state and local governments and to technology-based industry. Strong fundamental research serves as the foundation for applied research and the creation, development and applications of technological advances that ultimately benefit the economy and society. RBI also forms part of the European Research Area and collaborates with many international research institutions and universities upholding the same joint values and vision.

In addition, RBI is active in technology transfer of scientific projects into business environment and has recently established a Technology Transfer unit – Ruđer Innovations Ltd. RBI acts in partnership with industry to promote the transfer and application of research results into new products, techniques and processes.

Scientific Output

The RBI has 125 projects in basic research which are funded by the MSES. In August 2005 the three year project term ended. MSES performed an evaluation of all the projects and, according to the results thereof, the financial support was continued at an increased, diminished or unchanged rate. In addition to the fundamental projects, the Institute is involved in 65 international projects (38 bilateral, 2 FP5, 10 FP6, 11 IAEA, 2 COST, 1 INTERREG III, 1 UNESCO), as well as 11 applied and technological projects.

The total number of research articles published in 2004 was 578. Amongst these, 391 were published in journals cited by Current Contents. With less than 5% of the total number of scientists in the country working at the Institute, it is worthy of note that 27% of all Croatian articles in Current Contents journals originated from the RBI. A considerable proportion of these articles were published in high ranking journals.

There are 4 divisions at IRB with large research groups and significant scientific output in the field of Biomedicine and Life Sciences. Due to the significant number of market oriented R&D projects IRB can be considered as one of the main “suppliers” of projects with high commercial potential in the field of biosciences and as one of the most important consumer of the Centre’s services (customer) at the same time.

The Croatian Institute for Brain Research (CIBR), Zagreb

The Croatian Institute for Brain Research (CIBR) is a research and educational affiliate of the Medical School, responsible for multidisciplinary research and interuniversity teaching in the field of neuroscience. It also fosters research and teaching in other basic biomedical sciences. One of the primary objectives of the CIBR today is research on the neurobiological basis of cognitive development and cognitive disorders.

An additional role of the CIBR is to bridge the gap between the basic neuroscience research and clinical experience. The research program of the CIBR is oriented towards the neurobiological and molecular basis of major neurological, cognitive and mental diseases during the developmental and aging period in the human life. Developmental disorders, Down’s syndrome, schizophrenia and Alzheimer’s disease are among the research priorities. Another important aspect of the CIBR’s work is that it houses the Zagreb Neuroembryological Collection and Brain Tissue Bank. The researchers active on projects developed by the CIBR have established a vigorous international cooperation with neuroscientists and universities in Europe, the United States, Canada and Japan.

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Identification of Research with High Commercial Potential

Biomedicine

Area of cytokine research

Cytokines are a group of proteins and peptides that are used in organisms as signalling compounds. These chemical signals are similar to hormones and neurotransmitters and are used to allow one cell to communicate with another. The cytokine family consists mainly of smaller water-soluble proteins and glycoproteins (proteins with an added sugar chain) with a mass of between 8 and 30 kDa. Cytokines are produced by a wide variety of cell types (both haemopoietic and non-haemopoietic) and can have effects on both nearby cells or throughout the organism. Due to their central role in the immune system, cytokines are involved in a variety of immunological, inflammatory and infectious diseases. However, not all their functions are limited to the immune system, as they are also involved in several developmental processes during embryogenesis. *[Source: Gallin J, Snyderman R (eds). Inflammation: Basic Principles and Clinical Correlates. 3rd edition, Philadelphia, Lippincott William and Wilkins, 1999]*.

Cytokines include such agents as erythropoietin, which stimulates the production of red blood cells and can be used to treat severe anemia associated with renal disease; granulocyte colony-stimulating factor, which stimulates the production of white blood cells and is used to counter the loss of such cells in patients who have received anticancer therapy; and interferons, which help regulate and target the body's immune response and can be used to treat certain cancers and selected viral infections.

Examples of the relevant expertise in Croatia

Cytokines R&D, including "similar biological medicinal products" or "biosimilar products /biogeneric" development and production is a domain of advanced technical expertise in Croatia.

Innovative potential – High

Prospects for expansion of the new applications within the sector and into Biomedicine could be significant.

Several research labs, universities and industry centres throughout Croatia have contributed to advances in basic and applied research as well as commercialization of selected cytokines and other biomolecules, these are:

- PLIVA (Teva), Zagreb Croatia

  Currently, PLIVA's two most advanced projects in its biological programme are cytokines Erithropoetin (EPO) and Growth colony stimulating factor (G-CSF)
- Glaxo Smith Kline Research Centre, Zagreb Croatia
- Split University School of Medicine, Split Croatia
- Institute of Immunology Inc., Zagreb Croatia

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Area of Molecular Medicine

Example of relevant expertise in Croatia

Studies of molecular mechanisms that control cell growth and cell division, molecular mechanisms of ribosome biogenesis during oogenesis and embryonic development, molecular response to ribosome insufficiency and a 53-dependent checkpoint activation by a group of scientist at the Department of Molecular Medicine and Biotechnology, School of Medicine, University of Rijeka, Braće Branchetta 20, 51000, Rijeka, Croatia: Panić L, Tamarut S, Sticker-Jantscheff M, Barkić M, Solter D, Uzelac M, Grabusić K, Volarević S.

Innovative potential of the previous and present publications of the core group of Croatian scientists is very advanced. Establishment, development and performance of Prof. Dr. Volarević laboratory is an excellent example of how Croatia could benefit from international cooperation (NIH, European Universities) and, with expansion of research of high quality in universities, potentially transform itself to a regionally or internationally prominent hub in certain areas of Molecular Medicine.

Prospects for expansion of innovative applications within the sector could be significant, as in long-term perspective, understanding how molecular mechanisms that control cell growth and cell division are coordinated in vivo and how their interplay is deregulated in a number of diseases, may have a direct impact on the efficiency of modern therapeutics.

Area of Developmental Biology and Morphogenesis

This area also includes tissue regeneration and repair, morphogenetic proteins, Biological mechanisms of bone, cartilage and tendon regeneration, Tissue engineering of bone and cartilage based on bio-materials and biotechnology.

Example of relevant expertise in Croatia

Research team of Professor Dr. Slobodan Vukicević and Centre for Functional Genomics, School of Medicine, University Hospital Centre, University of Zagreb, Šalata 2, 10 000, Zagreb, Croatia, fbor@mef.hr.

Innovative potential – Very advanced

Innovative potential of the previous and present publications of the core group of Croatian scientists is very advanced. Prospects for expansion of the new applications within the sector could be very significant as “rapid advancements in the field of genomics, enabled by the achievements of the Human Genome Project and the complete decoding of the human genome, have opened an unimaginable set of opportunities for scientists to further unveil delicate mechanisms underlying the functional homeostasis of biological systems”.

Recent developments in Croatia

Genera Ltd. is a biotechnology start up founded by a group of scientists of the Medical School in Zagreb focused on research, development and production of human tissue and gene diagnostics in cooperation with relevant medical institutions in Croatia. Products and services include: Cartilage autologal transplant, epidermal auto graft, epidermal-dermal skin transplant, gene markers for cardiovascular diseases. Research and development program in progress: heart muscle regeneration and repair.

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Area of Vaccines and Diagnostics

Diagnostics: Tests that use biotechnology materials to detect the presence or risk of a disease or a pollutant. Vaccines: Preparations of whole or significant structural portions of viruses, microbes, plants or other entities that are intended for active immunological prophylaxis. Companies working in this area may specialize in the route of administration as well as in the disease that the vaccine targets.

Example of relevant expertise in Croatia

Institute of Immunology Inc is just one of noticeable institutions for specialized research focused on vaccines and diagnostics in Croatia. Illustration of recent research includes:

- Genetic characterization of L-Zagreb mumps vaccine strain by the following group: Ivancic J, Gulija TK, Forcic D, Baricevic M, Jug R, Mesko-Prejac M, Mazuran R., Molecular Biomedicine Unit.
- Mumps virus strains isolated in Croatia in 1998 and 2005 - Genotyping and putative antigenic relatedness to vaccine strains by: Santak M, Kosutić-Gulija T, Tesović G, Ljubin-Sternak S, Gjenero-Margan I, Betica-Radić L, Forcić D., Molecular Biomedicine Unit.

Innovative potential -Medium to high

Prospects for expansion of the new applications within this sector could be very significant as there is an unmet demand worldwide for novel vaccines and diagnostics.

Area of Natural Products Screening

New methods of screening materials extracted from animals and plants offer a rich source of potentially therapeutic compounds.

Example of relevant expertise in Croatia

Relatively high share of new publications by Croatian scientists is focused on screening materials extracted from plants. Several specialized research teams throughout Croatia, such as:

- Orsolić N, Basić I., Department of Animal Physiology, Faculty of Science, University of Zagreb, Croatia. (Water-soluble derivative of propolis and its polyphenolic compounds enhance tumoricidal activity of macrophages).
- Skocibusić M, Bezić N., University of Split, Faculty of Natural Science Mathematics and Education, Department of Biology, Split, Croatia. (Phytochemical analysis and in vitro antimicrobial activity of two Satureja species essential oils).
- Kosalec I, Bakmaz M, Pepeljnjak S, Vladimir-Knezević S. Quantitative analysis of the flavonoids in raw propolis from northern Croatia. Institute of Microbiology, Faculty of Pharmacy and Biochemistry, University of Zagreb, Croatia.
- Petlevski R, Hadzija M, Slijepcevic M, Juretic D. (Effect of 'antidiabetis' herbal preparation on serum glucose and fructosamine in NOD mice). Department of Medical Biochemistry and Haematology, Faculty of Pharmacy and Biochemistry, University of Zagreb, Croatia.

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Innovative potential – Medium to high

Area of Monoclonal Antibodies Research and Development

Biological systems for production of monoclonal antibodies are relatively novel fields of biotechnology expertise in Croatia, nonetheless they attract much attention from researchers.

Examples of relevant expertise in Croatia

Research team of Professor Dr. Bojan Polić, in partnership with von Pettenkofer Institute in Munch. Other participants: Dr. Juergen Haas, Munich, Dr. Bojan Polić, Rijeka, Dr. Stipan Jonjić, Rijeka, Coordinator.

Project goals:

- Establishment of high-throughput monoclonal antibody production and hybridoma bank at the Centre for Laboratory Mice Production Rijeka (LAMRI).
- Monoclonal Antibodies research and development, including production of labelled mABs at the Centre for Antibody Production Rijeka (CAPRI).

Monoclonal antibodies (mAbs) represent key reagents in proteome research and are broadly used in diagnostics and therapy of human diseases. Labelling of mAbs is commonly used method to increase their value and usefulness in numerous applications. This project targets development of a biological system for production of specifically labelled mAbs based on a mouse mutant that will produce, upon immunization, specific mAbs fused with a particular peptide sequence, and, as a fusion partner a myeloma cell line, transfected with a prokaryotic gene, coding an enzyme, that specifically recognizes the peptide sequence and catalyzes labelling reaction with an appropriate biomarker. It is expected that this project will significantly contribute to the development of new, more valuable reagents, particularly adapted for a high-throughput research of various proteomes (i.e. protein microarrays), which would be a driving force for further scientific and biotechnological development at the Rijeka University Medical School.

Innovative potential – High to very advanced

Prospects for expansion of hybridoma technologies and mAbs production for the new applications in all areas of Biotechnology and Life sciences is very significant as there is a growing demand for mABs products, that are the key reagents for Basic Research in the Life Sciences, Diagnostics in Laboratory Medicine, Diagnostics in Pathology, Biomarker Validation, Pharmacological Target Identification and Analysis and therapeutic applications worldwide.

Area of Viral Vector Technology

Viral vectors - modified, non pathogenic viruses that deliver useful genetic information to host cells in gene therapy and genetic engineering. In gene therapy applications, such viruses are encoded with a specific gene, which, when incorporated into a host cell, confers a clinical benefit to the patient.

Vector technology represents a potentially advantageous area of opportunity to build up development, production and distribution capacities in Croatia.

Lentigen, as innovative US-based biotechnology company, focuses on developing Lentiviral vector (LV) gene delivery technology for a wide variety of applications in biotechnology and medicine. Lentigen's vision is to apply its core competency in Lentiviral vector technology to develop

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therapeutics, vaccines, and to provide them to researchers as highly efficient gene delivery tools. A US scientist of Croatian origin Dr. Boro Dropulić is the Founder of Lentigen and serves as its Chief Executive Officer. Lentigen presently is advancing its reach to Croatian scientific and business community. These links may provide an impulse for unfolding of segments of world class R&D in selected areas of biomedicine in Croatia.

Innovative potential – High to very advanced

Lentigen is involved in design, construction and manufacturing of Lentiviral platform based vectors for basic and applied research and clinical applications: Lentiviral vectors (LV) are viral-based gene delivery systems that can stably deliver genes or RNAi into primary cells or cell lines with up to 100% efficiency. LVs bind to target cells using an envelope protein which allows for release of the LV RNA containing the gene or gene silencing sequence into the cell. The LVs RNA is then converted into DNA using an enzyme called reverse transcriptase by a process called reverse transcription. The DNA pre-integration complex then enters the nucleus and integrates into the target cell's chromosomal DNA. Gene delivery is stable because the target gene or gene silencing sequence is integrated in the chromosome and is copied along with the DNA of the cell every time the cell divides.

Prospects for expansion of Lentiviral vector (LV) gene delivery technology in new applications in all areas of Biotechnology and Life sciences could be very significant as there is an unmet demand worldwide for viral-based gene delivery systems that can stably deliver genes or RNAi into primary cells or cell lines.

Area of Stem Cell Research

An area with very good prospects for linkages between Croatian universities and American universities and research and development centres in support of pioneer biomedicine development. Stem Cell Research represents a potentially advantageous link important for Croatia: Stanimir Vuk-Pavlović, Ph.D., Professor of Biochemistry and Molecular Biology, Director, Stem Cell Laboratory, Mayo Clinic Cancer Centre, Department of Biochemistry and Molecular Biology, additional information/contact http://mayoresearch.mayo.edu/mayo/research/vuk_lab/

Present Engagement in Croatia of Professor Dr. Stanimir Vuk-Pavlović:

- Advisory Board, Croatian Medical Journal, Zagreb, Croatia
- Scientific Advisory Board, PLIVA Pharmaceutical and Chemical Works, Zagreb, Croatia,
- Organizer: Mayo Clinic and University of Zagreb Program in Advanced Medical Education.

Advancing ties to Mayo Clinic, especially in relation to University of Zagreb Program in Advanced Medical Education represent a very significant potential for Croatian universities and Croatian Biomedicine community as a whole to benefit from advances in one of the most dynamic areas of Life Science research, as well as potentially in the development of infrastructure for innovative clinical trials in hematopoietic stem cell transplantation and cellular immunotherapy**.**

Prof. Dr. Stanimir Vuk-Pavlović research interests that may represent significant potential for broad collaborative projects and beneficial cooperation with universities and corporations in Croatia:

- Hematopoietic stem cell biology and application in cancer therapy. Transplantation of hematopoietic stem cells is of considerable promise for treatment of some genetic defects,

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malignancies, and immune diseases. Research is focused on the biology of hematopoietic microenvironment and developing technology pertinent to the improvement of hematopoietic stem cell transplantation, particularly of haploidentical stem cells and the associated immunosuppression due to pre-transplant conditioning.

- Biology of dendritic cells and their interactions with T cells. Research is focused on the role of T cells in induction of dendritic cell phenotype, function morphology of dendritic cell membrane rearrangement and redistribution of antigen presenting and co-stimulatory molecules in the membrane, and mechanisms and functional consequences of membrane transfer among the cells of the immune system.

- Interactions of dendritic cells and T cells with drugs. Pharmacological agents in dendritic cells and T cells may modulate immunity. Thus, the understanding of this role is important for feasibility of immunotherapy and immunosuppression. Currently, research is focused on imatinib mesylate, a drug effective in the treatment of chronic myeloid leukemia and other malignant diseases. Functional models include dendritic cell maturation (terminal differentiation) and mixed lymphocyte reaction that we study by use of transcriptome, proteome and phosphoproteome analysis.

- Engineering dendritic cell grafts for cancer immunotherapy. Research is focused on developing technology for clinical-grade manufacturing of dendritic cell grafts for clinical trials. The ongoing and planned clinical trials include chronic myelogenous leukemia, malignant melanoma, ovarian carcinoma, pancreatic carcinoma and others.

- Recombinant replication-defective adenoviruses for gene transfer to dendritic cells. Laboratory of Vuk-Pavlovic, PhD, pioneered the use of recombinant replication-defective adenoviruses for gene transfer to human dendritic cells. Research is focused on the application of adenoviruses harboring the gene for human IL-2 in the hope that they will provide a powerful tool for preparation of dendritic cells that secrete IL-2 and stimulate expansion of cytotoxic T cells and on design of the first clinical use of this technology in clinical trials of dendritic cell immunotherapy of malignant diseases.

Area of Molecular Mechanisms and Signalling

Ubiquitin and Ub-like modifiers as signalling devices controlling intracellular trafficking, gene transcription and DNA repair represents an area of opportunity to build upon the research work of Prof. Dr. Ivan Dikić, presently professor at Goethe University Medical School in Germany Through this work, Dr. Dikić has prompted a major advancement of current understanding of the molecular machinery, which along with the ubiquitylation, controls the intracellular trafficking of ligand-engaged and activated growth factor receptors in support of pioneer biomedicine development.

Present links to Croatia

Dr. Dikić is a founder of the Dubrovnik signaling conferences. His current research interests are focused on the emerging role of ubiquitin and Ub-like modifiers as signalling devices controlling intracellular trafficking, gene transcription and DNA repair. Dr. Dikić's pioneer research as well as his engagement in education of young scientists represents a very significant potential for Croatian Biomedicine sector to benefit from advances in one of the most dynamic areas of Life Science research.

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Bioprocessing Technology

Area of Bioprocessing Technology, Biocatalysis and Bioprocess Engineering

The oldest of biotechnologies, bio-processing technology uses living cells or the molecular components to produce desired products. Living cells most commonly used are one-celled microorganisms, such as yeast and bacteria; the biomolecular components used most often are enzymes, which are proteins that catalyze biochemical reactions.

Relevant expertise

Bioprocessing Technology Research and Development, Biocatalysis and Bioprocess Engineering in particular are traditional fields of advanced technical expertise in Croatia.

Innovative potential – High to very advanced

Prospects for expansion of the new applications within the sector could be very significant, as demand for bio-processing Technologies is growing worldwide and as a number of specialized research labs, universities and industrial centres throughout Croatia contribute to advances in research and commercialization of selected bio-processing Technologies, including:

- Faculty of Food Technology and Biotechnology, University of Zagreb,
- Faculty of Chemical Engineering and Technology, University of Zagreb,
- Croatian Academy of Engineering, Zagreb,
- Croatian Academy of Sciences and Arts - Scientific Council for Agriculture and Forestry, Zagreb,
- PLIVA (Teva) Zagreb, Croatia
- Veterina Ltd

and numerous other public and private labs, universities and industry centres.

Croatia is a well respected regional/intra-regional Technology transfer/knowledge transfer hub for bioprocess engineering, including a comprehensive international annual Bioprocess Engineering Course held in Supetar, on the Island of Brač. The course covers the full spectrum of bioprocess engineering, starting from genetic concepts for micro-organisms used to produce pharmaceutical and other products via microbial physiology, bio-reaction kinetics to bioreactor design. Micro-organisms in consideration range from bacteria to yeast, as well as highly specialized animal cell cultures.

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Computational Biology

Area of Bioinformatics

Relevant expertise in Croatia

The Bioinformatics group bioinfo.hr is located in the Department of Molecular Biology at the Division of Biology, Faculty of Natural Sciences in Zagreb, Croatia. The group was formed in 2002 in an effort to include bioinformatics and computational biology courses in the molecular biology curriculum at the Faculty of Science and to motivate undergraduate and graduate students for research in this prominent and highly interesting new field of biology. Present research interests include codon usage analysis in whole genomes (INCA), protein-protein interactions and microarray data processing and analysis (MADNet).

The Bioinformatics group bioinfo.hropen is open to all forms of collaborative activities and looking for interesting biological problems to apply their computational biology methods. Teaching activities are one of the main priorities: bioinformatics for biology undergraduates and computational biology for graduate students in molecular and cellular biology. Bioinfo.hr is the organizer of the annual bioinformatics course with lecturers from the European Bioinformatics Institute, University of Cambridge, UK and University of Wageningen, The Netherlands. Community Bioinformatics group is the coordinator and maintainer of the Croatian bioinformatics referral centre - bioinformatika.hr.

Innovative potential – High

Prospects for expansion of the new Bioinformatics applications in all areas of Biotechnology and Life sciences are very significant as there is a growing demand for innovative computational biology methods.

Scientific base outside Croatia

Notable fields of Life sciences and Biotechnology that engage prominent scientist of Croatian origin, interested and/or participating in beneficial cooperation in Croatia (e.g. Prof. Dr. Nenad Ban at the ETH, Zurich in Switzerland)

Research in Biomedicine and Life Sciences at Mediterranean Institute for Life Sciences (MedILS)

MedIls is an international, private, non-profit scientific institution located in Split, Croatia. According to the founders of MedILS, the primary goal is to breed a specially trained generation of young scientists: creative, multidisciplinary professionals trained to "think the unthinkable" and do experiments about it.

MedILS is positioned to become a "hotbed" of original intellects with a freedom “to doubt and to practice a connective/synthetic thinking in high-risk innovative research”. Best young talents and the most inspiring senior scientific leaders will be invited from all over the world and let free to create a special intellectual culture. “People, not projects, will be selected” because of expectations for the projects to be so original as to be absent from the current global repertoire of projects”. The results of the research work in the course of training will be only a welcome byproduct of the primary activity of MedILS. MedILS is positioned as both a global international project with the European cultural imprint and a local Croatian and South-East European project. Innovative potential of the previous and present publications of the core group of Institute scientists is very advanced. If

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strategic vision of the MedILS founders is successfully implemented, Croatia could become a regionally or internationally prominent hub in certain segments of life sciences knowledge creation and transfer - Further assessment is required**.**

Research fields and teams include:

- Evolutionary and medical molecular genetics
  Taddei / Svetec group: Genetics of death in yeast.
  Radman / Zahradka group: Life under extreme conditions

- Computational biophysics and bioinformatics
  Sbalzarini / Kriško group: Biophysics and bioinformatics of bacterial cells
  Žagrović group: Computational biophysics of macromolecules

- Ikeda group: Inflammation and cancer

- Tumor biology program
  Đikić / Terzić group: Ubiquitin and cancer