



Report:

Task 1.1 _ WP1

Identifying best practices in innovation management from EU

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1. OBJECTIVES, METHODOLOGY AND RESULTS

The general objective of the WP1_Task 1.1 was to review and benchmark best practice in teaching and research from the existing European study programmes. The purpose of this task was to help developing the structure and the teaching of contents for an interdisciplinary master and PhD curriculum in innovation management at universities in Serbia.

Our specific objectives as task leader were:

1. To develop a template for data collection,
2. To distribute countries for research among partners,
3. To collect completed templates from all partners,
4. To develop a category system for data analyze and to evaluate all collected programmes
5. To summarize the results of evaluation and to prepare a presentation for the workshop

1.1 Templates for data collection

With the aim to facilitate both, the data collection from different EU countries and the evaluation afterwards, we developed a template for master and PhD programmes as well as a separate template for life-long-learning courses which were sent to all partners addressed in task 1.1 of the WP1.

Our templates consisted of four main parts:

1. Basic information,
2. Vision/mission and goal of the study programme with learning outcomes and focus areas,
3. Programme structure with teaching methodology and modules distribution,
4. Admission requirements.

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The purpose of the template was to develop a common approach for data collection and patterning. Thus, by some categories we defined also the possible answers to help the data structuration and evaluation in the next step of the study. Hence, the four blocks represented our main categories for the programme evaluation in Atlas.ti. By means of this tool we were able to analyse simultaneously a big amount of collected data.

Table 1: Templates for data collection

Basic information
Country, Programme, University, Address, Field, Degree awarded, Level, Official length of the programme, Language of instruction, ECTS, Programme type, Website, Email address
Vision / Mission / Goals of study programme
Learning outcomes and competences
Areas of focus
Connection to industry / practical placement
Programme structure
Teaching methodology, didactic
Mandatory and elective modules
Most interesting subjects (title, overview, didactic, exam, literature)
Format of final thesis
Admission requirement
Admission semester
Comments (max. 200 words)

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1.2. Countries' distribution

All EU partners on the project were included into the research on best practice of study programmes. The distribution of the countries for the data collection is presented in the next table:

Table 2: countries' distribution

Project partner	Acronym	Country for case study
South East European Research Center	SEERC	UK, Netherlands
Freie Universität Berlin	FUB	Germany, Denmark, Finland, Norway, Sweden
Aristotle University of Thessaloniki	AUTH	Greece, Spain, Bulgaria, Portugal
University of Maribor	UM	Slovenia, Italy, France, Belgium
World University Service - Austrian Committee	WUS	Austria, Czech Republic, Slovak, Poland

The partners were asked to collect at least 7 master and 4 PhD programmes as well as 8 training courses (LLL) from countries which were assigned to them. They ought to complete a separate template for each study programme and LLL-courses and to send them all together to us via e-mail by 4th April 2014.

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1.3. Data base – descriptive statistics

After all data had been collected we analyzed separately all templates with the aim to identify the programmes that fit best to our purpose. In sum, we had 120 usable programmes in our sample (see table 2). Among these, we had 72 master, 25 PhD and 23 LLL programmes.

Table 3: Data base summary total

Country	Master	PhD	LLL	sum (countries)
Austria	6		1	7
Belgium	2			2
Bulgaria	2	1	2	5
Czech Republic	2			2
Denmark	6	3	3	12
Finland	4	2	3	9
France	5			5
Germany	6	4	5	15
Greece	5			5
Italy	3	1		4
Netherlands	3	1		4
Norway	5	4	1	10
Poland	2			2
Portugal	2	1	1	4
Spain	5	1		6
Sweden	5	3	1	9
UK	9	4	6	19
sum (programmes)	72	25	23	120

In the next step we separated and analyzed the collected programmes by fields. In the sample of 72 master programmes we found 26 curricula specialized in innovation management. The number of business and economics master programmes including innovation management as module is higher (38 programmes). In contrast, industrial management and engineering programmes which include innovation management modules are far fewer present.

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The situation is contrary concerning PhD programmes. Surprisingly, we could only find four PhD programmes which are specialized in innovation management (two in UK, one in Germany and one in Denmark). The situation is very similar to industrial management and engineering PhD programmes. These results point to an interesting trend: PhD programmes which are closely related to innovation management are more business and economics oriented and offer innovation management as a module only.

In addition we collected a sample of 15 innovation management LLL-courses. They are presented mostly in UK and Germany.

1.4. Evaluation- Methodology

Based on the previously developed category system with four main categories and several subcategories (see table 3), we analyzed the collected data using the Atlas.ti software tool. The purpose of the evaluation was to draw general conclusions on collected programmes from all countries that we did research on.

Table 4: Category system for evaluation

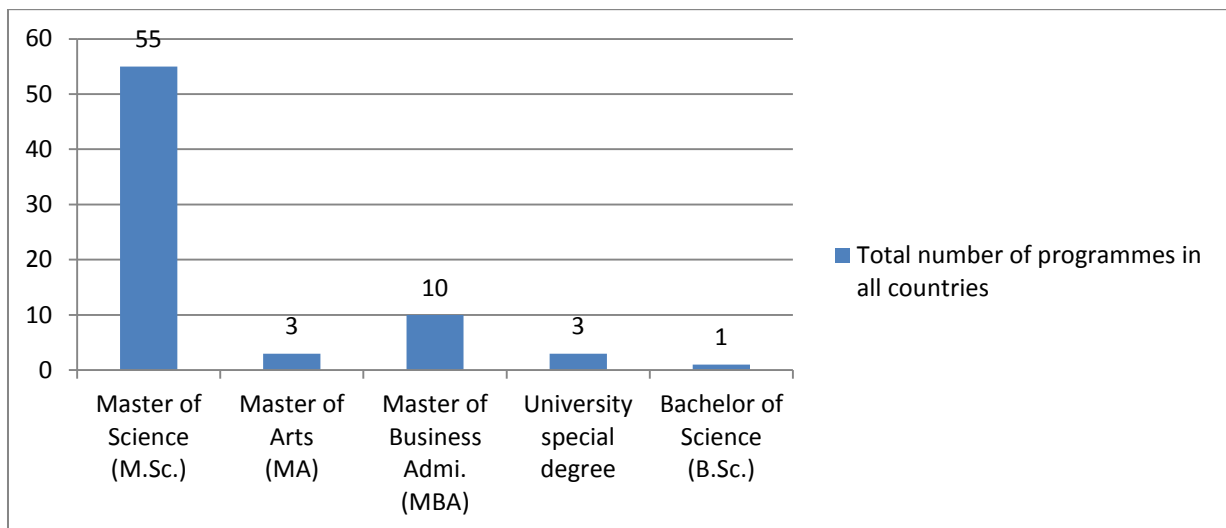
Categories	Sub-categories
Basic information	Country
	ECTS and length of the programme
	Degree awarded
Programme structure	Mandatory and elective modules distribution in semesters
	Subjects in modules
Teaching methodology and didactics	
Admission requirement	Required degree
	ECTS in special subjects
	Language and additional skills
	Work experience

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1.2. Results

Regarding the sample of 72 collected master programmes the main degree awarded after completing the study programme is the M.Sc. (Master of Science). On the second place, but far below the first one is the Master of Business Administration (MBA) with only 10 programmes. Further special degrees offered by the universities as well as the Master of Arts (M.A) are far less presented in our sample (see chart 1).

Chart 1: Degree awarded

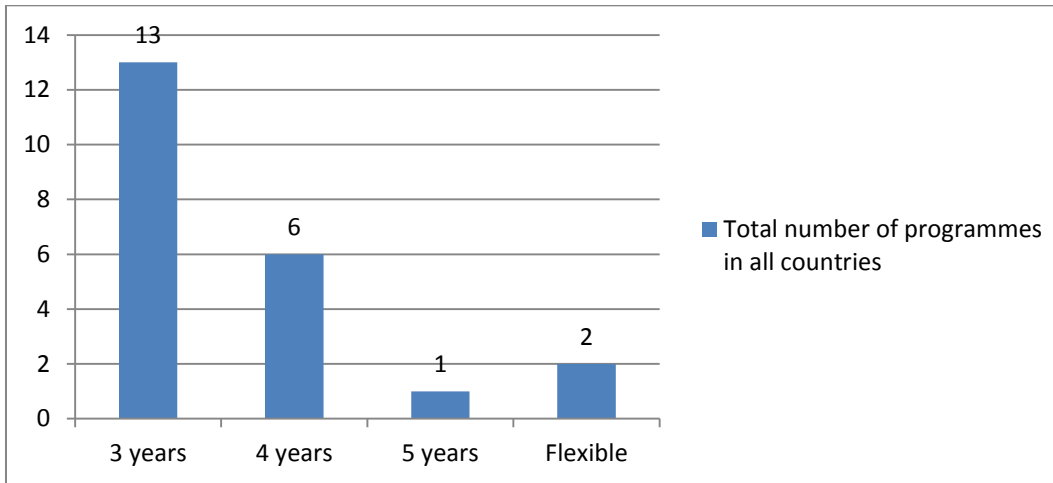


We found that 4 semester master programmes with 42 collected examples constitute the majority regarding the length of the master's studies. In these, students have to collect 120 ECTS credit points in order to complete the programme. However, the number of programmes with 2 semesters plus master thesis shouldn't be neglected, particularly since all of the master programmes in UK represent this study model. Moreover, France, Belgium, Greece, Netherlands and Spain offer such programme models as well. Therefore, in the following chapters both of the models will be considered and further analyzed.

Most of the collected PhD programmes are structured into three years. Only few examples can be found with a length of four or more years (see chart 2)

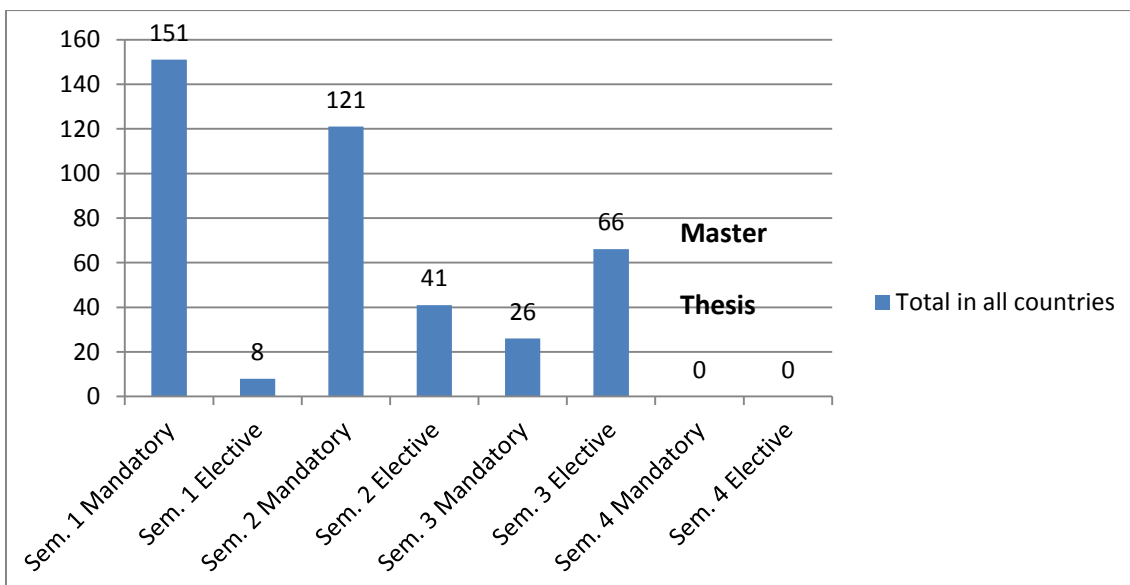
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Chart 2: Length of the PhD programmes



Comparing the four and the three semester master programmes we can see the difference concerning their structure and particularly in the distribution of mandatory and elective modules. The four semester programmes include more mandatory modules in the first and second semester (75% mandatory vs. 25% elective) but more elective in the third semester (25% mandatory vs. 75% elective). The fourth semester is provided for writing the master thesis. Conversely, the three semesters master's models include less elective but more mandatory modules (75% elective vs. 25% mandatory).

Chart 3: Distribution of mandatory and elective modules in four semester master programmes



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Analyzing the structures of all collected master programmes from the sample we could define several subjects' categories. Afterwards we ranked these categories based on their frequency in the whole sample and defined four groups of subjects' modules:

Rank1: Innovation management, entrepreneurship and strategies management, information and knowledge management, project management

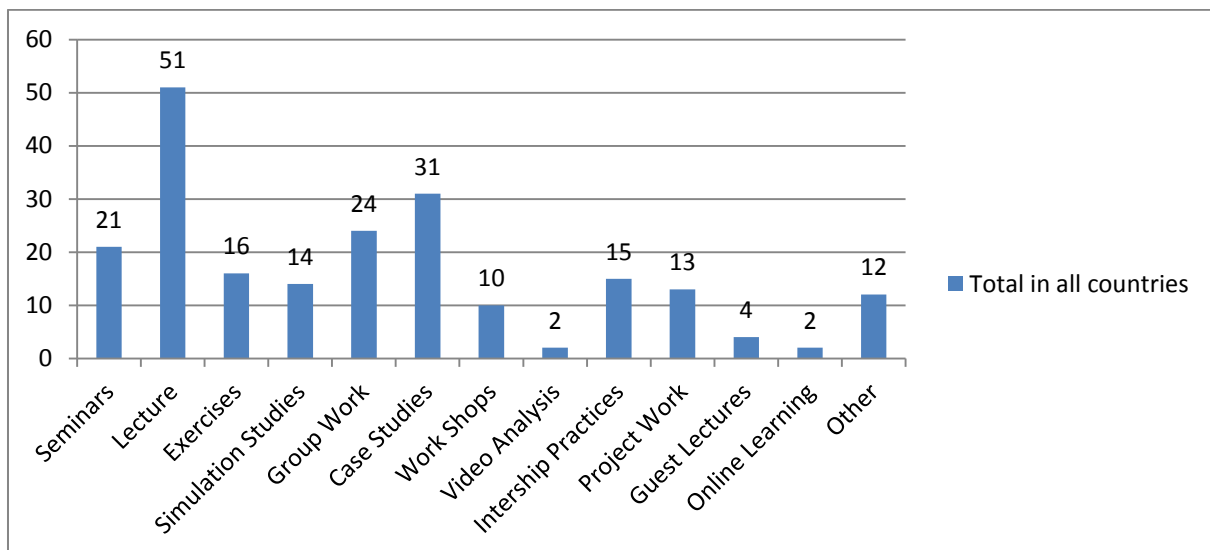
Rank 2: Intellectual property management, human resource management, marketing management

Rank 3: Research methods, idea management, accounting and finance

Rank 4: Foreign language, quality management, innovation policy

The used teaching methodologies and didactics are very similar regard in all considered countries and programmes (see the table 4). The most used methods are lectures, case studies and group works. Moreover, the students have possibilities to participate in projects and internship programmes with the aim to collect practical experience during their studies. Moreover, some programmes include different simulation studies and workshops which contribute to the interactive learning approach.

Chart 4: Teaching methodology and didactic

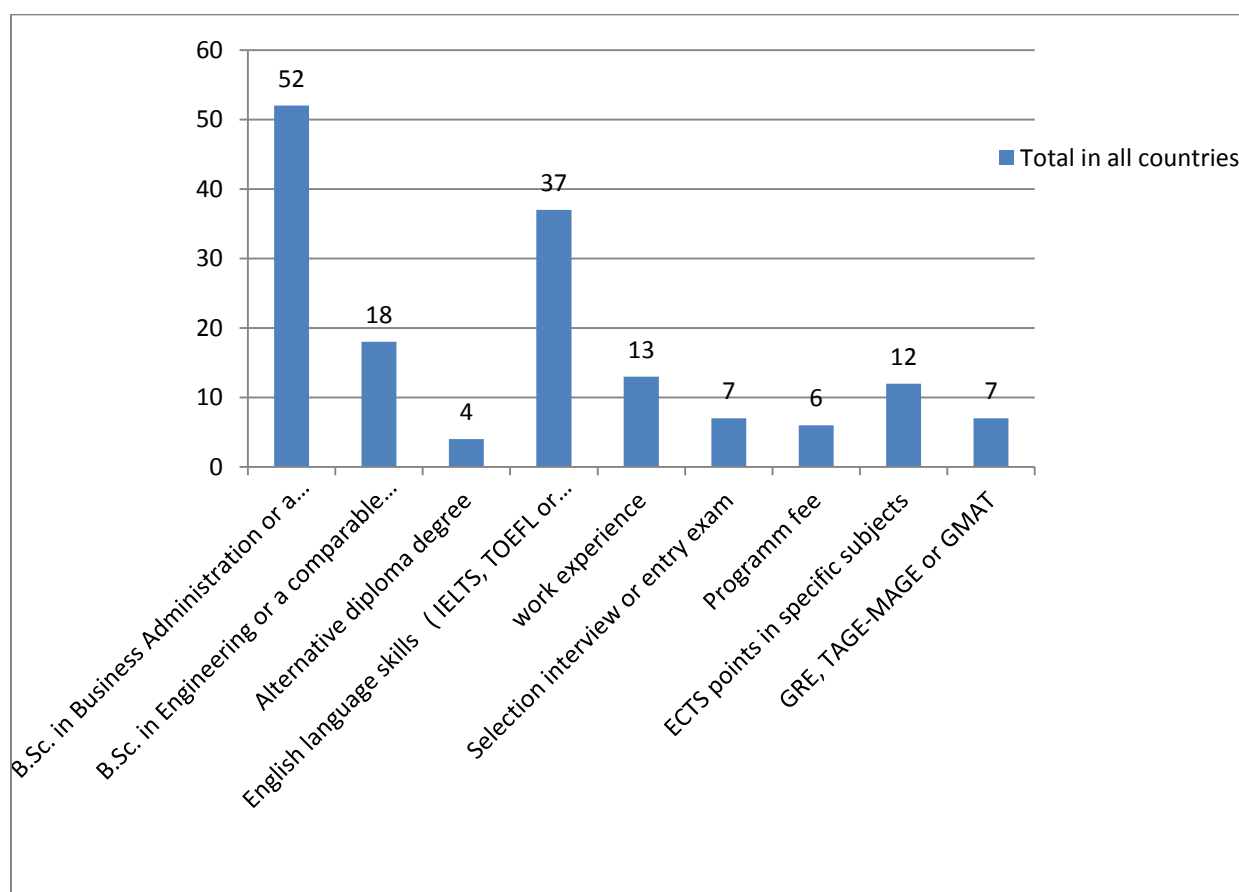


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In the final phase we analyzed the admission requirements. In this process we also used some previously defined sub-categories such as the required degree of prior studies, ECTS credit points in some special subjects, language and additional skills as well as work experience. Our goal was to figure out the most important admission requirements in the analyzed countries and programmes. Finally, we came to the following results (see chart 5).

Chart 5: Admission requirements



The most important requirement is the degree rewarded for prior studies. In dependence on the orientation of the master programme (more business- or more engineering-oriented) the potential candidates need to have a successfully finished equivalent bachelor or diploma degree. In addition the language skills proven by IELTS, TOEFL or ESOL certificates also represent a dominant requirement, because most of the courses and learning materials are in English. Surprisingly, some of the universities even require work experiences. This could be the reason for practical relevance of these study programmes. By contrast, selection interviews and GRE/GMAT/TAGE-MAGE certificates as requirements are very rarely presented.

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2. DETAILED DESCRIPTION OF SELECTED MASTER PROGRAMMES

In this section we will present three master programmes from our sample which could be relevant for developing the curriculum for a similar study programme at Serbian universities. In the selection process we used two main criteria based on the outcomes of our three sessions at the curriculum development workshop with other Consortium members in Thessaloniki.

First, we focused our selection on the needs of the Serbian universities. Hence, the main criterion was the length of the study programme. With the aim to facilitate the development of a curriculum for a one year master programme (two semesters with 60 ECTS), we were focusing on programmes with similar length and structure.

Secondly, we used learning outcomes as criteria defined at the workshop. Thus, we selected programmes which bridge the gap between engineering and management. In this process, we were looking for master programmes which include both, innovation and technology management as well as entrepreneurship-related subjects. Such programmes could be used as a basis for the development of a master programme's curriculum with both, technical and management background. Moreover, we considered also the teaching methodology and didactics which provide interdisciplinary understanding of principles, theories and techniques in the field of innovation management.

In the following, the four selected master programmes will be presented and commented. The last section deals with conclusions which can be drawn from the specific findings.

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2.1. MSc Innovation & Technology Management – Bath University

2.1.1. Basic information and learning outcomes

This master programme is a joint degree runs by two of the University of Bath's top ranked departments- the School of Management and the Department of Mechanical. The official length of the programme is 12 months and offers an advanced qualification useful to engineering, science, and management graduates wishing to develop an in-depth understanding of innovation and technology management concepts and methods and the skills to apply these in real life. On the end students award a degree of Master of Science (M.Sc.)

The programme provides students with:

- a deep intellectual appreciation of the theoretical foundations of innovation and technology management with an applied emphasis - It is anticipated that most students will want to complete the MSc.
- the ability to apply relevant bodies of innovation and technology management knowledge to make an immediate contribution to industry in the field of innovation and technology management
- a learning environment which encourages the development of systematic and independent thought and learning
- a comprehensive knowledge and appreciation of significant contemporary issues in innovation and technology management research
- a knowledge of innovation and technology management research methods beyond the undergraduate level so that students will have the skills necessary for them to undertake independent research of innovation and technology management problems
- a research training in innovation and technology management enabling them to continue on to doctoral work should they so choose

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2.1.2. Programme structure

The programme is offered on a full-time basis. It lasts 12 months divided into two 11 week semesters and the dissertation period. The teaching programme consists of 10 units (5 per semester), each focusing on a different aspect of innovation and technology management. The first unit, Management of innovation, introduces the key themes of the programme, while other units provide in depth treatments of key management and engineering principles, processes and techniques. During the final three months of the degree students produce a dissertation. Given the combined management and engineering nature of the programme, dissertations may span both management and engineering perspectives and methodologies. Dissertations are expected to draw on real world innovation management practice.

2.1.3. Modules

All modules of the programme are mandatory for all students

Semester 1

- Management of Innovation
- Decision analysis
- Managing product development
- TRIZ-based innovation
- Creativity and innovation methods

Semester 2

- Engineering and project management
- Commercialization of new technology
- Innovation in networks
- Technology strategy and organisation
- International networks for production, services & logistics

Format of the final thesis: Dissertation of between 10,000-12,000 words

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2.1.4. Admission requirements

- A good first degree in engineering, management, or science (2:1 or above or its international equivalent). Other disciplines with some numerical content will be considered, on an individual basis.
- A minimum of GCSE Grade B Mathematics, or equivalent
- A minimum of GCSE Grade C English Language, or equivalent for students whose first language is English
- For students whose first language is not English, a minimum of TOEFL 600 (250 computer based) or IELTS 7 with no less than 6.5 in all parts or equivalent

2.1.5. Comments

This MSc integrates two disciplines with the aim to ensure students have the necessary skills to manage across boundaries. This makes it the ideal programme for graduates wishing to bridge the gap between engineering and management. It provides a strong background in the technical aspects of innovation and technology management whilst offering an underpinning in business and management studies.

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2.2. MSc Innovation, Entrepreneurship and Management - Imperial College London

2.2.1. Basic Information and learning outcomes

This master programme aims to teach the students how to manage in dynamic, uncertain and entrepreneurial environments. Hence, it consists of three distinct phases to meet this need: Management, Innovation and Entrepreneurship as well as Business Applications. The programme has been designed to meet the need to understand how to manage the introduction of the new technologies, systems and services that are vital for opening up new business opportunities.

Combining core management courses with advanced insights in innovation and entrepreneurship, the programme aims to enhance students' strategic and operational management skills through a unique and highly practical syllabus. This will be as relevant to an individual looking to work in a large organization as to an entrepreneur planning to start their own business. Through its blend of theory and practice, students learn how to manage the resources, people and other assets at the heart of any business, preparing them for a wide range of careers in management.

2.2.2. Programme structure

The programme consists of three distinct phases:

- Management
- Innovation and Entrepreneurship
- Business Applications

The Management Core, consisting of five courses in the autumn term, provides students with a broad business understanding as a foundation for the focused study of innovation and entrepreneurship. In the spring term, the Innovation and Entrepreneurship Core comprises of five courses which teach students how to create, deliver and capture value from innovation. Business Applications in the summer term provide students with valuable practical experience in applying the theories they have covered in the autumn and spring to real-world cases.

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2.2.3. Modules

The Management Core (September – December)

- Organizational Behavior and Human Resource Management
- Strategic Management
- International Marketing
- Business Economics
- Accounting and Corporate Reporting Analysis

The Innovation and Entrepreneurship Core (January – March)

- Entrepreneurship
- Innovation Management
- Business Models and Intellectual Property
- Design, Products and Services
- Venture Growth and Finance

Business Applications (April – September)

- Project Management
- Business Simulation
- Business Plan Competition
- Consulting Project
- Individual Essay

In this master programme students do not have any final thesis

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2.2.4. Admission requirements

- A first or upper second Class honours degree (or international equivalent) is required in a subject other than business or management. Alternatively, a Lower Second Class honors degree (or international equivalent) from a recognized university in a subject other than business or management may be accepted alongside a proven track record of significant experience in innovation or entrepreneurship. Here is a list of documents it is accepted as evidence of innovation or entrepreneurship:
- Invention submission to a company
- Applied for or hold a patent
- Applied for or own a trademark
- Winning or being shortlisted in a design competition
- Founding an active company
- Being a named Director on a new venture (up to 5 years old)
- Having an article published in a recognized scientific journal or trade press publication
- Solved a problem on an Innovation Portal such as Inno Centive or Nine Sigma
- Created a product idea that was used or developed by a company
- Candidates who believe they have significant innovation or entrepreneurship experience but in an area that is not specified above will have the opportunity to state this in the application.

Candidates whose degrees are in business or management are acceptable for the programme.

2.2.5. Comments

The programme truly combines theory with application in a unique way by separating out the applications aspect into individual modules in the last part of the programme. The programme has a consulting project at the end but does not require a dissertation unlike most U.K. MSc degrees. The programme balances knowledge in general management with entrepreneurship and innovation and has applications as the overarching feature of the programme.

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2.3. Technology and Innovation Management - University of Sussex

2.3.1. Basic information and learning outcomes

The course provides a common set of intellectual foundations that provides the postgraduate students with a unique set of skills required to analyze and understand complex problems. Such problems cannot be solved by only one discipline. Therefore, the programme takes an interdisciplinary approach in order for students to develop a deeper understanding of these pressing issues. More specifically, the programme seeks to address the role of science and technology in society and how can sustainable and fair economic growth be ensured. The research focuses on understanding, managing and directing economic growth so that it is smart, inclusive and sustainable - in an economic and social sense, as well as environmentally.

2.3.2. Programme structure

Autumn term: 3 core modules

Spring term: 3 core modules and 2 electives

In addition,

Spring and summer terms: A group technology management project that assesses the sources and outcomes of a specific technology or innovation.

A Research Design, Planning and Management workshop

Individual Research dissertation

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2.3.3. Modules

Mandatory modules

- Dissertation (Technology and Innovation Management)
- Introduction to Statistical Research Methods
- Managing Innovation
- Perspectives, Methods and Skills for Science, Technology and Innovation Studies
- Science, Technology and Innovations: Markets, Firms and Policies
- Technology Management Project

Elective modules

- Energy and Development
- Energy Policy and Sustainability
- Governing energy transitions
- Information and Communication Technology Policy and Strategy
- Innovation for Sustainability
- Managing Complex Projects, Products and Systems
- Managing Intellectual Property
- Managing Knowledge
- Statistical Methods for Science, Technology and Innovation Studies
- Strategic Management - Business Mgmt Course

2.3.4. Admission requirements

The main requirement is a first- or upper second-class undergraduate degree in either social or natural sciences. Applicants with relevant professional experience will also be considered. In addition English language requirements IELTS 6.5 overall, with not less than 6.0 in each section. Internet-based TOEFL with 88 overall, with at least 20 in Listening, 19 in Reading, 21 in Speaking and 23 in Writing.

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2.3.5. Comments

The structure of the programme reflects the premise that problems are complex and cannot be solved in a mono-disciplinary manner. There is a clear link between Technology Innovation and Sustainability that underpins the modules of the programme. The dissertation which can be carried out in a company further supports the hands –on approach to problem solving.

2.5. Conclusion

All selected master programmes last only one year (e.g. two semesters). They combine theory with practice and provide students with a deeper understanding of creativity, idea and product development, innovation processes and technology management, strategy development, organizational and management concepts, business development and entrepreneurship as well as intellectual property rights. With these features these master programmes could serve as example for an interdisciplinary innovation management master programme at Serbian universities.

The structure of the teaching programmes consists of mandatory and elective modules which focus on different aspects of innovation and technology management as well as business and entrepreneurship. However, there are also examples for programmes with exclusive core modules which are mandatory for all students. Since the master programme runs over only two semesters there is a structure that offers more field specific learning outcomes. By contrast, a programme with additional elective modules offers more flexibility and interdisciplinarity for students.

In addition to theoretical subjects, students are also offered selected programmes with courses for additional soft skills and research methods in order to help them in preparing their master dissertations. Moreover, such courses are suitable for students who plan to work in research or in consulting or to study further in a PhD programme. The final thesis is based on an empirical research in form of a case study and should be in average between 10.000 and 15.000 words in length. Thereby the practical relevance of the study programmes is intensified to a large extent.

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Candidates holding a bachelor degree in engineering or in management field are eligible to study one of these master programmes. This admission characteristic emphasizes the interdisciplinarity of programmes. Due to the internationally oriented studies programmes English skills are required (TOEFL). In addition, candidates with professional experience are considered by the admission as well.

To summarize, it is possible to organize a master programme in innovation management in only two semesters (e.g. one year) and to achieve the planned objectives and complex interdisciplinary learning outcomes at the same time. Such a study programme would offer an advanced qualification for students with both, engineering and management background as well as an academic background in economics or business. The structure of the programme and learning methods should be focused on theoretical lectures as well as on project work, case studies and group work with the aim to prepare the candidates for practical work in innovation management and business development fields. Thus, after a successfully completed programme the students should be able to work in complex product, process and service innovation as well as business development projects. The majority of the subjects should be organized in mandatory modules focusing on the key learning outcomes of the programme. However, the elective modules should provide students with additional skills which could be used for empirical research and be applied to the thesis writing. Moreover, these courses could upgrade the academic profile of the students with their personal interests. Hence, they should include subjects such as innovation for sustainability, innovation policy, knowledge management, strategic management, idea management and so on. Because of the time shortness the elective modules should exclusively take place in the second semester at the same time as the research for final master thesis.