OPEN INNOVATION ALLIANCES AND COMMUNITIES IN HIGHER EDUCATION

Juha Kettunen, Turku University of Applied Sciences

ABSTRACT

This study develops an extended taxonomy of innovation types by actor and learning type. The concepts of invention and collaborative and networked innovations are extended to crowd innovations, which is a new concept. The study introduces open innovation alliances and communities to promote innovations in higher education and presents a stakeholder map for such open innovation alliances and communities. Empirical evidence is presented from a European innovation alliance, which has been favorable for promoting research and development projects and student and staff exchanges in higher education. Empirical evidence is also presented from innovation communities, where crowdsourcing is used to search and evaluate new ideas. Finally, these ideas are forwarded for further development and implementation to produce crowd innovations.

JEL: O34

KEYWORDS: Innovation Alliances, Innovation Communities, Crowdsourcing, Research and Development, Learning, Higher Education

INTRODUCTION

An inventor is a person who creates inventions. The interjection "eureka" is used to celebrate an invention made by an inventor as in the times of Archimedes. The complex structures and processes of the modern society have reduced the importance of inventors and taught people to innovate. This dynamic and turbulent environment has forced higher education institutions (HEIs) to realize the value of collaborative and networked innovation to build open strategic networks that are involving external partners in their innovation process. Innovation has become too important to be left only in the hands of inventors.

A traditional innovation paradigm where a single scholar in a university internally generates a new idea and publishes the results in a journal takes time and is also inefficient because only very few people outside the HEIs read these articles and utilize the results. The traditional concept of developing unique competence through innovation within the institution as a competitive asset has become inadequate in today's fast changing and complex global economy. The closed innovation environment of research and development simply is typically too slow and costly to produce competitive results. The traditional approach to innovation can thus be challenged and improved by producing open innovation networks.

Open and collaborative innovations can be characterized as an emerging area in HEIs, which have established innovation alliances and created mechanisms for how research and development can be integrated into their education. Open innovation alliances provide their partners advantages that facilitate learning and knowledge complementary to their current capabilities and strategic drivers for organizational growth in knowledge-intensive organizations. Individual scholars from various institutions work together in innovation alliances to create different types of creative ideas and innovative solutions to achieve the objectives of their institutions and their networks.

Lee et al. (2012) comment that "co-innovation is a new innovation paradigm where new ideas and approaches from various internal and external sources are integrated into a platform to generate new organizational and shared values." Strategic networks show high potential as drivers of co-innovation because they provide access to new knowledge, skills, technologies, and markets by sharing risk and integrating complementary competencies (Romero and Molina, 2011). Problem solving is no longer only the activity of the individual genius; it can be radically distributed beyond the boundaries of professionalism.

The concept of open innovation generally includes inbound and outbound knowledge flows and their combined processes (Chesbrough, 2003, Chesbrough et al., 2006, Gianiodis et al., 2010, and Lichtenthaler, 2011). An open networked co-innovation is a form of external actor involvement in innovation, wherein actors from a diversity of backgrounds collectively solve complex problems via a virtual network (von Raesfeld et al., 2012, and Song et al., 2013). Inbound knowledge flows will utilize the discoveries of others, while outbound knowledge flows involve passing on internally developed knowledge, skills, and technologies and their combinations.

Internal team-based and often multidisciplinary collaborative innovation processes can also be extended to externally distributed networks and crowdsourcing activities. Crowdsourcing represents the action of an organization that is then outsourced to an undefined and generally large group of people as an open call. An important characteristic of crowdsourcing is that organizations have carried these actions themselves, but in this new situation they use the open call format to communicate to an innovation community consisting of a large crowd of innovators.

The purpose of this study is to present a taxonomy of innovation types and illustrate open strategic innovation alliances and communities so as to create a new stakeholder map for HEIs. Empirical evidence is presented on five European universities of applied sciences that have created an innovation alliance to promote collaboration in education, research, and development. The partners outside the network are able to join the research and development projects as well as the student and staff exchange. This study also presents a web-based innovation platform, which is a technical tool for an innovation community. That platform is a forum where new ideas from the general public can be also evaluated, improved, and further transferred for implementation.

The remainder of this paper is set up as follows. Section 2 includes the literature review, which depicts the evolution of innovations, open innovation alliances and communities, the extended taxonomy of innovation types and the stakeholder map of innovation alliances and communities. Section 3 describes the data and methodology and presents the cases from the Consortium on Applied Research and Professional Education (CARPE) and Innopankki platform. The results and discussion in Section 4 present networked learning and crowdsourcing as a means to promote innovations. The final Section 6 offers final comments.

LITERATURE REVIEW

The Evolution of Innovation

The dynamic forces of the environment have changed, so that an institutions' own competencies are not sufficient enough to develop sustainable competitive advantage. The traditional closed and critical approach of self-sufficiency and self-reliance has become virtually impossible to use to produce valued added for business companies and the public sector. Higher education institutions (HEIs) have now started to follow business companies where many new forms of partnerships, strategic alliances, and joint ventures have become increasingly popular.

HEIs used to develop knowledge and competencies internally, so that the researchers or institutions could be the first presenter of the new knowledge. It was thought that the researcher was a critical source of innovation even though in a few cases cooperation was extended to other researchers. Cooperation was, however, more distant than collaboration in many cases. The innovation process has gradually evolved from closed innovations to collaborative innovations and open networked innovations, wherein people outside the institution also participate in research and development.

Collaborative open value creation is not restricted only to HEIs, because the ideas and innovative efforts flow inside-out and outside-in between research institutes, business companies and public sector. Such open innovation builds a value chain through establishing an innovation ecosystem where various partners can combine their contributions into coherent value creating solutions. These research and development projects connect solution seekers to solution providers. The core of open innovation is the cumulative competence of the researchers and the institutions with external expertise.

The importance of collaboration with students and other stakeholders in the development of innovative services and products has emerged in recent years. As a result, such collaboration has become a major component in those HEIs that want to carry out research and development projects to promote innovations. These projects allow researchers to utilize partner knowledge and those capabilities for the improvement of services and products. Collaboration with external bodies has grown substantially as institutions have taken a paradigm shift from lecturing and exams to applied research and development which is then integrated into the delivery of education. These improved processes also create new capabilities for students to participate in development work after graduation.

Open Innovation Alliances

An open innovation alliance is a coalition between two or more parties to promote innovations and secure common interests. Open innovation alliances evolve over time, as the participating members are free to enter and leave the alliance (Kunsoo et al., 2012). Open innovation alliances have a number of benefits, including 1) pooling complementary skills, 2) accessing external knowledge, 3) accelerating product development (Pittaway et al., 2004), and 4) earlier and closer customer interaction in product development (Corso et al., 2001). There is extensive literature on the positive contributions of networks to innovation (Burt, 2005, Faems et al., 2005, and Perks and Jeffery, 2006). The business literature indeed shows that strategic alliances can lead to positive returns (Reuer and Koza, 2000).

HEIs use open innovation alliances to apply for funding and collaborate in research and development projects to better serve customers in their region and all of society. Han et al. (2012) suggest that the type of innovation process and the degree of openness are significantly associated with the profitability of open innovation alliances. This new paradigm of open and collaborative innovation alliances emerged and extended in higher education when countries joined the European Union, an event that required collaboration between several countries in its funding programs. Such projects differ substantially from traditional projects with no partners or international collaboration. It is important to assess and understand that research and development projects and their funding have changed their strategic scope and do require new and open innovation alliances to be most effective.

The strategic innovation alliances of HEIs and their partners facilitate value co-creation through joint design and the success of completed research and development projects, joint educational programs, and student and staff exchange. These alliances are expected to generate competitive advantage (Kaplan et al., 2010). Competitive advantage is created by entering the project or task based on an agreement. The majority of these agreements are made for research and development projects funded by external funding sources and student exchanges between HEIs.

The open innovation alliances of HEIs are formed and maintained based on several unique governing principles, such as open project membership and student and staff exchange, regulation of the funding bodies and self-monitoring and evaluation of HEIs for quality assurance. Open alliances evolve dynamically over time in terms of partner composition and the funding of projects and exchanges. Also, the focal areas of the European Union change when new program periods start. The evolutionary aspects of open strategic innovation alliances have positive implications for research and development project partnerships. HEIs must look for new partners according to their strategic plans and the changing environment, indeed not possible in a closed strategic network.

Innovation pedagogy was developed for HEIs, so that lecture-based education could be extended to collaborative and networked learning (Kettunen, 2011, Kantola and Kettunen, 2012, and Kettunen et al., 2013). Innovation pedagogy responds to the development needs of the companies and the public sector in the region and integrates research and development projects into education. Typically, the development needs are multidisciplinary, and innovations are improvements to existing processes, services, and products. The literature indicates that customer involvement tends to prefer incremental innovations (van der Panne et al., 2003), while radical or disruptive innovation may face resistance from customers (Christensen, 1997).

Individual-based knowledge is the basis of a self-sufficient profession, which has a small ambition, narrow applications, and is only incremental in its impact. The creation of innovations has gone through the evolutionary steps to collaborative innovation and open innovation during the past decades (Lee et al., 2010). In this study then, innovation pedagogy is extended from collaborative and networked learning to larger innovation communities where learning takes place as innovations are created based on the development ideas and evaluations of the greater public.

Open Innovation Communities

Von Hippel (2005) defines "innovation communities" as meaning nodes that consist of firms that are interconnected by information transfer links that may involve face-to-face, electronic, or other communication. Innovation communities are open and not limited to membership groups. Innovation communications can have users as customers or contributors, and they can offer sophisticated support, collaboration, evaluation, and assistance in developing and applying innovations.

Von Hippel (2005) emphasized the importance of users in the innovation process. Users join together in networked communities that provide a useful innovation platform for their interactions and the distribution of innovations. These innovation platforms can increase the speed and effectiveness with which users and customers can present, evaluate, and diffuse their innovations. Innovation with customers has become popular, because individual customers can be an important source of tacit knowledge, particularly, as it relates to a product's use and design (Greer and Lei, 2012).

Crowdsourcing is a model used to attract an interested and motivated crowd of individuals to produce solutions that are superior to the ideas of individual genius or teams working in traditional forms of business. Under the right circumstances, this crowd is able to present a solution that is better than the ideas of a scientific researcher. The wisdom of crowds is not derived from averaging solutions, but rather, the crowdsourcing user must find situations wherein mediocrity is excellence and the solutions can be aggregated in the same way that markets and intelligent voting systems do (Surowiecki, 2004).

The conditions for collective wisdom are 1) diversity of opinion, 2) independence, 3) decentralization, and 4) aggregation of the crowd (Surowiecki, 2004). These four specifications can be implemented on the web, which is the necessary technology for decentralized individuals to be able to communicate on a

single platform. As the literature has noted, firms now perform these aspects of product development on a virtual basis (Greer and Lei, 2012).

Crowdsourcing is a distributed problem-solving model that is not necessarily open-source practice in business companies, because problems solved by the crowd may become the property of companies. The crowd knows this aspect when it participates in problem solving. A company posts a problem online, a vast number of individuals offer solutions to the problem, the winning ideas are awarded some form of a bounty, and the company produces the idea for its own gain. For business companies, it is reasonable to own the ideas it acquires from the crowd (Brabham, 2008). HEIs are open because they primarily publish the results of research and development.

The purpose of crowdsourcing is to take users and customers into the development processes to create valued that is then added for the producer and the customer (Brabham, 2008). Innovation communities and alliances are based on the collective intelligence distributed among people. Collaboration is desirable because one individual does not know everything and every individual knows something to add value to a project. A growing number of organizations have adopted such concept and implements online platforms to engage motivated individuals in their activities (Baldwin and von Hippel, 2011). This new ecosystem includes knowledge-based organizations where individuals and organizations are networked and interdependent. The co-innovation process of this ecosystem includes internal collaborative and external networked learning that converges to create a shared value. Collaborative and networked intelligence and crowdsourcing are possible through formal electronic channels and social networks. Diverse forms of learning and innovation can also be used, depending on their context and the situation.

Innovation Types

Innovation types can be classified based on the actor and the corresponding learning types. Inventions and collaborative and networked innovations are well known, but the concept of the crowd innovation is semantically new. The crowd innovation is based on crowdsourcing where innovations are obtained from an open innovation community. It is clearly a different process from the previous types of innovation because individual geniuses from the greater public present the idea and then evaluate the ideas of other people before the ideas are forwarded for implementation.

Table 1 depicts the innovation types by actor and learning type in an innovation ecosystem. An inventor is a researcher or developer who acts and learns individually and produces an invention that is related to a new or improved process, service, or product. Inventions have developed into collaborative innovations that are produced by internal innovation teams using collaborative learning. Innovation alliances provide possibilities for networked learning and innovation that can then be divided into networked inbound and co-creation innovations. Networked inbound innovations are those wherein explicit knowledge or technology is transferred from external partners. Networked co-creation innovations are created in collaboration with external partners. Innovation communities are based on crowdsourcing, where ideas and opinions of crowds are used to create crowd innovations.

Table 1: Innovation Types by Actor and Learning Type

Actor types	Learning types	Innovation types
Inventor	Individual learning	Invention
Team	Collaborative learning	Collaborative innovation
Innovation alliance	Networked learning	Networked innovation
Innovation community	Crowdsourcing	Crowd innovation

This table displays the taxonomy of innovation types by actor and learning type. An inventor, team, and innovation alliance are well known in the literature. The concept of crowd innovation is new and is based on crowdsourcing of the innovation community.

Stakeholder Map of Innovation Alliances and Communities

Various internal and external sources present new ideas or approaches in co-innovation to create new value for partners, users, and other stakeholders (von Hippel et al., 2011). Innovation alliances and communities can be described using the stakeholder map (Kettunen, 2015b), which was developed for this study to describe networking and crowdsourcing. Co-innovation is especially relevant in terms of value creation with partners and customers who are actively involved with the HEI to create value for themselves and the general public at large.

Figure 1 depicts the open innovation alliances and communities in the stakeholder map. The HEI is embraced by the strategic network. Other institutions and organizations outside the strategic network are partners in those research and development projects that are funded by the European Union or other funding bodies. Students outside the strategic network are able to enroll in education as exchange students. Also teachers and other staff join from outside the strategic network to exchange ideas. The innovation community is a larger concept than the more formal structure of institutions and partners. It consists of users and customers that produce ideas and give feedback using the basic principles of crowdsourcing.

The students and staff of HEIs are internal stakeholders, while other institutions, partners, users and customers are external stakeholders. Stakeholders clearly have various roles that relate to the institution. These roles have been described by Kaplan, Norton and Rugelsjoen (2010) using the balanced scorecard approach. Following those perspectives, some of the institutional stakeholders are related to 1) processes and structures, 2) finance, 3) innovations and learning, and 4) the external impact of their institutions. These perspectives are presented as a stakeholder map.

DATA AND METHODOLOGY

Networked learning in an open strategic network provides opportunities for inbound and co-creation innovations, indeed an innovation paradigm that helps a higher education institution (HEI) and its networks and partners create value for users and customers. The Consortium on Applied Research and Professional Education (CARPE) is an example of an innovation alliance and is the first European strategic network of its kind (Kettunen, 2015a, c). Crowdsourcing is a learning type where students, teachers, and other staff create and evaluate ideas for innovative processes, services and products. The project outcome called Innopankki by several educational institutions is an example of crowdsourcing.

CARPE is an open strategic innovation alliance that includes the following member institutions: 1) HU University of Applied Sciences Utrecht (Hogeschool Utrecht), 2) Turku University of Applied Sciences (Turun ammattikorkeakoulu), 3) Polytechnic University of Valencia (Universitat Politècnica de València), 4) Hamburg University of Applied Sciences (Hochschule für Angewandte Wissenschaften Hamburg), and 5) Manchester Metropolitan University. The agreement for the strategic network was signed in November of 2011. The key objectives of the network are 1) exchange and collaboration in European research programs, 2) the development of joint study programs, 3) an exchange of students and staff, and 4) the establishment of a strong European reputation.

A case study on the innovation communities and crowdsourcing can be found in South Savo in Finland, where the Center for Economic Development, Transport, and the Environment allocated funding from the European Union for a project titled "Kinos", which then developed the web-based platform Innopankki to collect development ideas from the crowd. The University of Helsinki, Aalto University, Mikkeli University of Applied Sciences and the Mikkeli University Consortium joined Otava Folk High School and South Savo Vocational College to develop and maintain the innovation platform. This study is an

interesting example where ideas were collected from the wider audience that included users and customers so as to meet their needs and gather their views of development.

Figure 1: Open Innovation Alliances and Communities in a Stakeholder Map
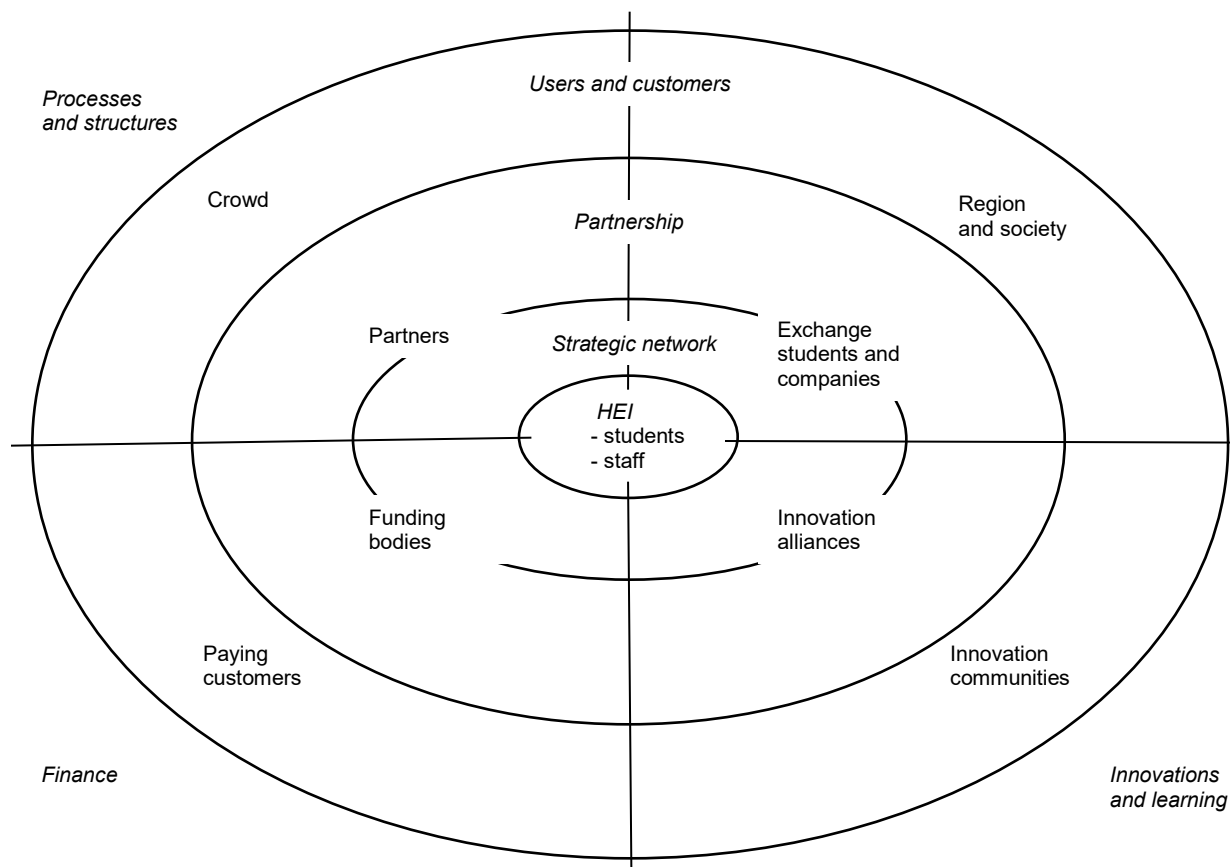
This figure displays the stakeholders of a HEI. Open innovation alliances include a strategic network and its partners. Open innovation communities include users and customers. These stakeholders are classified according to their perspectives of the processes and structures, external impacts, innovations, and learning and finance.

The overall methodological approach for research design in this study is to connect the research questions and theoretical concepts as empirical data and select relevant tools and procedures as the coherent whole following the outlines presented by Bryman and Bell (2011) and Punch (2005). Qualitative research is used for this study to interpret the behavior at HEIs. A case study described by Yin (2003) involves an interpretative approach, which is used here too to capture the open research, development, and education in innovation alliances and communities. An interpretative study seeks a subjective understanding and enlightened details about the institutional management that is commonly omitted in quantitative studies (Mason, 2002).

RESULTS AND DISCUSSION

A Strategic Network That Promotes Innovations

A strategic alliance is expected to increase the resources and complementarities of the participating members and also improve their competitiveness. The partners outside the alliance are likely to take advantage of free-riding benefits as allied members provide them partnership in an open innovation alliance. The study by Han et al. (2012) supports the argument that these non-members can benefit from

the open strategic innovation alliance if they take part in the innovation ecosystem. Research and development projects and student and staff exchange all provide feasible ways to participate and thus take advantage of the innovation alliance.

The degree of openness may vary from one open innovation alliance to another depending on the access and decision making of that network. Access can be defined as the extent to which the external partners are allowed to enter the innovation alliance. Decision making describes the extent to which a partner of the open innovation alliance is authorized to participate in its operational and strategic decision making. The formal agreement of the Consortium on Applied Research and Professional Education (CARPE) was planned to create trust between partners and take responsibility for the core processes of member institutions, which included education, research and development projects, and support services (Kettunen, 2015c). However, the agreement did not limit the activities to member institutions only.

CARPE is an open strategic network because other higher education institutions (HEIs) and partners can join its research and development projects whenever it is deemed necessary to achieve the objectives of the projects. CARPE is also open in the sense that students and staff from other HEIs outside CARPE are able to participate in exchanges with the member institution of CARPE. Active collaboration opens up new possibilities for outsiders to acquire associate membership and finally full membership. Such active collaboration generates trust and improves the quality of that collaboration.

Crowdsourcing to Promote Innovations

Collective intelligence from multiple perspectives can be created when people from a diversity of backgrounds become involved in an online innovation process. Bartel et al. (2007) argue that next generation innovation management systems should take into account the stimulation of interactive and efficient innovation development. In this context, a web-based platform is promising for fostering such crowd innovations. An open innovation platform can be used to extend an invitation to the greater public to contribute to the innovation process.

The educational institutions located in South Savo developed the innovation platform, Innopankki, based on crowdsourcing. The users of the platform can register for free on Innopankki, as it is a virtual platform developed for sharing and evaluating ideas to promote innovations. Teachers are able to use these ideas in education and promote their research and development activities with partners. The ideas can also be used for a strategy process to evaluate the opportunities and threats in the environment. In addition, the ideas are collected to develop the campus environment further.

The generic innovation management process includes phases of search, refinement, selection, implementation, and capturing (Reinhard et al., 2012). Innopankki follows these phases and allows anyone to present, like, and comment on ideas on the platform. The diverse opinions of all the participants are aggregated when other people comment and improve the ideas through use of the web. The ideas are listed and finally forwarded for further development and implementation if the idea eventually meets the requirements of the challenge.

Figure 2 depicts the generic innovation process of the Innopankki platform. A user presents an idea at the first stage. That idea is usually based on an existing problem that needs a solution. The idea is commented on and improved by other users in the second stage. The idea is then rejected or selected for further development. It is important to reject the idea before implementation if the idea cannot lead to any benefits. The rejected idea can be left in the platform for further development. In the final stage, the evaluated and improved idea is forwarded to partners or taken on by any outsider for implementation.

The registered and anonymous users of the platform are able to present ideas that are in their field of expertise or area of interest. Users are able to follow the full development of the idea. They can also comment and improve on the ideas presented by other users of the platform. In this way, the wisdom of crowds can be collected to create or improve a new service or product, and the companies or other organizations are able to obtain the views of users for their development of services and products even in the planning phase. The generated ideas are open and free for anyone to implement.

An example of crowdsourcing was minimizing waste food in student restaurants. One of the facts was that there was surplus food after the lunch period in restaurants. The idea was to sell the excess food on the cheap for students in the afternoon. An improved idea was to freeze the remaining food into boxes, so that students could take them home in the afternoon. The idea was liked by 382 users and commented on by 7 users. Finally, the idea was moved ahead for further development and practice.

Figure 2: The Innovation Process for the Innopankki Platform
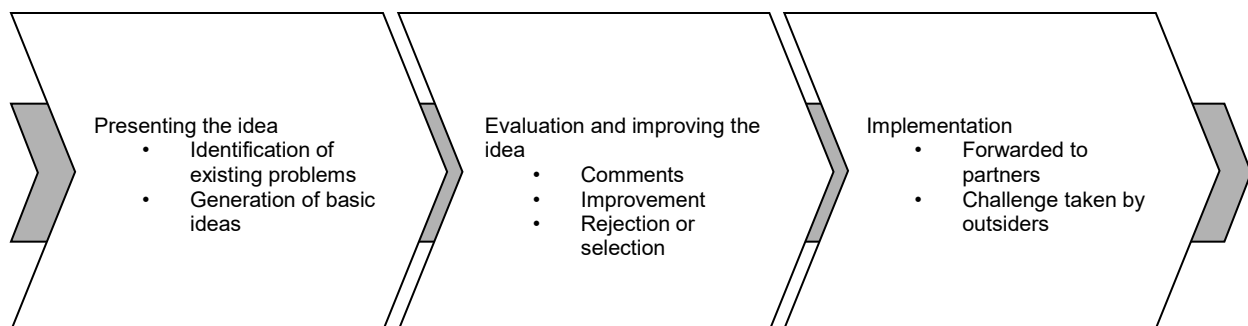
This figure displays the generic innovation process of the web-based Innopankki platform. Any user or customer is able to present an innovative idea, which is then evaluated and improved on in the second stage of the process. Finally, the idea is forwarded for implementation in the third stage of the process.

CONCLUDING COMMENTS

This paper presented a taxonomy for innovation types, illustrated the open innovation alliances and communities in higher education, and created a stakeholder map for them. Empirical evidence was presented from the Consortium on Applied Research and Professional Education (CARPE), a pioneering example of an innovation alliance in higher education. Evidence was also presented from the innovation community, Innopankki, where the principle of crowdsourcing is used to collect and evaluate ideas and develop innovations. These case studies demonstrate that closed innovation systems have given way to open co-innovations that now create shared value for institutions, partners, users, and customers.

The study shows that the traditional inventions of inventors and the research of single scholars have extended and expanded to internal collaborative innovations and networked innovations that consist of inbound, outbound and co-creation innovations. The study presents a new innovation type, namely, "crowd innovation" to correspond to those innovations created by crowdsourcing. It is not reasonable to limit innovations to a specific type whenever various types of innovations can be used in suitable situations. The limitations of this qualitative case study are unlikely to have a significant effect on the validity and reliability of the results because the objective of the study was not to generalize, but rather provide new insights and innovation types for higher education institutions (HEIs).

The empirical evidence supports the recommendation that HEIs create strategic innovation alliances to reform the structure of networking that promotes research and development, activates student and staff exchanges, and provides opportunities for HEIs and other partners to collaborate. The empirical evidence

also supports the reasoning that HEIs can use crowdsourcing to encourage the public at large to present and evaluate innovative ideas for further development and implementation.

These various types of innovation alliances and communities can be modified for various countries and regions to improve collaboration, collect and evaluate new ideas and forward them for further development and implementation. These partners, users and customers can help the institution improve or create new services or products. A challenge and indeed a fruitful topic for further study is to analyze the complementary competencies expressed herein to build innovation alliances in higher education. Another important challenge is to encourage and motivate the greater public to present innovative ideas for evaluation and further development in this endeavor.

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ACKNOWLEDGMENTS

BIOGRAPHY

Dr. Juha Kettunen is the Chancellor of the Turku University of Applied Sciences, having previously served 14 years as University Rector. He is also an Adjunct Professor at the University of Jyväskylä in Finland. He holds a PhD (Econometrics) from the University of Bristol in the UK, a DSc (Economics and Business Administration) from the University of Jyväskylä in Finland and a DSc (Technology) from the University of Oulu in Finland. He can be reached at the Turku University of Applied Sciences, Lemminkäisenkatu 30, FI-20520 Turku, Finland, at Juha.Kettunen@turkuamk.fi.