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Research Publication 2015

Marja-Liisa Kakkonen & Marja-Liisa Neuvonen-Rauhala (eds.)



Mikkeli University of Applied Sciences
Kymenlaakso University of Applied Sciences

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Preface

Most countries are willing to encourage entrepreneurship among the students, graduates and staff members of their higher education institutions. Universities aim to strengthen students' willingness to undertake different kinds of enterprising projects, facilitate the acquisition of entrepreneurial competences and enhance the entrepreneurial mind-sets and intentions of students, graduates and staff members. In addition, all of the Finnish universities of applied sciences have either adopted an entrepreneurship strategy to promote entrepreneurship or included entrepreneurship in their own development strategies.

In higher education, the goals of entrepreneurship education can differ: for example, establishing a company or improving the management of SMEs, increasing knowledge related to entrepreneurship and business operations, or increasing the use of entrepreneurial methods. It is important to note that entrepreneurship can also be channelled through other means than starting a business. Therefore, entrepreneurship education in higher education does not mean a straightforward aim to contribute to the development of the number of enterprises, but can also mean contributing to individuals' entrepreneurial behaviour or mind-sets. In addition, some initiatives directly promote entrepreneurship and some through innovation contain the seeds of new starts-ups or even spin-offs, something that is still rare in the context of universities of applied sciences.

Entrepreneurship is the theme of this year's Research Publication. The six articles in the publication approach entrepreneurship from different perspectives. In the first article, Riitta Tuikkanen, Teija Rautiainen and Pekka Turkki describe the innovation process thoroughly from idea to prototype and patent, with emphasis on the open innovation process and collaboration.

Entrepreneurship is also a cross-sectional operation in all UAS education and is promoted by common studies offered to all students. Students themselves are more and more active and wish to organise entrepreneurial and other inspirational events "from students to students". Research can also support this kind of approach in promoting entrepreneurship. Ari Lindeman, Marja-Liisa Neuvonen-Rauhala and Antti Viitanen describe the development of the entrepreneurship society (ES) in Kyamk and discuss the connections between ES activities, education and UAS itself.

Research and development projects often promote entrepreneurship and arrange appropriate environments for clients', partners' and students' paths to entrepreneurship through coaching, training and development activities. Ilkka Virolainen discusses coaching as a method supporting entrepreneurial intentions. Furthermore, Kirsi Itkonen writes about a cross-border project and its mixed approaches to promoting entrepreneurship in wood procurement.

Traditionally, physiotherapy can be seen an "entrepreneurship-minded" field of education. According to the findings of Marja-Liisa Laitinen and Outi Pyöriä, entrepreneurship intentions are high among physiotherapy students. They discuss what entrepreneurship means in physiotherapy degree education and how it should be taken into account. Finally, the sixth article, written by Teijo Linnanen, is strongly research-based and deals with a new technology method related to applications for utilising carbon dioxide. The results can be used to help certain enterprises to develop their businesses and therefore facilitates them recognising new opportunities in business.

To conclude, according to the articles in this research publication, entrepreneurship can be seen as a cross-sectional operation in education, research and development. It is a mind-set of students and staff members. It is also an institutional and strategic approach to many operations. Since 2009, Kymenlaakso University of Applied Sciences (Kyamk) and Mikkeli University of Applied Sciences (Mamk) have extended their collaboration gradually, and they will merge on 1 January 2017. This joint publication is one outcome of this cooperation and provides an insight into entrepreneurship education as well as the research and development activities of the two higher education institutions. We would like to thank all of the professionals who contributed to this publication.

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1

SMART BUFFET – AN OPEN INNOVATION PROCESS THROUGH COLLABORATION

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Abstract

This article introduces a new innovation: a smart buffet giving a restaurant customer individualised real-time information on the nutritional value of their meal as portioned on the plate, for example, the amount of energy, fibre, fats, carbohydrates and protein that it contains. We describe how a brand new innovation arose from a research project and was developed all the way to a patented service solution. The Smart buffet case shows that the birth of an innovation is not a single action but a total process of interrelated sub-processes. The whole process (which has not yet come to an end) took a considerable amount of time, mostly because of the nature of the innovation, which required several partners and introduced major challenges for the management of the whole process. We found that the innovation produced in this case could be classified as an open innovation. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as they look to advance their technology. The Smart buffet case represents one type of open innovation, inbound open innovation, where external knowledge, or in this case even the original idea and invention, comes to the firm for development and exploitation.

1 Introduction

In recent years, consumers have become more health conscious. Computer and mobile solutions have been launched to help people to evaluate their own eating (e.g. Keventäjät 2015; Meal Tracker 2015). People eat out more often than ever before and health-conscious customers want to know about the nutritional value of the meal they are eating at a restaurant. At restaurants, nutritional information on dishes or menus has been mainly available for customers in hard copy, but food management software providers have also developed mobile solutions for customers to assess menu content with nutritional information, ingredients, GDAs and allergens (Cobanoglu & Heiberger 2003; Feinstein et al. 2005; Jamix 2015; CGI 2015; AIVO 2015). Nowadays, customers are able to assess the nutritional value of an average restaurant menu or an average restaurant meal but there is no IT application or mobile solution for customers to assess the nutritional value of their individual meal portioned on their plate from a buffet.

This article introduces a new innovation, a smart buffet giving a restaurant customer individualised real-time information on the nutritional value of their meal, portioned to the plate; for example, the amount of energy, fibre, fats, carbohydrates and protein that it contains. We tell a story, give an example of how a brand new innovation and new business idea – a Smart buffet – arose from a research project and was developed all the way to a patented service solution. We want to emphasise two aspects of the Smart buffet innovation process: the significance of collaboration between multidisciplinary actors and the importance of proceeding step by step. At the Mikkeli University of Applied Sciences, we have a practical learning and research environment: several restaurants and a study kitchen where we use and test food service management software applications. It was in these environments that the new innovation was planted and started growing. We got to know experts in different fields during the development work at our university. We found experts from enterprises and other uni-

versities who were also interested in the same issue. We worked together on several projects and together have written publications and articles about IT technology in professional kitchens (e.g. Tuikkanen et al. 2005; Taskinen 2007; Taskinen et al. 2007; Tiainen et al., 2009). This cooperation formed the basis for the Smart buffet innovation and expanded during the innovation process. The Smart buffet innovation process took several years and therefore it was important to concentrate on essential issues during every step of the process. Nevertheless, one should always remember to trust one's intuition, bravely grab at new ideas which may or may not succeed and trust that things will succeed even when there seems only a slight chance of that happening.

2 From an idea to an invention

A research project called The modular information model of professional kitchens, MODU was carried out in 2003–2005 in Mamk (Taskinen 2007). The process of planning, executing and developing food production was examined in different types of professional kitchen. Based on the research material, a general model of food production in professional kitchens was developed. Alongside concrete actions such as menu planning, cooking or delivering food, the model described information flows in processes: in other words, what pieces of information were needed at different stages and how information changed during the process. Modelling forced us to conceptualise food services in two ways: how work and information flows are connected to each other and the importance and role of data management in food services. The MODU project produced a general model of professional kitchen processes which differed from previous ones (Lampi et al. 2009; Rogers 2008; Taskinen et al 2007). The MODU project, funded by four enterprises and Tekes, the Finnish Funding Agency for Innovation, 'got the ball rolling.' It provided the groundwork for further development and a new innovation.

2.1 A new idea grows in the multidisciplinary researcher group

The experts in different fields (nutrition, IT technology, food services) who worked together on the MODU project, delivered a new professional network and shared expertise. The multidisciplinary collaboration brought about a new idea of a Smart buffet.

The idea of the Smart buffet was originally produced by a principal lecturer, an expert in nutritional sciences. She discussed with her colleague about the data flows in the professional kitchens and drew the first picture of the Smart buffet (Figure 1).

The innovation process started in a meeting with a cooperating company where she mentioned the idea in passing. The research director of Mamk happened to be taking part in the same meeting. After the meeting, he recommended that she should not bring the idea forward without patent protection and advised her to write a notification of the employment invention to the employer.

The idea of the Smart buffet was complex, and knowledge from different fields of expertise was required to refine the idea. Work started among the experts who had co-

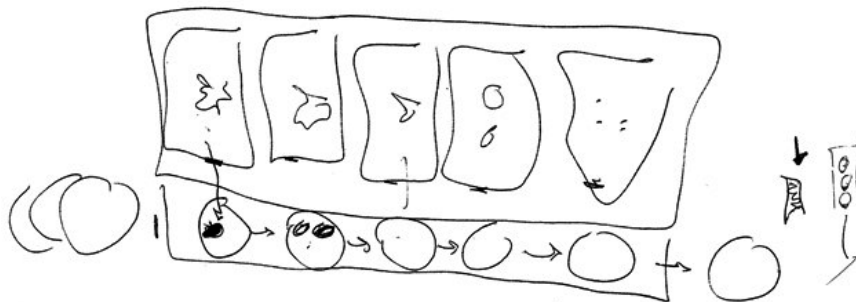


Figure 1. The first drawing of the idea (Riitta Tuikkanen 2008)

operated in the previous MODU project: the nutritional scientist, the expert in professional kitchen processes and the IT expert. They prepared the notification of the employment invention for the employer in February 2008 and the employer decided to claim the rights for the invention. A preliminary examination of novelty made by a patent consultant showed that it could be possible to protect the invention with a patent. The brand-new invention was born!

2.2 Searching for funding, partners and protection

It was a lucky coincidence that the Finnish Funding Agency for Innovation (Tekes) re-launched its TULI funding programme in the spring of 2008, just when we needed some monetary resources to push our idea forward. TULI (Tutkimuksesta liiketoimintaa, Creating Business from Research) was Tekes' targeted long-term effort aimed at creating business from public research. Mamk was admitted into the programme and through that small but extremely necessary move, grants also became available for the Smart buffet idea. TULI made it possible for us to apply for financing for the conceptualisation and novelty examinations of the idea with minimal bureaucracy in the first phase, and for the construction of the prototype in the later phase. This financing input provided by Tekes was of crucial importance for the realisation of the innovation.

Soon it became clear that the invention was commercially valuable and it would not be long before the role and possibilities of Mamk to lead the innovation alone would be unrealistic. Therefore, a trustworthy company partner was needed. But how should we talk about the idea to a potential partner who could run away with it and start to put it into practice without us? Non-disclosure agreements were made for the preliminary discussions, but they were not sufficient as tools for getting into deeper cooperation.

In the spring of 2009 we ended up presenting the invention to Metos, a well-known Finnish company producing a wide variety of equipment for professional kitchens. We had cooperated successfully with Metos on former projects. They became inter-

ested in partnership, but demanded that we apply for the patent before we could move onto real negotiations. We also considered this a good precondition. While writing the application helps to refine the idea further, sending in the application protects the invention and makes open discussion with the partner possible. We started to prepare the application immediately, but it took almost five years until we finally obtained Finnish Patent No. 123414 “Method, arrangement, equipment and system for catering services”. The corresponding European patent is still in the pending phase.

The partnership with Metos was extremely important for the commercialisation of the invention. The additional core competence of Metos, however, was market knowledge on the physical buffet line itself, not the IT applications the product contains. Therefore, another partner was needed with specialist knowledge of ICT and the development of embedded systems. A company of this type, AgentIT, was found through the recommendation of another ICT company with which we had cooperated before. From autumn 2009, AgentIT took a strong role in the development of the IT systems for the Smart buffet.

At the beginning of 2010, all of the components for the development work were finally in place and we were ready to start to construct the first prototype of the Smart buffet. As a collaboration between Mamk, Metos and AgentIT and with financing by Tekes, the first prototype was ready in the spring of 2010.

2.3 Testing the first prototype with staff on campus

Plenty of development work had to be done before getting to the stage of testing the prototype. To help this, two Bachelor’s degree students of hospitality management researched a thesis about how customers operate with lunch buffets (Mörsky & Savikkomaa 2010). Their video clips revealed interesting details and facts that had not occurred to us. For example, customers had various ways of placing the scoops and many of them hold the plate in their hand when taking the portion from the container. It would have been simpler if customers placed the tray in the middle of the container. As you can guess, that did not happen. These details and facts helped a great deal when the principles of the prototype functions and technological solutions were being defined.

We were living in exciting times - it was time to test the functionality and usability of the Smart buffet prototype with real customers at the Kasarmin Campus at Mamk. Mamk staff members formed a test group of 16 members representing ordinary diners, some of them having special expertise in nutrition, programming, information technology or the catering business.

There were four test sessions in May 2010 and all participants were asked to sign a non-disclosure agreement (NDA). Before the test, the stakeholders responsible for developing the prototype, Agent IT, Metos and Mamk, arranged a pre-test just to be sure that the prototype was ready for testing. Printed How-to-use instructions were given to the testers beforehand and a short oral presentation about Smart buffet took place before each testing. Test sessions were recorded with a camcorder and observations were made.

The test sessions turned out to be useful. They showed, for example, detailed needs for technical improvements, for example, the reader for a remote user card should be more effective and the reading area larger. The tests also produced many other ideas for further development. And to tell the truth, the tests proved that it was best to forget some ideas! Moreover, the testing showed strongly that the invention was found to be truly interesting and attractive. An illustration of this was the first time that participants received prints of their meals. There it was: how many grams of each food I took, how many calories I got and the nutritional content of my meal. The discussion of “my calorie intake” and generation of new ideas on how to use the information started immediately.

The testing continued with group interviews on the themes of the functionality, usability, usefulness and acceptability of the prototype and the concept of the Smart buffet. There were two groups, one for diners and one for catering staff. Smart buffet was found to be interesting, exciting, easy to use and useful, particularly the real-time feedback and prints. The interviewees thought that using the Smart buffet in a lunch restaurant is a new way to tackle learning how to eat well. The use of the Smart buffet was not very fluent at the time, but still the catering staff pointed out that the Smart buffet had a huge potential for business, as it brings customers new valuable information and a new competitive advantage for restaurants.

The prototype tests proved that the solutions that had been made formed a good basis for further development. It also strengthened the importance and benefits of user testing. The Bachelor’s thesis in hospitality management relating to the form and content of the nutritional information received also supported the results of the testing well. The company responsible for the software and technical development became convinced of the potential of the Smart buffet. Accordingly, Mamk and AgentIT signed a mutual licensing agreement for the patent. The first step towards commercialisation had been taken.

3 From invention to innovation

3.1 The development group is expanded by a food service company

AgentIT applied for and received funding for the development of the second prototype. Tekes supported the development work. Metos and Mamk were partners in the RD project. Mamk offered expertise in food services and usability testing for the project.

We needed a new partner, a food service organisation willing to test the second prototype in their restaurant. We had previous contacts with Fazer Food Services and we demonstrated the first prototype of the Smart buffet to the directors in May 2012. The next autumn, we signed a confidentiality and cooperation contract with them. Fazer Food Services, operating with almost 1,100 restaurants in Finland, Sweden, Norway and Denmark, wanted to be the first organisation in the world to test this kind of the Smart buffet to gain the image-related benefits and visibility as a food service organisation offering new nutritional services for restaurant customers. They want-

ed to develop a Smart meal service to help staff restaurant customers to ration lunch meals that support their well-being and to help them to keep their diets on track (Fazer Group 2015).

3.2 Huhmare Restaurant installs the second prototype

The second prototype was developed in October 2012 – May 2013. The development work involved the development of IT and electronics engineering and the implementation of electronic devices to a buffet trolley plus many other aspects. Therefore, the development team gathered several times to discuss, plan, evaluate and test the solutions. The timeframe for the development work was tight and some setbacks were inevitable. A great deal of confidence in the invention and trust in each other was needed. The second prototype was ready to be installed in the Huhmare restaurant, which is the staff restaurant of the Fazer Food Services (FF) headquarters in Helsinki, at the beginning of February 2013. Those 300 or so daily customers would soon see the fruit of the long-lasting, sometimes exhausting but still very inspiring development, the Smart buffet prototype Version 2. It had taken four years to develop the idea from the drawing (Figure 1) to a real buffet for a restaurant (Figure 2).



Figure 2. The Smart buffet in Huhmare restaurant (Metos 2013)

A short explanation of how customers use Smart buffet is necessary. One main principle from the very beginning was that customers should act as they usually do when using the Smart buffet. The first step is to place an identification card on a tray and a tray in front of serving dish. The name of the customer is shown on the display with greetings, of course. When the customer has taken a food portion, the display tells them straight away how much the food weighs (g) and how much energy (kcal) it contains. The display can also indicate the applicability of the food to special diets. Additional food items that are not integrated into the smart buffet, such as drinks, dressings, bread, butter, etc. are registered to the system with a touch screen tablet. After putting together a meal, the customer can print out a detailed summary of the nutritional value of the meal (Figure 3). Daily and weekly summaries can be sent to the customer's email.



Ruokailija Maija Meikäläinen 3.4.2013 otetut annokset:

Amerikansalaattia 170g 20kcal
Tomaattia/Kurkkua 95g 5kcal
Porkkana-kurpitsasalaattia/Sitruuna -
marinoitua punakaali 40g 9kcal
Soijapapupihvejä 85g 238kcal
Linssejä sitruuna persilja 50g 114kcal

Ravintosisäilitö:

Energia 418,1 kcal
Proteiinit 20 g.
Hiilihydraatit 35,8 g.
Rasvat 19,9 g.
Tyydyttyneen rasvan osuus 1,4 g.
Kuitu 10,3 g.

Ravintotekijöiden osuudet energiasta: (suositus)

Proteiinit 19 % (10 - 20)
Hiilihydraatit 34 % (50 - 60)
Kokonaisrasva 13 % (25 - 35)
Tyydyttymätön rasva 40 %
Tyydyttynyt rasva 3 % (alle 10)

Osuus päivän energiatarpeesta 19 %.

Figure 3. Display, identification card and example of a printout of the nutritional analysis: weight of food and kcal of food, nutritional content of meal, nutritional content compared to nutritional recommendation (Metos 2013)

3.3 Usability testing of the Smart buffet line with food service customers

The second prototype was tested in spring 2013 in the Huhmare restaurant. The test group (n=59) included FF staff members, volunteers enrolled in the test. The usability test was part of the development work and its results played a role in the decision whether to launch the Smart buffet.

The test user survey revealed that people who had lunch at the staff restaurant were interested in the nutritional information relating to the lunch meals. According to the results of the survey, using the Smart buffet was easy, and it helped people to put together healthier meals. Sixty-six per cent of the people who responded to the survey said that using the service had had an impact on their eating habits, and 76% said that it had increased their interest in healthy eating; 48% of the respondents said that the service provided added value to having lunch at the staff restaurant.

Test users found it positive that the service made people think about what they ate. They also lauded the fact that the service indicated the actual amount of calories and weight of each food on your plate and indicated how healthy the complete meal was when compared to the nutritional recommendations. People who took part in the survey felt that the service helped them to make choices that were more conscious and to pay more attention to how to put together their meals. Some of the users reported that their portion sizes had decreased, and they had eaten more vegetables at each meal during the time that they had used the service. Survey participants described the Smart buffet as “a modern food plate model” and felt that it actually brought something new to the way in which they monitored and managed their eating behaviour.

The usability test encouraged us to launch the buffet. Although the Smart buffet was still a prototype, the test had shown that it worked, it was easy to learn how to use it and customers were interested in the information that it provided.

3.4 Cooperation in marketing and further developing work

The innovation of the Smart buffet was launched on 15 May 2013. The Smart buffet had been in use for seven weeks at the Huhmare restaurant and many problems had occurred during that time. Despite these problems having been solved, there was a suspicion of possible failure on launching. Nevertheless the date was set and careful arrangements were made. The launch of the Smart buffet was an exciting, almost thrilling moment for each stakeholder involved. Happily, it was also a successful occasion and attracted a great deal of media attention, for instance, a report in the national news plus several electronic news sources. In almost a lucky coincidence, the national patent for Smart buffet was granted to Mamk a few weeks before the launch.

A new period of development was at hand and it was time to present the Smart buffet at international professional fairs in Europe. The Smart buffet was awarded with the Smart Label recognition at Host Fair 2013 and attracted interest at the fairs in Riga and Stockholm. The Gastro 2014 fair in Finland also awarded the Smart buffet with the label “Gastron parhaat”. Mamk staff also played their own part in promotion by

spreading the word, writing articles for professional magazines and conferences plus presenting the concept at seminars.

The development of the Smart buffet did not end with the launch and awards. It might sound harsh after such a long and intensive period of development, but at that time, the development started again. It was no longer only the development of the Smart buffet itself but also the development of the whole concept. It was time to re-think the ways in which customers and catering managers interacted with the Smart buffet: that is, to start to development of mobile and cloud services. AgentIT started the new phase of development and a new service concept was formed.

Mamk also made a significant decision – it would invest in Smart buffet. The Kasarmi-na student and staff restaurant will have Smart buffets in use in autumn 2015. This will give Mamk students and staff a new way to test and develop the concept in cooperation with the stakeholders involved, plus, of course, also a possibility for healthier and more conscious eating.

4 Discussion and conclusions

The Smart buffet case showed us that the birth of an innovation is not a single action but a total process of interrelated sub-processes. We really found that the sub-processes and their sequence followed the description of the innovation process by Trott (2012): innovation = theoretical conception + technical invention + commercial exploitation. The conception of the new idea was the starting point. The idea turned to an invention after the description of the idea for the employer and the patent consultant. The technical invention phase involved formulating technical specifications, building and testing the prototypes and applying for the patent. The commercial exploitation phase started with searching for the first customers willing to purchase the Smart buffet for their restaurants. The whole process (which has not yet come to an end) took a considerable amount of time, mostly because of the nature of the innovation, which required several partners and introduced major challenges for the management of the whole process (Figure 4).

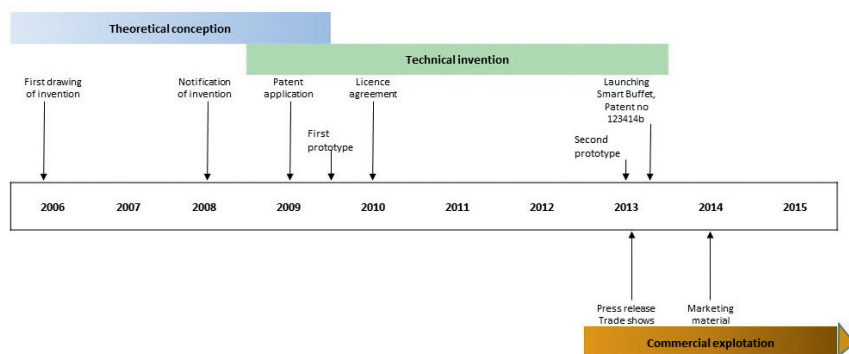


Figure 4. The Smart buffet innovation process (theoretical conception + technical invention + commercial exploitation)

We found that the innovation produced in this case could be classified as an open innovation. Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to the market, as they look to advance their technology. This definition, first launched by Chesbrough (2003), has been a hot topic in the literature of innovation management. Instead of the closed innovation type, where the whole innovation process from the idea to the final product takes place inside the firm, open innovation relies on inflows or outflows of knowledge to accelerate internal innovation. The Smart buffet case represents one type of open innovation, inbound open innovation, where external knowledge, or in this case even the original idea and invention, comes to the firm for development and exploitation. As described by Torkkeli (2008), the contractual acquisition of external knowledge, new business models, more efficient use of intangible assets and cooperation are characteristic of open innovation, and characteristic of this case as well.

According to Hautamäki (2006), we will progress towards a knowledge economy, where innovation processes will be dispersed. Huizingh (2011) predicts that within a decade the term open innovation will fade away, because it will be fully integrated into innovation management practices. He also predicts that time will come when we cannot imagine we have ever lived without open innovation, assuming we ever did. So it seems that besides creating a new innovation, the Smart buffet, we have gone through the open innovation process, which will be a useful lesson to learn for ourselves regarding future practices, and maybe for others, too.

The Smart buffet case indicates the strength of cooperation. The idea of the Smart buffet was born at Mamk and our teachers, researchers and students brought the idea forward. However, very soon it became clear that company partners and new expertise were needed. We had to expand our development team. In Figure 5 we illustrate how our development team expanded from the small RDI group to a multidisciplinary development team during the process.

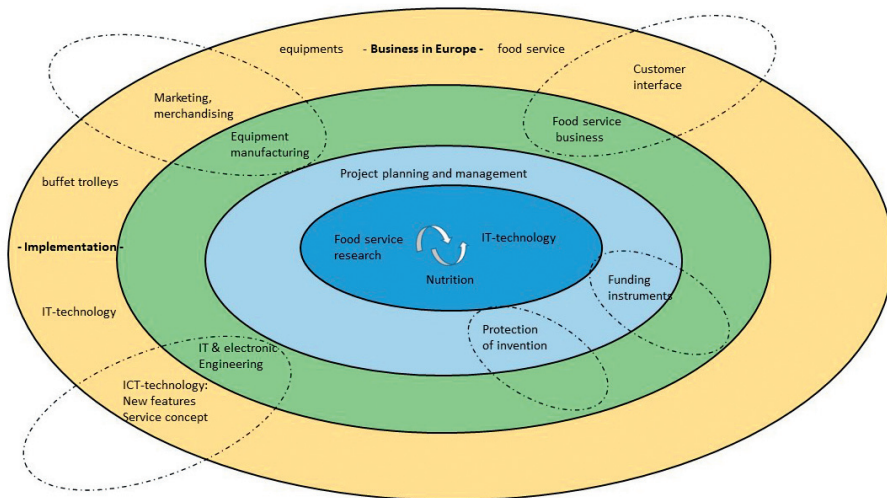


Figure 5. Expanding expertise and enlargement of development team

The TULI funding instrument launched by Tekes made it possible to take steps forwards in our innovation process. In our opinion, this kind of flexible financing programme or an instrument is of crucial importance for the realisation of open innovation. Financing was easy to apply for and the development team was given the financing decision quickly.

The role of the Mamk staff in the development team was to bring the partners of the expanding development team together and to act as an interpreter between the experts in different fields. The Mamk staff were the neutral quarter able to test the usability of the buffet or introduce the Smart buffet in seminars. We created new concepts during the development work to explain how customers operate with a lunch buffet. One new concept was the Finnish “*ottotapahtuma*”, which means an action where a customer takes a portion of food with a scoop from a serving dish. Our role in the team reduced during the innovation process. We were the owner of the idea but we had to let our ‘kid’, the Smart buffet, go, and we hope that our partner companies will take care of it.

In practice, the development work of the Smart buffet meant practical building work, plenty of electronics and IT design and several testing and meeting sessions with the participants. The timeframe for the development work was tight and some setbacks were inevitable. A great deal of confidence in the invention and trust in each other was needed. It was important to concentrate on essential issues in the product development and to proceed step by step. We were impatient waiting for the first tests in the real restaurant and the launch day. Nevertheless, in this kind of long process we needed our dreams and we needed each other: together we did it, we developed the Smart buffet for health-conscious customers who want to know about the nutritional value of their own meal that they eat at a restaurant.

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2

THE STUDENT-DRIVEN ENTREPRENEURIAL TURN

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Abstract

This article presents student-driven initiatives to boost entrepreneurship activities at the Kymenlaakso University of Applied Sciences, describes how student-driven initiatives can be embedded into curricula, and finally discusses the role of UAS in supporting student-driven initiatives.

Universities need to consider whether to leave entrepreneurship activism to students operating outside formal university systems, integrate student-driven entrepreneurial activities into its curricula or embark upon a holistic transformation of the whole educational culture and architecture of the institution.

The student-driven movement challenges the delivery modes of education and managerial structures of universities. It also creates opportunities for student engagement and empowerment and new partnerships. Student-driven activities are vital for higher education institutions, with profound effects on their structures and evolution.

1 Introduction

This article presents student-driven initiatives to boost entrepreneurship activities at the Kymenlaakso University of Applied Sciences, describes how student-driven initiatives can be embedded into curricula, and finally discusses the role of UAS in supporting student-driven initiatives.

In the case of Kymenlaakso Region, the role of entrepreneurship and its increase is essential, because in recent years, Kymenlaakso Region has lost thousands of vacancies when its paper mills closed. Those lost places of work need to be replaced, mostly by entrepreneurship and a new service industry for tourists, elderly people, etc. (See, e.g. Tulkki 2012). A similar development has already happened in many regions around Europe. For instance, in the early 1980s, the University of Twente started a programme to support graduates to establish their own companies (van der Heide & van der Sijde 2008) after losing industrial jobs.

Even existing jobs are going through transformation and demand more entrepreneurial attitudes, mindsets and competencies. New green-collar employment is based on entrepreneurial networking and innovations.

In this article we first describe from the point of view of students and alumni how student-driven activities have emerged at the Kymenlaakso UAS. Secondly, we present three alternatives for how student-driven entrepreneurship activities can be embedded into curricula, and lastly we discuss the role of the Kymenlaakso UAS in supporting student-driven entrepreneurship activities.

2 Student-driven entrepreneurial initiatives - what does this mean for students?

Students' entrepreneurial initiatives started at the Laurea University of Applied Sciences in 2007 and Aalto University in 2008, based on camps organised in Cambridge, and as a continuation of projects organised in the Helsinki Metropolitan Area. Some events and blogs for students were also established. Enthusiasm spread in Finland, and the roots of programmes such as Startup Sauna and Slush & Arctic15 were born (Leino 2014).



Figure 1. Student teams with startup ideas took part to a business development program organized in Cambridge (Photo: Thành Nhân)

The most popular way to organise student-driven entrepreneurship initiatives is to establish an Entrepreneurship Society (ES) and then let ES students produce events, startups, and other innovative initiatives (Leino 2014).

Nowadays, Finland has the following ES actors:

AaltoES (Helsinki metropolitan area): www.aaltoes.com

LaureaES (Hma) www.laureaes.fi

Metropolia ES (Hma): www.metropoliaes.fi

HankenES (Helsinki) www.hanken.es

BoostTurku (Turku) www.boostturku.com

TampereES:(Tampere) <http://www.tampere.es/>

KuopioES (Kuopio): www.kuopioes.fi

OuluSES (Oulu): www.ouluses.fi

JyväskyläES (Jyväskylä): www.jyvaskylaes.fi

MikkeliES (Mikkeli): www.mikkelies.fi/en

Lappeenranta ES (Lappeenranta): www.lutes.fi

ArcadaES (Helsinki): www.facebook.com/arcadaes.

Helsinki Think Company: <http://thinkcompany.fi/>

PatteriES: www.patterinetwork.fi

The development at the Kymenlaakso University of Applied Sciences has been similar to that of other entrepreneurship societies in Finland. PatteriES events were piloted in 2013 as part of the Wood Academy Project. During 2014, student activists participated more in PatteriES, and by the end of that year PatteriES was officially registered as an association.

The purpose of PatteriES is to develop entrepreneurial culture in the Kymenlaakso region and support ideas and businesses going forward. It is run by students and alumni of the Kymenlaakso University of Applied Sciences and its main target group is students at Kymenlaakso UAS. The main activities of PatteriES are organising different kinds of events for inspiration, networking, team working and getting businesses up and running.

PatteriES organises events called Stage which offer talks and lectures, the main intention of which is to inspire the audience. Other activities include networking events and workshops which are organised to grow ideas, entrepreneurial mindsets, teams and businesses.



Picture 2. Timo Nisula, local liquorise company, Kouvolan lakritsi Oy, owner speaking on a Stage -event, for full house, about entrepreneurship (Photo: Kalle Silvola)

For the last step of actually starting up a business, PatteriES organises Startup Summer Camp, a startup entrepreneurship training programme, during the summer. This is a 10-week intensive acceleration programme which focuses on the development of a business model and pitching. The programme is targeted for early stage startup ideas, but normal business ideas can apply to it as well. All applicants go through an evaluation process and the ten most motivated teams qualify. Startup Summer Camp was piloted in 2013 and organised for the first time in 2014. It garners great interest among the students and gathers together the region's innovator actors, investors, mentors, educators, entrepreneurs and students.



Picture 3. Local startup coach and PatteriES active are mentoring and developing Startup Summer Camp entrepreneurs business (Photo: Jonne Kuoppamaa)

Aside from PatteriES, many other student-driven initiatives have arisen. One example is a cooperative business started by students and based at the Kymenlaakso UAS, on the Kouvola campus. Its mission is to gather students who want to work as entrepreneurs during and after their studies. It creates an operating platform for billing customers, testing business ideas and learning about entrepreneurship as well as enhancing peer learning and support and integrating all this work into personal study plans. The students' cooperative is a place for students and alumni to begin their entrepreneurial journey.

Another example is students looking for real life projects for other students. This was piloted in the spring by an organisation called Kreative, which is a project within PatteriES. It was done in a form of a process where a pilot customer gave a task and Kreative collected student teams and guided them through the process. Another similar activity was organised by Gonsul Oy, a new company established by Kymenlaakso UAS students and alumni. Their event was called “Touch your Future”, a two-day workshop with four companies with assignments. These kinds of activities make studying a lot more interesting for students and make them work and think independently, all of which nurtures an entrepreneurial mindset. Both of these initiatives were inspired by the Entrepreneurship Society and student activities which shows how things start to grow at the grassroots level as opportunities are provided.

Supporting student-driven activities is important as it gives the students the opportunity to act for themselves. They need to make connections during their studies, as this period is the best time to start developing a business. Giving responsibility to students also nurtures an entrepreneurial mindset, creates self-confidence and improves belongingness and social cohesion in the organisation. As a side effect, the student-driven approach nurtures the whole entrepreneurial ecosystem and brings the school alive: no boring aisles or withdrawn students, but a lively and vibrant atmosphere which is not only needed during the winter months in Finland.

The next step in student-driven initiatives in PatteriES will be taken in autumn 2015, when it assumes more of a role in studies and creates a workshop for the first year students’ “From idea to innovation” course. In this workshop, PatteriES students will act as mentors and facilitators in the course. This will nourish the ecosystem by integrating more senior students and recent alumni into studies as new students familiarise themselves with the entrepreneurial path.

So far the biggest student-driven initiative has been *ship – The Startup Festival. This is a startup event in which early stage companies meet mentors and angel investors in a pitching competition, a place where all the most interesting startups showcase their ideas for the first time. This event will be organised by PatteriES and student volunteers. It takes place for the first time in Kotka during the Maritime Festival in late July 2015. See you there!

3 Embedding student-driven entrepreneurial initiatives into curricula and curriculum development

Student activism around entrepreneurship in Finland has gained global visibility through the burgeoning startup scene in Helsinki region led by Aalto University students’ events and initiatives. Elsewhere in Finland as well, as described above, a contagious entrepreneurial spirit is spreading through student entrepreneurship societies and related grassroots initiatives, which are forcing educators to consider how these developments challenge curricula and curriculum development (Farny and Kyrö 2015, Lindeman 2015). It seems as if several years of experimentation and the development of entrepreneurial education models has reached a point at which students are taking matters more and more into their own hands. The purpose of this section is to discuss the future of curricula in the face of the student grassroots entrepreneurial revolution.

Three main alternatives emerge as ways for entrepreneurship to be incorporated and eventually institutionalised into the curricular structure. One alternative is to keep student-driven entrepreneurship activities separate from the curricula. This is basically the model of the student unions. There exists a wealth of opportunities and interesting things to do with other students outside the curricula. Entrepreneurial activism is like political activism in the past. You do it out of your passion, without optimising the accrual of credit points. Time at the university is valuable in itself, and whether or not you are interested in your own core studies, your personality and attractive social occasions draw you towards extra-curricular activities, too.

The positive side of this alternative is that it really separates the best from the rest with respect to people taking their own initiative and responsibility. Students are very free to try and do anything. If they want to keep pace with their study schedule they (need to) learn how to balance studies and extra-curricular activities, thus building the good self-management skills vital for employability. The downside of this model is at least twofold: First, student unions, for instance, are often based on long and strong traditions and it may be challenging to break those traditions with new initiatives or movements, of which the entrepreneurial movement can be seen as a good current example. For instance, how much time and assets are established student unions willing to invest in entrepreneurial programmes? The challenge with the most institutionalised student unions seems to be similar to that of universities themselves. Second, there is the danger of prolonged graduation, as students divert from their planned study plan to time-consuming duties of traditional projects, publications, and various student bodies. At the time when a student's progress in her studies is under close scrutiny from many sides, this model seems especially vulnerable as the sole model for the (dis)integration of curricula and the entrepreneurial path.

Another alternative is to offer credit points for students' own entrepreneurial initiatives and work. This can be done through entrepreneurship courses, practical training, or even thesis work that have competence objectives which match competences gained through student-driven activities, or by closer cooperation with student entrepreneurship activists such as entrepreneurship societies on a course level so as to include student-driven actions as part of the course delivery. This is a model towards which the process described in the previous section seems to be heading. It tries to combine the freedom of the 'student union model' and the co-development of curricula by students, lecturers, and university management. The aim is to 'let freedom ring' in the entrepreneurial sphere while securing the accrual of credit points. The challenge is that the model is highly dependent on the receptivity of university lecturers and management, as well as their willingness and vision to commit themselves to changes regarding modes of course delivery, curriculum development, and management style. It also produces challenges in the relationship between the university and its more traditional industry partners if the latter do not yet share the idea of the entrepreneurial turn.

The third alternative is to raise the strategic priority of entrepreneurship education and develop curricula with a fully-fledged entrepreneurial university concept in mind. This would mean the adoption of the entrepreneurial agenda into the heart of the university identity, and as a consequence into its curricula, regardless of discipline, in the manner of the Babson model (Fetters et al. 2010, 15-43). Among universities of applied sciences in Finland, this is perhaps best seen in the strategic direction

of Jyväskylä University of Applied Sciences, which has included entrepreneurship as one of the three main goals of the institution, as expressed by Rector Halttunen: “Our goal is to be Finland’s best university of applied sciences which has strong evidence on quality of education, internationalisation and promotion of entrepreneurship” (www.jamk.fi, translated by the author).

The positive side of the third alternative is that the promotion of entrepreneurship secures enough (if the strategy is implemented consistently) funding from the university which can be manifested, for example, in new faculty appointments, innovative learning environments, relevant international partnerships and programmes, and RDI projects geared to developing conditions for entrepreneurship. This clear strategic priority most likely also helps with the redesigning of existing curricula and training of personnel to meet the needs of curricular changes. However, this model can be still be seen as institution-driven, because it is the university – with its stakeholders, of course – which sets the strategic priority and drives the change. The dangers of this kind of top-down approach to entrepreneurial culture may be offset by a very competent leadership which allows implementation along a postmodern approach to strategic management (Luoma & Juuti 2010). Another challenge is that the model relies on strategic priorities which may change if new leadership is put in place. And it is a matter of whether a strong enough grassroots movement has been grown that will support the entrepreneurial turn despite changes in institutional leadership.

4 Supporting student-driven entrepreneurial initiatives

The current trend of higher education institutions emphasising student-driven activities is a challenge to teaching and to UASs. Earlier in this article we discussed what kind of activities are initiated and how they are organised at the Kymenlaakso UAS from the point of view of curriculum design and development. In this section we discuss possibilities and items for supporting student-driven activities in higher education institutions. Firstly, we describe how processes of entrepreneurship are supported, and secondly how these processes might affect universities themselves. We use the Kymenlaakso UAS as a case study again.

Student-driven entrepreneurship and the establishment of entrepreneurship societies (ES) besides UASs is welcomed and boosted by UASs (Leino 2014). It can be argued that ESs continue entrepreneurship teaching, processes and incubators that were arranged by the UASs themselves. For instance, at the Kymenlaakso UAS, one starting point was the Business Academy, where training was based on student cooperatives (Pelli 2014), although still closely connected to business education.

Entrepreneurship means that initiatives, ideas and innovations should be in the hands of students, who have the potential to develop startups, as they also did in the Business Academy. That principle was followed in practice at the LCCE[®] -yrittäjyysprosessi (LCCE – Learning and Competence Creating Ecosystem, yrittäjyysprosessi – the process for entrepreneurship) (see more in Jaskari, Pienimäki, & Vihavainen 2012.) It seems that encouraging students in their own entrepreneurship processes during their studies has boosted just what is needed for startups and initiatives from students to students: Entrepreneurship Societies. The LCCE is a pedagogical framework at Kymenlaakso UAS that emphasises the possibilities of an authentic learning

environment and close connection between learning and the world of working. PatteriES is a good example of how students apply the framework. It can be seen as an innovation that continued pedagogical change in its own way, where learning ecosystems and training are practice and work-orientated and the teachers' role is changing to one of mentoring.

Interaction between ES activities and UAS education is essential. Institutional support at its best happens when UASs and ESs work together, enrich each other, and develop constantly learning and innovative ecosystems. Common mental and development processes are important to networking, to deal with the 'wicked problems' of the future. So, PatteriES is a part of the higher education ecosystem that guarantees work-related and entrepreneurial learning through experiments.

It might be argued that entrepreneurship societies are the natural next steps for entrepreneurship education in UASs, in order to create stronger entrepreneurial mindsets in the context of higher education. The importance of the social context in which universities are operating is recognised and emphasised when discussing entrepreneurial universities (Foss & Gibson 2015). This means that universities fulfil their missions according to the expectations and needs of their operational environment and partners. Students can be seen as part of that context, and the entrepreneurial turn is inevitable both for students' sake and for the UASs. Entrepreneurship is needed for employment (see also van der Heide & van der Sijde 2008).

As Sjors van der Heide and Peter van der Sijde (2008) put it, the University of Twente is seen as an entrepreneurial university because of its entrepreneurial activities in education and its managerial approach. The same kind of conclusion is made by Lene Foss and David Gibson (2015), in their investigation of universities in Europe and the USA. They call it an 'entrepreneurial turn' that happens on one hand in teaching and the other in management, or as they put it, on the institutional and organisational level. The entrepreneurial turn started in UASs in Finland in the first decade of the 21st century, first in education then in establishing a supporting infrastructure, and then in the management of UASs. The importance of entrepreneurship was first shown in UASs' strategies at the beginning of the 21st century (see e.g. Mertanen, Lähdeniemi & Neuvonen-Rauhala 2008). Nowadays, entrepreneurship is included in the strategies of most UASs, and the third common entrepreneurship strategy of ARENE (Rector's Conference of Finnish Universities of Applied Sciences ARENE ry) is being launched this year (see www.arena.fi).

It is important to have an entrepreneurial community in higher education to boost entrepreneurship and innovation, and that makes a university an entrepreneurial one (van der Heide & van der Sijde 2008). That is why it is important to support students in both ways: in creating an entrepreneurial mindset and skills and also by offering an entrepreneurial ecosystem with an infrastructure in which ESs can act. The Kymenlaakso UAS has supported PatteriES by giving it space, opportunities for events and funding for activities.

Funding is still constantly requested by ESs. They need more stable funding (see also Leino 2014) than they have now. The Kymenlaakso UAS has also supported PatteriES financially, but more is needed to continue its activities. Originally, external project funding provided the necessary financial resources for developing entrepreneurship education, and more recently the student-driven entrepreneurship movement. The most current developments e.g. *ship, have benefited from both project funding and closer partnership with regional development corporations. More and more local business partners have invested their time and small amounts of sponsorship to allow it to carry on its activities.

In the future, PatteriES as a registered association and possible student cooperatives could create services and products that partly finance entrepreneurship activities. These kinds of alternative methods of support need to be considered in addition to the integration of individual students' entrepreneurial paths and evolution of curricula.

In light of the progress described here, it seems to be impossible that entrepreneurial activities will not be integrated somehow into the architecture of universities. UASs need to rethink their strategic priorities and their level of ambition regarding the promotion of entrepreneurship, and operational models to organise education as part of the entrepreneurial ecosystem.

5 Discussion and conclusions

We have presented some developments in entrepreneurship education from the perspectives of students and alumni, programmes and curriculum development and management. Our main observation is that the entrepreneurial turn within university system is continuing, but the direction of entrepreneurial drift seems to be changing.

Top-down promotion of entrepreneurship education by universities (professorships, degree programmes, incubators) and external funding instruments (EU entrepreneurial policies and initiatives) were necessary steps to build up momentum for the student-driven entrepreneurship movement, which is sustained by global trends and value changes among youth.

The student-driven movement challenges the delivery modes of education and managerial structures of universities. It also creates opportunities for student engagement and empowerment and new partnerships. Student-driven activities are vital for higher education institutions, with profound effects on their structures and evolution.

According to Elene Ruskovaara (2014), Finland is a pioneer in entrepreneurship education. After two decades of promoting entrepreneurship activities, several Finnish universities and UASs are including entrepreneurial elements in their strategies. Some universities are even profiling themselves strategically as entrepreneurial universities. It will be interesting to see the next phase of entrepreneurial universities in the context of higher education.

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3

ENTREPRENEURSHIP COACHING

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Abstract

The Kymenlaakso university of applied sciences implemented the Uutta Elinvoimaa project. The purpose of this project was mainly to help the Kymenlaakso region's unemployed paper and wood industry workers to become entrepreneurs. This was done by organising entrepreneurship coaching. Entrepreneurship coaching is a very useful way to help entrepreneurs to start and develop their company. The effectuation model is a practical and action-orientated way in which to implement entrepreneurship coaching.

1 Introduction

The Kymenlaakso university of applied sciences implemented the Uutta Elinvoimaa project. The purpose of this project was mainly to help the Kymenlaakso region's unemployed paper and wood industry workers to become entrepreneurs. This was done by organising entrepreneurship coaching (Heimonen 2014).

The use of coaching in business has increased greatly in recent years. Coaching has a role to play in helping entrepreneurs to develop their companies. It can help entrepreneurs in many ways, for example by developing their business skills, helping them to make good decisions and develop their innovations, and in general helping them to develop new ideas and new ways of thinking and seeing things (Virolainen 2010). This chapter discusses how entrepreneurship coaching can help entrepreneurs to start their business.

2 Entrepreneurship coaching

Entrepreneurship coaching is a development process whereby a coach helps an entrepreneur to start and develop their company. The entrepreneur's own learning and growth are important elements in this. By helping the entrepreneur to develop, the coach helps the entrepreneur's company to develop. Then the entrepreneur can make better decisions, create better plans and take action that leads to results. Coaching is a goal-orientated process which integrates the goals of the entrepreneur and their company (Virolainen 2015; Virolainen 2010).

2.1 Effectuation as an entrepreneurship coaching model

Saraswathy (2008, 101) researched successful entrepreneurs and created an effectuation model which is presented in Figure 1.

The effectuation model was the key model used in the Uutta Elinvoimaa project (Heimonen 2014; Virolainen 2014a). Saraswathy's (2008, 101) model is a useful tool in entrepreneurship coaching. In addition, Virolainen's (2014b) approach related to entrepreneurial passion was used. Entrepreneurial passion is associated with commitment, empowerment and energy (Laaksonen et al. 2011) and also with positive outcomes such as high levels of long-term performance and high subjective well-being

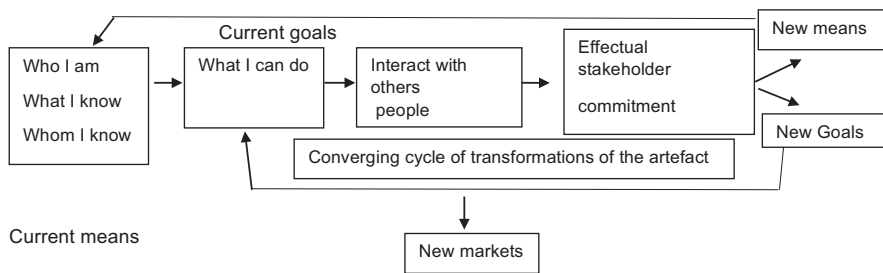


Figure 1. Dynamic model of effectuation (Saraswathy 2008, 101)

(Bonneville-Roussy et al. 2010). In the effectuation model, the first step is to help the entrepreneur to know themselves better (the first box in Figure 2). These elements are related to the entrepreneur's interests and passion. Coaching usually starts here. The entrepreneur is considering what their business is going to be or how to develop existing business going forwards. At this point, the coach helps the entrepreneur to recognise their own interests and passion; to become aware of what they really enjoy doing, what really inspires them (see Roberts 2010).

Next in Figure 1 come the elements related to the entrepreneur's skills and know-how. These can be based on studies and work experience, but also hobbies. From the coaching point of view, it is important to help the coachee to be aware of the many kinds of skill and knowledge that they have, and also to help them to use these in their business. People who can use their strengths at work are more committed and motivated than people who are not able to use their strengths. This also results in getting less work done during the day and fewer creative moments. (Rath 2007.) This step is also related to finding passion, since by considering their own interests, skills and strengths, a person can often recognise several options for their business and see different opportunities (see Saraswathy 2008).

The next element in the effectuation model is related to networking. An entrepreneur does not have to do everything by themselves. The entrepreneur may have some business ideas where their own skills and resources are limited. This does not have to mean that they must give up the business idea that they are really interested in. Instead they can find persons or companies who have these skills and resources and cooperate. Networking helps the entrepreneur to develop their products and services. They will also learn new things and may have access to new customer groups. The coach helps the coachee to think and find key partners with whom the entrepreneur can cooperate (Saraswathy 2008, 101).

The next element in the effectuation model is the stakeholder's commitment. A key element of this stage is developing relationships with key stakeholders. Having common goals and a common understanding of cooperation principles is important (Saraswathy 2008, 101).

The effectuation model is a cycle. The most important element is to take action. By taking action, the entrepreneur develops their company and also gains new ideas. Seeing what is working and what is not is important in learning and developing. The coach can help the coachee to manage resistance and doubt when trying something new. These elements are quite common, even if an idea itself has potential and the entrepreneur has a passion for it. If doubt and fear are not managed, they can present obstacles to taking action and grabbing opportunities. It is important not to postpone the action steps for too long. The entrepreneur should start to take small action steps soon and continue to do constantly, instead of just planning. By taking action, networking and reflecting, the entrepreneur can think up new goals, new business ideas and how to achieve them. The coach's task is to help with this (see Saraswathy 2008).

2.2 Group coaching

The Uutta Elinvoimaa project involved both group and individual coaching. In the group coaching sessions, the focus was on different areas related to starting and developing a business. These themes were related to marketing and sales, business law, finance and accounting, communication, business strategy, and work well-being. Each day had its own theme. This was implemented such that key points were explained and at the same time the participants applied these points to their own companies. So, the coaching was action-orientated, and both during and between the group coaching sessions, the participants took steps to develop their business ideas further. Typically three days of each week were set aside for group coaching. Coaching was intensive, lasting 4 weeks. At the same time, individual coaching was offered, which also continued after the group coaching.

One important element in the group coaching was networking and cooperation between participants. They were able to think about what they were able to do together so that each would benefit. In addition, when discussing with each other they gained new ideas about how to develop their business, even if the other person was in a different line of business. The support of other participants was highly important here.

2.3 Individual coaching

Individual coaching was organised so that each participant had their own coach, whom they met approximately every three weeks. During the session, key issues related to the entrepreneur's business issues were discussed. Each time, certain tasks were agreed that coachee must complete before the next meeting. These tasks were related to the entrepreneur's business and by completing them, they were able to take their business ideas further and also take some practical actions to develop their company.

Key elements in coaching sessions involved helping the coachee to see things from a different point of view and develop their way of thinking. An improved way of thinking helps an entrepreneur to see opportunities. A very important element in this coaching was also helping the entrepreneur to put insights and plans into action (Virolainen 2015; Virolainen 2010).

A typical way to implement coaching is that the coach asks questions and the entrepreneur answers them. Figure 2 shows the coach's action on a scale from solving the entrepreneur's problem to helping the entrepreneur to solve their own problem and achieve their goals. The idea in entrepreneurship coaching is to help the entrepreneur to solve their problems and achieve their goals.

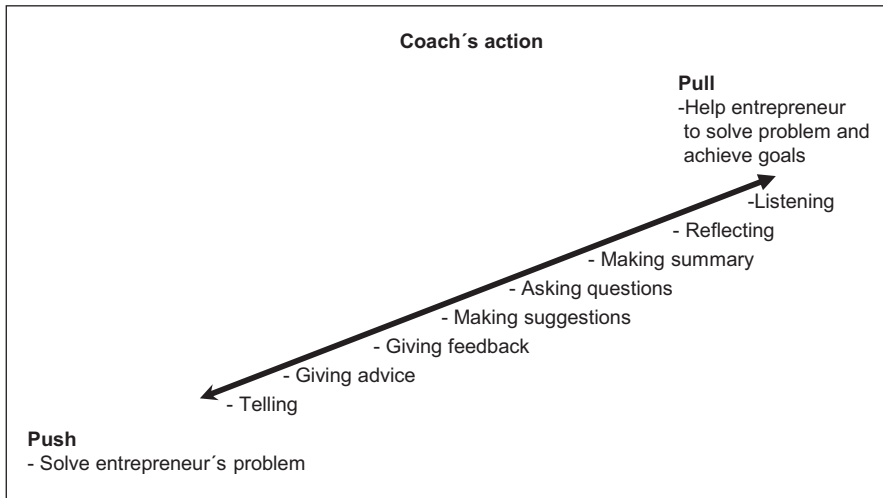


Figure 2. Coach's action (Downey 1999)

The approach taken in the entrepreneurship coaching had an entrepreneurship orientation. This meant that the entrepreneur's agenda was followed during the coaching. The coach helped the entrepreneur to find answers for themselves. The coach helped the coachee to achieve their goals related to entrepreneurship. If the coach helps the coachee to gain insights by themselves and put these into action, the coachee takes more responsibility than if the answers had just been given to them. Taking responsibility and working in a self-orientated manner is important in entrepreneurship.

2.3 Coaching approaches

The coaching approaches used in the Uutta Elinvoimaa project were practical, goal-orientated and solution-focused. One of the coaching models used in the individual coaching was the GROW model, which is based on the words: Goal, Reality, Opportunities and Wrap up (Will is also used for this stage in the literature). The goal step means setting goals that the entrepreneur wants to achieve. The coach and coachee discuss the coachee's goals related to income, markets, sales and deadlines. The reality stage includes discussion related to the current moment, the current situation and what coachee has done so far related to their company. The opportunities step includes a discussion of opportunities and the ways in which the coachee can achieve their goals. A concrete plan is created in order to achieve the goals. The last step is wrap up, which means making a summary of the session discussion and also agree-

ing what the coachee is going to do next (Virolainen 2010, 79; Whitmore 2007, 54, 88-96).

Experts from different fields were involved in the Uutta Elinvoimaa project. Each participant had a personal coach. This made communication and contact clear. The personal coach was also aware where the entrepreneur was going in this process. Sometimes there were matters that needed some special expertise; then the coachee also met experts in those areas, related to business law, Internet marketing, branding, design and financing. Even though most of these were covered during group sessions, in the individual sessions there was a possibility to go through current challenges that the entrepreneur was facing related to those issues.

The Uutta Elinvoimaa project was integrated into teaching in several ways. Students with different backgrounds conducted research and development projects for entrepreneurs. These were related to marketing, design, and general product and service concept development.

3 Key elements in entrepreneurship coaching

In order for entrepreneurship coaching to be successful, it helps if the coach and coachee fulfil certain criteria and that the system supports the coaching process.

3.1 The entrepreneur's success elements

Several elements related to the entrepreneur's success are concerned with their attitude. The entrepreneur's own commitment to starting and developing their company is important, as is their commitment to coaching. This means that they take time for coaching and do the agreed tasks. It is also important to take responsibility for their own development and the company's development. This means a willingness to learn, an open mind, and a willingness to question their own point of view and put their insights and plans into action. One key element is also to go out of their comfort zone. This is crucial especially for the new entrepreneur starting a company for the first time. Trying new things is important in product and service development as well as in going into new markets (Virolainen 2008; 2010).

3.2 The coach's success elements

The coach can at some level influence some of the coachee's factors, for example by creating a trustworthy and open environment. This helps them to discuss matters openly. By following the coachee's agenda, the coach's goals are to facilitate the coachee's own decision-making and action.

Of course, coaching skills such as listening, asking questions, building trust, helping the coachee to see things from different points of view and taking action are important, as are encouragement, honesty, support and being present as well as easy to reach (Virolainen 2008; 2010).

3.3 The system's success elements

The group coaching in the Uutta Elinvoimaa project was intensive. This helped to keep the focus on developing the company. The additional individual coaching made the coaching more effective because individual points could be discussed more deeply. The effectuation model is useful in entrepreneurship coaching because it is action orientated and takes good care of the entrepreneur's own interests, strengths and goals.

4 Discussion and conclusions

Entrepreneurship coaching is a useful tool to help people who want to be entrepreneurs to start their business and develop it. Several ideas that were used in the Uutta Elinvoimaa project can be used to develop further entrepreneurship coaching processes, whether the target group is students or other people wanting to become entrepreneurs.

Saraswathy's (2008) effectuation model is useful in entrepreneurship coaching. It is entrepreneur-orientated, starting from the entrepreneur's own interests, goals, skills and knowledge and helping them to use these in their company. One key element in entrepreneurship coaching is helping the coachee to follow their passion and take action, putting things into practice. The coach and coachee can agree on the concrete steps that the entrepreneur must take in order to develop their company. By taking action steps, the entrepreneur develops the company in a concrete way. By doing things and reflecting on them, the entrepreneur gets new ideas about how to develop their company. It is important for the coachee to have an open mind so that once they see what works and what does not work, they can change direction, set new goals and find new ways to achieve these.

The coachee's own will to start and develop a company is vital. The coach can help the entrepreneur to create a vision and plan how to achieve it. The coach's encouragement and support is very important. Sometimes the coachee may have good ideas and skills but have doubts because they are new in the role. Especially at these moments, support is important.

One important element in entrepreneurship coaching is that the coach helps the entrepreneur to take responsibility for developing their company. The coachee may have been used to following orders as to what to do and how to do it in their previous workplace, but as an entrepreneur it is important to take responsibility for yourself in a self-orientated way. The coach can help with this by asking good questions and allowing the coachee to form insights, so that the entrepreneur makes the decisions. It is also important for the goals to be their own instead of being imposed from outside, and that they themselves take the action steps.

The support of other group members is important. By building a friendly, open, trustworthy atmosphere, entrepreneurship coaching participants can share ideas and gain insights into their own businesses. They can also find opportunities for cooperation. Trust is important here, so that ideas shared with other members are not shared any further.

Entrepreneurship coaching is also good way to test ideas. Instead of keeping ideas in their own head, the entrepreneur can test their ideas with their coach. The coach can help the coachee to look at these ideas systematically and see them from different points of view. If they still seem good ideas, then the coach can help the entrepreneur to develop them further.

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4

PROMOTING ENTREPRENEURSHIP IN WOOD PROCUREMENT

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Abstract

The South-East Finland Russia ENPI CBC 2007-2013 programme involved a project called Wood Procurement Entrepreneurship (WOPE). The aim of the project was to develop entrepreneurship in wood procurement in the Leningrad region and Finland. The main activities included 16 tailor-made training programs for the personnel of wood harvesting companies and the teachers at vocational forestry schools in the Leningrad region and wood procurement companies in Finland. Three educational organisations from Finland and two from Russia implemented the project. The project was co-funded by the European Union, the Russian Federation and the Republic of Finland.

There were 47 training days involving 212 participants. The training courses enhanced and developed the competences and skills of companies in wood harvesting, entrepreneurship and business operations in Finland and Russia. Thanks to the project, the network of partners is more prepared to offer training for companies in the forest sector in both Finland and Russia. New competences in wood harvesting companies will be needed when the planned investments in the forest industry in Finland and Russia are implemented.

1 Introduction

Many aspects of the forest sector relate to both Russia and Finland. Both belong to the boreal coniferous forest zone and both of the countries have huge forest resources. Wood is harvested for the most part by private wood harvesting companies. The cut-to-length harvesting system has been used in Finland for more than thirty years and during the last ten years it has become more popular in Russia, too, especially in North-West Russia.

The development of entrepreneurship is an important tool for improving the finances of the harvesting companies and helping them to adjust to current demands in the planning of harvesting, investment planning and environmental aspects, for example. The WOPE – Wood Procurement Entrepreneurship - project started in December 2012 with a duration of 24 months. The purpose of the project was to develop entrepreneurship in wood procurement in North-West Russia and Finland. The main means of the project were 16 tailor-made training courses for Russian and Finnish wood procurement companies. Wood procurement includes the purchase, logging and transportation of wood.

The partners of the project were educational institutions operating in South Savo, Finland and in the city of St. Petersburg and Leningrad region, Russia. The Mikkeli University of Applied Sciences (Mamk) was the lead partner and the other partners were the Aalto University of Business, Small Business Centre (Aalto Biz SBC), South Savo Education (Esedu), St. Petersburg State Forest Technical University (FTU) and the Autonomous Public Institution of Secondary Vocational Education of Leningrad oblast (Vyborg). Cooperation and joint implementation of the project between these partners was natural. All of the partners are educational organisations, and entrepre-

neurship, forestry, and their promotion play an important strategic role in these organisations. Group work at the Kick-off seminar in St. Petersburg is shown in Figure 1.



Figure 1. Group work on training needs, Kick-off seminar in St. Petersburg January 2013 (Photo: Kirsi Itkonen)

This article presents the WOPE project as a tool for developing entrepreneurship in the field of wood procurement in the Leningrad region and South Savo. The article also presents some concrete ideas which could be useful when planning and implementing upcoming joint projects.

2 BACKGROUND OF THE WOPE PROJECT

2.1 Cross-border cooperation between Finland and Russia

The European Union is interested in supporting cross-border cooperation on the external borders of the EU. Therefore, cooperation between Finland and Russia was promoted through the European Neighbourhood and Partnership Instrument (ENPI) during the programming period 2007-2013. The South-East Finland – Russia ENPI CBC Programme was a programme aimed at promoting cross-border cooperation across the Finnish-Russian border between South Savo, St. Petersburg and the Leningrad region. During the years 2007-2013, a total of 47 standard development projects and 8 large infrastructure projects were granted. The European Union, the Russian

Federation and the Republic of Finland co-funded the programme. One of the main priorities of the programme was to increase the activity of small and medium sized enterprises (SMEs). Another objective was to improve the opportunities for SMEs to advance their competitiveness through networking, corporate cooperation, production development and technological expertise (Brochure of funded projects 2013).

In addition to education and training, the promotion of regional expertise and development is one of the Mikkeli University of Applied Sciences's (Mamk's) primary missions. With strong and growing research, development and innovation (RDI) activities, Mamk aims at improving the conditions for regeneration, growth and entrepreneurship in the South Savo region. The fields of expertise in Mamk support the regional strategies and action plans. Besides this, European Union policy and research and innovation policy also have a role. The RDI activities directed at Russia focus on environment and forestry (The Strategy of Mikkeli University of Applied Sciences 2013).

Considering the location of the Mikkeli University of Applied Sciences in South-Eastern Finland, it is natural to cooperate with Russian higher educational institutions, especially those from the Leningrad region and the city of St. Petersburg. The ENPI-programme was a one way to combine the strategies of the European Union, the Republic of Finland, South Savo and Mamk, and promote entrepreneurship and create new business opportunities.

2.2 Aims and objectives of the project

The target groups of the project were wood harvesting and transportation companies in the Leningrad Region, vocational forestry schools and logging companies in the Leningrad Region and entrepreneurs in wood procurement in Finland interested in starting to do business in Russia. The target groups were divided among the partners so that Mamk and FTU concentrated on Russian wood harvesting enterprises, Esedu and Vyborg on Russian logging companies and forestry colleges and Aalto Biz SBC on Finnish wood procurement enterprises.

The aims and objectives of the project were classified into two different levels, the overall and the specific. The overall objective of the project was to develop entrepreneurship in wood procurement in North-West Russia. The specific objectives of the project were to:

- improve, increase and strengthen know-how in wood harvesting, entrepreneurship and business operations among Finnish and Russian enterprises operating in the Leningrad region,
- increase the competences of the vocational forestry schools and logging companies in wood harvesting, entrepreneurship and business operations in the Leningrad region,
- improve and increase the skills and motivation of Finnish wood procurement enterprises to work in the Russian business environment and
- strengthen and improve the risk management and business security of Finnish companies working in wood procurement in North-West Russia.

The objectives of the project were in line with the objectives and priorities of the South-East Finland - Russia ENPI CBC 2007-2013 programme as well as the objectives of the Regional Development Programme of South Savo. The objectives and measures for regional development include entrepreneurship, production, and working and labour policies. The programme involves principles and measures that deepen and strengthen the cooperation between South Savo and St. Petersburg and the Leningrad region. They relate to strengthening educational networks, research and innovation activities, and the promotion of business cooperation and its comprehensiveness. Reaching these objectives is supported by helping businesses to enter the Russian market (Etelä-Savon maakuntaliitto 2010).

Within the objectives mentioned in the development programmes of St. Petersburg and Leningrad region, the following were partly in line with the objectives of the WOPE project: improving the preconditions for entrepreneurship; developing international relations; training staff; creating a positive climate for entrepreneurship; ensuring the safety of business; improving opportunities to reach a higher standard of living; developing the labour market and continuing education. Recently, the investments made by Russian and international forest companies in North-West Russia have been increasing significantly. This will mean that greater amounts of timber will be needed in the forest industry, which will set demands on wood procurement activities accordingly (Karvinen et al. 2011, 138).



Figure 2. Forest road field trip in Tihvin, Russia (Photo: Kirsi Itkonen)

In addition, there are more than 100 harvesting companies operating in the Leningrad region and annually more than 200 agreements are made for renting harvesting areas. For example, in 2012 about 5 million cubic metres of about 7 million harvested cubic metres were processed into the products of forest industry in the Leningrad region. The starting point for the project was the need to develop the competences of the companies in business skills, entrepreneurship and wood harvesting. One of the field trips arranged during the project in Tihvin is shown in Figure 2.

There are a few studies offering information about the training needs of wood harvesting companies in North West Russia. The studies show a lack of skills, experience and motivation among forest machinery operators in Russia. In addition, the full potential of the investments is challenged by the shortage of companies in the fields of wood harvesting, and the lack of knowledge of the operating companies about planning in the changing operating environment (Goltsev et al. 2011, Gerasimov et al. 2012).

On the other hand, a structural change has been taking place within the field of wood procurement in Finland. Several companies are interested in enlarging their businesses and looking for opportunities for growth, and as a result, improved profitability. One way of doing this is to extend their operational area and go international, especially into Russia. Despite the customs duties imposed on Russian round wood in 2009, many Finnish wood procurement companies might consider harvesting in Russia again. After achieving membership of the WTO, Russia declared that it would decrease the customs duties for round wood. However, the experiences of Finnish wood procurement companies in the North-West Russia have been varied, and too often Finnish operations have faced severe difficulties, causing them to withdraw from the area. One of the main reasons has been poor knowledge of the Russian business environment among the Finnish companies.

3 ACTIVITIES AND OUTCOMES OF WOPE

Consequently, the project activities were planned so that they served as tools in achieving the objectives. Because the project partners involved were educational institutions, the main activities to reach the objectives were naturally training and coaching. Altogether, the project partners planned and arranged 16 different training programmes and courses. The duration of the courses ranged from one to five days. A total of 47 training days were provided, with 212 participants. This number does not include the project staff, who of course participated in most of the sessions. The total number of training days multiplied by the number of participants in each of the training programmes was 493 days. The participants represented 28 different companies, seven educational institutions, one research institution and four associations or government agencies. Table 1 presents more detailed information about the training that was arranged.

Table 1. Information on training that was arranged

Target group	Duration days	Place	Date	Participants	Partner
Owners and personnel of wood harvesting companies in the Leningrad Region	3	Podporozhe	Oct 2013	15	Mamk
	3	Mikkeli	Apr 2014	13	FTU
	2	Jämsä/Mikkeli	Aug 2014	13	
	3	Tihvin	Oct 2014	18	
Teachers of vocational forestry education, workers from logging companies in the Leningrad Region	5	Mikkeli	Nov 2013	9	Esedu
	5	Mikkeli	Nov 2013	7	Vyborg
	5	Mikkeli	Apr 2014	10	
	5	Mikkeli	Apr 2014	7	
	2	Jämsä/Mikkeli	Aug 2014	10	
Entrepreneurs in wood procurement in Finland	2	Mikkeli	Apr 2013	11	Aalto
	1	Mikkeli	Oct 2013	9	Biz SBC
	1	Mikkeli	Oct 2013	26	
	2	Mikkeli	Apr 2014	7	
	3	Podporozhe	Oct 2014	9	
Forwarder operators from Leningrad region	2	St. Petersburg	Nov 2014	9	FTU
	1	Vyborg	Nov 2014	9	Vyborg
	2	Mikkeli	Nov 2014	9	Esedu

The other activities were establishing the environment and the content of an online service, designing a model for managing risks and improving safety and publishing a manual for wood procurement.

The website environment for the virtual services includes, for example, training materials including themes around entrepreneurship, business management and operational efficiency of forest procurement. The materials are available in both Finnish and Russian, as is the safety and risk management model for wood procurement companies in Russia. The model for managing risks and improving safety was developed for the acute needs of Finnish wood procurement companies in Russia in terms of risk management. The finished model includes components covering the identification, qualification and management of risks.

One of the tools, which the project offered for the development of the companies was the publication *Ideas, practices and tools for the development of wood procurement*. The publication consists of a selection of articles that aim at developing wood procurement in Russia and Finland. It covers themes that were dealt with during the project in the training courses plus some completely new themes. The publication covers aspects such as the cost calculation and profitability of wood harvesting, wood

harvesting entrepreneurship in Finland and Finnish forest machine entrepreneurs' risks in Russia. A number of experts from the fields of education, RDI and working life contributed to the publication as authors. The publication is available on the project website in both English and Russian (Itkonen 2014).

One of the activities was establishing a network of partners. The network worked and will work as a tool for exploiting the outcomes and strengthening the sustainability of the project. During the training programmes, the target groups and associates joined the network. One way to cooperate in the future is to plan and arrange joint training together with partners and companies. Already during the project a new product for training Russian forest machine operators was developed. The training course deals with forest machine maintenance and thinning.

4 EVALUATION OF THE ACTIVITIES AND LESSONS LEARNED

4.1 Challenging assessment of outcomes

One way to evaluate the success of the project is to observe the outcomes. Both quantitative and qualitative indicators were set for the project activities. The project achieved the quantitative objectives set for the number of training courses, the number of training participants, the number of participants in the meetings and seminars and the number of training days. The qualitative indicators included feedback from the participants in the training as well as self-evaluation by the project staff.

Firstly, according the feedback, the project activities had a positive impact, substantially increasing the know-how of the Finnish companies in terms of entrepreneurship, profitability, cost-effectiveness and starting and running a wood procurement business in the Russian environment. Secondly, after the training courses, the participants had a concrete idea of the requirements to start a business, what the business environment looks like, who potential partners could be, where to get more information, how to manage the risks and safety issues and how to increase the profitability of the company by planning the harvesting.

Furthermore, the competences of wood harvesting companies in the Leningrad Region in wood procurement increased. They know how to harvest wood more cost-effectively, safely and productively. They also understand the importance of maintaining the machines, the influence of a proper road network and the different kinds of possibility for building forest roads and the latest forest machinery techniques. The participants gained a picture of the situation in forestry and wood procurement in Finland and concrete ideas on how to implement the practices in the Leningrad region.

In addition, the training courses had a positive impact on increasing the know-how and skills of the Russian logging companies and the forestry schools concerning forest machinery maintenance, environmental issues in forestry, nursery techniques and the production of forest machines.

However, it is challenging to measure these extensive effects and their impact immediately after the project has ended. The increase in competencies will be seen later with the change in operations in the companies. Concrete examples could be frequent and careful maintenance of forest machinery, paying attention to leadership and risk management, investing in forest road construction and starting up new businesses.

4.2 Lessons learned

One important matter to be considered from the point of view of the implementing partners when the project has ended is the question of what did we learn. We present some aspects project partners discovered that could be useful for upcoming initiatives. Firstly, the better the partners know each other and the more they cooperate as early as the planning phase, the easier it is to implement the project. Experience shows that often the project planning phase takes a lot of time and effort, and it is challenging to make a detailed project plan. Nevertheless, the more carefully prepared the plan, the easier it is to implement the project.

The importance of customer orientation in adult education and training was noticed once again. It is extremely important for the participants to contribute to the content of the training, even as early as in the planning phase. Even though a Kick-off seminar was arranged where the training needs of the wood harvesting companies were defined and sorted out, it was challenging to plan the content of the training days. In the end, the sufficiently long implementation period made it possible to update and develop the content for the next modules.

Part of customer orientation, besides the content of the training, is the timing of the training. There is a risk in finding convenient times, especially when dealing with wood harvesting in Russia. There are certain limitations, one of which is the bad condition of forest roads. Because of this, the forest roads are suitable for heavy traffic only during the wintertime, when the roads are totally frozen. If the conditions for working in the forest is good, it is very difficult to leave the work. It is subsequently difficult to forecast the weather and try to guess when the people in the forest will be ready for training. Therefore, a lot of effort had to be put into recruiting the participants.

In addition, it was important to include associates from the companies in the implementation of the training as well as in seminars and workshops (Figure 3). It was good to find out that more than 20 companies in the Leningrad region and Finland wanted to contribute by giving their expertise to the arranged training. It was useful to have associates present to get a realistic conception of the field in Russia. Arranging even more contacts with both Finnish and Russian entrepreneurs doing business in wood procurement in Russia would have been helpful for the Finnish participants.



Figure 3. Kari Lassila from MetsäForest Podporoze hosts a field trip (Photo: Kirsi Itkonen)

Many advantages can be gained through implementing a project for the staff of the partners. First, the projects offer an opportunity to test the skills and competences of the staff to operate in an international environment, to implement the planned activities and to take responsibility for what has been agreed. Second, it could be an opportunity to develop, strengthen and increase the training skills. Finally these experiences as well as connections with working life can be transferred to be part of the work, for example in teaching in their own universities.

5 Discussion and Conclusions

The objectives of the WOPE project were achieved through the activities and the outcomes of the project. The increased competencies in entrepreneurship, business operations and wood procurement help in running the businesses in a new business environment, managing enterprises, establishing new companies, operating machinery on forest sites and training students in vocational education. In addition to the direct beneficiaries of the project, there could also be a positive effect on the local and regional economies in South Savo and the Leningrad region. There could be more extensive effects, even though their impact cannot be measured immediately.

On the other hand, several companies are interested in expanding their businesses and looking for opportunities for growth in Finland. One way of achieving this could be by extending the operational area, especially to Russia. Finnish wood harvesting companies could consider harvesting in Russia, when their knowledge of the Russian business environment has been increased.

In addition, it is important to look at the future. What is the sustainability of the project? In this project, much emphasis and expectations were placed on the training network. During the two years, the network of partners strengthened. While implementing the project, useful experience was gained in coaching the companies as well as working together. This gives better opportunities for arrange training in wood procurement at the entrepreneurial, managerial and educational levels. It is important to ensure that the network has the possibility to exploit the project results. This can be done by offering joint training courses to the different companies with an emphasis on customer orientation in South-East Finland and North-West Russia. The valuable information which was received from the participants' feedback on the training courses must be utilised.

A significant number of professionals from different companies gathered together as a result of the training courses. During the project, more than 60 different people participated in the training courses. This offered an extremely good opportunity to share knowledge and good practices. Every time that professionals come together, something new can be created – new contacts, shared knowledge, new practices, maybe also new business ventures. However, it is said that the more you know, the more aware you are about what you do not know. This can be considered the driving force to innovate, develop and cooperate in the future. New approaches and ideas for developing wood procurement came about as a result of discussions with participants on the training courses, seminars and workshops. The participants in the final seminar in November in St. Petersburg discussed and found new solutions and cooperation possibilities for the development of wood procurement (Figure 4).



Figure 4. Topics for the joint development of wood harvesting (Photo: Kirsi Itkonen)

Lastly, the signals coming from the forest industry from both Finland and Russia are positive ones. There are plan to invest about RUB 16.4 billion in forest-based industry in year 2015 in Russia. In Finland, the forest-based sector is planning or preparing for investments that are worth about € 1.5 billion in total. One example of those is a plan to build a bioproduct factory in Äänekoski. The investment worth some € 1.1 billion is the largest such investment announced up to that date.

These investments will increase the demand for raw wood in Finland by about 10 million cubic metres by 2017. This will set demand for wood procurement activities accordingly. New enterprises in the planning, logging and transportation of wood as well as in forestry operations will be needed.

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5

PHYSIOTHERAPY AND THE PROMOTION OF ENTREPRENEURSHIP DURING STUDIES

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Abstract

Physiotherapy is a strong and independent sector in Finland, and is heavily made up of entrepreneurs. In Finland, around 80% of the physiotherapy services provided are catered for by the private sector. Physiotherapy business customers either pay for the service themselves, or the services are paid for as outsourced services by a public or private sector organisation.

A physiotherapy degree takes three and half years to complete and is equivalent to a Bachelor's undergraduate degree. The studies involve general health care modules and occupational modules in physiotherapy. The course also involves business studies, which is worth 5 credits and undertaken during the penultimate semester of the degree. The business studies course includes both health care and physiotherapy-related business and leadership components.

A survey was conducted on a group of students (N=30) who had begun their studies a year ago, asking about their preconceptions about entrepreneurship. There were 12 male and 18 female participants and their average age was 22.5 years. 58% of the males planned to become entrepreneurs, and 56% of the females. The students highlighted that running their own business would give them freedom, economic success and the possibility to manage their own work. The challenges of entrepreneurship were listed to be competition in the field, acquiring customers, quality of expertise and how to stand out from other professionals.

Our survey proved that physiotherapy students are much more business orientated compared to other students at the universities of applied sciences. This fact should be considered carefully when planning for future careers; the students should be offered the appropriate support during their studies to develop their business skills, understanding of economics and how to build up their own business. Additionally, the local district councils should take more account of the physiotherapy sector in their business and growth strategies.

The work environment of the physiotherapist requires bold professionals who have entrepreneurial risk-taking skills. In particular, students who have shown an interest in business should be encouraged to develop towards their goals.

1 Introduction

1.1 Physiotherapy in Finland

In Finland, around 80% of physiotherapy services are provided in the private sector. In 2009, in the field of physiotherapy there were 2,538 businesses which employed 3,771 professionals (Hartman 2011). According to the Finnish Physiotherapy Association, its members are divided as follows: (Figure 1)

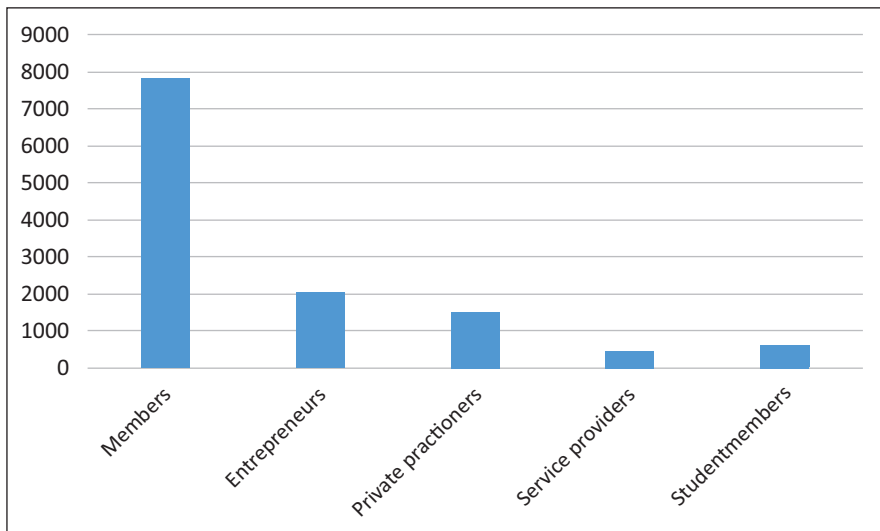


Figure 1. Finnish Physiotherapy Association membership structure (Partia, 2015)

The customers of physiotherapy businesses are drawn from self-paying customers and also from public and private sector outsourced services which have been bid for publicly. Customers who are looking for outsourced services include, for example, businesses (occupational health care), the Social Insurance Institute of Finland – Kela (especially medical services and severe disability rehabilitation), government offices (e.g. war invalid and veteran rehabilitation), insurance companies, town councils, and health care districts. Public bidding in the physiotherapy sector was made possible by the Valtava law, which came into operation in 1984; hence, the sector has been bidding for services for almost 30 years now (Hartman 2011). In 2013, Kela paid up to 17 million euros in compensation for physical therapy services (Kela 2013).

1.2 Physiotherapy degrees in Finland

The physiotherapy qualification can be obtained in three and a half years; the degree (210 credits) is equivalent to an undergraduate Bachelor's degree. In Finland 17 universities of applied sciences offer the qualification. The studies consist of basic health care study modules and physiotherapy-specific core and professional modules. Additionally, the studies include a guided practical placement which is designed to develop professional skills, including the freedom to choose electives and the final dissertation (Suomen fysioterapeutit 2015).

2 Entrepreneurship studies within the physiotherapy degree at the Mikkeli University of Applied Sciences (MUAS)

One of the physiotherapy degrees offered in Finland is situated at Mikkeli University of Applied Sciences (MUAS) campus in Savonniemi, Savonlinna city. Annually, around 35 physiotherapy students begin their studies on this campus. The entrepre-

neurship modules are worth five credits and are undertaken close to the end of the degree. These modules are built from health care and physiotherapy-related entrepreneurship and leadership studies courses.

The aim of the entrepreneurship studies is to understand the significance of business development and how this is a centre of economics. The students must familiarise themselves with running a business and establish an understanding of Finnish business structures. Furthermore, the aim is to develop students' understanding of how entrepreneurship is included as part of a profitable operation.

Moreover, the key content of the studies includes leadership and organisation theories, social and health care management, financing and development strategies. Also, the studies introduce the strategic and operative planning, execution and monitoring of the health care system. These entrepreneurship modules include themes such as work quality and effectiveness and patient safety, team leadership and development management. The students create a business idea during their studies to develop the institution's collaborative practice clinic, Elixiri. Elixiri is a multi-professional practice clinic where nurse, podiatrist and physiotherapy students gain experience in practical work and develop the basics of business management.

2.1 Entrepreneurship questionnaire for new physiotherapist students

At the beginning of 2015, physiotherapy students (N=30) who had started their studies a year ago were asked to participate in an entrepreneurship-related survey. The aim was to map out preconceptions about entrepreneurship within their own field. Out of the participants, 18 were women and 12 were men; their average age was 22.6 years old. Out of the males, 58% were planning to become physiotherapy entrepreneurs, similarly 56% of the females were planning the same. Figure 2 indicates the comparison between the interviewed physiotherapy students who were interested in

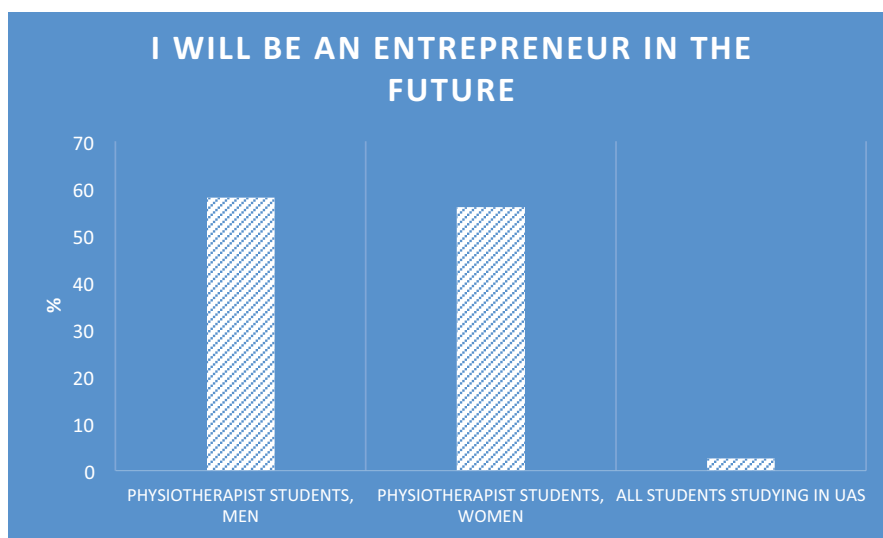


Figure 2. Entrepreneurial interest by physiotherapy students and other university students

becoming entrepreneurs and all the other graduates from the universities of applied sciences who are interested in creating their own business (Opala 2014).

Four out of five students agree that the image of the occupation of physiotherapy has its grounds in entrepreneurship and providing specialist services. The students highlighted the benefits of entrepreneurship to be freedom of choice, financial success and the possibility to manage one's own work. In contrast, the students felt that the greatest challenges for entrepreneurs are competitions in the field, acquiring customers, and being able to stand out with their own expertise from other professionals. However, looking at the business plans of the students, their primary aims were to set up enterprises for the Finnish market. Almost all of the participants knew someone who works within the physiotherapy industry, and the positive image of the business was linked with success, diversity and training with the field.

In addition, 70% of the participating students wanted the business modules to have an emphasis on what is to be an entrepreneur and how to set up a business, and not so much on the philosophy of entrepreneurship. They hoped that the business modules would include theories of entrepreneurship and practical experiences from the field. Figure 3 shows students' wishes for the business modules at MUAS (N=28).

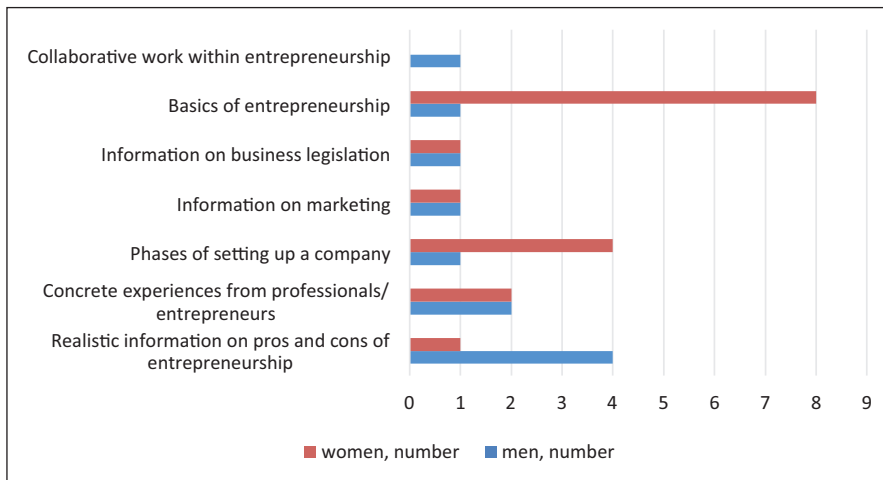


Figure 3. Physiotherapy students' wish list for business studies

2.2 What are the future entrepreneurial prospects for the physiotherapy entrepreneurs from Eastern Savo?

MUAS conducted a questionnaire as part of an applied research study project in autumn 2013; the participants in the research were entrepreneurs within the well-being sector in the Eastern Savo district, and 17 of these were physiotherapy businesses. The questionnaire results highlighted the periodic challenge of hiring qualified staff for their companies by the entrepreneurs. Business owners think that accessing qualified staff is improved by maintaining the degree education in the district, and also by securing further education in the field (Hirvonen 2014).

However, the physiotherapists who participated in the research did not count foreign people as targeted customers; however, a third of the participants saw foreign customers as potential future customers (Hirvonen 2014). This finding is intriguing, as according to a report by the Ministry of Employment and the Economics, there is increasing demand in Russia in particular for rehabilitation and physiotherapy services for disabled adults and children. Customers are also interested in post-surgery rehabilitation, neurological and geriatric rehabilitation, and furthermore, different forms of rehabilitation services for injuries after trauma or sporting accidents. Moreover, diverse fitness makeovers and wellness services are attractive to private customers and companies in Russia (TEM 2014).

The questionnaire for the wellness entrepreneurs was also designed also to survey their training needs. The need for more qualifications for physiotherapists was indicated to be mainly around how to define one's services as products, how to manage and make bids, how to maintain one's own occupational health and how to benefit better from the use of IT. There was less interest in leadership and management training, the general logistics of business management, development of business growth (e.g. with training programmes), and training on the changeover between generations (Hirvonen 2014).

3 Discussion and Conclusions

In the development planning for the Applied Universities, there is an aim that from the 5% of graduates will become entrepreneurs (Jussila 2012). Looking at the physiotherapy sector, it has been noted to be a business-led environment. Hence, the questionnaire conducted for this article established that the preconceptions of the physiotherapy students were similar - the sector is very much business-minded. Also, the questionnaire proved that over half of the students are intending to set up their own businesses. Our survey proposed that physiotherapy students' business setup plans after graduation are noticeably higher than other students from other degrees at the university (Opala 2014). Hence, the needs of the students should be taken into consideration whilst deciding the plan of action for the future. Furthermore, the physiotherapy sector should be emphasised more highly in the business and development strategies of the district councils.

The structures of social and health care services will be transitioning towards a more private business-oriented model; this can be referenced to the discussion of the new production sectors of the social and health care service in Finland. Physiotherapy students' prospective business plans and the above-mentioned fact about the structural change in the field, should be much more heavily introduced and embedded into their higher education. Education should be in collaboration with the practical field and existing entrepreneurs, and provide opportunities for students to take part in business training and workshops organised for entrepreneurs; it is also important to provide further information about 'start up' business models. In summary, professional education in collaboration with the business sector can be the grounding for innovative projects and international partnerships; this can make a great difference in wellness entrepreneurship and its growth.

According to a report by TEM (2014), Russian customers in particular are interested in diverse health and rehabilitation services for different age groups. For this reason, wellness entrepreneurs from North-Eastern Finland would benefit geographically and professionally from looking at this area, as they would have a good possibility to offer these services.

The content of physiotherapy rehabilitation develops rapidly. One of the key development areas in the field is work with senior customers; this work aims to maintain the daily activity level of the elderly and lessen the need for extensive care later in life. Innovative solutions have been developed in recent years, especially within care for people with memory loss. In addition to senior physiotherapy rehabilitation services, other central specialist areas are physiotherapy for children and sports physiotherapy (Hartman 2011). In the future, the elderly will also more ready to use their own resources for the maintenance of their health (Oikarinen 2012).

Exports of the equipment used in physiotherapy will increase in the future. For example, physiotherapists are recommending the use of Firstbeat Wellness Analysis (www.firstbeat.fi), which has reached international standards in product development and accuracy. In addition, care expertise has export potential: geriatric rehabilitation and sustenance for the elderly, and also war veteran rehabilitation and equipment in use in the field are specialities which might have potential international demand (Harman 2011). In spring 2014, almost two thirds of the participants in a questionnaire given to private service providers expected that revenue would grow over the next three years (Lith 2014).

Looking at the questionnaires undertaken by TEM and the Health Services Association, the most important internal development needs for service providers were: sales and marketing development; customer and partnership development; service advancement and service productisation; and staff and training development (Lith 2014). The questionnaire tailored for physiotherapists gave similar indicators. These results both show that during professional education, entrepreneurship and leadership studies should be strengthened – in both qualitative and quantitative sense.

People who are selected for the physiotherapy field have the right amount of entrepreneurial risk-taking sense. These qualities should be taken into consideration even more in their education, and there should be support for acquiring strong business skills, knowledge of economics and ability to set up a new business. In particular, those students who show an interest in entrepreneurship should be encouraged to reach this future goal.

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6

A NOVEL METHOD FOR SEPARATING CARBON DIOXIDE FROM FLUE GASES – SOME APPLICATIONS FOR THE UTILISATION OF CARBON DIOXIDE

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Abstract

Carbon dioxide could be used more as a multi-purpose raw material, but the challenges to its greater use can be considered as price, transportation, storage, processing for use and other factors which increase its cost of utilisation. Otherwise, carbon dioxide would be an ideal raw material in many processes. The commercially profitable capture of carbon dioxide from flue gas emissions could also provide a better starting point for its future use as an industrial raw material.

The recognised current state of the art in CO₂ capture from flue gases is based on the chemical bonding of carbon dioxide gas to monoethanolamine (MEA) aqueous solutions. This technology has problems of toxicity, corrosion, reactive chemistry and evaporative loss, and the process is energy intensive.

There has been interest in Finland in developing clean physical water-absorption based CO₂ separation methods. In the Savonlinna FiberLaboratory, which is the research unit of the Mikkeli University of Applied Sciences, researchers are studying a novel water-based CO₂ separation method which is being tentatively calculated and experimentally tested. The Technical Research Centre of Finland has also verified these calculations and has given a second opinion on the performance of this method. The results of these evaluations have presented that this process could offer an efficient method to capture carbon dioxide from flue gases using competitive energy. The process also enriches the separated carbon dioxide to the high concentration CO₂ gas produced by the water circulation, which can be considered as a clean way to capture CO₂ from flue gases. This process method can be said to be innovative, and some companies in Finland are already interested in developing this technology further in cooperation with research organisations.

1 Introduction

Carbon capture and storage (CCS) has been suggested as a solution to reduce CO₂ emissions, but a more attractive solution would be utilisation of CO₂ as a valuable chemical raw material. Despite the development of carbon capture methods and the good availability of carbon dioxide, the use of CO₂ for the preparation and manufacture of industrially useful chemicals is not yet very common. Worldwide, about 110 million tons of CO₂ is used as a raw material for chemistry. However, that is only 0.3% of the world emission of 34 billion tons. The largest uses are 107 million tons of CO₂ for the production of urea as fertilisers and 2 million tons of CO₂ for the production of methanol (Müller et al. 2012).

Water absorption has not been heavily utilised before from the perspective of carbon dioxide capture, but in reality it is used a great deal in the purification of natural or biogas, in which carbon dioxide is separated from hydrocarbon gases before the gas quality is good enough for use as transport fuel. Counter-current water absorption is the most common use of the biogas purification method, for example in Sweden, which has the most extensive use of biogas in transport (Persson 2003).

Water is highly selective for carbon dioxide as compared to other normal neutral gases in a flue gas; for example, the solubility of carbon dioxide in water is about 100 times higher compared to nitrogen and about 40 times higher compared to oxygen, which gases are mostly found in normal flue gas in addition to carbon dioxide (among others, dry flue gas contains around N_2 78 vol-%, CO_2 10-15 vol-%, O_2 4-8 vol-%). This makes the separation and selective enrichment of carbon dioxide from flue gases possible using the water circulation process. This feature makes water specifically useful in relation to other physically CO_2 -separating liquids, because it is difficult to find other liquids which have such a relatively high selectivity in the solubility of carbon dioxide in relation to other neutral gases. The process method is based on these solubility differences in water. The process also multiplies this effect, and can be used to enrich the separated CO_2 -product gas to normally over 95 vol-% CO_2 -concentration through water circulation. The process method is very suitable for normal flue gases which initially contain carbon dioxide at around 11-15 vol-% or more. The specific energy consumption of the CO_2 separation process has been computationally estimated to be approximately 0.35-0.4 MWh / liquefied CO_2 ton (slightly depending on the temperature of the external cooling) using normal flue gases (≈ 14 CO_2 vol-%) in the estimated conditions which obtain the minimum specific energy of the process (Teir, 2014). The efficiency of the process increases from this level if a higher CO_2 concentration flue gas is used, or if the recovered carbon dioxide is utilised directly as a product gas.

2 Some applications for the industrial utilisation of carbon dioxide

There are many applications for the use of carbon dioxide, of which the most important are to boost oil production, water treatment, in the food and pharmaceutical industries and in the chemical, pulp and paper industry processes. In the chemical industry, carbon dioxide is used as a raw material for the manufacture of urea, salicylic acid, methanol, sodium, potassium, ammonia, hydrogen carbonates, and polycarbonates as well as many other polymerised plastics and chemicals (Vansant 2003, Bayer 2014). The estimated annual global production of synthetic organic chemicals using CO_2 and other compounds as raw materials is approximately 0.2 billion tons. Synthetic urea is equivalent to about half of that amount. Urea is used in chemical fertilisers, resins and animal feed additives. The neutralising compound CO_2 has been used in water purification plants, replacing the use of sulfuric acid in pH balance control. CO_2 has supercritical solvent properties suitable for the food industry, among other uses for the removal of caffeine from coffee, as well as in the chemical industry for cleaning or dyeing of plant, animal and polymer fibres (Song 2006). Carbon dioxide can also be used as a raw material for the production of various organic chemicals and synthetic materials, including synthetic plastics, rubbers and fibres, ammonia, urea and methanol. The global theoretical potential in this production is estimated to be approximately 650 million tons of CO_2 per year (Song 2006).

2.1 The utilisation of carbon dioxide in greenhouses

Finland has around 4.3 million square metres of heated greenhouses which are used for professional cultivation (Westerlund 2005). In greenhouses, carbon dioxide is required for plant photosynthesis, in which plants use carbon dioxide from the air and emit oxygen. Mostly to avoid heat escaping, air ventilation to the outside in the greenhouses is limited, hence the plants may use all of the available carbon dioxide. Carbon dioxide is also used to increase plant growth in greenhouses. When the carbon dioxide level is higher than the normal atmospheric level, growth may be improved by 10–30% or even more. Each year in greenhouses carbon dioxide is utilised at around 10–30 kg/m². The need for carbon dioxide fertilisation depends on the plant species as well as the exposure time of plant growth.

Figure 1 presents photographs from a separation and enrichment test of carbon dioxide at the site of a thermal power plant and an evening view of a greenhouse (Fami-farm Ltd, Joroinen, in 2014). This greenhouse produces pot salads in an approximately 5 hectare covered area and about 1 million kilos of CO₂ gas is used for carbon dioxide fertilisation annually.



Figure 1. Photographs from the bench scale CO₂-capture test at the site of a thermal power plant and greenhouse (Photos: Teijo Linnanen)

Greenhouse entrepreneurs are also interested in local carbon capture for their own use, if that can be done in a commercially profitable way that guarantees the quality of the CO₂ gas. The separation of carbon dioxide from flue gases could also raise the equity ratio of carbon dioxide at greenhouses, which is also seen as an important issue in a changing world.

In Finland the price of carbon dioxide varies between 185 €/ton and 210 €/ton depending on the amount of CO₂ consumption (20–80 ton/a) at the greenhouse (West-erlund 2005). However, these and other average prices in Table 1 do not take into account different transport distances, for example. To reduce the costs of carbon dioxide utilisation at least in large quantities, and to cover CO₂ fertilisation requirements, it might be useful to separate CO₂ from energy production emissions close to the plants. This could be useful in cases where it can be estimated that the production will be commercially profitable and the capital payback time will be short.

Table 1. Current statistical fuel average price for the heat production in Finland (€/MWh) and calculated price to produce carbon dioxide. Fuel prices do not include VAT at 24% (7-12)

<i>Fuel</i>	<i>Price of fuel (€ / MWh)</i>	<i>Emission factor (kg CO₂/ MWh)</i>	<i>Price of produced carbon dioxide (€ / tn CO₂)</i>
<i>Liquefied petroleum gas (LPG)</i>	56	234	239
<i>Natural gas</i>	45	198	226
<i>Light fuel oil (S < 0.1 w-%)</i>	62	267	232
<i>Forest chips</i>	20	382	54
<i>Milled peat</i>	19	381	51
<i>Delivered carbon dioxide</i>	185 €/tn – 210 €/tn (80 – 20 tn CO ₂ /a) and 140 €/tn (800 tn CO ₂ /a)		

<i>Estimate price of separated CO₂ from flue gases</i>	<i>Average electricity price in CHP- power plant (€/MWh)</i>	<i>Electricity consumption in the CO₂-separation (MWh / tn CO₂)</i>	<i>Price of separated carbon dioxide (€ / tn CO₂)</i>
	60	0.35 - 0.40	21 - 24

Table 1 presents fuels of which only LPG and natural gas can be burned so cleanly that the flue gases can be used directly for the carbon dioxide fertilisation of greenhouses. The combustion gases of other fuels in Table 1 require purification before they can be used for this, because they contain very low concentrations of harmful gases. The water separation of carbon dioxide is also useful for this, because in the process most of those harmful compounds in flue gas will also be separated away from the CO₂ gas, which allows its better utilisation when separated from the flue gases of renewable fuels.

2.2 The utilisation of carbon dioxide for adjustment of pH

The acidification of water for pH adjustment is utilized in many neutralisation, pH buffering, thickening and washing processes. Large quantities of acids are used in these processes annually, where carbon dioxide could be used or used more. In these cases, the availability of affordable carbon dioxide would allow its more extensive utilisation.

Carbon dioxide reacts with water to form carbonic acid H_2CO_3 (Figure 2). Alkaline water, depending on its pH, reacts with the carbonic acid again to form bicarbonate HCO_3^- and carboxyl ions CO_3^{2-} . This also occurs in nature, where the pH of seawater is typically on the alkaline side (between 7.5 and 8.4) (Chester 2012), in which case bicarbonate, among other chemicals, is formed in the world's oceans, so this can be considered to be the largest single buffering factor binding dissolved carbon dioxide from the atmosphere in water. Only in acidic water is it possible for carbon dioxide to be released from the water as a supersaturation dissolved gas.

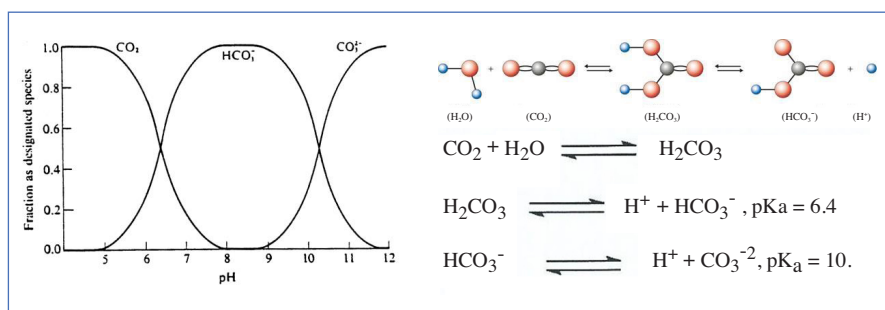


Figure 2. Equilibrium curve for the dissolution of carbon dioxide in water (Girard 1999)

Since carbon dioxide reacts with water to form acids, at high pH its effect to reduce pH is higher than monovalent acid. Figure 3 presents the chemical consumption of carbon dioxide and sulfuric acid for reducing pH of water, because the molecular mass of carbon dioxide is approximately 45% of the mass of sulfuric acid, therefore the consumption of CO_2 is relatively smaller. The graph also shows that the risk of overshooting the target pH is drastically reduced with CO_2 .

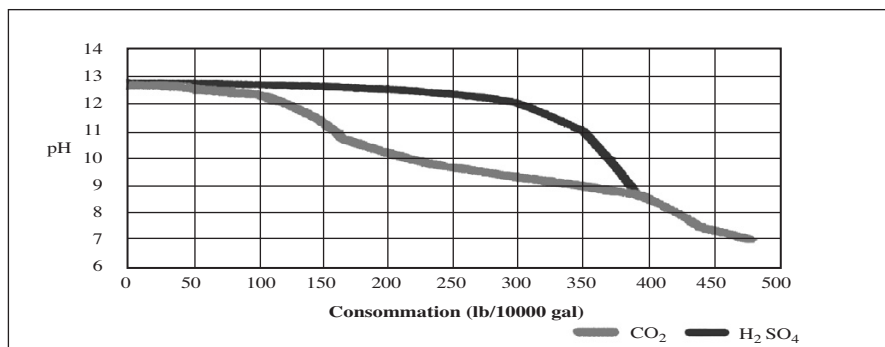


Figure 3. Effect of carbon dioxide and sulfuric acid on pH (Girard 1999)

Figure 4 presents the washing coupling of brown stock, where carbon dioxide is used for washing water acidification. Acidification with carbon dioxide can significantly increase the efficiency of the washers and thus reduce water consumption and/or bleaching chemicals. Some mills have experienced a significant reduction in the cost of bleaching as well as substantial environmental benefits. In some cases, total soda and chemical oxygen demand (COD) carryover to the bleach plant have been re-

duced by up to 50% (Girard 1999). Another consideration when comparing the use of carbon dioxide with that of sulfuric acid is that with CO_2 , no sulfur compounds dissolve in the water or remain in the pulp.

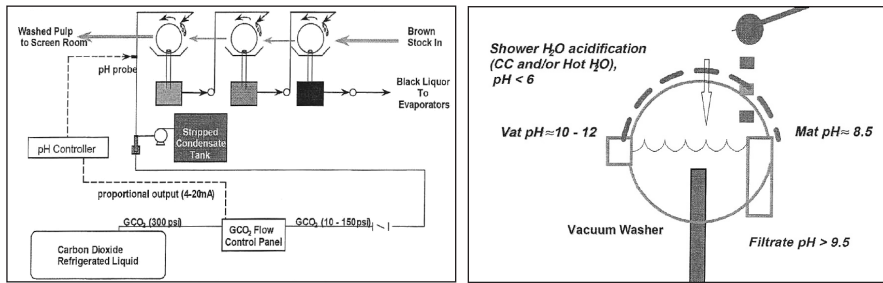


Figure 4. Brown stock washing with carbon dioxide acidification system (Girard 1999)

Carbon dioxide can be used in pulp washing to reduce the consumption of sulfuric acid, steam, water and anti-foaming agent and improve runnability. It can also improve drainability of water-pulp suspension in the thickening (Leino 1998). Enzymes are used in the bleaching process to achieve a better brightness of pulp with less chemical consumption, and carbon dioxide can be used for the reduction of pH without damaging enzymes (Girard 1999). Carbon dioxide can also be used in the production of crude tall oil (splitting tall oil soap) and in the neutralisation of alkaline waste water, and also for pH buffering to reduce fluctuations of pH changes by neutralising the equivalent alkaline (Linde Group 2012).

2.3 The utilisation of carbon dioxide in the manufacture of precipitated calcium carbonate

In the paper industry, calcium carbonate is used in magazine and fine paper filler. PCC (Precipitated Calcium Carbonate) is a synthetic product of which around 7 Mt is produced annually for worldwide production, about 75% of which is used in the paper industry (Zevenhoven 2006). Fillers such as PCC are used, for example, in uncoated printing papers, such as a copy paper and magazine paper, forming around a third of the weight of the paper. Filler is used in paper to improve its optical properties and printability, as well as lowering raw material costs. In Finland more than three million tons of fillers and coating materials are consumed per year in the production of paper, and calcium carbonate makes up more than half of the total filler. The new In-Line PCC technology is based on a method in which calcium carbonate is produced in seconds from calcium hydroxide and carbon dioxide in the short circulation of the paper machine, $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$. This technology has advantages, for example, it provides high filler retention without necessarily using retention chemicals. The In-line PCC carbonation process also binds and eliminates interfering substances resulting in a much cleaner process, reduced solids and COD of white water. The clean process improves process runnability significantly and improves the efficiency of wet end additives (Ojanperä 2010).

3 Discussion and Conclusions

Carbon dioxide is useful in many industrial processes as a raw material, but its use is reduced in many ways by its price, transport, storage, processing for use and other factors which increase its usage cost and make it difficult to utilise. Consumption of CO₂ would quicker increase if carbon dioxide could be separated near to its end-use destination cost-efficiently from energy production emissions and if the quality of the separated CO₂ product gas could be guaranteed. This could also improve the competitiveness of enterprises in the long term.

Carbon dioxide is multi-purpose raw material and its utilisation will increase in the future. In many cases that have been studied, its use could improve efficiency of production and at the same time make production more ecological, as, for example, it does not leave harmful residues in product. This article has presented some applications for the utilisation of carbon dioxide and a potential novel method to separate carbon dioxide from flue gases for many end-use applications. The energy consumption of the process method is calculated to be competitive with existing CO₂ capture methods, it also separates carbon dioxide in a clean and efficient way, which creates better opportunities for its use in the future.

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