ENEX Innovation Management

Lesson plans ver. 2

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Introduction

Part II (Innovation Management) of the ENEX curriculum focuses on innovation processes and will impart knowledge that is necessary to understand, assess and manage the R2M process in the area of nanotechnology. The lessons provide a systematic view of peculiarities of the NT innovation process from idea to market describing the most critical phases and typical innovation barriers. Special attention is given to the very early stage of the innovation process that is commonly understood as being the root of success for any company to compete on the basis of innovation. The course aims to provide methodological knowhow and appropriate problem solving techniques that help manage the innovation process. Starting with the early stage of innovation (market research, idea generation, product strategy, concept development, IPR etc.) the course guides the ENEX trainee through the development phase (e.g. product design, development etc.) to the commercialization process (certification, licensing, marketing etc.). Success stories are used to map and discuss the value chain from idea to market and demonstrate the relevant phases of the R2M process.

Innovation Management ver. 1 pilot training

University of Lodz conducted pilot courses with 15 trainees who evaluated and gave feedback on the basis of the first version of lesson plans. The feedback collected from the participants was used to revise the first version of lesson plans. On the basis of the pilot, two modules were added to the first version, learning outcomes were revised as well as an overall content of the course.

Course modules

The course is divided into 8 modules.

List of Modules:

IM 1 - **Introduction to innovation management (4 hrs)**

IM 2 - **Technology commercialization fundamentals (12 hrs)**

IM 3 – **Assessing the market value of (nano) technology (10 hrs)**

IM 4 – **Innovation marketing (12 hrs)**

IM 5 – **Intellectual property (8 hrs)**

IM 6 – **Management of (nano) technology development project (12 hrs)**

IM 7 – **Financing of innovation management in nanotechnology (8 hrs)**

IM 8 – **Corporate and academic entrepreneurship**

Innovation Management

ver.2 modules

MODULE IM1

Introduction to innovation management

Study load: 4 hours

Description of the module

The aim of the module is to present the overall context of innovation management. The main areas covered by the module are as follows:

1. Basic concepts of innovation management including among others: innovation, creativity, technology commercialisation, technology transfer.
2. Innovation in organisations – typology. Various types of innovation as a source of competitive advantage of companies.
3. Innovative process. Technology push vs market pull approach. Interactive process. Product development process. Scientific research as part of innovative process.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Basic concepts of innovation management.
2. Types of innovation in organizations.
3. Characteristics of innovation processes.

Skills

After following this module, the trainee (should be able to):

1. Know the basic concepts of innovation management including creativity/ idea generation, technology commercialisation, technology transfer etc.

2. Know about the various types of innovation as a source of competitive advantage of companies.

3. Know about various approaches to innovation processes, including technology push/ market pull, interactive and non-linear processes, value chain and the nanotechnology research-to-market (R2M) process.

Competences

After following this module, the trainee (should):

1. Develop a critical understanding of the complexity and heterogeneity of research-tomarket processes and innovation management.

2. Build capabilities in interdisciplinary and analytical thinking.

Course materials

- PowerPoint presentations cover main topics
- Self-testing quiz

MODULE IM2

Technology commercialization fundamentals

Study load: 12 hours

Description of the module

The aim of the module is to present the overall context of the nanotechnology research-to-market (R2M) process, and its importance for enterprises and for the development of the economy. The main areas covered by the module are as follows:

1. Developing the competitive advantage of a modern enterprise: the importance of technology commercialisation and innovation.
2. Key components of the concept of commercialization. Process models for commercialization, the stages of the R2M process.
3. Choosing an appropriate innovation strategy in the R2M process.
4. Key areas of decision-making in the commercialization process (to commercialize or not, intellectual property protection, how to finance, and market entry strategies).
5. Key strategies and tactics for commercialization. Strategic partnerships of companies and research institutions in the process of commercialization.
6. Management competencies in the area of technology commercialisation and innovation management.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Building competitive advantage of a modern enterprise.

2. Commercialization of R&D output. Stages of the nanotechnology research-tomarket (R2M) process.

3. Innovation and commercialization strategies.

4. Strategic partnerships.

5. Management competencies in the area of technology commercialisation.

Skills

After following this module, the trainee (should be able to):

1. Understand the principles of commercialization processes.

2. Identify critical milestones/ bottlenecks in the nanotechnology R2M process.

3. Know commercialization strategies and how to adapt them to nanotechnology R2M processes.

4. Identify market characteristics and market opportunities.

Competences

After following this module, the trainee (should):

1. Develop a systematic and general understanding of the complexity of nanotechnology R2M processes.

2. Be able to understand the process of commercializing R&D outputfrom different angles (researcher, company manager, investor etc.).

3. Develop analytical competences and creativity.

4. Build social competences and communication skills.

Course materials

- PowerPoint presentations cover main topics
- Youtube/presentation: commercialization models of research results and the transfer of knowledge and technologies in the biotechnology
- Case: Novasome company
- Self-testing quiz

MODULE IM3

Assessing the market value of (nano) technology

Study load: 10 hours

Description of the module

The module aims at providing knowledge and skills necessary to assess the economic value of know-how / technology. The main areas covered by the module are as follows:

1. Introduction to economic value assessment: process, components and types. Technology readiness levels (TRL) and its applicability in economic value assessment.
2. The criteria for determining the economic value of the know-how / technology. The context and specific factors related to scientific research outcomes.
3. Valuating the results of research and development projects.
4. Key competences and key areas of activity of a commercialization / technology transfer manager.
5. Presenting the outcomes of economic value assessment.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Economic value assessment.

2. Technology readiness levels (TRL).

2. Criteria for determining the economic value of a technology.

3. Valuation of R&D output.

4. Key competences and key tasks of a commercialization/ technology transfer manager.

5. Presenting the outcomes of economic value assessment.

Skills

After following this module, the trainee (should be able to):

1. Understand the process of economic value assessment.

2. Assess the level of technology readiness for a given research outcome.

3. Write technology offers/ requests based on R&D outcomes/ company needs.

4. Know the methods for assessing the economic value of industrial property rights (IPR) and how to apply them.

5. Write business reports relating to economic value assessment.

Competences

After following this module, the trainee (should):

1. Be capable of understanding the interrelation between product maturity and economic value.

2. Enhance capacities in analytical thinking.

3. Build capabilities in decision making.

4. Enhance communication and presentation skills.

Course materials

- PowerPoint presentations cover main topics
- Cases containing descriptions of scientific research outcomes, which provide a basis for training assessment skills.
- Self-testing quiz

MODULE IM4

Innovation marketing

Study load: 12 hours

Description of the module

The aim of the module is to provide the knowledge about marketing activities related to the product in the different stages of its development. Particular attention is paid to increase the understanding of interconnection between the technology development process and market issues. The main areas covered by the module are as follows:

1. Market analysis. Sources of market information.
2. The product structure and its quality characteristics from the point of view of the supplier and the user.
3. Identification of the qualitative characteristics of the product and its place in the value chain.
4. Product marking.
5. Product Lifecycle Management.
6. Purchasing process within organizations.
7. Rules for the product innovation development.
8. Promotional tools for innovative products and services.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Market analysis. Sources of market information.

2. Product structure and its quality characteristics from the supplier's and user's point of view.

3. The product in the value chain.

4. Marking products.

5. Product lifecycle management.

6. Developing product innovations.

7. Promotional tools for innovative products/ services.

Skills

After following this module, the trainee (should be able to):

1. Know where and how to find market information and carry out market research.

2. Analyze market segments and the competitive milieu.

3. Understand the stages of the product development process.

4. Knows the basic principles for the assessment of new product ideas.

5. Identify opportunities for the developing ideas for product innovation.

Competences

After following this module, the trainee (should):

1. Develop market intelligence capabilities.

2. Build capacities in information gathering.

3. Enhance analytical competences.

4. Enhance creativity.

5. Develop communication skills.

4. Build methodic competences (marketing).

Course materials

- PowerPoint presentations cover main topics
- Guidelines relating to the exercises: (i) analyse the marketing environment, (ii) identify the characteristics of the product quality and its place in the value chain, (iii) identify the stage of product life cycle.
- Self-testing quiz

MODULE IM5

Intellectual property

Study load: 8 hours

Description of the module

The module aims at building capabilities required for choosing the proper form of legal protection of R&D outcomes. This is particularly important in the context of the process of innovation management. It is necessary to build capabilities related to the use of various intellectual property (IP) protection strategies. The main areas covered by the module are as follows:

1. Basics of IP regulations. Regulations at European and international level.
2. Different types of protection rights. Procedures for establishing these property rights.
3. Patents. Paths for patent protection (EPO PCT). Rights and obligations related to patents. Infringement, misappropriation, and enforcement.
4. Search in patent databases.
5. Agreements related to intellectual property rights.
6. Licensing.
7. Trade secrets in the process of technology commercialization.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Intellectual property rights (IPR) legislation.

2. Types of IPR. Procedures for establishing IPR.

3. Patents. Paths for patent protection. Rights and obligations related to patents. Infringement, misappropriation, and enforcement.

4. Trade secrets.

5. Patent databases.

6. Types of IPR agreements.

7. Licensing.

Skills

After following this module, the trainee (should be able to):

1. Know categories of IPR and the differences between them.

2. Know procedures for the protection of intellectual property.

3. Understand the structure of patent documents and the importance of patent claims.

4. Develop an IP strategy for a given case.

5. Know the most important sources of patent information and how to retrieve information from patent databases.

6. Know the basic structure and aims of IPR agreements and how to use them.

7. Understand the structure and most important phrases of license agreements.

Competences

After following this module, the trainee (should):

1. Understand patents as assets, think proactive and be sensitized to protecting IPR in the early stage of nanotechnology R&D.

2. Be able to analyze patents and draft IP strategies and/or commercialization strategies baased on IP.

3. Be capable of using patent databases as important tool for technological information and novelty search.

4. Develop communication and negotiation skills (licensing).

Course materials

- PowerPoint presentations cover main topics.
- Webpages of European Patent Office, World Intellectual Property Organisation and national patent offices.
- Self-testing quiz.

MODULE IM6

Management of (nano) technology development project

Study load: 20 hours

Description of the module

The aims of the module are to provide knowledge and skills necessary to prepare a plan of commercialization of R&D results and to gain knowledge about tools and techniques related to innovation management. The main areas covered by the module are as follows:

1. Business planning. Aims, objectives and elements of the commercialization plan..
2. Creativity fostering tools in the process of innovation management
3. Evaluation and determination of the appropriate IP strategy.
4. Evaluation of possible application options of R&D results.
5. Development of the key stimulus for the implementation of R&D results. Stakeholders / benefits matrix.
6. Preparation of the scenarios of technology and product development on the market.
7. Business model canvas.
8. Cooperation on the implementation of R&D results or relating to further development.
9. The principles of presenting the commercialization plan – structure, main components, rules of communication
10. Management of technology and product development projects: structure, stages and management techniques.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Business planning.
2. Creativity techniques in innovation management.
3. Developing IPR strategies.
4. Implementation of research results. Stakeholders/ benefits matrix.
5. Business model canvas.
6. The commercialization plan.
7. Management techniques for nanotechnology/ product development projects.

Skills

After following this module, the trainee (should be able to):

1. Know appropriate management tools supporting the understanding of complex nanotechnology research-to-market processes and how to apply those tools.

2. Understand the purpose, contents and how to develop a business/ commercialization plan.

3. Elaborate and present a commercialization plan.

4. Know the principles and basic tools of project management relating to technology/ product development .

Competences

After following this module, the trainee (should):

1. Build analytic competences.

2. Develop social competences: communication skills, empathy, team-working abilities.

3. Build leadership capabilities.

4. Build methodic competences (coaching, use of innovation and project management tools).

Course materials

- PowerPoint presentations cover main topics.
- Sheet to prepare the conception of a commercialization plan.
- Self-testing quiz.

MODULE IM7

Financing of innovation management in nanotechnology

Study load: 8 hours

Description of the module

The aim of the module is to provide knowledge and understanding of financing strategies for nanotechnology implementation as well as practical preparation of a financial plan. The module encompasses the practical preparation of proposals for the investor. The main areas covered by the module are as follows:

1. Management and financing of the innovation process.
2. Economics of innovation: selected issues related to financing innovation.
3. Stages of development and innovation funding.
4. Financing innovation in the process of commercialization.
5. Types of sources of research funding and implementation.
6. Equity financing: definition, pros and cons.
7. Gaining investors: types of investors, search for investor.
8. Methods and forms of preparation and presentation of offers for investors and other target groups / stakeholders.
9. Cooperation with the investor: stages of cooperation, types of contracts, evaluation of innovation, risk assessment.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Management and financing of the innovation process.

2. Economics of innovation.

3. Stages of development and innovation funding.

4. Financing innovation in the nanotechnology research-to-market process.

5. Sources of research funding.

6. Equity financing.

7. Gaining investors: types of investors, search for investors.

8. Preparing and presenting offers for investors and other target groups/stakeholders.

9. Cooperation with investors.

Skills

After following this module, the trainee (should be able to):

1. Know and understand the process of commercialization of research results.

2. Elaborate a financial plan as part of the commercialization plan (or business plan).

2. Know and understand the decisionmaking process of commercialization strategies based on analysis of the available financing sources and other relevant factors.

3. Know the rules of preparing presentations for an investor and how to apply them.

4. Know the basic conditions for the preparation of an investment agreement for the implementation of research results.

Competences

After following this module, the trainee (should):

1. Develop analytical competences.

2. Enhance creativity.

3. Enhance communication and presentation skills.

Course materials

- PowerPoint presentations cover main topics
- Youtube: Financing of implementation of research results in the enterprise (in English)
- Webpages of equity investors
- Webpages of public sources of innovation financing
- Self-testing quiz

MODULE IM8

Corporate and academic entrepreneurship

Study load: 8 hours

Description of the module

The aim of the module is to provide knowledge and understanding of commercialization processes in the legal and organisational context of corporations and public research institutions. The main areas covered by module are as follows:

1. Intrapreneurship: invention generation and technology development.
2. Corporate entrepreneurship: entrepreneurial technology commercialization within large companies.
3. Academic entrepreneurship. New technology commercialization in the university context.
4. Legal forms to implement solutions to business practice.
5. Innovative processes and intellectual property rights in the context of private and public organisations.
6. Spin off as a form of technology commercialization.
7. Organisational aspects of large entities (universities, corporations) – culture, decision-making process, inter personal relations, hierarchy etc.

Learning outcomes

Knowledge

After following this module, the trainee (should know about):

1. Intrapreneurship: invention generation and technology development.

2. Academic entrepreneurship: new technology commercialization in the university context.

3. Corporate entrepreneurship: entrepreneurial technology commercialization within large companies.

4. Innovation processes and IPR in the context of public and private organisations.

5. Spin-off as a form of technology commercialization.

6. Organisational aspects of large entities (universities, corporations): culture, decision-making process, interpersonal relations, hierarchy issues etc.

Skills

After following this module, the trainee (should be able to):

1. Know the conditions of the organizational process of commercialization of R&D within public research institutions and corporations.

2. Know the legal requirements relating to the process of commercialization of R&D within public research institutions and corporations.

3. Know the legal forms of commercialization of scientific research and its main features.

4. Know the managerial tools for interacting with employees of public research institutions.

Competences

After following this module, the trainee (should):

1. Enhance creativity.

2. Build networking capabilities.

3. Develop capabilities relating to conflict-solving and decisionmaking.

4. Develop communication skills.

Course materials

- PowerPoint presentations cover main topics.
- Flow charts of possible commercialization processes (as a summary)
- Case study: (i) creating a corporate spin off, (ii) creating a university-based spin off.
- Self-testing quiz.