Legal and confidence value as the key factors of radical industrial innovation adoption: a case of a novel steel repair technology

ABSTRACT

Perceived value explains why people engage in certain activities from the standpoint of consequences that the innovation brings to them. Perceived value of an innovation for a company influences its acceptance. By understanding the value of industrial innovation for various stakeholders, the innovation can be adjusted to the stakeholders need better and its benefits could be communicated clearer. This study portrays legal and confidence value of a radical innovation through qualitative case studies in the shipbuilding and civil engineering industries. The concept of value provides the understanding both of the characteristics of the innovation that drive and that hinder value, and of consequences that the innovation incurs to stakeholders. The study contributes to the literature on innovations in business-to-business relationships. It brings the theory on perceived value to the literature on innovations that can aid in building more comprehensive view on innovations and in providing inputs for marketing communication strategies.

Keywords: industrial innovation, perceived value, legal and confidence value

Work-in-progress

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INTRODUCTION

Innovations nowadays are considered as crucial for achieving competitive advantage and improving business performance (Roberts, 2001, Deshpandé, et al. 1998, Deshpandé and Farley, 2004, Hult, Hurley and Knight, 2003). They are drivers of technological progress and economic growth. But, it is radical innovation that leads to long term business growth and sustainable competitive advantage. The firms that introduce radical innovations profit by achieving superior market position (Carpenter and Nakamoto, 1989). The relationship between innovativeness and profitability is mediated by quality (Cho and Pucik, 2005) hence; superior quality innovation that is recognized by consumers can contribute to increase of profitability.

It should be noted, however, that radical innovation development requires high investment and possession of unique internal capabilities (Bala Subrahmanya, 2005, Tellis, Prabhu and Chandy, 2009, O'Connor and Ayers, 2005). Process itself is time-consuming with uncertain outcome. In the case of radical innovations sometimes the years are required for a radical innovation to start to generate profit and contribute to the overall performance.

Firms can benefit financially only from successful innovations, i.e. innovations that are accepted on the market. The innovation success depends on the buyers' decision to buy and consequently accept innovation. This rule applies for all innovations, including industrial innovations.

In this paper we focus on exploration of the key types of perceived value of a radical industrial innovation for different stakeholders.

Acceptance of the innovation depends on views of various stakeholders in the industry and value of the innovation is perceived differently by stakeholders. In order to clearly communicate its benefits and develop an innovation inline with stakeholders need and requirements, one needs to understand the value of industrial innovation for various stakeholders. The concept of value provides the understanding both characteristics of the innovation which drive and hinder value, and of consequences which the innovation incurs to stakeholders (Lapierre 2000; Ulaga 2003). It aids in understanding customer behavior in a more comprehensive way than other concepts such as TAM which focus on factors encouraging and discouraging innovation acceptance. Perceived value explains why people engage in certain activities from the stand point of consequences which the innovation brings to them.

However, research on value of industrial innovation is scarce, in particular of radical innovation. In order to develop appropriate communication strategies with various stakeholders, it is important to understand how and which types of value need to be outlined. This study investigates perceived value of innovations for various stakeholders through a qualitative case study of a novel technology for ship repair. Through the case, we examine

value of such an innovation for different stakeholders. We portray legal and confidence value of a radical innovation in the shipbuilding and civil engineering.

CASE STUDY

This study investigates perceived value of an industrial innovation for various stakeholders through a case study of a technology for repair of steel structures with composite materials. This particular innovation is novel for the users in this industry (shipbuilding) offering them the benefits not given by other products in this category. Thus, it can be classified as commercially discontinuous innovation (Veryzer, 1998). In fact, even though a similar technique is used in other less-regulated industries, the technique represents a radical innovation in this sector. Following Henderson and Clark (1990), the application of the technique requires change in its components as well as in its architecture. That means that in this industry the innovation is changed in its technical characteristics as well as in procedure.

Perceptions of various stakeholders relevant for the adoption of the innovation, such as shipyards, shipowners, civil engineering companies, repair companies, material suppliers, and industry regulators, are followed through a project which deals with the technology testing and definition. The stakeholders perceptions are captured throughout the project through emails, several meetings, open-ended questionnaires, personal interviews and a forum.

The case study is part of an EU FP7 research project CO-PATCH which deals with development and market aspects of an innovative technology for repair of metal structures (such as ships, bridges or pipes) with composite materials. The project gathers participants from various EU countries and from various fields of work. In addition to the members of project consortium, a separate body, so called stakeholder forum was formed. The forum gathers players in various industries that influence the adoption of the new technology. Two main industries were identified as the most prospective for the adoption: shipbuilding and repair and civil engineering, and their representatives were included in the study.

Table 1: Companies involved in the case study and research techniques used for data collection

Respondents		**Techniques**	
Company	**Position**	**Questionnaire**	**Forum**
Shipbuilding and offshore			
Shipowner 1	Head of Technical Department	x	
Shipowner 2	Vice president	x	x
Shipowner 3	Technical director	x	
Ship repair yard	Head of Ship Repair and Conversions technical department	x	
Classification society	Head of Hull and Equipment Department	x	
Offshore company	Chief operating officer	x	x
Civil Engineering			
Rail infrastructure company	Senior Technology Engineer, Bridges	x	x
Highways operator	Senior Structures Advisor	x	x

The study of value of the repair innovation for various stakeholders involved several techniques: meeting participation, open-ended questionnaires and forum discussions. The case study captures stakeholders from two industries that might adopt the innovation: ship and offshore and civil engineering. Within each of the industry several companies were involved as presented in Table 1.

In accordance with Yin (2003), the companies were chosen with the aim to gain insights into relevant aspects of the technology adoption from the point of relevant stakeholders in the industry. Different stakeholders can provide a richer picture of the issue. The main stakeholders are shipyards, ship repair companies, offshore companies and classifications societies, all of which were included in the study. The company representatives were those individuals whose works are related with ship repair and have experience with the process in order to provide relevant views on the technology adoption.

Data collection started with meetings with project partners in January 2010. Based on the literature and the insights through the meetings, an open-ended questionnaire was prepared and emailed to the companies detected as stakeholders. In total, 20 questionnaires were emailed out of which 10 were returned by September 2010. The open-ended questionnaire included questions about: the company; the ways how they do repairs; advantages and disadvantages of current repair methods; factors influencing repair choice; repair decision-making process and influencers; expected benefits and problems of the new method; relevant information about the new method; barriers and drivers of the method adoption; suggestions for better communication about the method. The collected responses were informative though short. The writing form influenced the answers to be straight to the point. The collected data were analysed by NVivo software for qualitative data analysis. Each respondent was analysed separately. Codes and categories were formed and modified based on each response until the categories were clear and concise. The value categories were derived in the interaction with the data (text) and the literature.

Following the questionnaire, in January 2011, a meeting with project partners was held, in addition to which a stakeholder forum took place. The forum moderation was based on the preliminary findings from the questionnaires. The forum discussion was noted and included in the analysis. The findings from the forum were triangulated with the findings from the questionnaire, finding no major differences. The forum clarified and confirmed the findings based on the questionnaire.

FINDINGS

The results point at innovation characteristics that impact value perceptions and portray differences in value types for the stakeholders. It was found that a legal aspect of the innovation comes into play and is one of the main factors for the innovation adoption. Namely, shipbuilding industry is heavily regulated by Classification Societies that define main standards in shipbuilding and repair. The repair innovation in the case, despite its use in other fields, has to go though the acceptance process by the regulative bodies and still needs to be adopted as a standard.

In the shipbuilding industry, it was found that legal value of the innovation is crucial for the technology adoption. Majority of the respondents replied in the line of: "The method requires absolute need of certification by Classification Societies."; "Traditional repair methods have

Classification approval."

Legal value is followed by confidence value that relates to the experience of the method. "There is a lack of industry experience and the concern by customers that using “new” technology imports technical risks."; "Lack of historical behaviour and Ship Owner’ scepticism."; "Traditional methods are tried and trusted methods which require little management intervention...and there is well consolidated practice at the shipyards, with qualified personnel...published guides on these techniques."

Particular differences can be found in respect with the type of the industry. In the civil engineering sector, legal aspect of the value was not emphasised as in the shipbuilding industry. Rather, from this sector's point of view, confidence value comes into play the first. The respondents outlined the lack of experience and knowledge of the new method. The respondent reflect on their ability to rely on the method: "We lack experience of the method"; "A problem might be an inertia and distrust of new technology on the part of colleagues."; There is a risk of skills missing"; "....questioned availability of suitably experienced operatives." "It (the method) needs research reassuring that it can be stable, long-term under fatigue loading and under a range of temperatures."

CONCLUSIONS

This work-in-progress portrays how legal and confidence value play role in adoption of a radical industrial innovation. Industry regulations impact legal value of innovation, while confidence value is connected with user experience of the innovation. In very regulated industries such as in the shipbuilding industry, legal value is of utmost importance. Innovation performance value (i.e. innovation technical superiority) is not enough for innovation to be accepted.

Radical innovations in the shipbuilding industry face catch 22. Namely, without the approval from Classification Societies, the innovation cannot be implemented. Classification Societies encourage the use of new technology and once it has been demonstrated by calculations, modelling or any other means that the technology is reliable they will accept it and in some cases even adjust the rules accordingly. On the other hand, to get to a phase in which the technology would be adopted in the industry, the innovation needs to be tested and used - which is restricted.

The study portrays how the concept of value can be used in the context of innovation adoption and outlines the role of legal and confidence value. It suggests that companies should place efforts to communicate to potential customers how their innovation relates to the two types of value and steps needed in order to enable such a value. It also portrays the need for clear and direct interaction with regulatory bodies as important stakeholders in the innovation adoption.

Further research could examine how the role of different types of value changes with innovation adoption and across different industries. Also, the link between innovation characteristics and the value of the innovation should be studied further.

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References

Bala Subrahmanya, M.H. (2005)., Pattern of technological innovations in small enterprises: a comparative perspective of Bangalore (India) and Northeast England (UK), *Technovation* 25, pp. 269–280.

Carpenter, G.S., Nakamoto, K. (1989), Consumer Preference Formation and Pioneering Cho, H.J., Pucik, V. (2005), Relationship between Innovativeness, Quality, Growth, Profitability, and Market Value, *Strategic Management Journal* 26, pp. 555-575.

Deshpandé, R., Farley, J.U. (2004), Organizational culture, market orientation, innovativeness, and firm performance: an international research odyssey, *International Journal of Research in Marketing* 21(1), pp. 3-22.

Henderson, Rebecca M. /Clark, Kim B. (1990): Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms, in: Administrative Science Quarterly, Vol. 35 (1990), p. 9-30.

Hult, G.T.M., Hurley, R. F., Knight, G. A. (2004), Innovativeness: Its antecedents and impact on business performance, *Industrial Marketing Management* 33, pp. 429-438.

Lapierre, J. (2000): Customer-perceived value in industrial contexts, The Journal of Business and Industrial Marketing, 15 (2/3), pp. 122-140.

O'Connor, G. C., Ayers, A.D. (2005), Building a Radical Innovation Competency Research-Technology Management 48(1), pp. 23-31.

Roberts, P.W. (2001), Innovation and Firm-Level Persistent Profitability: A Schumpeterian Framework, *Managerial and Decision Economics* 22, pp. 239-250.

Tellis, G.J., Prabhu, J.C., Chandy, R.K. (2009) Radical Innovation Across Nations: The Preeminence of Corporate Culture, *Journal of Marketing* 73, pp. 3–23.

Ulaga, W. (2003): Capturing value creation in business relationships: A customer perspective, Industrial Marketing Management, 32, pp. 677-693.

Veryzer, R. W. (1998), Discontinuous Innovation and the New Product Development Process, *Journal of Product Innovation Management 15*, pp. 304-321.

Yin, RK (2003) *Case study research design and methods* (3rd edn), Sage publications, Thousand Oaks