

Making Food Science Education and Research Activities More Attractive for University Students and Food Enterprises by Utilizing Open Innovative Space Approach

A-M. Saarela

Abstract—At the Savonia University of Applied Sciences (UAS), curriculum and studies have been improved by applying an Open Innovation Space approach (OIS). It is based on multidisciplinary action learning. The key elements of OIS-ideology are work-life orientation, and student-centric communal learning. In this approach, every participant can learn from each other and innovations will be created. In this social innovation educational approach, all practices are carried out in close collaboration with enterprises in real-life settings, not in classrooms. As an example, in this paper, Savonia UAS's Future Food RDI hub (FF) shows how OIS practices are implemented by providing food product development and consumer research services for enterprises in close collaboration with academicians, students and consumers. In particular one example of OIS experimentation in the field is provided by a consumer research carried out utilizing verbal analysis protocol combined with audio-visual observation (VAP-WAVO). In this case, all co-learners were acting together in supermarket settings to collect the relevant data for a product development and the marketing department of a company. The company benefitted from the results obtained, students were more satisfied with their studies, educators and academicians were able to obtain good evidence for further collaboration as well as renewing curriculum contents based on the requirements of working life. In addition, society will benefit over time as young university adults find careers more easily through their OIS related food science studies. Also this knowledge interaction model re-news education practices and brings working-life closer to educational research institutes.

Keywords—Collaboration, education, food science, industry, knowledge transfer, RDI, student.

I. AIMS

THE paper is aimed at describing practices of making food science education and research more attractive to university students and enterprises. It offers novel interactive real-life teaching and learning experiences in close collaboration between universities and industry.

II. INTRODUCTION

Higher education continues to evolve worldwide. Knowledge transfer has become increasingly important in every organization. Organizations that can transfer knowledge effectively are more successful and more likely to thrive than

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those that are less clever at knowledge transfer [1].

At the Savonia UAS, curriculum and studies has been reformed by applying an Open Innovation Space approach (OIS). [2] In the OIS approach, there are three key players collaborating in the field. Industry provides a challenge, a mentor and a multidisciplinary team of students work together to solve a problem [Fig. 1]. Everyone learns from each other in an authentic everyday setting. OIS ideology builds on socio-constructive and contextual learning [3]-[7].

In the OIS approach, learning, development, research and teaching practices are implemented in close cooperation with industry and often in the field [4]. This social innovation educational OIS approach is requires close interaction between all parties and therefore, it more easily reveals tacit information about every day practices [5]-[7]. Effective transfer of tacit knowledge generally requires close collaboration between people. This kind of knowledge can only be revealed through real-life actions in a particular context and passed via social networks [7].

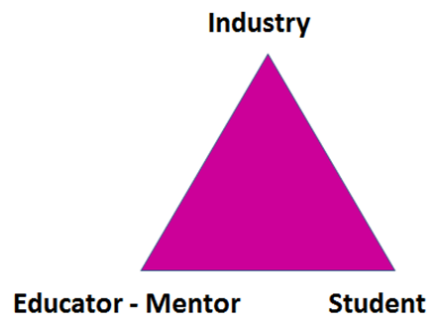


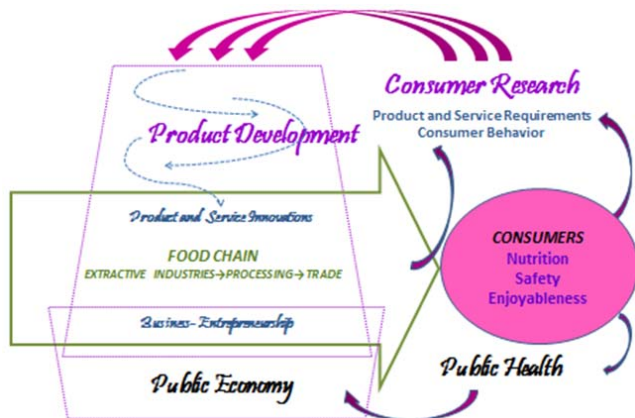
Fig. 1 Open Innovation Space –approach

III. OIS METHOD IN PRACTICE

As an example of implementing the OIS approach, Savonia UAS's Future Food RDI hub follows OIS practices in offering food product development and consumer research services to food enterprises [8], [9]. Over the years, this FF RDI hub model has integrated the OIS approach into several EU-funded projects; regional ERDF-funded Future Food project [8] and Tradeit a project by FP7-KBBE project [10]-[12].

At FF RDI hub, the main idea is to ease students, entrepreneurs, educators, scientists and end-users, such as

consumers, into working together more closely and to create new value for the whole food industry through product development [Fig. 2]. At the FF RDI hub, students are involved in working life practices through course works (1-5 ECTS – European Credit Transfer System), project studies (1-5 ECTS), final thesis (15 ECTS) and work placements (15 + 15 ECTS) at the FF RDI hub [Fig. 3]. Under the FF RDI operational environment, students are often able to simultaneously study several fields of their choice, complete their university studies faster and gain employment with an enterprise that they have already worked for. During implementation of the services, enterprises are involved in product development activities at the FF RDI hub, delivering applied and tailored RDI projects and trainings for their needs.



The OIS approach is utilized throughout the product development process: student – enterprise – consumer – academician in close collaboration:

- Creating ideas
- Carrying out consumers' needs
- Gathering information about consumer profiles
- Finding information about behaviour in decision-making and buying
- Product supply and markets
- Sensory assessment
- Development of sensory quality
- Development of nutritional quality
- Safety and risk management
- Package communication
- Product and service development

Fig. 2 At the Future Food RDI Hub Finland, the Open Innovation Space approach is utilized throughout the food product development process: students – enterprises – consumers – academicians in close collaboration

Applying the model in practice at FF RDI hub means communicating in different ways (face-to face meetings in an enterprise, in a field - e.g. supermarkets, emails, phone calls, web-meetings), learning together, sharing knowledge, researching, developing processes in close cooperation between all partners. Therefore, the OIS model contains five stages from the students, the educators and the enterprises perspective;

- 1) partner engagement and mission – motivation, roles and duties, clarified goal,
- 2) partner profiling and knowledge capture – proper background information for implementing tasks given,
- 3) identification for further collaboration – planning field practices,
- 4) supportive actions – acting in the field to solve the problem, e.g. data collection and analysis in supermarket settings, sensory evaluation tests for consumers, and
- 5) summary briefings – evaluation and new collaboration ways of partners.

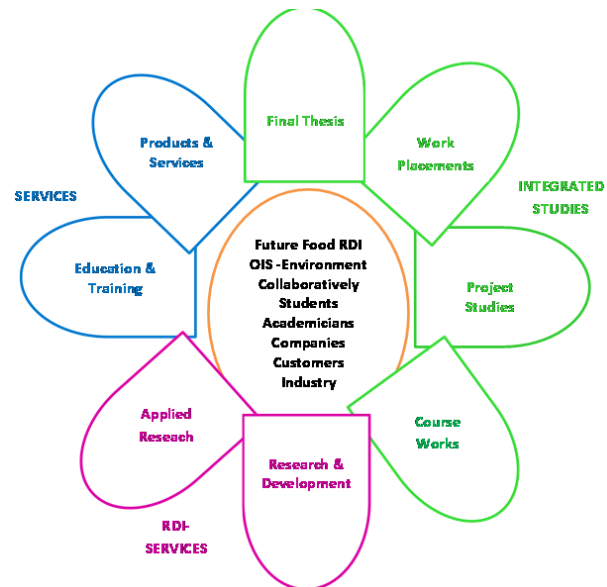


Fig. 3 Future Food RDI Hub operational environment and collaboration tools for enterprises, students, consumers and academicians

At the FF RDI hub, the OIS based services are targeted especially at small and medium sized enterprises (SMEs) that need support and resources for their daily and new product development operations. By utilizing students in daily operations, SMEs can cost-effectively utilize services. For each enterprise, individual services can be tailored. Also the uniqueness of the FF RDI hub's every day functions are based on an integrated concept concerning the application of consumers' current and future needs, its determinants, in the development of innovation products with true added value, such as by utilizing a world-wide recognized consumer research method called VAP-WAVO-method - Verbal Analysis Protocol combined to Wireless Audio-Visual Observation for the companies' needs [13].

In this VAP-WAVO-OIS activity, real-life data is collected cooperatively by several co-actors on the field. Every actor: a student, a RDI expert, a technician and an educator, works closely together during each step of the OIS activity. During OIS activities, all partners collaboratively plan, implement, analyze, report and evaluate each step of the activity [Fig. 4].

IV. RESULTS AND DISCUSSION

The OIS application of Savonia UAS's has also produced significant results from the student, the university and the industry perspective.

A. Student - University Perspective

The OIS approach integrated to the FF RDI hub services facilitates students to achieve comprehensive know-how in many fields. Based on interviews and feedbacks of students after OIS experiments in the field, in this case the experiment carried out in the supermarket setting [Fig. 4], they were able to apply their existing knowledge and learn more about communication skills, research techniques, consumer behavior, nutritional and food science, business and retail sector specific information alongside many other useful every day skills with other partners in an everyday environment. Versatile OIS activities in the field led students to more satisfactory learning experiences as they were fully involved into real-life experiments as an equal co-partner, not only as a passive listener in a class room. Also after OIS experiments, students have achieved more work-oriented knowledge and skills as well as valuable contacts for their future careers.



Fig. 4 New approach developed in data collection for collecting silent signals of consumers for product development needs of enterprises. The actual verbal analysis protocol combined to wireless audio-visual observation setting at the supermarket; the researcher was coordinating the verbal protocol analysis. The technician was controlling the wireless documentation of the shopping environs, the consumer and the researcher. There was also a student assistant who was observing the subject's selection process

Educators have been satisfied with achieving more positive feedback from students and also more impulses and contacts from enterprises. Those actions provide more resources for the university from a teaching, financing and learning material perspective. Also from the university perspective, OIS provides opportunities for educators to utilize their expertise by implementing versatile pedagogical approaches in the field as well as increasing the work motivation and desire to develop professional and pedagogical skills further. Also the OIS approach provides educators opportunities to enter their discomfort zones to act as a supportive co-actor in the learning process in the field and simultaneously becoming active learners as well.

As a result of utilizing the OIS approach in learning activities above other things, The Finnish Higher Education Evaluation Council has rewarded Savonia UAS three times. Also from the student perspective, Savonia UAS is among most desirable universities in Finland to apply a higher university degree according to annual statistics of applicants.

B. Industry Perspective

The OIS approach integrated with the FF RDI hub services improves the growth potential of food producing SMEs through the utilization of technologies intended to lead to improvements in capacity, efficiency, compliance, product quality and innovation. It has refreshed research-industry collaboration and brought business people closer to educational research institutes. For example, after the OIS related VAP-WAVO method delivered in the field [Fig. 4], the food product development and marketing department of a bakery called Trube Ltd. made some concrete changes in their food packages. The packaging material of the Trube Ltd. was replaced as the former material was not desirable for consumers. As the company renewed the visual outlook of their products the company was able to increase sales of cinnamon bread by 88% and butter bread by 22%. The director of the company gave the statistical numbers based on quarterly reports of retailer chains six months after the changes were made in the food packaging [14]. Also that example shows that the multidisciplinary OIS approach in the field simultaneously benefits companies by gaining novel information for their product development needs. By meeting new actors in authentic environments it generates innovations and improvements for everyday practical operations [15]. This collaborative OIS approach allows enterprises to participate in these profitable team working activities with universities and concurrently improve their competitiveness. Regular OIS activities and continuous support for SMEs enhance the probability of enterprises participating in real action of networking and partnering under other RDI operations with universities in the long run. Also enterprises are able to recruit more suitable employees as they already know graduating students from previous OIS activities.

V. CONCLUSION

The FF RDI hub model integrated to the OIS approach is a driving force for renewing education and providing new insights for RDI operations as well as making scientific careers more attractive. University students are also able to find their careers more easily during their OIS related food science studies. OIS strengthens partnerships, networking and network development by providing win-win situation for all partners.

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REFERENCES

- [1] L. Argote, P. Ingram, J. M. Levine, R. L. Moreland, Knowledge transfer in organizations: learning from the experience of others. *Organizational Behaviour and Human Decision Processes* 82 (1), 1-8, 2000.
- [2] M. Gröhn-Rissanen, M. Kontio and S. Laulainen (ed.), *OIS-SOI! Open Innovation Space – Suuntana Oppimisen Ilo. Kohti työelämälähtöistä ja opiskelijakeskeistä koulutusinnovaatiota*. D4/2014. Savonia University of Applied Sciences. 2014.
- [3] L.S. Vygotsky, *Mind in society*. Cambridge, MA: Harvard University Press. 1978.
- [4] D. Hull, *Opening Minds, Opening Doors: The Rebirth of American Education*. 1993.
- [5] Y. Engeström, Innovative learning in work teams: Analyzing cycles of knowledge creation in practice. In Y. Engeström, R. Miettinen & R-L. Punamäki (eds.) *Perspectives on activity theory*. Cambridge: Cambridge University Press, 377–404. 1999.
- [6] Y. Engeström Weaving the texture of school change. *Journal of Educational Change* 9, 379-383. 2008.
- [7] I. Nonaka, R. Toyama, P. Byosiere, A theory of organizational knowledge creation: understanding the dynamic process of creating knowledge. In book: M. Dierkes, A. Berthoin Antal, J. Child, I Nonaka (eds.) *Handbook of organizational learning & knowledge*. Oxford University Press, Oxford, p. 491-517. 2003.
- [8] Savonia UAS, *Future Food RDI Hub*, Available at: <http://futurefood.savonia.fi/index.php/fi/> 2015. Last access date: 15th Dec 2015.
- [9] A-M. Saarela, S. Willman, M. Vartiainen and Muikkumedia Ltd, "Savonia Future Food Hub –video in YouTube", Available at: <https://www.youtube.com/watch?v=MK8-g2FPkqY>, 2015. Last access date: 15th Dec 2015.
- [10] Savonia UAS. Savonia is participating in a n international food industry project. 2015. Available at: <http://portal.savonia.fi/amk/en/about-savonia/savonia-participating-international-food-industry-project> Last access date: 15th Dec 2015.
- [11] FP-7 KBBE: Tradeit -project. Available at: www.tradeitnetwork.eu 2015. Last access date: 15th Dec 2015.
- [12] A-M. Saarela, *Close interaction with SMEs supported by Savonia University of Applied Sciences' Future Food Finland Hub*. Tradeit Newsletter. 2014. Available at: <http://tradeit2.newsweaver.com/newsletter/1accfaw0ee7?a=6&p=48267231&t=26497515> Last access date: 15th Dec 2015.
- [13] A-M. Saarela, T. Kantanen, A. Lapveteläinen, H. Mykkänen, H. Karppinen and R. Rissanen, "Combining Verbal Analysis Protocol and Wireless Audio-Visual Observation to Examine Consumers' Supermarket Shopping Behavior." *International Journal of Consumer Studies*. doi: 10.1111/ijcs.12022, 2013.
- [14] J. Tolvanen, Oral reference given by the director Mr. Jarmo Tolvanen of the bakery called Trube Ltd. www.trube.fi 2014. Last access date: 15th Dec 2015.
- [15] D. Brachos, K. Kostopoulos, K.E. Soderquist, G. Prastacos, Knowledge effectiveness, social context and innovation. *Journal of Knowledge Management* 11 (5), 31-44, 2007.



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