

## **Farm-to-table concept: How the industry and commerce are integrated to the academic education system**

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**Abstract.** The academic education within the complete farm-to-table concept was brought together at the Seinäjoki University of Applied Sciences (Seinäjoki UAS), combining the schools of Agriculture, Food and Biotechnology engineering and Hospitality management as school of Food and Agriculture. By a close cooperation, the schools of primary production, food engineering, and commerce & marketing, establish a way to efficiently facilitate the learning process of the students, and help them to obtain knowledge of all stages in the production of food. Accomplished employees with multiple skills and good understanding of the complete food chain are in greater demand. This is particularly evident in case of SMEs. Large companies may rely more on specialists. The good knowledge of marketing and sales, as well as the product development and the logistics are further areas that possess room for improvement in many companies located in South Ostrobothnia region. Furthermore, companies evaluate sustainability and ethical responsibility as values of greatest significance. From the educational perspective, a comprehensive theoretical knowledge accompanied by well-organized practical training periods is important.

Approaches to tighten up the interactions between the education at Seinäjoki UAS school of Food and Agriculture and the enterprises in southern Ostrobothnia region are further evaluated. Education implementing projects is becoming regularly utilized in the student curricula at UAS. Students learn cooperativity, sharing and taking responsibility, and they learn to take initiatives and to solve problems – important skills in real working environment. Re-grouping students with different acts as an innovative and motivating force for students and gives an option for companies to introduce themselves. Novel technological solutions for data collection and analysis, based on mobile laboratory equipment and other systems, open up new possibilities for education within the farm-to-table concept.

**Key words:** Farm-to-table concept, learning environment, integration, mobile technologies.

### **INTRODUCTION**

The development of a good education system requires a long-term cooperative strategic planning. Southern Ostrobothnia has selected a strategic plan to implement an attractive, requirement-based and creative education system into Southern Ostrobothnia for the years 2015–2020. This region, with about 200,000 inhabitants, has Seinäjoki University of Applied Sciences (Seinäjoki UAS) as the only higher education unit which gives BA bachelor level degrees. City of Seinäjoki possesses, however, a consortium of different universities in addition to Seinäjoki UAS, including Tampere, Helsinki and Vaasa universities, as well as the Tampere University of Technology and

Sibelius Academy. The University Consortium of Seinäjoki was established 50 years ago particularly to strengthen the research efforts in the area, and to complement the established education system. This has formed a basis onto which new pedagogic methods, including project-based methods, were easily structured. A major driving force for the establishment of the new strategic plan for Southern Ostrobothnia has been the focus of the European scientific policy, in which the European innovation partnership (EIP) is accentuated (European Union, 2014). EIP strategy offers the small and medium size enterprises new opportunities to take part in innovation projects e.g. in the Horizon 2020 program. Integration of the education system is crucial in this process.

Key focus area of the South Ostrobothnia, as well as of Seinäjoki UAS, is agro-industry, including agriculture and food sectors. As the customer-oriented hospitality management sector is also well represented, the complete farm-to-table concept typifies the area. The role of the higher education units is significant in the integration process of SMEs and education. Novel approaches are needed, which increase the cooperative actions between universities and SMEs and enable closer participation of the study curricula system with the interests of SME development strategies, including proliferate information technologies. In order to further develop the SME operations and the new education, good innovation atmosphere needs to be created. It is possible that study curricula need expansions from strict, narrow-niche curricula to be expanded into multi-skill curricula, with more entrepreneurial intentions. To gain more understanding about the past developments in the integration process in the education sector with the three farm-to-table units, this paper will focus on looking the past education system in agriculture, food processing & biotechnology, as well as hospitality management sectors at Seinäjoki UAS from the alumni perspective. The paper covers the present education system and evaluates the employed pedagogical methods to increase the entrepreneurship attitude and multi-skill identity of the experts at the agriculture, food processing and hospitality management sectors.

## **MATERIALS AND METHODS**

The material considering the data of the evaluation of alumnis is collected from the data published by Elina Varamäki et al as several separate papers (Varamäki et al., 1999, 2002, 2005, 2007, 2011). Analysis of ‘food agronomist’ survey is based on interviews conducted in year 2011 by Hanna Helander and Margit Närvä. Altogether 19 companies or organizations were interviewed. Potential to employ students from Seinäjoki UAS as well as the size of the company was used as the selection criteria. Micro-companies were omitted. Companies and organizations were interviewed between November 2010 and January 2011.

## **RESULTS AND DISCUSSION**

### **New advanced studies option for agronomy**

Farm-to-table concept, as it is described today and how the current education system in Seinäjoki UAS is formed, is brought together as an integrated unit of agriculture, food processing and biotechnology engineering and hospitality management. To better evaluate the functionality of the current curricula at the School

of Food and Agriculture, and to improve the education to better meet the needs of the business and commerce within the food and agriculture sector, we first evaluated the functionality of the new advanced studies module that combines the first two the farm-to-table concept study programmes, Degree Programme in Agriculture and Rural Enterprises and the Degree Programme in Food Processing and Biotechnology. In this module, agronomist students take selected parts of the studies from the degree programme of Food processing and biotechnology (40 ECTS) to strengthen their knowledge in food processing part. Those students are later called 'food agronomists'. Interviews concerned interviewees' opinion about planned education, the know-how of food agronomists, and the suitable position in labor market.

The majority of the interviewees appreciated planned food agronomist education. A few interviewees brought out that there will be need for few food agronomists yearly, but if the number of graduating food agronomists increases much, the labor market will be quickly saturated. The versatile know-how brought by the education was considered as a positive matter and the education was considered well suitable to South Ostrobothnia. In the interviewees' opinion, a food agrologist should have the knowledge of raw materials and they should understand food processes from several separate points of view. The studies of the management, which are included in the education, were considered advantageous. On the other hand, the interviewees pointed out that the agriculture know-how is important.

According to the answers, food agronomists have many options in the labor market. According to the interviewees, food agronomists could act as entrepreneurs or in the small and medium-sized companies in where the know-how must be wide. In large companies, the suitable positions for them are between primary production and food processing, for example in duties with raw material acquisition. Suitable tasks for the food agronomist include product development, advisory tasks, and tasks relating to the primary production, the acquisition of the raw material. Furthermore, the different connection tasks, marketing, development projects, quality control, and administration would be potential options. The first food agronomists graduated in the spring of 2013. They had jobs in the food industry. Some of them are planning to run their own company in the future.

### **Have the studies met the expectations of the working life?**

The curricula within the Degree Programme in Agriculture and Rural Enterprises appeared to well meet the expectations from the working life throughout the period of last 20 years. More than 60% of the alumni were employed in positions that matched the curriculum very well (Varamäki et al., 1999, 2002, 2005, 2007). Alumni of the Degree Programme in Food Processing and Biotechnology were employed in positions that matched slightly worse the curricula than the alumni of the school of agriculture. However, as the surveys typically combined all engineering schools, no separate analysis of the alumnis in the Degree of the Food Processing and Biotechnology Programme can be made from the complete time frame of 18 years. However, in the survey conducted in year 2004 (Varamäki et al., 2005), only 1/3 of the Food Processing and Biotechnology alumnis were employed in positions that fully matched their education. Even less of the alumni of hospitality management were employed in positions fully matching their curricula, as only 20% replied that their current position matched fully the curricula. Noteworthy is that 23% were employed in positions other

than what they were educated for. In year 2007, this group was even slightly increased to 29% (Varamäki et al., 2007). Several alumnis wanted more supportive education in career planning (Varamäki et al., 2011), and according to the data presented above, improved career planning during the studies might be worth consideration to facilitate the proper positioning of the alumnis later.

### **Useful skills**

When the study subjects were estimated, the alumnis of agriculture and rural enterprises estimated the studies of economics especially useful, in addition to animal and cultivar production courses throughout the 20 years survey period. Foreign language skills were regarded by many, about 30% of alumnis, as too little among the studies of agriculture and hospitality management. This may reflect also the need for the skills for international affairs, which was evident among all the three investigated degree programmes. Needs to further develop such skills was evident, but also other skills important in business and commerce, such as leadership and customer orientation skills, which were only barely achieved during the studies. Especially the alumnis of the degree programme of agriculture and rural enterprises evaluated customer orientation skills poor, as did the food processing and biotechnology alumnis. About 21% of the latter alumnis also noted the education of juridical aspects worth deeper study (Varamäki et al., 2011). According to Jumppanen and Närvä (2013), even more skills in marketing are needed also in agriculture and food industry sectors.

The integration process between working life and studies is biased at the stage of practical training and the final work. Students maintain and gain even more motivation for studies during the practical periods, and obtain important practical skills. According to surveys conducted within industry & commerce, the attitude towards trainees that arrive to work in companies for a short period is not always very good (Zacheus, 2009). Moreover, it is thought that from the educational perspective in Finland too low level of information is given about the expertises required in working life (Zacheus, 2009). Integrated projects with companies and applied universities require different type of skills from the teachers, compared to the traditional education methods, because the interests between teachers, students and company employees need to be handled properly (Stauffacher et al., 2006). Cooperative work between business and commerce and the universities may also become problematic, if heavy theoretical information and formalities are carried out with the project without a realistic approach to the problem (Freeman et al., 2004). In Seinäjoki area, a good networking between universities, businesses, and organizations has been established both at the regional level by bringing different institutions physically close to the same campus, as well as by actively communicating with local companies and authorities. Universities utilize little lecturing expertise from working life (Zacheus, 2009). This resource should be seen as an underutilized source to improve integration opportunities between working life and universities. On the other hand, lecturers at the universities may remain distanced from working life connections. As an approach to fill this gap, specific training, so-called business toolbox package, followed by short-term visits at the companies and SMEs, is implemented at the Seinäjoki UAS in a project 'PK-Inno'.

## **Projects and R&D**

Multi-skills are required in current society. Applied universities produce employees typically for various expert positions, and it appears that multi-skill expertise is in demand in the competence development of the agricultural and food industry sectors (Jumppanen & Närvä, 2013). Looking from the educational perspective, theoretical background is well covered in all farm-to-table chain educating units according to the surveys (Varamäki et al., 1999, 2002, 2005, 2007, 2011). Skills such as project management, is only recently becoming more and more educated. However, project-type learning was more and more implemented as part of the curricula from the beginning of the millennium. Learning in projects, designed to engage students with investigations with authentic problems, is much about a motivation force for a student (Blumenfeld et al., 1991). In the curriculum of the degree programme of agriculture and rural enterprises, learning in projects was regarded as very useful in their current work by 48% of the alumnis, whereas in the food processing and biotechnology and in hospitality management programmes, 50–60% of the alumnis found project learning very useful. As a learning environment, projects are known to operate with societal and social contexts, and include ideas, such as intentional and action learning, problem-solving skills and ability to share expertise (Ward & Tiessen, 1997). Interestingly, alumnis at the Degree programme of food processing and biotechnology evaluated skills, such as ‘control of change’, ‘organizational skills’ and ‘responsibility and ethics’ only as poorly achieved during the studies (Varamäki et al., 2011). These skills can be difficult to evaluate, as projects typically do not have right answers or one way to be accomplished. Organizational skills are among those that may well develop during the project-based learning. Teachers may also have difficulties to manage and sustain project-based learning (Tobin & Capie, 1988). Project design and implementation must be well balanced so that the students do not get frustrated. Well-structured projects preferably carried out as a group work, support development of organizational skills and leadership development. As one of the novel approaches to implement project-based learning at Seinäjoki UAS, FramiPro® learning environment was developed. The broad field of higher education, including culture, economics, environment, agriculture, health care and technology, the education areas of Seinäjoki UAS – were brought together as a project-type learning platform, where the various expertise and different backgrounds of students were efficiently utilized to create novel innovations.

Research and product development is a specific group of activities within business and commerce, and contribute to the maintenance of a good competitiveness. Evaluation of pedagogical methods used in the three different degree programmes of the School of Food and Agriculture at Seinäjoki UAS indicated that within the degree programme of hospitality management, the curricula especially well supported those skills to be improved, according to the survey by Varamäki et al. (Varamäki et al., 2007). The alumnis evaluated by 67% those skills very well achieved, whereas the alumnis of the degree programme of agriculture and rural enterprises only 32% estimated research methodological skills as well achieved (Varamäki et al., 2007). New innovations form an integral part of R&D. The education system at the level of applied universities, which produces experts for multiple sectors along the farm-to-table concept, is taken into account at Seinäjoki UAS Food and Agriculture. Multi-skills expertise, where innovations mostly form at the interface between different platforms

and joint groups, will be more implemented to students' curricula even further. We will see important to create learning environments, where students from different study degree programmes can work and study together. Such needs are clearly expressed in the survey of Varamäki et al (2011), in which the alumnis of the Degree programme of food processing and biotechnology was investigated. Innovation policy and the joint ventures between education organizations and institutions and SMEs is currently regarded as one of the leading themes also at the level of European Union, as exemplified by the establishment of stakeholders advisory platforms, European Innovation Partnerships (EIPs) within the EU strategy Innovation Union (European Union, 2014). One of the five partnerships is on agricultural sustainability and productivity.

Another aspect to improve within the university curricula appears to exist in the guidance for practical training and the final thesis. At Seinäjoki UAS in the school of Food and Agriculture this aspect has been addressed by implementing mobile technologies as tool to keep contact and make the documentation process easier in situ at the training place, such as in the farm. The traditional role of teaching is changing at the higher education level. Novel mobile ICT technologies offer new opportunities to integrate business and education. A project Frami Food exemplifies an approach at Seinäjoki UAS to utilize mobile ICT technologies to integrate business R&D, but also to collect and store measurable data to be utilized in cross-disciplinary approaches, thus creating spaces for novel innovations. Several other projects have been running during the last few years that contribute networking and business relations. For example, Agro Living Lab, developed by Seinäjoki UAS, is a project where farmers and students from Agriculture and rural enterprises together develop new technological innovations. Project workshops, used to develop engineering studies and facilitate innovative networking for future trends in agricultural and food processing sectors, is another example. These approaches have gained a very positive feedback from both the students and from the partners involved. Seinäjoki UAS supports the broad field of higher education, including culture, economics, environment, agriculture, health care and technology –expertise that were brought together as FramiPro®, a project-type learning platform, where the different backgrounds of students were efficiently utilized to create novel innovations.

### **Seinäjoki UAS as producer of skills of entrepreneurship**

Training of the entrepreneurship is an important part of studies at the curricula of applied university. In Seinäjoki UAS, a relatively large proportion of young and adult alumni become entrepreneurs (6.5% and 10.5%, respectively), a high degree compared to the situation in other universities in Finland (Varamäki & Heikkilä, 2011). Southern Ostrobothnia region is predominantly a region with a lot of small and medium size enterprises, which is line with this notion. Even 18% of the alumnis after graduating during the years 1997–2000 worked as part-time entrepreneurs in the year 2010 (Varamäki & Heikkilä, 2011). Obviously studies of entrepreneurship need to be encouraged and supported even after graduation, in the form of implemented supplementary courses. The values give are compiled from all fields studied at Seinäjoki UAS. While the curricula of the agriculture unit well supports the high degree of entrepreneurial attitude, there appears to be room for improvement in food and biotech engineering curricula, as about 1/3 of the alumnis estimated that they did

not gain any entrepreneurial skills during the studies (Varamäki et al., 2007). Also in the unit of hospitality management, entrepreneurial skills were estimated as rather poorly achieved (Varamäki et al., 2007).

Entrepreneurial actions should be promoted in the current societal context. Various entrepreneurial initiatives have been conducted at different educational levels, although the evaluation of these to measure the impact of these initiatives on the development of the entrepreneurial intention development or the establishment of entrepreneurship as alumni. Entre Intentio –measurement tool has been launched at Seinäjoki UAS to get information and encouragement system for students to reveal their interest for entrepreneurship, even at the very early phase of the studies (Varamäki & Joensuu, 2012). The self-evaluation approach will, on one hand, help to encourage the student's self-evaluation to support her/his future intention to become entrepreneur, and on the other hand to guide the study curricula to facilitate entrepreneurial skills. It was noted that teaching the entrepreneurship along with the other studies did not affect the potential of alteration of the entrepreneurial intention, whereas the influence of the close social connections (relatives, friends, student colleagues) was important (Varamäki & Joensuu, 2012). Entrepreneurship education is not just education entrepreneurship. At the level of higher education, skills to development include proactivity, leadership, innovativeness, capability to tolerate insecurity and risk taking. How to educate these skills? Current approaches in Finland realized at different applied universities are more commonly taking as part of their curricula, such as project learning and problem-solving approaches. At Seinäjoki UAS, also multiple approaches have been conducted, which are briefly introduced below. At school of Food and agriculture, traditionally a high amount of students become entrepreneurs (to continue as farmers), whereas entrepreneurship in technology-biased level (Degree programme of Food processing and biotechnology), or in the degree of hospitality management is clearly an option only for a small minority of alumnis.

## CONCLUSIONS

Farm-to-table concept is a complex chain, the governance of which requires a multiple sources of expertise. Universities of Applied Sciences serve as important units to act as links between higher education, research, product development, and innovations. A close cooperation between the education and enterprises is needed, and the proper networking forms a good basis for sustainable development of the food chain. Similar networking which is required in the business and commerce sector is required at the level of education. Good progress has been achieved in Seinäjoki UAS, as exemplified by the curriculum for a food agronomist. Integration of education and working life still requires both pedagogical and technological developments, where the new managerial role of the teachers especially in the project-based learning process is implemented. Although the different degree programmes within the Farm-to-table concept possess their own clear specialties, the closer cooperation facilitates the positioning of the alumnis to the working markets as multi-skill persons.

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