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Innovation Co-creation Ecosytems by CEE

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Abstract: Oulu Innovation Alliance (OIA) is an example of triple-Helix consortium. It integrates top know-how from Printed Intelligence, Wellbeing Technology, Cleantech and 3D Internet and Commercialization and brings together research institutions, businesses and public sector organizations. At the moment OIA is in change and new Innovation Co-creation Ecosystems will be formed in future areas Northern attractive city, Oulu Health, ICT and digitalization, Industry 2026 and Agile commercialization. OIA generates cutting-edge global business from research, development and innovation projects and ventures. The essential mission of the Centre for Environment and Energy (CEE) is to be strongly involved in branding Oulu as an eco-innovative city with green economy. Spin-off enterprises born thorough the CEE activities include ten companies. This year turnover these companies were 2 million EUR and they employ over 20 people. The value of the RDI projects coordinated by the CEE in the past three years is around EUR 8 million. The portfolio of projects has provided employment for more than 150 people locally and generated more than EUR 1.6 million tax revenue the area.

Key words: innovations; environment; energy; cleantech
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1. Introduction

An economic situation and accelerating technological development has changed industrial structures both globally and locally. Previously, industrial development was predominantly based on the natural resources available in the region. During the last few decades, however, industrial positions have been increasingly obtained by new technology-based firms, no matter what area of industry we are discussing. Technological skills and capabilities have become more critical factors in regional development, which now consequently is tightly connected to the technological development and the economy of the region, as well as to the regional ability to seize the opportunities and convert these technological skills into new products and services. Basic technological skills and capabilities are brought about in research institutes and universities, while enterprises are the actors which apply and utilize this knowledge. In this type of development process, interaction between the HEIs (Higher Education Institutes) and the firms is crucial. The interaction is strongly influenced by regional and national cultures and policies.

The aim of this paper is to describe the theoretical foundation and operative model for our centre of expertise — CEE. We first review the diversified literature behind strategy and operations of these centres of expertise. Then

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we outline the operation of CEE — example of a centre of expertise, finally to describe the future avenues of CEE.

2. Innovation Co-creation

An innovation activity should be seen as a large entity. In addition to new projects and processes, new technology may bring along new features and market opportunities. Business development must, therefore, be considered to be an important part of innovation activities (Drejer, 2002). A business model must adapt to changes arising from innovations. The value of an innovation cannot be delivered or achieved without a business model (Teece, 2010). Technology generates less value, if a suitable business model cannot be found for it (Chesbrough, 2010). Technological innovations must often be launched on the markets and the new needs of customers must be met. As a consequence, a suitable business model is also required (Teece, 2010).

The business operations of a company are typically based on a business model, and every enterprise has its own model, be it intentional or unintentional (Chesbrough, 2007). A business model does not, however, equal a strategy. A mere business model is not enough to succeed in fiercely competitive markets; a strategy states the areas, in which the company intends to exceed or differ from its competitors (Magretta, 2002). According to Pekuri et al. (20013, 2014), a business model can describe business as a system, business model is also used to describe how to implement strategy.

A company's business model may present an outlook on how the company creates and produces value for its customers (Teece, 2010). Business models can also be used to identify the core parts of the company's business and their relations (Osterwalder et al., 2005). From the company's point of view, business models have two important functions: a creation of value and assuming value (Chesborough, 2007). According to Teece (2010), a business model describes the company's value creation system, how the company delivers value and benefits from it. Therefore our current paper examines the offering, value creation system and revenue logic of business models.

An offering refers to the end product of a value creation chain. Through its offering, a company can create value for its customers, for example, by the means of products, services, knowledge or a combination of these. (Kotler, 1997). The value creation system is based on a value chain. Porter (1985) uses the term "value chain" to describe a system in which a company designs, manufactures, markets and delivers its products. Revenue logic describes where and how a company generates its profit (Rajala et al., 2001).

Creativity, ideas and innovations are concepts that are often used in the same context. According to Schilling (2008), an idea is a concept which has been imagined or outlined in one's own mind. According to Damanpour et al. (2009) an idea can be attributed to new products, processes, markets or administrative structures or even on business model (Osterwalder et al., 2005). Fairbank et al. (2003) describes creativity as solving problems with new, practical solutions. Creativity can be defined as the generation of ideas and innovation can, then, be understood as the processing of these ideas (Alves et al., 2007). In business, creativity often refers to ideas that give rise to new product or process innovations (Gordon et al., 2008). Creativity is, therefore, strongly linked with innovation, also in the field of business. It is also important to note that innovation creates change in one area of business model and then leads on a change in others also.

There are a number of definitions for innovation. According to Gopalakrishnan and Damanpour (1997), innovation, at its simplest, means something new, whereas McAdam and McClelland (2002) consider innovation to be a gradual process stretching from the creation of an idea to its practical implementation. In their view, creativity is part of the idea creation process. Innovation is also often connected with invention, which is often considered to

be a short, once-off event. According to Garcia and Calantone (2002), in addition to a product development process, innovation can occur in processes that entail continuous improvements or modernisations.

In terms of business, innovation is often connected with commercial and technological aspects. Innovation requires the exploitation of ideas and the commercialisation of inventions (Drejer, 2002). It is often also described as a change, which a company can offer as an actual product or as a process innovation, which means the way a company produces the product it offers to its customers (Francis & Bessant, 2005). According to Fairbank and Williams (2001), the impacts of innovations may cover everything from new products to minor improvement in processes.

One of the most commonly used ways is perhaps to consider innovations to be a part of process and product innovations, as was also stated by Francis and Bessant (2005). According to Gopalakrishnan et al. (1999), process and product innovations are related to know-how, which is a part of the systems, methods and individual employees of an organisation. The difference between process and product innovation is the target of the innovation (Gopalakrishnan & Damanpour, 1997). According to Damanpour and Gopalakrishnan (2001), innovations which are related to products and technologies affect industries, whereas process innovations are primarily targeted at specific organisations. Garcia and Calantone (2002) stated that the difference between process and product innovation is often difficult to define, because product innovations may have their origins in process innovations.

According to Garcia and Calantone (2002), innovativeness often refers to the novelty of an innovation, but one seldom pays attention to whose viewpoint the novelty is assessed. According to Drejer (2002), one possible way to assess the novelty of an innovation is to examine it from the viewpoint of the company and its field of industry. In addition, an innovation can be new to the individual, organisation or industry who are applying the said innovation (Damanpour et al., 2009). According to Carcia and Calantone (2002), innovativeness can be examined — regardless of one's viewpoint — as the degree of change in a technology or the markets.

Drejer (2002), however, describes innovation as a result of an innovation process. The entire innovation process must be included into the company's strategy, in order for the company to guarantee a continuous flow of innovations (Koen et al., 2001). Koen et al. (2001) describes a three-stage innovation process that starts from the onset of the process, continues towards a systematic product or process development stages and terminates in a commercialisation. For example, the innovation process described by Koen et al. (2001) divides the process into three sub-processes defined in the literature and it is, therefore, an illustrative example of the innovation process. Tidd et al. (2005) presents a general model of four common tasks in the innovation process of a company: 1) The company must observe its environment for innovation opportunities, 2) The company must choose the most lucrative opportunities to enhance its competitiveness, 3) The company must implement the chosen opportunities and develop them into products or processes and 4) The company must monitor the previous stages and collect and exploit information gathered from various stages in order to develop the process.

According to Khurana and Rosenthal (1998), the holistic innovation process management is based on creating connections between business, product strategy and decision-making during the early phases of an innovation process. Decision-making in the early phases of an innovation process should be based on the company's strategy (Khurana & Rosenthal, 1998). According to Broeddrich (2004), innovations are considered to be successful in so far as they are linked to the company's strategy at an early stage and if the ideas which are suggested result in products that have clear advantages to competing products. Kim and Wilemon (2002a) also state that the early phases of an innovation process must be in accordance with the company's strategy and existing capabilities. A successful product development process can only be achieved if the early phases of the innovation process are based on the

company's capabilities (Koen et al., 2001). Khurana and Rosenthal (1998) also underline the importance of integrating a business and product strategy on the early phases of an innovation process, for example, in creating product definitions. New products must be supported by development plans and testing and as possible new business (Khurana & Rosenthal, 1998).

According to Koen et al. (2001), the greatest improvement opportunities of an innovation process can be found during the early phases of the innovation process. According to Kim and Wilemon (2002b), the early phases of an innovation process consist of the recognition of an opportunity and the making of the decision to develop it further. According to Koen et al. (2001), however, the early phases of an innovation are actions which precede the formal project development of a product development process. The successful management of the early phases of an innovation process, therefore, includes an understanding of the form of the process and the consequences of actions taken within the process (Kim & Wilemon, 2002b).

The importance of the early phases of an innovation process is highlighted since it precedes actual product or process development processes (Koen et al., 2001). The R&D of the company benefits from a good organisation of the early phases of an innovation process, and its results affect any later stages of the process (Kim & Wilemon, 2002a). For Koen et al. (2001), the early phases of an innovation process are informal and unpredictable. The early phases of an innovation process could also be described as being creative actions or actions aimed at formulating an idea — through various stages — into a development proposal (Gordon et al., 2008). Boeddrich (2004) stated that the early phases of an innovation process are considered to be informal and unpredictable, due to the impacts of creative elements on the innovation process. The early phases of an innovation process are challenging, as it is susceptible to great uncertainty and expectations, in addition to which, the skills and operating models of the various parts of an organisation merge during the early phases of the process (Khurana & Rosenthal, 1998). Uncertainty is underlined in the cases of new products or changes in the markets, for example (Kim & Wilemon, 2002a).

Also, Koen et al. (2001) say that the company's strategy, competition and the company's capabilities and technology affect the onset of an innovation process. According to Khurana and Roselthal (1998), if a company wishes to make the early phases of an innovation process more effective, the company must focus on the strategy, culture, processes and roles. The company must adapt its process to match the products, markets and its own organisation (Khurana & Rosenthal, 1998).

According to Koen et al. (2001), the five elements of the early phases of an innovation process are: the identification of an opportunity, the analysis of the opportunity, the generation of an idea, selecting the idea to further development, and the development of a concept and technology. These five elements are included in a new concept development model by Koen et al. (2001). The underlying force, engine, of the model is support by the company management, whereas the outer circle consists of external factors that influence decision-making in other components (Koen et al., 2001).

Companies often identify opportunities that they want to exploit in line with their business goals. The opportunities may vary from minor improvements to major overhauls (Koen et al., 2001). During an innovation process, companies must observe their environment, in order to identify threats and opportunities (Tidd et al., 2005). A company then examines an opportunity that it has identified, obtains further information and, if required, invests additional resources in its analysis, in order to better assess the impacts of the opportunities which have been identified for, among others, its business (Koen et al., 2001).

An opportunity is developed into an idea and during the idea generation phase described by Koen et al. (2001), an opportunity evolves into a concrete idea. The process may be repeated several times and ideas are used to

generate, analyse, combine, process and update other ideas. This phase may include idea banks and brainstorming operations, which are used to develop and collect new ideas or further develop existing ones (Koen et al., 2001).

Due to the large number of ideas generated, selecting the right one is often challenging for the company. In order to identify viable ideas that are useful to the company's business, they must be examined from the viewpoints of the company's capabilities, competition, available technology and markets, for example (Koen et al., 2001). As an idea becomes better defined and less unclear, it usually moves onto the development stage (Kim & Wilemon, 2002b). The concept is further developed and its business opportunities and risks are assessed. The development of the concept can be organised in various ways, depending on how much resources it requires and what kind of a company is exploiting the concept (Koen et al., 2001).

3. Innovation Co-creation Ecosystems by CEE

3.1 Oulu Innovation Alliance

In recent years, an efficient and tight-knit cooperation network of innovative operators has been built in Oulu. Oulu Innovation Alliance (OIA)[1] is a strategic partnership between the City of Oulu, the University of Oulu, Oulu University of Applied Sciences, the Technical Research Centre of Finland (VTT), the Finnish Environment Institute and Technopolis Plc. The main purpose of the alliance is to continue the long Oulu tradition of involving education, research, business and trade, and the public sector in cooperation. The current target sectors are printed intelligence (PrintoCent, www.printocent.net), internet and 3D research (CIE, www.cie.fi), international business operations (MAI, www.maigbe.fi), health and wellbeing technology (CHT, (cht.oulu.fi) and the environment and energy (CEE, www.cee.fi).

"The Innovation Alliance partners all have a long tradition of collaboration, highlighted by mutual trust and strong commitment to common goals," says Matti Pennanen, Mayor of Oulu and chairman of the OIA Management Group.

"The success of the province is a result of the joint efforts — in research and development, in companies, and in the public sector. Team work generates the best results, with partners from regional to national levels working toward the same goal," says Pauli Harju, Regional Mayor of the Council of Oulu Region.

In November 2014, the Finnish Environment Institute (SYKE) joined the Innovation Alliance and signed a separate strategic agreement with the CEE on cooperation in research and development. CEE's network facilitates effective cooperation between companies and research communities. Joint projects generate new expertise and business operations for the international market.

"SYKE can offer high-quality expert services in the environmental and energy sectors for the development sectors selected by the CEE, including bioeconomy, air pollution management, energy efficiency and low carbon issues, water resources, and measuring technology," says Raimo Ihme, Account Manager at the Finnish Environment Institute.

"SYKE further strengthens the environmental expertise at the CEE," Lea Kauppi, Director General of SYKE, and Pekka Tervonen, Director of CEE, say together.

3.2 CEE — Making Business Green and Green into Business

Established in 2012, the Centre for Environment and Energy (CEE) is an innovation hub organized under the University of Oulu and a partner in the Oulu Innovation Alliance (OIA). Its objective is to turn innovations in the

[1] www.ouluinnovationalliance.fi.

environmental, energy and cleantech sectors into business. The CEE is branding Oulu with eco-innovations and the green economy. The CEE is an environmental business campaigner and builder of bridges, bringing experts together and showing confidence in new ideas. We are based in Oulu and believe in making the new possible in the environmental and energy business.

"First, it was the tar trade that put Oulu on the map, and then Nokia brought Gorbachev and the rest of the world to Oulu. I have a vision. Now we are putting Oulu back on the map with eco-innovations. And goals tend to get realised," Pekka Tervonen, Director of the CEE, chuckles. The value of the RDI projects coordinated by the CEE in the past three years is around EUR 8 million. This portfolio of projects has provided employment for more than 150 people locally and generated more than EUR 1.6 million tax revenue in the area.

The CEE is also actively involved in direct business projects and the OIA contracting parties' strategic projects. "Cooperation in research is instrumental in creating new business operations. The OIA is an expert in quickly connecting sector-specific business expertise and the latest research. OIA's principle of a one-stop-shop is its greatest operational strength, making the activities accessible. A company can contact the innovation hub at the OIA and have easy, live access to experts. Similarly, the OIA can connect researchers with companies and innovation angels. The OIA clusters allow each operator to concentrate on what it does best, without having to spend time searching for the right partners among endless alternatives," says Jouko Niinimäki, the new Rector of the University of Oulu.

Hilla (High-tech ICT Leverage from Long-term Assetization) is a research project funded by the Finnish Funding Agency for Innovation (Tekes) and involved in piloting a new operating model. Hilla comprises four areas utilizing digitalization, which are wireless ICT, transport, health and wellbeing, and industry. "Driving forces behind Hilla are the University of Oulu, the Technical Research Centre of Finland (VTT), and the Oulu University of Applied Sciences in corporation with businesses and Business Oulu. It is an excellent example of active OIA cooperation," says Harri Kopola, Director at VTT.

"The development of cleantech in Oulu is firmly based on the particularly strong ICT expertise gathered in the region. Combining it with extensive environmental expertise will carry us far in the future. Creative utilization of wireless technology, in particular, enables us to create entirely new applications," says Juha Ala-Mursula, Executive Director at Business Oulu.

The CEE is an innovation hub focused on the fast-pace commercialization of ideas coming in from the business and research world, by bringing together the best experts. Decisions on project launches are made within two weeks. For feasible ideas, the CEE will seek funding where ever possible, from sources worldwide.

3.3 Environment Science House — World Class Environmental Expertise

For three years now, the CEE has been located at the Environment House of the University of Oulu. The building also houses the Natural Resources Institute Finland (Luke), Finnish Environment Institute (SYKE), Thule Institute of the University of Oulu, and the NorNet and LYNET consortiums of the university and research institutions. In addition, the campus is home to the University of Oulu, the Technical Research Centre of Finland (VTT), Technopolis, and several companies in the environmental and energy sector. The network of environmental experts on campus is impressive, also from an international aspect, and should we lack the required expertise, we will use our national and global networks to find it. An agreement is currently being prepared at the university on cooperation with NorNet and LYNET. The contacting parties are the same for both, meaning that in practice, NorNet can be made a northern operator in LYNET under the theme of northern issues. The CEE is also negotiating with Luke on strategic cooperation in research and development.

3.4 Innovation Angels — Who Deserves Wings

The CEE applies the "Entrepreneur in Residence" model of teaming up researchers and commercial experts. This model allows an existing or aspiring entrepreneur to join a research community. Cooperation with the FIMECC programmes is a valued part of these activities. A good example of this is Luxmet Ltd, founded in 2014 (www.luxmet. fi). The company develops advanced control systems for steel and metal industries.

"Early cooperation between the entrepreneur and researchers makes it possible to use research results in new innovative business operations without delay," says Mikko Jokinen, Managing Director of Luxmet Ltd.

"We should make more systematic use of all available human capital, whatever the source," CEE Project Manager Juha Roininen adds.

The CEE is currently creating a human capital investment programme, i.e., a network of innovation angels. One of CEE's innovation angels is the long-standing rector of the University of Oulu, Emeritus professor Lauri Lajunen. "People play a key role in innovation, and creating new combinations of competence, resources and methods accelerates the innovation process!" says Lajunen.

The latest addition to the team of CEE innovation angels is a Finnish mountaineering icon, HR trainer, serial entrepreneur and business investor Veikka Gustafsson. "The phrase innovation angel alone is too beautiful to resist", Mr Gustafsson says with a smile, and makes a skilful parallel between the challenges faced in the mountains and in the business world. "Making your dreams come true and conquering mountains both require cooperation, competence, determination and resilience."

3.5 Several New Innovations and Enterprises — Small and Medium-size Miracles

Spin-off enterprises born through the CEE activities include for example Luxmet, Sapotech Oy, Oulu Water Alliance Oy (OWA), SFTec Ltd, Lumipower Oy, and Aldapro Oy. Last year, the turnover of these companies was EUR 1.6 million, and they employ 20 people.

3.6 NBTec — Nordic Blue Technologies

The latest spin-off enterprise at the University of Oulu, NBTec (Nordic Blue Technologies), is at the establishment stage. Its activities and innovations will be based on using electrocoagulation (EC) in the treatment of water and waste water in an ecological and cost effective manner (e.g., leachate from peat bogs, which contains organic impurities, waste water containing oil, and water from oil spillages), and in nutrient recovery and utilization in, for example, various bio-ash-based products in the future.

"The innovation angel's activity also creates interesting entrepreneurial opportunities for researchers. It combines the network of researchers and their extensive multidisciplinary expertise with the cleantech expertise available at the CEE," say docent/innovation angel Toivo Kuokkanen and researcher Ville Kuokkanen.

3.7 Macon

At the beginning of 2015, an expert with a long career in the environmental and energy sector, Mikko Ahokas, started a new company by the name of Macon (www.macon.fi). The company aims to help other companies find new business opportunities in the fields of bioeconomy and cleantech. Mr Ahokas has worked as an expert on several CEE projects, and the CEE has been actively involved in developing the business operations of the new company.

"I want to help both small enterprises and large corporations with issues relating to the environment, renewable energy, water treatment and technological choices, and other sustainability issues. With our services, companies can reduce risks in company acquisitions, and create new opportunities and a competitive edge with solutions related to the bioeconomy and clean technology," says Mikko Ahokas, CEO.

3.8 Sapotech

Sapotech Oy[2] was established in 2012. Sapotech provides innovative solutions for monitoring of high temperature processes for steel, metal and energy industries. The CEE is actively involved in innovating and setting up projects according to its strategy, as well as assisting in finding the right national and international contacts. In its solutions, Sapotech makes use of the latest computer vision, equipment and software technologies.

"Sapotech develops products based on the industrial internet and modern laser and imaging technologies for the measuring and monitoring of high temperature processes, especially for the needs of steel and metal industries. Our activities focus on global product business based on our products and on providing a new type of comprehensive service for our industrial customers. The obvious benefits generated by the industrial internet will make a breakthrough, especially in global companies within the steel and metal industries," says Saku Kaukonen, CEO of Sapotech.

3.9 Oulu Water Alliance

Oulu Water Alliance Oy, OWA (www.ouluwateralliance.fi) was established in 2013. One of the key functions of the OWA is bringing together regional water expertise in collaboration with the CEE, in order to continue the work of the CEWIC project (Centre of Expertise in Water Industry Cluster). The OWA can offer advanced water treatment solutions and services for mining and steel industries, and for water treatment in municipal water treatment and management facilities. In addition, the OWA provides expert, research and development services in the water sector.

"At OWA, we have acquired new technology for testing and piloting the treatment of water and sludge. Our plan is to open a water-treatment "showroom" in a hall (400 sq.m.) previously used by the university's Water Resources and Environmental Engineering programme in Linnanmaa. The showroom will be used as a testing, teaching and training environment in collaboration with the University of Oulu and Oulu University of Applied Sciences. Methods currently in use include the FF-MVR evaporating equipment, SHS dryer, and plasma," says Jaakko Pellinen, CEO of the OWA.

3.10 LumiPower

Lumipower Oy was established in 2014. Development work and innovations at Lumipower relate to the use of snow silos which utilize the return water from district heat, and the development of snow storage in order to start using it for cooling.

"We should capitalize on the power of snow. We have been developing this with the CEE since 2012," says the father of the idea, inventor, entrepreneur and innovation angel Juha Karppinen of Lumipower. The CEO of Lumipower is Pekka Purola. The men list the benefits of this innovation briefly as follows:

- Faster clearance of snow in city centres
- Melting snow improves the efficiency of the power plant
- Fuel costs are reduced (carbon footprint)
- Low carbon targets are met in several ways
- Less noise pollution
- Contamination of snow dumping grounds is significantly improved due to smaller amounts of hazardous waste
- Amounts of rainwater and melt water are reduced, thus reducing the moisture loads of buildings

[2] www.sapotech.fi.

In addition, the CEE has awarded innovation grants as seed money for new projects and innovations. One of the grant recipients is the university's Optoelectronics and Measurement Techniques Laboratory. Led by docent Tapio Fabritius, the laboratory is developing polymer-based solar cell technology made using a printing machine and used in applications for distributed energy generation. The CEE network currently has half a dozen potential new companies in need of new entrepreneurs.

3.11 CEE Is Currently Leading Several Multidisciplinary and Multi-sector Project

The value of the RDI projects coordinated by the CEE in the past three years is around EUR 8 million. For example at the end of 2014, the SME-MET IMCEE Project (Innovative Metal-lurgical Cooperation for Environmental Efficiency) was granted one million Euros in the Tekes Growth Programme. Around the same time, decisions were made on SME partner projects worth two million Euros for cooperation on innovation development. An excellent example of the development of a value network is FIMECC Factory, which was established by one of the partners, FIMECC Oy[3] on the premises provided by the University of Oulu. It is a working space and meeting point for researchers and enterprises involved in metallurgy and mechanical engineering.

"The IMCEE project takes corporate cooperation a step further. New solutions are created in joint projects, which increase the competitiveness of all participating companies," says Project Manager Hannu Suopajärvi.

"In recent years, there has been huge demand for our activities in Oulu. For the industries, the University of Oulu is an excellent generator of digital expertise. Start-ups established on campus as a result of the FIMECC programmes include Luxmet, Kraftcer and Sapotech. This makes it a natural step for us to bring the Factory method to the university campus," says Harri Kulmala, CEO of FIMECC Ltd.

"The FIMECC Factory further strengthens the existing innovation expertise in the Oulu region," says Pekka Tervonen, Director of the CEE. "In addition, a new innovation centre will start in the Oulu Innovation Alliance towards the end of 2015, with a focus on metal and engineering, thus guaranteeing synergy benefits!" Mr Tervonen continues.

4. Conclusion

The mission of CEE is to be involved in making eco innovations and green economy a brand for Oulu. Our strategy is to develop a knowledge hub that brings together the fields of environment and energy, thus, creating efficient connections between top experts and R&D&I projects; and co-operation networks and investors. CEE builds business clusters for the focus areas of air, water, energy, instrumentation and the efficiency of resources. CEE establishes transparent networks in Oulu, Finland and the world. Our operational philosophy is based on research programmes and networking with an emphasis on speed, transparency and the co-operation between businesses and the scientific world. This co-operation will bring cutting edge know-how and business for into the international market. Our vision is to be the number one partner in eco-innovative solutions. You can find more of CEE in our webpages — www.cee.fi for example our project portfolio which is over 8m EUR and ten companies established by CEE activities.

[3] http://www.fimecc.com.

References

Alves J, Marques M. J., Saur I. and Marques P. (2007). "Creativity and Innovation through multidisciplinary and multisectoral cooperation", *Creativity and Innovation Management*, Vol. 16, No. 1, pp. 27-34.

Boeddrich H. J. (2004). "Ideas in the workplace: A new approach towards organizing the fuzzy front end of the innovation process", *Creativity and Innovation Management*, Vol. 13, No. 4, pp. 274-285.

Chesbrough H. (2007). "Business model innovation it's not just about technology anymore", *Strategy & Leadership*, Vol. 35, No. 6, pp. 12-17.

Chesbrough H. (2010). "Business model innovation: Opportunities and barriers", *Long Range Planning*, Vol. 43, No. (2-3), p. 354.

Damanpour F., Walker R. M. and Avellaneda C. N. (2009). "Combinative effects of innovation types and organizational performance a longitudinal study of service organizations", *Journal of Management Studies*, Vol. 46, No. 4, pp. 650-675.

Damanpour F. and Gopalakrishnan S. (2001). "The dynamics of the adoption of product and process innovations in organizations", *Journal of Management Studies*, Vol. 38, No. 1, pp. 45-65.

Drejer A. (2002). "Situations for innovation management: Towards a contingency model", *European Journal of Innovation Management*, Vol. 5, No. 1, pp. 4-17.

Etzkowitz H. (2002). *The Triple Helix of University–Industry–Government: Implications for Policy and Evaluation*, Sweden, Stockholm, Science Policy Institute, p. 17.

Fairbank J. F., Spangler W. E. and Williams S. D. (2003). "Motivating creativity through a computer-mediated employee suggestion management system", *Behaviour & Information Technology*, Vol. 22, No. 5, pp. 305-14.

Fairbank J. F. and Williams S. D. (2001). "Motivating creativity and enhancing innovation through employee suggestion system technology", *Creativity and Innovation Management*, Vol. 10, No. 2, pp. 68-74.

Francis D. and Bessant J. (2005). "Targeting innovation and implications for capability development", *Technovation*, Vol. 25, No. 19, pp. 171-183.

Garcia R. and Calantone R. (2002). "A Critical look at technological innovation topology and innovativeness: A literature review", *The Journal of Product Innovation Management*, Vol. 19, No. 2, pp. 110-132.

Gopalakrishnan S. and Damanpour F. (1997). "A review of innovation research in economics, sociology and technology management", *Omega*, Vol. 25, No. 1, pp. 15-28.

Gopalakrishnan S., Bierly P. and Kessler E. H. (1999). "A Re-examination of product and process innovations using a knowledge-based view", *The Journal of High Technology Management Research*, Vol. 10, No. 1, pp. 147-166.

Gordon S., Tarafdar M., Cook R., Maksimoski R. and Rogowitz B. (2008). "Improving the front end of innovation with information technology", *Research Technology Management*, Vol. 51, No. 3, pp. 50-58.

Gorski C. and Heinekamp E. J. (2002). "Capturin employee ideas for new products", in: Belliveau P., Griffin A. & Somermeyer S., *The PDMA Toolbook for New Product Development*, Wiley & Sons, New York.

Järvinen P. and Järvinen A. (2000). *Tutkimustyön metodeista*, Tampere: Opinpaja Oy 211 s.

Kasanen E., Lukka K. and Siitonen A. (1993). "The constructive approach in management accounting research", *Journal of Management Accounting Research*, Vol. 5, pp. 243-264.

Kaplan R. S. and Norton D. P. (2004). "Strategy Maps: converting intangible assets into outcomes", Harvard Business School.

Khurana A. and Rosenthal S. R. (1998). "Towards holistic 'front ends' in new product development", *Journal of Product Innovation Management*, Vol. 15, No. 1, pp. 57-74.

Kim J. and Wilemon D. (2002a). "Strategic issues in managing innovation's fuzzy front-end", *European Journal of Innovation Management*, Vol. 5, No. 1, pp. 27-39.

Kim J. and Wilemon D. (2002b). "Focusing the fuzzy front-end in new product development", *R&D Management*, Vol. 32, No. 4, pp. 269-279.

Koen P., Ajamian G., Burkart R., Clamen A., Davidson J., D'Amore R., Elkins C., Herald K., Incorvia M., Johnson A., Karol R., Seibert R., Slavejkov A. and Wagner K. (2001). "Providing clarity and a common language to the fuzzy front end", *Research Technology Management*, Vol. 44, No. 2, pp. 46-55.

Kotler P. (1997). *Marketing Management: Analysis, Planning, Implementation, and Control* (11th ed.), Upper Saddle River: Prentice-Hall International, Inc.

McAdam R. and McClelland J. (2002). "Individual and team-based idea generation within innovation management: Organisational and research agendas", *European Journal of Innovation Management*, Vol. 5, No. 2, pp. 86-97.

Magretta J. (2002). "Why business models matter", *Harvard Business Review*, Vol. 80, No. 5, pp. 86-92.

Osterwalder A., Pigneur Y. and Tucci C. L. (2005). "Clarifying business models origins, present, and future of the concept", *Communications of the Association for Information Systems*, Vol. 16, No. 1, pp. 1-25.

Pekuri A., Pekuri L. and Haapasalo H. (2013). "The role of business models in Finnish construction companies", *Australasian Journal of Construction Economics and Building*, Vol. 13, No. 3, pp. 13-23.

Pekuri A., Suvanto M., Haapasalo H. and Pekuri L. (2014). "Managing value creation: the business model approach in construction", *International Journal of Business Innovation and Research*, Vol. 8, No. 1, pp. 36-51.

Porter M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: The Free Press.

Rajala R., Rossi M., Tuunainen V., Rautiainen K. and Korri S. (2001). "Software business models: A framework for analyzing software industry", *Technology Review*, Helsinki: TEKES.

Rapp C. and Eklund J. (2002). "Sustainable development of improvement", *Total Quality Management*, Vol. 13, No. 7, pp. 945- 969.

Schilling M. A. (2008). *Strategic Management of Technological Innovation* (2nd ed.), McGraw Hill.

Tarafdar M. and Gordon S. R. (2007). "Understanding the influence of information systems competencies on process innovation: A resource-based view, *Journal of Strategic Information Systems*, Vol. 16, No. 4, pp. 353-392.

Tervonen P., Alapiha J. and Haapasalo H. (2009). "Benchmarking ESSQ management system through tailored maturity model", *International Journal of Management & Enterprise Development*, Vol. 7, No. 3, pp. 262-280.

Teece D. J. (2010). "Business models, business strategy and innovation", *Long Range Planning*, Vol. 43, pp. 172-194.

Tidd J., Bessant J. and Pavitt K. (2005). *Managing Innovation: Integrating Technological, Market and Organizational Change* (3rd ed.), Wiley.

Tonnesen T. (2005). "Continuous innovation through company wide employee participation", *The TQM Magazine*, Vol. 17, No. 2, pp. 195-207.

Yin R. K. (2003). *Case Study Research: Design and Methods* (3rd ed.), Thousand Oak, California: Sage Publications.

Ylinenpää H. (2001). "Co-operation, trust and triple helixes in a northern dimension", in: *Think-tank Seminar*, Björkliden Sweden, June 14-17, 2001.