Innovation case study of a life cycle management company

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Abstract The study was set to investigate the role of proper management and leadership in generating successful sustainability business innovations (SBIs) in built environment. The innovation practises of a successful life cycle management (LCM) company was analysed, and the results were compared to general innovation literature. The main findings of this paper suggest that the successful innovation management and leadership process in built environment actually combines parts of several innovation theories; no single theory could explain the success of the company. In addition, some potential innovation management and leadership characteristics, such as influence to industry practises and owner network, were identified, which are not emphasized in innovation literature. In future research, it would be extremely interesting to further study the role of innovation management and leadership in creating SBIs in built environment.

1 Introduction

The study of sustainability in built environment has become an important aspect of environmental research. In general, built environment uses 40 % of all global material resources. Moreover, built environment uses over 40 % of all energy and generates over 40 % of carbon emissions. Therefore, it has become acknowledged that development of sustainability in built environment means radical long-term

and far reaching changes of current technologies [1]. In academia the focus of sustainability research in built environment have been mostly on traditional R&D, LCM approaches, and new environmental technologies. However, there is a lot of evidence to support the belief that in order to radically increase sustainability in built environment the radical innovation is essential. In fact, innovation has recently been emphasized in general environmental economics literature and has been defined for example as technical environmental innovation, eco-innovation [2] or sustainability business innovation (SBI) [3]. SBI is defined as innovations that bridge the gap between business, social, and environment actors to achieve sustainability. We would, however, suggest that theory and practices of innovation processes in the field of built environment could drastically be developed - especially in the real estate and construction (REC) industry.

Climate mitigation has boosted the fastest growing new investment market in the world with over 140 billion dollars yearly investments [4]. Inside the market, built environment and especially REC industry is assessed to offer a wide scope of opportunities for cost effective SBIs. Paradoxically, research suggests [3] that despite the sustainability opportunity there is little SBI activity in REC industry. In particular, there is a lack of fast customer-oriented radical innovations that are expected at the moment in sustainability markets. In spite of this, the few radical SBIs already in the market have great difficulties in raising funds from potential investors [5].

One potential factor of the SBI dilemma in REC industry is the lack of innovation leadership and management competence in the companies. The purpose of this paper is to shed light on the innovation practices in organization in order to generate successful SBIs in built environment. In this exploratory research a successful LCM company is studied in detail with the focus to identify characteristics of successful innovation leadership and management practices in the company case. The study uses case analyse process with an action research twist. One of the authors has been the CEO of the company during the studied innovation period and another worked in the company. The findings of this study are later compared with theories presented in general innovation literature.

The paper is divided into three sections. First, we present the research design and data. Second, we offer case results and formulate hypothesis for characteristics of successful innovation leadership and management practices. Third, we compare the findings to innovation literature and finally, the key research implications are presented with suggestions for future research.

2 Empirical data and research design

2.1 Presentation of the case

The case is a successful Finnish company, which develops construction and real estate LCM design methods, software products, and related services. Company's products minimize buildings construction and maintenance costs, as well as, the overall material consumption in building design. The company has developed its services and products from the early 1990s and reached the national market leader status at middle of 2000s. Interestingly, the company's revenues growth at that period was quite limited, but profitability was immense; over 30 % of yearly turnover. The case was chosen from group of other sustainability business cases since it presented very successfully commercialized SBI in built environment - a technology based innovation which improved sustainability in construction and real estate industry and generated profitable business.

Company's products are based on construction and maintenance target costing technology. The know-how behind the technology has been developed in close co-operation with Helsinki University of Technology and Finnish Construction Government in 1970s and 1980s. The technology had actually been part of the academic research and education, as well as actively been used by numerous organizations from both public and private sector before the case company was founded.

Today, the case company is setting up - de-facto - national target cost standards for industry by its products. From sustainability innovation research perspective the case is interesting, because it has occurred in built environment, it has successfully utilized LCM technology to new products and services, and its products and services have enchased the markets effectiveness as well as sustainable development.

2.2 Empirical data and research design

The data used in the research mainly consist of the experiences of the acting CEO of the case company from beginning of 1990s until the year 2010. The person is also a co-author of the paper. Moreover, another co-author has worked in the

company's R&D unit and another co-author has followed closely the development of the company from the beginning of 2000s.

The empirical data of this study was collected in two workshops [6] [7] and from secondary case data, such as peer-company and customer interviews, company documents and presentations, and articles from media. In first workshop, authors constructed a schematic framework for innovation management and leadership practices in the company case [6]. In second workshop, the framework was presented and further improved for accuracy. Also, the general hypothesis for successful innovation management and leadership practices in SBIs were generated [7]. Finally, the hypotheses were evaluated by comparing these hypotheses with principles of successful innovation practices presented in general innovation literature.

3 Case results

3.1 Empirical data: Innovation management and leadership characteristics of SBIs

Innovation management and leadership characteristics of SBIs were identified from three chronological phases of the innovation process: starting point, early SBI process, and late SBI process. Starting point phase was defined as external and internal company environment where the LCM innovation was invented. Early SBI phase was period where the invention was developed and commercialized to new products. At the late SBI phase new products were diffused into the national markets and managed to the market-standard position. It is important to notice here, that the actual innovation process did not happen in the well-structured and pre-defined manner, which is used here to analyse and present the process.

3.1.1 Starting point: external and internal environment of innovation

The external environment of the company was radically developing at the time, early 90's, the innovation was initialized. The building owners and whole construction industry was used to focused on the construction process of the building, but the national economic recession forced the industry to "re-examine

its business concepts including the life cycle performance of the building and the value it generates to its users" as stated by an interviewee. There was a clear customer need for analysing tools, which could effectively analyse how building features depends with operations occurring inside the building. At the same time, "development of ICT-hardware and -software enabled efficient and economical technologies to generate new products and services". Moreover, as the target cost method, the foundation of the innovation, was widely in use in many public organizations and part of academic education, the technology push and regulatory acceptance were also creating productive foundation for innovation. Based on these findings a tentative hypothesis was formulated:

Hypothesis 1: The external components for SBIs include customer pull, technology push, and regulatory acceptance

Based on the case the key internal components for the SBIs were indentified to be the team, IPR in value network, innovation target, and customer value delivery orientation. The team in case was built to include technology competence from ICT and building LCM technologies, innovation management competence, and business competence. All team members had strong drive for improving practises in industry and "own passions from the field of technology or business", as stated by an interviewee.

As the research and development of target costing method had lasted for couple of decades, the IPR of the technology was actually fragmentized across many organizations and individual professionals. Therefore, the ownership of the company was divided with different IPR stakeholders from private, public, academy and funding organizations and, as expressed by the interviewee, "truce in IPR was accomplished". Interestingly, the emerging IPR problem was strategically managed to an asset, i.e. to a motivated value network for later innovation development process.

The target of the innovation was radical as it solved customer's problem with unique new product and "gave a clear customer promise that differed from competitors". Typical for Finnish markets, the target of the company was set more on diffusion of new products across the industry, not on fast revenue growth. Finally, the orientation to customer value delivery was the baseline for internal innovation environment, as all the development work was strongly aligned to incorporate customer feedback. The second tentative hypothesis was formulated:

Hypothesis 2: The internal components for SBIs include motivated team, incorporated value and owner network, customer orientation, and target for radical innovation.

3.2 Early SBI: R&D and commercialization

Early SBI phase was identified to include first and foremost innovation champion recruiting and customer oriented R&D and commercialisation, in which the new invention was presented to selected customers and further developed according to the feedback. Interestingly, customer involvement had been so strong that customers were willing to contribute in the development work with their out-of-pocket expenses. Moreover, public R&D grants played notable role in this phase.

The main feature of the innovation practises in the case was to align new innovation development around genuine innovation champions i.e. identifying innovation leader who had passion and competence to develop the invention to new product in accordance with customer requirements. As the company developed several new products simultaneously, it was considered crucial that each product had their own champion. During the research it became clear that several initially good new product ideas were rejected, because no genuine champion was found. As stated by an interviewee: "many potential inventions didn't develop to innovation stage because they didn't have own champion". Champion's competence was identified to include strong technology knowledge, leadership skills, and passion.

In addition to the innovation champion feature, the innovation management in early phase included components typically related to product development. First, the innovation - LCM software - was radically differentiated from competitor's products and the value created to customer was identified, optimized, and visualized. Therefore, the relative advantage was high compared to the competitors. Second, the innovations were made to be compatible with current customer's business operations and significant effort was allocated to user analysis and pleasant usability. Although the target costing technology was known and accepted in many organizations, the main part of the industry was not familiar with it. Therefore, easy usability was an essential part of implementation as well as educating the new technology to industry professionals and, meanwhile, decreasing the complexity of the innovation. Third, some potential key customers were motivated to use products by giving free licenses and demos for testing the

innovation. Moreover, software was also distributed free for universities for educational purposes. Hence, students, experts of the future, could familiarize with the new software and technology.

From CEO's perspective public R&D grants at the early phase of innovation catalysed significantly development ability of the company. Grants worked in two dimensions. First, they gave much needed resources to execute R&D. Second, availability of public grants gave the signal that R&D work is prominent for the company and assisted to generate develop orientated atmosphere in company. Thus, a third hypothesis was developed:

Hypotheses 3: Successful early SBI process needs innovation champions and customer driven product development.

3.3 Late SBI process: Diffusion

At the late SBI phase, new products were diffused into the national markets and reached the market standard -position. The phase started approximately at late 1990s and market standard position was achieved at the mid 2000s. The main characteristics at this phase were reaching "street cred" status for the innovation, generating effective selling and network management process, influencing industry practises, and active new knowledge implementation. Moreover, general business management competence and tools were necessary to give good substrate for the diffusion.

The "street cred" status was reached after years of testing and calculating sustainable feasibility and relevant advantage of the products. Status was reached by getting developed technology and software to convincing and industry practises improving use of financing, incurrence and large private companies. As mentioned by interviewee, "one crucial component of successful diffusion of the innovations was the fact that technology was first presented to markets with quite narrow application of targeting cost method", and after it became accepted by experts it was expanded to other LCM products and services. Moreover, the convincing references and strategic partnerships with different stakeholders accelerated the innovation diffusion into market. The effective selling process was one of the end products of customer orientated development work. Consequently, the co-operation experience between the company and customer generated reputation and a brand for the company as a customer orientated and problem solving firm. At

the same time, the company developed effective tools and practises to transform the reputation to business deals. Moreover, as development work between customer and company ended, the value networks of the development work were converged, improved, and managed to business networks. As the sustainable benefits of the products were pointed out by the result and experience of the products, company started to implement its products to national standards. The target of these actions was to improve national practises with developed sustainable methods and generate demand of the products. Moreover, the company preserved its technology leader status through active recruiting of young talented students and experts and close co-operation with universities.

Interestingly, despite the demand for the innovation and the profitability of the company was great, the growth of the company was quite modest. This might have affected the general market approval of the company as it could maintain the technology leader status, good profitability, and brand. Thus, a fourth hypothesis was developed:

Hypothesis 4: The effective diffusion of SBIs calls for combination of managerial skills, strong references for credibility, actively participating in the development of industry practises, and maintaining technology leader status.

3.4 Analysis of the hypothesis

Hypothesis 1: The external components for SBIs include customer pull, technology push, and regulatory acceptance.

These three components or determinants are identified also by eco-innovation literature e.g. [1],[2],[8] and few studies [9] in general innovation literature. With regard to eco-innovation, new eco-efficient technologies can be implemented under technology push factors, while preferences for environmentally friendly products or image can be implemented under market pull factors. Because factors of technology push and market pull alone do not seem to be strong enough, in contrast to such technologies as microelectronics and telecommunications, eco-innovations need specific regulatory support. Therefore, these components may be identified as critical SBIs starting point components.

Hypothesis 2: The internal components for SBIs include motivated team, incorporated value and owner network, customer orientation, and target for radical innovation.

The recent general innovation literature has widely studied value and owner network, customer orientation, and target on radical innovation. For example the service-dominant logic (S-D logic) is a new approach that has emerged to explain modern innovation process. The S-D logic studies e.g. [10], [11], [12] suggest that the improvement in innovation process can reduce the time-to-market for innovations and facilitate the application of new technologies. While S–D logic focuses on intangible resources, goods and tangible resources are not ignored; interestingly S–D logic views goods as tools or appliances in the customer's service provision process [11]. In contrast to the traditional R&D process, the S-D logic underlines the importance of customer role, value network, and resources which involve the value creation process for modern innovation process [11], [12]. Moreover, the S-D logic based innovation process is well-aligned with the principles of the open innovation paradigm [13], [14], [15], which emphasizes the balance between external and internal knowledge in the innovation process.

Latest research suggests, however, that these key components are lacking from the SBIs in built environment currently [3]. Moreover, several construction innovation studies e.g. [16] have presented complex value networks, lack of innovation competence, and long development periods as key challenges to produce innovations. Therefore, hypothesis 2 may play an essential role in development of SBI management processes.

Hypotheses 3: Successful early SBI process needs innovation champions and customer driven product development.

Innovation champion is commonly accepted as an essential determinant of innovation in innovation leadership literature [17], [18]. Selecting the right innovation champion- a manager who will have the leadership skills, charisma and determination to lead a major innovation initiative -is one of the most important decisions a CEO has to make. As innovations come in many forms, selecting right kind of champion may be challenging. Therefore, a CEO must fully understand the importance of matching the skills of innovation leaders with the specific tasks and roles they will face in specific situations [17].

The case company's product development exhibited the features of building product's relative advantage, developing compatibility, reducing complexity,

improving triability, and observability. In the innovation theory, these factors affect the probability of innovation adaption [19]. Factors are briefly explained in the following. Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. In effect, compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. In contrast, complexity is the degree to which an innovation is perceived as difficult to understand and use. Triability is the degree to which an innovation may be experimented on a limited basis. Furthermore, observability is the degree to which the results of an innovation are visible to others. Moreover, uncertainty and adopter characteristics are mentioned as features of adoption decision in literature [20]. Each of these factors, as well as innovation champion characteristics, affects the probability to adopt innovations and, therefore, should be noticed in SBIs management.

Hypothesis 4: The effective diffusion of SBIs calls for combination of managerial skills, strong references for credibility, actively participating in the development of industry practises, and maintaining technology leader status.

These components are generally mentioned in business management literature, but not widely discussed in earlier eco-innovation literature [e.g. 2, 21]. However, they seem to be characteristics of successful external and internal innovation leadership process of SBIs. Therefore, these attributes are a highly interesting area for further research.

4 Discussion

The study was set to investigate what is the role of efficient innovation leadership and management to generate successful SBIs in built environment. A successful SBI innovation process of a LCM company was analysed, and finally the results were compared with general innovation theories.

The main findings of this paper suggest that the successful sustainability innovation management and leadership process in built environment actually contains parts of different innovation theories; no single theory could explain the success of the company. The innovation theories found to explain parts of the innovation case were market innovation, innovation leadership, S-D logic, construction innovation and innovation diffusion. Different characteristics of innovation management and leadership were identified at different phases of the

innovation life-cycle: starting point, early SBI process, and late SBI process. At the starting point, components of successful SBIs external environment constructs from customer pull, technology push, and regulatory. Internal environment components constructs from motivated team, incorporated value and owner network, customer orientation, and target for radical innovation. Successful early SBI process needs innovation champions and customer driven product development focusing especially on relative advantage, compatibility, complexity, triability, and observability. Effective late SBI process is a result of combination of managerial skills, strong references for credibility, actively participating in the development of industry practises, and maintaining technology leader status.

Based on the empirical observations in this paper, it would seem that examination of the innovation management and leadership process in practise and in literature is an effective method to develop SBI operations in built environment. When generalizing based on the results, this study has some important limitations. Since the data collected through one case study is limited in number and geographically, the implications made should consider as suggestive only. Moreover, as the study generated the hypothesis from the characteristics that felt most important to authors, some critical aspects may have not been noticed.

This paper sets forth several leads for future research. It would be highly interesting to study further the role of innovation management and leadership role in creating SBIs in built environment. Moreover, more research attention should be given to investigate the relationship between sustainability innovation process and diffusion of new LCM -approach.

5 References

[1] Rennings K., Ziegler A., Ankele K., and Hoffmann E., The Influence of Different Characteristics of the EU Environmental Management and Auditing Scheme on Technical Environmental Innovations and Economic Performance, Ecological Economics Vol. 57, No. 1, 2006, pp. 45-59.

[2] Rennings K., Redefining innovation – Eco-Innovation Research and the Contribution from Ecological Economics, Ecological Economics, Vol. 32, Issue 2, 2000, pp. 319-332

[3] Kajander J-K. Sivunen M., Junnila S. Challenges of Sustainability Business Innovation in Built Environment, SB10 Finland, Espoo, 2010, Vol. 1, pp. 884-892.

[4] <www.newenergyfinance.com/Download/pressreleases/105/pdffile> (Accessed 03.03.2011)
[5] Rennings, K., Markewitz P., Vögele S., How clean is clean? Incremental versus radical technological change in coal-fired power plants, Journal of Evolutionary Economics, 2010, Vol. 20, pp. 1-25.
[6] Workshop A. A schematic framework of innovation management and leadership. 17.1.2011. Väänänen, H. Sivunen, M. Kajander, J-K
[7] Workshop B. Innovation management and leadership characteristics. 4.4.2011. Väänänen, H. Sivunen, M. Kajander, J-K, Junnila, S., Pulkka, L.
[8] Dewick P., and Miozzo, M., "Sustainable technologies and the innovation-regulation paradox", Futures, 34(9-10), 2002, pp. 823-840.
[9] Assink M., "Inhibitors of disruptive innovation capability: a conceptual model", European Journal of Innovation Management, Vol. 9, No. 2, 2006, pp. 215-33.
[10] Vargo S.L., and Lusch R.F., "Evolving to a New Dominant logic for Marketing", Journal of marketing, Vol. 68, No. 1, 2004, pp. 1-17.
[11] Michel S., Brown S.W., and Gallan A.S., "An expanded and strategic view of discontinuous innovation: deploying a service-dominant logic", Journal of the Academy of Marketing Science, Vol. 36, No. 1, 2008, pp. 54-66.
[12] Lusch R.F., Vargo S.L., Tanniru M., "Service, value networks and learning", Journal of the Academy of Marketing Science, Vol. 38, No. 1, 2010, pp. 19–31.
[13] Chesbrough H., "The Era of Open Innovation", MIT Sloan Management Review, Vol., No. 3, 2003, pp. 35-41.
[14] Chesbrough H. "Managing open innovation", Research-Technology Management, Vol. 47 No.1, 2004, pp. 23-26.
[15] Chesbrough H., "Why companies should have open business models", MIT Sloan Management Review, Vol. 48, No.2, 2007, pp. 22-28.
[16] Manley K.J. "Against the Odds: Small firms in Australia Successfully Introducing New Technology on Construction Projects", Research Policy, Vol 37, No.10, 2008. pp. 1751-1764.
[17] Deschamps, "Different leadership skills for different innovation strategies", Strategy & Leadership, Vol. 33 Iss: 5, 2005. pp.31 - 38
[18] Berry, S. Venkatesh, J.T. Parish, S. Cadwallader, and T. Dotzel, "Creating New Markets Through Service Innovation," MIT Sloan Management Review, Vol 47 No. 2, 2006. pp. 56-63.
[19] Rogers, E.M. Diffusion of innovation. 1995. New York: Free Press
[20] Frambach R, Schillewaert N, Organizational innovation adoption, a multilevel framework of determinants and opportunities for future research'. Journal of Business Research No. 55. 2002. pp. 163 - 176
[21] Nieto, M. 2003. "From R&D management to knowledge management: An overview of studies of innovation management", Technological Forecasting & Social Change, No. 70, pp. 135-161.