

Diffusion of e-Government IT Innovation: a Case of Failure?

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Abstract: This article examines the adoption and diffusion of an e-government innovation, an e-customs solution, which is currently subject of research of a European funded project. The main goal of this study is to understand why adoption and diffusion of this e-customs solution did fail in the specific case of a living lab. The research bases on Rogers' innovation-decision process with focus on the decision stage in which adoption variables proposed by Frambach and a model illustrated by Woodside & Biemans are considered. By developing a specific framework for adoption of organisational innovation in living labs, this paper contributes towards the analysis of the elements that may lead to rejection of new IT solutions.

1. Introduction

Innovation and diffusion of IT solutions in the field of e-government is facilitated by the collaboration between private and public organisations [1]. Especially, the often diverging interests among the particular parties, e.g. efficiency for industry in contrast to security and control for administrations, necessitate participation along all testing, assessment, and improvement stages. One concept for involving stakeholders with different backgrounds is the living lab, where practical and theoretical foundations can be combined in order to obtain new solutions [2, 3]. In the EU funded project ITAIDE (Information Technology for Adoption and Intelligent Design for E-Government) four living labs have been built where partners from academia, government, and IT collaborate in order to develop and implement proof-of-concept solutions for new e-customs systems. Living labs are considered as research and development context: they bring together multiple stakeholders from different domains with the purpose of aligning particular interests and perspectives [4]. In the ITAIDE project each living lab runs in a different country: Finland, The Netherlands, Denmark, and Ireland, and has a different focus that reflects a specific industry.

In this paper we consider the case of the living lab that took place in Finland, i.e. the Paper Living Lab. Within this lab the main stakeholders worked together with the scope to develop a new concept for an e-customs solution for paper industry.

However, the diffusion of the new IT solution faced some difficulties. In this article we aim to describe the diffusion and adoption process of the new technology in the Paper Living Lab, which turned out to be problematic after a promising beginning, and to understand why diffusion did fail. In order to achieve this goal, we first studied both the variables proposed by Frambach [5] and the model of Woodside & Biemans [6], and second developed a framework for organisational innovation adoption in living labs.

In Section 2, we introduce the concept of living labs, describe diffusion of innovations and its adoption variables [5] related to a framework for organisational innovation adoption [6], and finally develop a living lab-specific framework for organisational innovation adoption. In Section 3, we describe our research approach used in the case study of the Paper Living Lab. In Section 4, we illustrate the main results in the context of the variables and the framework proposed in Section 2. Conclusions follow in Section 5.

2. Theoretical Background

In this section we first define and describe the concept of living labs (see Section 2.1.) and second we focus on diffusion of innovations (see Section 2.2.)

2.1. *Living Labs Definition and Description*

“Living labs are collaborations of public-private partnerships in which stakeholders co-create new products, services, businesses, and technologies in real-life environments and virtual networks in multi-contextual spheres” [7].

This rather broad definition of living labs is one indication for a typical characteristic regarding the notion of living labs: Multiple but not necessarily mutual exclusive understandings co-exist. [8] defines living labs as “a research methodology for sensing, prototyping, validating, and refining complex solutions in multiple and evolving real-life contexts”. Another definition is given by [9] which consider living labs as “an experimentation environment in which technology is given shape in real-life contexts and in which (end-) users are considered as co-producers”. [10] emphasise the ‘living’ part of the living lab. The integration and central meaning of the users in the research and design process in a real-life context facilitates the inclusion of experiences and dynamics among technology, users, and social everyday-context. In addition to this conceptual work on living labs, empirical analyses of existing living labs in Europe show some common characteristics among this type of collaboration environment. They typically focus on the creation of innovative services featuring ICT and involve stakeholders both from the public and private domain. [11]. In addition to governmental and commercial stakeholders, academia is another typical stakeholder in a living lab [12].

From our perspective, we interpret the concept of a living lab similar to the understanding of Kipp & Schellhammer [4]. They emphasise the living lab as a research environment for multiple stakeholders: each stakeholder has particular interests and perspectives on the problem.

Focusing this first understanding of living labs on the innovation process, especially in business-to-government contexts, we refer to [13]. The authors propose to categorise the phenomenon of living labs as part of the Rogers’ innovation-development process [14]. They study the case of a business-to-government living lab. In this specific case they add another phase that is dedicated to the complex stakeholders’ acquisition process. They argue the gaining commitment to be a crucial and at the same time delicate part. This perspective is similar to the argumentation of Reimers & Li [15] who described three different stages in a process of enabling collective action and highlighted the initiation phase as being rather important (as personal and organisational commitment is created in this phase). In the case of [13], where a business-to-government innovation setting is described, the authors identify among others two factors related to a successful commitment in the context of a European living lab:

1. The results from the living lab need to be translated into strong business cases in order to gain commitment of both authorities and business partners;
2. There is a crucial role for the gatekeeper in order to create a profound basis for organisational commitment.

Therefore, gaining commitment may decide how successful a living lab will be. Choosing the right partners is a difficult step and an accurate analysis of potential partners is thus crucial and may take much time.

2.2. Diffusion of Innovations

Literature provides many opinions on diffusion and adoption of innovations that have been studied both in past (e.g. [16, 17]) and in recent studies (e.g. [18, 19]). In particular, the specific case of IT adoption in e-government has contributions like, e.g., [20, 21].

According to Rogers [14], the innovation-decision process consists of five stages: knowledge, persuasion, decision, implementation, and confirmation. In this paper we focus on the third stage, i.e. the decision. Decision, occurs when “an individual/organisation engages in activities that lead to adoption or rejection the innovation”. In particular, we analyse the rejection of innovations in the case of living labs.

Frambach [5] proposes eight elements that build a framework of potential innovation diffusion and adoption: adopter characteristics, information, information processing characteristics, innovation characteristics, competitive environment, network participation, innovation development, and marketing strategy. The first five elements are related to the decision process of the adopter while the last three to the decision process of the supplier. Since in our case we analyse the rejection decision of an adopter, we concentrate on the five elements related to the decision process of the adopter.

Besides the variables illustrated by Frambach, we also take into account the model proposed by Woodside & Biemans [6]. In their work the authors developed a framework for organisational innovation adoption where the organisation, considered as a buying centre, is seen as potential adopter. Five elements influence the adopter: environment, perceived innovation characteristics, social network, buying centre structure, and adopter characteristics.

Table 1 illustrates the elements proposed by both studies.

Table 1: A Comparison of Organisational Adoption Characteristics

Frambach’s characteristics	Woodside & Biemans’ characteristics
Adopter characteristics	Adopter characteristics
Information	Environmental influences
Information processing characteristics	Perceived innovation characteristics
Innovation characteristics	Buying centre structure and dynamics
Competitive environment	Social network

Three of these elements, namely environmental characteristics, perceived innovation, and adopter characteristics, are more or less the same in both frameworks.

Since we aim to understand why the main stakeholders of the Paper Living Lab decided a posteriori to reject the proposed innovation, we adapt the two concepts of Frambach and Woodside & Biemans to the case of living labs.

Consequently, we regroup all elements proposed into five generic elements, i.e. adopter characteristics, information (clustering information and information processing characteristics), innovation characteristics, environmental influences, and social network. Figure 1 illustrates the framework.

In the specific case of living labs, the environmental influences correspond on the one hand to the competitive environment in which the main stakeholder, i.e. the industry partner, is in and on the other hand to its market situation. Information is in this case a vital factor since without a high degree of information it is not possible to make potential stakeholders aware about new projects. Besides information, the social network plays in living labs a special role since it is easier to involve people in a project if there is a certain

degree of trust between the potential adopters and the project partners. Naturally, innovation itself and adopter characteristics are key elements for the final adoption decision.

We consider this framework appropriate for the analysis of living labs since a living lab is composed by different organisations each focusing on particular interests and perspectives. Therefore, in a first stage, the diffusion and adoption of a technology has to be analysed in each organisation involved in a living lab considering each organisation as a single one. Further, in a second stage, it is important to consider network-related effects. We, therefore, used this framework in order to categorise and analyse our findings.

3. Research Approach

According to Dedrick & West [22], in order to understand adoption decision it is helpful to develop a framework through a qualitative study of a specific adoption case. In addition, Eisenhardt [23] argues in her work that building theories from a limited number of cases is effective. Yin [24] differentiates between three types of case study research: exploratory, explanatory, and descriptive. In addition, he distinguishes between single case studies, focusing on exploring particular circumstance and challenging existing theories or frameworks. In our context we used the Paper Living Lab as a single case study in order to explore the failure of adoption of new e-customs solutions. We conducted six workshops and eight semi-structured interviews in the time between June 2006 and December 2007.

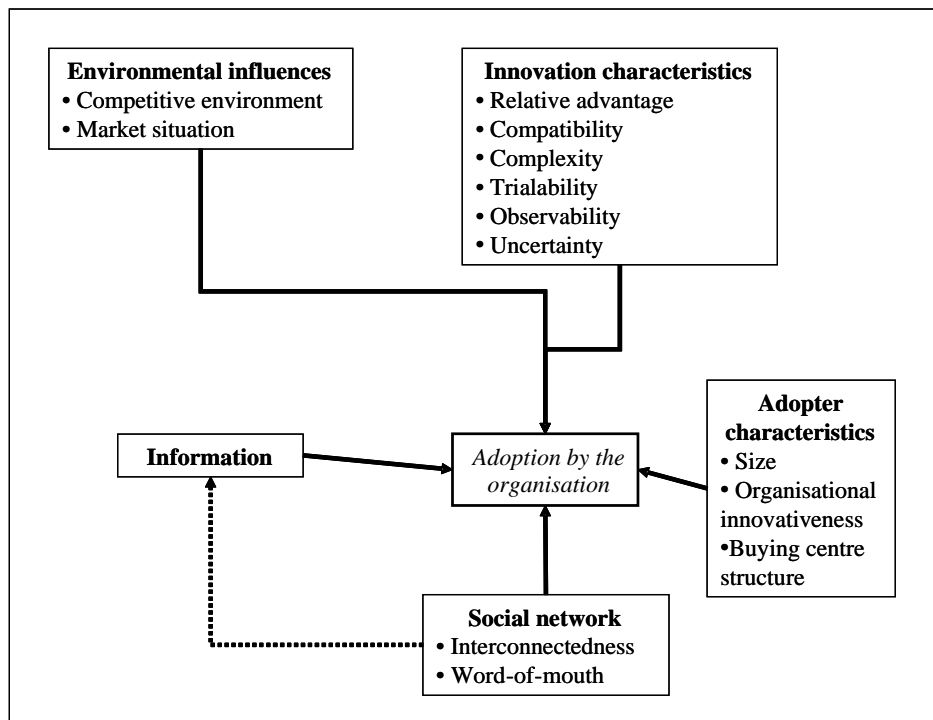


Figure 1: Framework for Organisational Innovation Adoption in Living Labs

3.1 Case Background

This study is part of the European funded project ITAIDE. In this project, actors coming from academy, industry, and governmental institutions collaborate with the scope to provide a concept for a new e-customs system. There are four different living labs (Beer, Paper, Food, and Drug Living Lab) that take place in four European countries involving four different industries. The Beer and Paper Living Labs are already completed while the Food Living Lab started in June 2007 and the Drug Living Lab in January 2008 both with a

time-span of 18 months. A successful example is given by the Beer Living Lab that took place in The Netherlands and involved a Dutch beer company [25, 26]. The Food Living Lab, which takes place in Denmark together with a Danish dairy company, is showing promising results [27, 28]. On the contrary, the Paper Living Lab, which began in January 2006 and closed in July 2007, showed some challenges and limitations. Its main stakeholders were the Finnish government, a large Finnish multinational company (called MNC in the ongoing paper) operating in pulp and paper industry, a technology provider, and several small and medium-sized enterprises (SMEs) that are suppliers to the company, either with services or raw materials.

The central stakeholder was the Finnish MNC (with production sites in 14, mainly European, countries; 26,000 employees and a turnover exceeding €10bn in 2007; one of the Finnish production sites was the main partner in the Paper Living Lab with, employing approximately 1000 people).

The focus of the Paper Living Lab was on the redesign of solutions for business-to-business and domestic e-government integration. These consisted of business processes, network interfaces, electronic documents, but also related administrative processes, and organisational structures. The primary goals were first to reduce administrative burden for the paper industry domestically and second to facilitate cross-border trade. The investigations also considered information accurateness and security of information from all Paper Living Lab stakeholders' perspectives, e.g. to meet the control requirements of customs declarations, etc. As an outcome, the living lab has resulted in a complete redesign solution, including different business processes (quotation, order, delivery, and invoice) and incorporating the needs of the MNC and its suppliers in terms of SMEs or public administrations.

In contrast to the positive results of the conceptual part of the Paper Living Lab, the practical application and implementation of the new system experienced some difficulties. Due to increasing retentiveness of the central stakeholder, the final implementation and real case testing has not been done until the end of the living lab time-frame. Although many SMEs mentioned in the interviews their readiness and interest in using the system, they were dependent upon the MNC in applying the new system.

As there was no official communication regarding the reasons for not applying the system by the MNC, two main motivations were assumed: Ongoing internal, organisational restructurings and increased competitive challenges in the paper industry. The next section discusses these results considering the proposed framework by Frambach [5] and Woodside & Biemans [6].

4. Results and Discussion

In our research we analyse the case the Paper Living Lab using the adapted model of Frambach and Woodside & Biemans. Following, we analyse each element of the framework in the case of the Paper Living Lab considering the MNC as main stakeholder.

Adopter characteristics. According to Frambach, the probability to adopt an innovation increases with size and innovativeness of the company. According to the figures presented in the former section, the MNC fulfils the size parameters. Also the innovativeness characteristic is fulfilled: The statements of the company mention explicitly the willingness to vertical integration of suppliers and customers, efficient production facilities, comprehensive logistics networks, etc. Also its involvement in this type of research-related projects like ITAIDE shows its innovative attitude. We interpret another adopter characteristic as being relevant for missing adoption behaviour in the later phase of the project: Due to internal reorganisations, the significance of the project for the organisation decreased. Other projects, more related to core business became more important and so resources and attraction was withdrawn from this project. In addition to

the adopter characteristics stated by the two authors, this might be another kind of characteristics helpful to explain especially failures of adoption and diffusion.

Information. The information's degree was high since all partners involved made many efforts to provide the relevant information to develop the new solution. Workshops and on-site-studies were conducted to get information about business processes, redesign potential, requirements of the stakeholders, etc.

Innovation characteristics. The innovation characteristics have been already studied in the case of the Food Living Lab [27]. In this work it is showed that these characteristics have a positive impact on the adoption willingness. Since the concepts proposed both in the Paper and in the Food Living Lab aim to propose a new e-customs solution, we assume that the case studies do not differ in a considerable manner. Therefore, we do not go through all the innovation characteristics in this paper because they have been already studied in the mentioned article.

Environmental influences. Frambach originally stated positive relation of diffusion and adoption behaviour and the level of competitiveness in industry. Nowadays, the paper industry is facing an increasing level of competition among the paper and pulp producers. Two exemplary reasons are new industry entrants from emerging markets, like China, and less paper demand in total. This is caused, for example, by the increased usage of other media like the internet that substitutes traditional information media like daily newspapers, magazines or books. Competition is, according to Frambach [5], an indicator for increased adoption. However, we observed the opposite. Facing the rising pressure from the market and other competitors, the MNC reduced its efforts spent in this type of research and development project significantly; therefore, it impeded the whole implementation of the system according to their hub-like position in the living lab. The internal decision to spend its resources on other projects and to reject the adoption at this stage was clearly related to this industry pressure.

Social network. Woodside & Biemans [6] discussed the relationship between social networks in terms of interconnectedness and word-of-mouth in an organisational adoption context. In our case, we have to distinct between two stages of participation in the project. At the beginning, the responsible individuals from the local manufacturing site were actively involved in the research and development process. They attended to several workshops and analysed the internal processes. At the second stage of the Paper Living Lab, when implementation and testing of the new system required an organisational adoption of the system, it became more difficult. The organisational participation was reduced due to internal reorganisation projects. The relevance of the project on an organisational level had been decreased in contrast to the relevance on the individual level. Our interpretation for the diffusion and adoption model is, therefore, to distinguish between individual and organisational level (according to Woodside & Biemans). In addition, the social network seemed to be more important for individual participation decision, whereas decision to adopt on an organisational level is usually more influenced by other parameters. To analyse the barriers for organisational adoption and to facilitate the transfer of personal involvement into organisational involvement, approaches from marketing might be useful. Especially in the area of business-to-government marketing, e.g. for industrial commodities, the issue of relating personal involvement into organisational activities has been discussed from many perspectives. For a general discussion see e.g. Backhaus & Voeth [29]; further, more focussed issue are discussed in Johnston & Lewin [30]. To analyse the transfer of personal involvement into organisational momentum and its potential barriers in the context of innovation and diffusion is an open issue and an important research opportunity for future work.

5. Conclusions

In this article we aimed to analyse why adoption and diffusion of a new e-customs solution faced some difficulties. The case studied has been researched within the EU funded project ITAIDE and based on the experience of a living lab. The research based on the innovation-decision process proposed by Rogers [14] with focus on the decision stage. In order to analyse the decision stage, we considered the studies of Frambach [5] and Woodside & Biemans [6] and developed a specific framework for organisational innovation adoption for the case of living labs.

As outlined in Section 4, many elements showed the potential of a successful adoption by the MNC. However, two elements, social network and environmental influences, had a negative impact on the MNC, the main stakeholder. Indeed, on the one hand competition resulted as negative factor; on the other hand the commitment process did not take place in a proper way. Personal social network could help at the beginning of a commitment while it could turn out to be a negative factor in a second stage: organisational commitment is also necessary in order to be sure that not only a single person but also the whole team sees the benefits of a new project and agrees on the participation.

As results, we may conclude that from the adopter point of view it is necessary to deeply analyse the social network and environmental influences since they may be not positive factors as stated by Frambach and Woodside & Biemans but, on the contrary, negative factors that may lead to adoption rejection.

This research paper only considered one case study and, therefore, future research is needed to analyse similar cases in order to formulate a broader set of possible adoption rejection factors.

Acknowledgements

The study presented in this paper was part of the ITAIDE research project, funded by the European Commission under the Sixth Framework Programme (IST-027829).

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