BRINGING IS INNOVATION IN A HIGHLY-REGULATED ENVIRONMENT: A COLLECTIVE ACTION PERSPECTIVE

Boriana Rukanova*
Vrije Universiteit Amsterdam,
Faculty of Economics and Business Administration,
Department of Information Systems and Logistics,
De Boelelaan 1105, 1081 HV,
Amsterdam, The Netherlands
brukanova@feweb.vu.nl

Helle Zinner Henriksen
Copenhagen Business School,
Center of Applied ICT,
Howitzvej 60, 2
000 Frederiksberg,
Denmark,
hzh.caict@cbs.dk

Eveline van Stijn
Vrije Universiteit Amsterdam,
Faculty of Economics and Business Administration,
Department of Information Systems and Logistics,
De Boelelaan 1105, 1081 HV,
Amsterdam, The Netherlands
evelinevanstijn@gmail.com

Yao-Hua Tan
Vrije Universiteit Amsterdam,
Faculty of Economics and Business Administration,
Department of Information Systems and Logistics,
De Boelelaan 1105, 1081 HV,
Amsterdam, The Netherlands
ytan@feweb.vu.nl

[Version 26 February, 2009]

*Corresponding author

BRINGING IS INNOVATION IN A HIGHLY-REGULATED ENVIRONMENT: A COLLECTIVE ACTION PERSPECTIVE

Abstract

The main question addressed in this paper is how to bring IS innovation in a highly regulated environment. The major challenge is that in domains that are highly regulated (such as Customs, Energy, and Healthcare), legal requirements often hinder the innovation process and the subsequent adoption of innovation. While adoption and diffusion of innovation has been the subject of extensive discussion in the context of IS, theories predominantly follow the rational positivistic perspective, focussing on variables which can predict the rate of diffusion and adoption. Such approaches remain static and fail to capture the complex social processes that would need to be mobilized to bring the desired change. Moreover, they do not pay specific attention to existing regulatory regimes that may need to be changed to create grounds for the further adoption of the innovation. To address these limitations, we apply the collective action model for institutional innovation (Hargrave and Van de Ven, 2006). Through our interpretive case study from the domain of eCustoms we are able to demonstrate the applicability of this alternative model to explain IS innovation, by showing how processes such as framing contests, mobilization of networks, utilization of political opportunities and engagement in collective action processes form an integral part of the institutional innovation process. The contribution of this paper is as follows. First of all, we apply a highly conceptual model borrowed from the organizational science field to analyse a real life case. We demonstrate the applicability of this model to explain processes of bringing IS innovation in a highly regulated context (eCustoms). By doing so, we contribute a new perspective for analyzing IS innovation, which can be seen as complementary to the theories traditionally used in the IS domain. Second, we propose several extensions of the model, based on our empirical findings. On the practical side, this paper brings insights to the processes that practitioners would need to take into account, when attempting to bring IS innovation in a highly regulated environment.

Keywords: IS innovation; regulated environment; institutional innovation; collective action; dialectics

1 INTRODUCTION

The main question addressed in this paper is how to bring Information System (IS) innovation in a highly regulated environment. IS innovations have already been successfully developed and adopted to support business-to-business interactions in various domains and one may wonder why bringing IS innovation in a highly-regulated environment would be interesting to study. A major challenge is that in domains that are highly regulated, government plays a central role in setting up rules, as well as requirements about IS. In that respect, legal and regulatory requirements often hinder the innovation process and make the subsequent adoption of innovation very challenging.

Our study was inspired by the domain of eCustoms, where governments are key players in the arena of cross-border trade. Process redesign and use of IS are widely perceived as key components of a solution for public sector institutions (Andersen, 2004). Where eGovernment is about making use of IS in public sectors operations (Koh and Prybutok, 2003; Moon, 2002; Norris and Moon, 2005), eCustoms is a specific form of eGovernment that focuses on international trade activities. In the EU at the moment, the development and implementation of numerous IS for supporting business-to-government interactions in the context of cross-border trade are put high on the political agenda (DG/TAXUD, 2006). The use of IS in support of customs aims at lowering the administrative burdens for companies and improving the control of the trade. The view fits well with how the benefits of IS implementation have been viewed in the context of businesses for decades (Wilcocks and Lester, 1999). Nevertheless, the results of the eCustoms efforts in EU are often questionable. For businesses, the introduction of multiple EU-wide eCustoms systems involves large costs for implementation and maintenance and such systems are seen as being introduced purely for communicating with the authorities and having no commercial value.

With the constant increase in government requirements, as well as related costs for eCustoms systems, it becomes increasingly important that governments and businesses jointly look for alternative innovative solutions to solve the dilemma of trade facilitation versus control. Such cooperation however is hardly visible in the current eCustoms practices in the EU, where government is usually imposing the rules and related IS. The main problem is that even if such innovations are developed bottom-up, the EU legislation is often a major barrier for their

subsequent adoption and a key question then becomes how can one bring IS innovation in such a highly-regulated environmet

This research examines a bottom-up innovation development project called the Beer Living Lab (BeerLL) through the conceptual lens of the collective action model for institutional innovation (Hargrave and Van de Ven, 2006). The model allows us to investigate the efforts of the BeerLL participants to change existing regulatory practices in order to create grounds for the further adoption of their IS innovation. It offers a novel, complementary perspective on IS innovation that brings the role of regulation and regulators in relation to innovators to the foreground. Through its empirical application, we also contribute directions for extension of the model as well as avenues for future research. In addition, we highlight important processes and questions for practitioners, who are faced with innovation in a highly regulated context.

While our discussions centre on the domain of eCustoms, IS innovations in other domains such as Energy and Healthcare are also often dependent on institutional changes in regulatory regimes and we believe that our findings can potentially have wider applicability for addressing innovation problems in this context as well.

The remainder of this paper is structured as follows. In Section Two, we provide a literature review and we present our conceptual framework. Our research methodology is presented in section Three, followed by a case analysis in section Four. In section Five, we discuss our findings and we end the paper with conclusions and directions for further research.

2 THEORETICAL BACKGROUND

2.1 Literature review: Organizational and IS innovation and the role of government

A widely accepted definition of an innovation is "… an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12). An interesting overview of the existing literature on organizational innovation is provided by Slappendel (1996) and her work has already found some application in the IS innovation research (see Kautz and Nielsen (2004) for the application of the framework to discuss the implementation of software improvement innovations). Slappendel (1996) distinguishes three perspectives according to which the organizational innovation research can be classified,

namely the individualist, structuralist, and interactive process perspective. While according to the individualist perspective individuals cause innovation, the structuralist perspective holds that innovation is determined by structural (organizational) characteristics, rather than by individuals. Both these perspectives view innovation as a static and objectively defined object or practice and the innovation process is conceptualized as rather simple and linear, with the focus on the adoption stage. According to the interaction process perspective, on the other hand, innovation is produced by the interaction of structural influences and the actions of the individuals. Innovations are not seen as static and objectively defined, but as perceived and reinvented. The innovation process is understood as complex and dynamic. In this respect the interaction process view rejects the rational economic model of decision-making; more attention is given to non-rational aspects, as well as the political context in which innovations are introduced (Normann, 1971; Child and Smith, 1987).

In the IS field, the concept of innovation and the adoption of innovations is also extensively explored. In Fichman (2004, p.315) we find that "the IT innovation field is concerned with understanding the factors that facilitate or inhibit the adoption and diffusion of emergent IT-based processes or products within a population of potential adopters (Fichman, 2004; Swanson, 1994). These adopters can be individuals (Brancheau and Wetherbe, 1990), organizational units (Cool et al., 1997), firms (Cooper and Zmud, 1990), or even groups of inter-related firms (Damsgaard and Lyytinen, 2001)." According to this view, the focus of the IS innovation field is on understanding factors that facilitate or inhibit adoption. Another definition that we find in the IS literature is provided by Lyytinen and Rose (2003), where IS innovation is defined as "a novel organizational application of digital computer and information communication technologies" (p. 301). This second definition seems to be more general in nature, as it is not limited to identification of factors and the adoption phase.

A review of the existing IS literature reveals that IS innovations are predominantly studied from an economic-rationalistic perspective (Attewell, 1991; Fichman, 2004). Within this "dominant paradigm", innovations are assumed to be beneficial, and organizations that have greater innovation-related needs and abilities are expected to exhibit a greater amount of innovative activity (Fichman, 2004). In his paper, Fichman (2004) addresses the question of how future work on IS innovation can step outside the dominant paradigm in some fundamental way. He outlines seven emerging perspectives that go beyond the dominant paradigm focus (i.e. innovation configuration, social contagion, management fashion,

technology density, quality of innovation and performance impacts). A closer look at the proposed directions by Fichman reveals that his suggestions for extension remain within the positivist paradigm. As a response to the call of Fichman (2004) we see that other authors have tried to provide contributions that fall outside of the dominant paradigm. For example, Melville and Ramirez (2008) propose to use an information requirements paradigm as a possible way to step out of the dominant paradigm. When reflecting on the method deployed in their analysis, however we see that although the authors use a case study, the analysis remains focussed on identification of factors, rather than processes.

Reflecting on the work of Fichman (2004), despite his positivist stance, he also acknowledges that there may be other threads of IS innovation research, inspired by non-positivistic theories such as structuration (Orlikowski, 1992), adaptive structuration (DeSanctis and Poole, 1994), and socio-technical (Bijker, 1995) theories, and that these would certainly keep with the goal of breaking with the dominant innovation paradigm. In the IS literature we find a number of examples that support this non-positivistic view on innovation. Prominent examples include the organizational adoption of a financial accounting system (Markus, 1983), the adoption of CT scanners in the American hospital environment (Barley, 1986), and the study of the massive diffusion of Business Process Re-engineering in the 1990's (Newell et al., 2000). In all these cases the view on innovation comes close to the view taken in the interaction process perspective described by Slappendel (1996), where innovations are seen not as fixed entities but as subject to interpretation, evolving over time, and requiring interactions among different counterparts.

Another strong critique on the rational theories on innovation can be found in the work of Lyytinen and Damsgaard (2001). The authors criticize the Diffusion of Innovation (DoI) theory which was (see the overview of Prescott and Conger, 1995) and still is widely applied in the IS field (e.g. Mustonen-Ollila and Lyytinen, 2003; Carter and Belanger, 2005). In their criticism, Lyytinen and Damsgaard (2001) suggest that:

> *"DoI researchers should carefully recognize the complex, networked, and learning intensive features of technology; understand the role of institutional regimes; focus on process features (including histories) and key players in the diffusion arena; develop multi-layered theories that factor out mappings between different layers and locales; use multiple perspectives including political models, institutional models and models of team behaviour, and applying varying time scales while crafting accounts of what happened and why." (p. 173).*

In terms of the perspectives of Slappendel (1996), the work of Lyytinen and Damsgaard (2001) also suggests a move of IS innovation research towards the interaction process perspective. In similar lines, Lyytinen and Rose (2003) advocate the need to "look beyond the linear, uni-directional and atomic concept of the diffusion of IS innovation" (p. 302).

What is also interesting to notice in the work of Lyytinen and Damsgaard (2001) is that they explicitly acknowledge the role of institutional regimes and the role of government. In their suggestions for future research they call for utilizing multiple perspectives and political and institutional models. This concurs with the observation of Slappendel (1996) who also points out the limited attention paid to the role of government in the context of organizational innovation. Indeed, we see that Fichman's (2004) listing of alternative perspectives does not include the role of regulators and government in the innovation process, something that we are interested in. Coming back to the IS field it is worth mentioning that in some earlier work we also find examples where the role of government in the IS innovation is discussed. For example King et al. (1994) explicitly acknowledge the role of government and identified six types of institutional intervention that the public sector may employ to stimulate adoption and diffusion of innovations. However, we find that the framework of King et al. (1994) is limited, as it is uni-directional in the sense that the assumption is that government sets the agenda for institutional change by issuing rules and regulation which adopters adapt to. We are interested, instead, in processes, where bottom-up innovations can change institutional practices.

Reflecting on the research problem that we aim to address in this paper - how to bring IS innovation in a highly regulated environment? -and on the literature review provided above, we can arrive at several observations and conclusions. First of all, the innovation processes that we observe in the domain of eCustoms are very complex, highly dynamic and political. In that respect, we adhere to the interactive-process perspective in our work (discussed by Slappendel (1996) and followed by a number of IS researchers as discussed above). The second conclusion that we draw is that government and regulatory regimes are seldom discussed in the innovation literature. When considered, the role of government is seen as uni-directional, where government sets the agenda for institutional change. We are, however, interested in IS innovations that can bring institutional change bottom-up, which is in line with the call of Lyytinen and Damsgaard (2001) to expand the innovation studies with models that account for the institutional and political aspects.

In the next section, we review the model of Hargrave and Van de Ven (2006). The model takes into account multiplicity of actors in the processes of mobilizing collective action for institutional innovation and it explicitly acknowledges that institutional innovation can be achieved by bottom-up collective action processes.

2.2   The collective action model of institutional innovation

In their review of the literature on institutional innovation and change, Hargrave and Van de Ven (2006) conclude that although the scholars have extensively examined how organizations adapt and conform to institutional environment pressures in order to achieve legitimacy, there is still little understanding about the generative processes of collective action through which institutions or institutional norms based on innovations are created. To fill this gap, Hargrave and Van de Ven (2006) introduce the collective action model of institutional innovation. The model is based on the technology innovation management and social movement literatures. The collective action model builds on the dialectical theory of change (Van de Ven and Poole, 1995). According to it, the established order or the *thesis* is challenged by some emerging order (*antithesis*) which leads to conflict and confrontation. The resulting outcome of this confrontation is what is called *synthesis*, which on its turn becomes the new established order (thesis).The synthesis is neither the thesis nor the anti-thesis but something new, which emerges as a result of the confrontation. (see also Figure 1).

DIALECTIC

Thesis —
        Conflict —→ Synthesis
Antithesis —
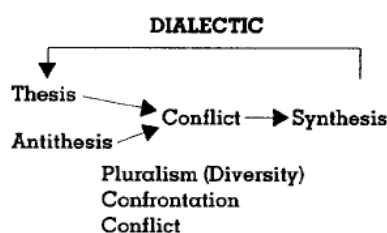
Pluralism (Diversity)
Confrontation
Conflict

Figure 1. Dialectic motor (Van de Ven and Poole, 1995, p. 520)

Building on the dialectic motor, the primary concern of the collective action model of institutional innovation is how new institutional arrangements emerge from interactions among interdependent partisan agents. The collective action model "examines the construction of new institutions through the political behaviour of many actors who play diverse and partisan roles in the organizational field or network that emerges around a social movement or technological innovation" (Hargrave and Van de Ven, 2006, p. 868).

There are four central elements in the collective action model, namely (1) the framing contests, (2) the construction of the networks, (3) the enactment of institutional arrangements, and (4) the collective action processes. The framing contests draw attention to the creation and manipulation of the meaning of issues. Hargrave and Van de Ven (2006) give examples from social movement theory where they demonstrate that the success of the activists depended on how they have positioned and framed their solution. The construction of the network discusses the organizing forms and resources that the activists have employed to pursue change. It is argued that it is important to focus on both bottom-up and top-down organizational processes and that the engaging of a network of operational actors is as important as ensuring the top-down political support and commitment. The enactment of institutional arrangements refers to the efforts of activists to challenge and alter "political opportunity structures". The political opportunity structures are seen as formal and informal political conditions that encourage and discourage the movement activity (Campbell, 2002). Finally, with insights from the technology innovation management literature, Hargrave and Van de Ven discuss the collective action processes, which describe the contested political process through which new technologies emerge. Based on the dialectic perspective, Hargrave and Van de Ven argue that innovation occurs when challengers gain sufficient power to confront and engage incumbents. Furthermore, Hargrave and Van de Ven argue that conflict, power and politics are central to the dialectical theory of change. Conflict is seen as the core generating mechanism of change, power is the necessary condition for the expression of conflict and political strategies and tactics are the means by which parties engage in conflict. Furthermore, the authors concur with Coser (1957), that conflict does not only generate new norms and institutions but it also stimulates economic and technological development.

In our view this model proposes an interesting theoretical lens to investigate IS innovation in a highly regulated environment, because it draws attention to the complex and dynamic processes in which proponents of an innovation interact with other actors to gain commitment and support and engage in joint actions to challenge the existing institutional rules and regulations in order to create grounds for the adoption of the IS innovation.

3 METHODOLOGY

The case study presented here is part of the EU-funded ITAIDE[1] research program (Tan et al., 2006). Four so-called Living Labs provide real-life settings in which innovative eCustoms solutions are developed and their broader influence on diffusion and adoption is investigated. These Living Labs focus on different domains (beer, paper, food and pharmaceutical) and take place in different countries (Netherland, Finland, Denmark, and Ireland and Germany). In this paper, we present our investigations of the Beer Living Lab (BeerLL), one of these four living labs. We will refer to the broader ITAIDE context where necessary, when discussing the collective action mobilization efforts. The BeerLL provides a platform for developing of innovative IS procedures for export of excise goods. Key partners involved are: a large beer producer, the Dutch Tax and Customs Administration (Dutch TCA), a National University and a technology provider. In addition, several other parties were also involved in some of the BeerLL activities, including a Sea Carrier, UK Tax and Customs Administration (UK TCA), and a second technology provider. Further case background can be found in Section 4.1.

The case study is conducted in an interpretative, processual tradition (Markus and Robey, 1988; Walsham, 1993). Interpretive studies are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham, 1993, p. 4-5). Our focus is on the processes that underlie collective action to bring the BeerLL innovation forward towards adoption. Data were collected from different sources in order to gain a comprehensive picture of the case: participation in full-day brainstorming and working sessions, individual interviews with the BeerLL participants, observations and document analysis.

Texts reviewed ranged from EU policy documents, EU documents on export of excise goods, internal reports of Dutch TCA, project reports from the BeerLL, to mention a few. The bulk of the field research was carried out in the period 2006 and 2007 when the key phases of the BeerLL such as initiation, analysis and redesign, pilot and evaluation took place. In this period we attended in total 19 work meetings, 5 brainstorming sessions, we conducted 25 interviews with BeerLL participants and these interviews lasted between 1 and 3 hours per

---

[1]   ITAIDE stands for "Information Technology for Adoption and Intelligent Design for E-Government" and is an EU-funded project from the 6th IST framework program.

session. In addition we also conducted 22 interviews with experts from Dutch TCA, who were not directly involved in the BeerLL, in order to get further background information concerning the strategic and political processes that play a role in eCustoms. These figures do not include the informal interactions which we maintained with the informants, which in the intensive periods of the data collection were multiple times per week. Almost all general BeerLL meetings and formal interviews were recorded. Due to the large number of meetings and recorded material, these were only partially transcribed. Meeting notes or reports have been sent out to participants for verification and clarification purposes.

While initial networking activities took place already in 2006 and 2007, these activities continued also in 2008 and will be on-going till the end of the project (July, 2010). In order to capture these networking activities, we collect information on-going and constantly update a database with organizations to which BeerLL participants reach out to in order to involve them in the change processes. While we cannot predict what the final outcome of these networking activities will be, we already see some initial impacts. In addition, we gained good insights in the collective action processes that took and continue to take place in the context of the BeerLL and we will report on these in this paper.

The data collection and the data analysis were done in an iterative manner. In the early phases of the analysis our goal was to understand the domain and to search for appropriate conceptual lens for analysing our findings. During one such iteration we came across the collective action model of Hargrave and Van de Ven (2006) and it seemed to provide an interesting perspective on the developments that we observed. As attempts to change existing regulatory practices are essential for the BeerLL innovators, the collective action model appears a very suitable lens, because it focuses explicitly on bottom-up institutional innovation processes. Subsequently, in the further data analysis we used the categories from the model to reflect on the past events and interactions and as guidance for the follow-up data collection activities. Thus, for the data analysis we used these constructs as a 'sensitizing device' (Klein and Myers, 1999); we also utilized them to structure the presentation of the case analysis (see Section 4). To summarize, the theoretical constructs of the model of Hargrave and Van de Ven (2006) are: framing contests, construction of the network, enactment of institutional arrangements, and collective action processes.

We acknowledge that investigating the innovation processes in the Beer Living Lab with one perspective necessarily entails ignoring others. In our broader research context of the ITAIDE project, we have established a set of interrelated themes and theories that we combine to yield a more holistic perspective.

4 ANALYSIS OF THE BEER LIVING LAB

4.1 Background

4.1.1 Introduction to the problem of the BeerLL

The focus in the BeerLL is to analyze how IS can support the administration of export of excise goods (e.g. beer and cigarettes). The current procedure revolves around the exchange of a paper-based document called Administrative Accompanying Document (AAD). EU reports indicate that there is huge fraud with the export of excise goods under suspension. As sources of the European Commission show Member States estimated in 1998 that for alcohol only, fraud amounted up to €1,5 billion yearly, the market share of illegal cigarettes is equivalent to approximately 9% of the total excise duty receipts on tobacco products (European Union, 2006) . In the report of the High Level Group on fraud in the tobacco and alcohol sectors (DG/TAXUD, 1998) it is pointed out that the AAD paper-based system does not work well and it is recommended that a computerized system is set up to tackle the weaknesses of the current paper-based system.

4.1.2 The EU approach: the thesis

To combat the fraud in the excise regime, the European Commission has initiated the development of a new information system solution to replace the paper AAD, the so-called Excise Movement and Control System (EMCS). The legal requirements, as well as the EMCS specifications are developed at EU level. The system will need to be implemented by all the governments of the 27 member states and all businesses trading in excise goods in the EU. The EMCS is only one of the eCustoms systems that is currently introduced. For the same commercial transaction, businesses have to introduce several different systems to report to the separate authorities (DG/TAXUD, 2006). Examples of such systems include the VIES (Value Added Tax Information Exchange System) system for VAT reporting, the NCTS (New

Computerized Transit System) system for transit procedures, and the ECS (Export Control System)system for export, to mention only a few.

The EU approach can be characterized as fragmented, top-down and with no differentiation between reliable and non-reliable companies. Fragmented means that for every new procedure, the EU introduces a separate system; from an exporting company's point of view this means that for the same commercial transaction the company needs to develop and maintain multiple interfaces, which adds administrative burden and costs. Top-down means that the introduction of such systems is made obligatory by law, and businesses, while they may be involved in consultations, formally have no decision power in developing the specifications. Last but not least, non-differentiation means that all the companies are treated the same: no difference is made between companies which have solid internal IS systems and procedures to prove that they are in control of their supply chain operations and have established trust relations with the government versus other companies that lack such infrastructure and prior trust relationships.

It is worth mentioning that in the EU policy documents we find visionary concepts like Single Window and Authorized Economic Operators that seem to promise significant simplifications for businesses (DG/TAXUD, 2006). Single Window (SW) services are intended to enable businesses to conduct all interactions with customs via one point (preferably online). Authorized Economic Operators (AEO) are certified businesses that because they can continuously show that they are in control of their own and their supply chain's operations, are granted simplification of their Customs interactions. Nevertheless, systems like the EMCS hardly support this vision.

4.1.3 The BeerLL: the anti-thesis

The BeerLL proposes an alternative approach to the one proposed by the EU. The BeerLL concept is holistic and developed bottom-up (including close collaboration between business and government). It advocates differentiation between trusted and other companies. Holistic means that for the same commercial transaction there is no need to introduce multiple procedures and systems to report to the authorities; access to the information can be provided from one interface. Bottom-up means that the initiative to develop the innovative concept emerged from collaboration between businesses, government representatives and technology providers where the parties saw each other as equal; the initiative was not driven by the

government agenda and governments were only one player in the decision-making process. Last but not least, the BeerLL advocated the need to make a distinction between reliable and other companies. The argument was made that if a company can prove that it is in control of its own and its supply chain operations by using its commercial systems and internal control procedures, governments can rely on these systems and procedures. This would mean that such companies would not be required to develop and maintain multiple interfaces to report to the authorities. Instead, the government can rely on company's own commercial systems.

4.1.4 The IS innovation in the BeerLL

For discussing the IS innovation in the BeerLL we will make use of the definition of IS innovation of Lyytinen and Rose (2003, p. 301) where IS innovation is defined as novel organizational application of computer and information and communication technologies. The information and communication technologies used in the BeerLL are as follows: (1) smart container seals, (2) service-oriented architecture and (3) open standards. The smart container seals are special electronic container locks that are equipped with multiple functionalities. Once the container is locked and the lock is activated, the smart seal can send location information, notification of unauthorized door opening and other information such as temperature readings. Via satellite communication the device can provide a continuous monitoring service. All the information from the smart seal can then be sent to a back-end system where it can be made available for further analysis and risk assessment. Through the use of service-oriented architecture it is possible to get access to the information available in the supply chain concerning each shipment and per transaction. This information will also include the data reported from the smart seal concerning the movement of the goods. In such a way, a full supply chain visibility can be ensured. This information can be made available to all supply chain and government actors who are authorized to have access to it. The use of open standards enables interoperability and allows for lower entry costs of new partners.

The novel organizational application of these technologies is that it enables fundamentally different interactions between companies and authorities, which are built on trust and partnership. It allows for a move from the hierarchical relationships between governments and businesses to more horizontal relationships that build on trust. In the hierarchical model, governments are the controlling agencies and companies need to submit information so that the government can fulfil these controls. This is very much the approach the EU is taking at

the moment when introducing EU-wide eCustoms systems. The BeerLL allows for implementing the concept of horizontal supervision, where government and businesses can rely on already established trust relationship and take a shared responsibility for controlling the safety and security of the supply chains. The BeerLL proposes a "full pull model", meaning that companies which are trusted by the government do not need to submit any information to the authorities any more. According to this model, companies take the responsibility to monitor the supply chain and report irregularities to the authorities, if they should occur. In addition, government officials can get authorized access to the data that they need and can pull information directly from the commercial systems of the companies whenever they would need it.

This concept suggests considerable reduction in costs and administrative burden for companies, and increased control and security, compared to the approach currently followed by the EU. It is very much in line with high-level goals of the EU such as Single Window and AEO and for reliable companies makes systems like the EMCS obsolete.

While the BeerLL participants could see clear benefits that the new concept could bring to both businesses and government, the further adoption of this concept was constrained by the existing legislation. Nevertheless, the BeerLL participants, as part of their activities in the wider ITAIDE project were determined to pursue bottom-up change and engage in collective action to create grounds for the further adoption of their ideas in practice.

4.2   Collective action in the BeerLL

In this section we will examine how the innovators, by using the BeerLL concept (the anti-thesis) challenge the current EU approach for implementing eCustoms systems (the thesis) and how they influence the formation of the synthesis. Table 1 summarizes the BeerLL case in general terms of the collective action perspective of institutional innovation put forward by Hargrave and Van de Ven (2006). It reconfirms the idea that it is suitable to investigate the BeerLL using the collective action model, as dimensions relate closely to the developments that we observe in the case.

Table 1. Characterization of the BeerLL along the dimensions of the collective action (adapted from Hardgrave and Van de Ven, 2006).

Dimension	Collective action	The Beer Living Lab
Question	How do institutions emerge to facilitate or constrain social movements or technological innovations?	Our central research question in this paper is how to bring IS innovation in a highly regulated environment? In the BeerLL specifically we investigate how the BeerLL emerges as a new power base (along with the EU and national administrations) to try to bring innovation in the highly-regulated domain of international trade by challenging existing approaches for development of EU-wide e Customs systems.
Focal institutional actors	Networks of distributed and partisan actors in an inter-organizational field who are embedded in a collective process of creating or revising institutions	The BeerLL network consists of the following key players: - a large beer producer - the Dutch Tax and Customs - technology providers - a university The network works on revising/shaping the current rules and approaches to customs and excise procedures and the role of IS. It aims to challenge the current approach and regulation for EU-wide system development for cross-border trade.
Generative mechanism	Recognition of an institutional problem, barrier, or injustice among groups of social or technical entrepreneurs	Recognition that the current approach for EU-wide systems development does not bring the sufficient reduction of the administrative burden and benefits for neither the companies nor the public administration The BeerLL network works towards creating an IS driven win-win situation
Process: event sequence	Collective political events dealing with processes of framing and mobilizing structures and opportunities for institutional reform	The collective political events dealing with processes of framing the BeerLL concept, mobilizing the wider network of supporters of the BeerLL ideas and utilizing the current political opportunities to institutionalize the BeerLL concept. A confrontation between the EU approach (the thesis) and the alternative approach proposed by the BeerLL (the anti-thesis).
Outcome	Institutional precedent, a new or changed working rule, an institutional innovation	Not yet identified, because the BeerLL is still in process. Nevertheless, initial shift in mindset already visible. In our analysis, we provide an overview of how the BeerLL currently develops towards a new synthesis.

For the remaining part of this section, we will go in detail discussing the BeerLL in terms of the core concepts from the collective action model, i.e. (1) the framing contests, (2) the construction of the networks, (3) the enactment of institutional arrangements and (4) the collective action processes.

4.2.1 Framing contests

To recall, framing contests call attention to the creation and manipulation of the meaning of issues. Previous research shows that framing can concern not only the problems and outcomes of the proposed solutions, but also the way in which such outcomes are achieved (Benford and Snow, 2000). Hargrave and Van de Ven refer to the work of Maguire (2002) to illustrate that. In the context of adoption of innovation in the treatment of HIV/AIDS, Maguire (2002) illustrates that the activists were successful not only because they managed to propose change in the outcomes of the drug approval process, but also because they were able to force negotiation on the structure of the drug approval system and the role of evidence used in the process. Framing is very important in the BeerLL. As we discussed earlier, we view IS

innovations not as fixed but as dynamic entities that change over time and are subject to reinvention and reinterpretations. The BeerLL concept and the underlying use of technologies evolved as socially constructed during the different stages of the BeerLL and they were framed and re-framed according to the often diverging goals and interest of the BeerLL participants. In the BeerLL we observe framing contests at two levels. The first one is related to the methodological basis for development of solutions in the EU and the second one is related to the proposed solution as a result of the development process.

With respect to the methodological basis, the BeerLL questions the basics of the approach that is currently used for such EU-wide system implementation. As discussed earlier, the BeerLL concept is framed as holistic (as opposed to fragmented), bottom-up (as opposed to top-down) and it advocates differentiation between reliable and other companies (as opposed to equal treatment of all).

The BeerLL also engages in framing about the proposed solution. BeerLL argues that the proposed solution is better than the EMCS in a number of respects. First of all, it offers to use one solution, with which businesses can communicate with their other business partners and can report to the authorities, rather than to introduce every time a new system for each separate legislation that is only directed to the government and not to other businesses. In this respect, it is argued that such a solution is more general and has higher impact in reducing the administrative burden for the companies, as the businesses do not have to introduce many different systems only for the purpose for communicating with the authorities. Furthermore, in the BeerLL it is also advocated that the solution is better able to ensure the control and security over the movement of the goods. The reason for that is that part of the concept is a secure container lock, which has the capability to signal unauthorized openings while goods are on a move and collect real-time information about the movement of the goods. This way, the authorities can have an access to a rich information base, which would allow for better auditing and risk assessment.

However, during the discussions of how to frame the BeerLL concept specifically with respect to the EMCS, the opinions differed and evolved over time. Instead of framing the BeerLL innovation as making the EMCS completely obsolete, it became re-framed as a supplementary solution which could be used only by reliable companies. In this way, the BeerLL attempts to work with the fact that the EMCS is a "running train" that cannot be

stopped, but may be "jumped on". We will come back to the framing contests later in this paper, to reflect on how they link to some of the other concepts of the collective action model.

4.2.2   Construction of the network

Hargrave and Van de Ven argue that the construction of the network is a second important element that plays a key role in institutional innovation change processes, as it refers to the mobilizations of the resources for starting up a collective action. It is argued that engaging a network of operational actors is as important as ensuring the top-level political support and commitment (see also Binder, 2002; Warren, 2001).

In the BeerLL we see the mobilization of a very complex network and mobilization processes of dynamic and continuous nature. We felt that the general category "construction of networks" as proposed by Hargrave and van de Ven is far too abstract to help explain the developments that we observe in the BeerLL. In this respect, to be able to better analyze and explain the involvement of the network in the BeerLL we propose several additional analytic categories. First of all, to be able to deal with the complexity of the network, we propose to use the notion "levels of actors". Similar ideas for using multi-level analysis have also been addressed in the IOS literature (e.g. Johnston and Gregor, 2000; Lyytinen and Damsgaard, 2001). The levels also illustrate the interplay between individuals and institutions (structures), something which is also very specific for the interaction process perspective (Slappendel, 1996).

For the purpose of this analysis we distinguish between three general levels of analysis:

Level 1:   The level of the BeerLL, where only specific individuals from different organizations are involved

Level 2:   The level of the different organizations, which participate in the BeerLL

Level 3:   The wider network, to which each organization participating in the BeerLL has access to

In order to further conceptualize the wider network, we introduce sub-levels of level 3 moving gradually through the progression of sub-levels as follows: national (member) states, other national member states in an economic zone; economic zone; other economic zones; global. The reason to provide the sub-levelling is to allow for a more structured analysis and to enable identification of regulatory regimes, which may be applicable at one sub-level but not for another. Figure 2 below is an extract of the network of actors to which the BeerLL participants have reached, or plan to reach out to (represented with the dashed ovals at the

level of economic zone). Furthermore, to be able to trace the dynamics of the mobilization of actors, we propose to use the notions of "horizontal interactions" and "vertical interactions" (see the arrows in Figure 2). We talk about horizontal interactions when it concerns actors from the same level, and about vertical interactions, when the construction of the network crosses different levels.
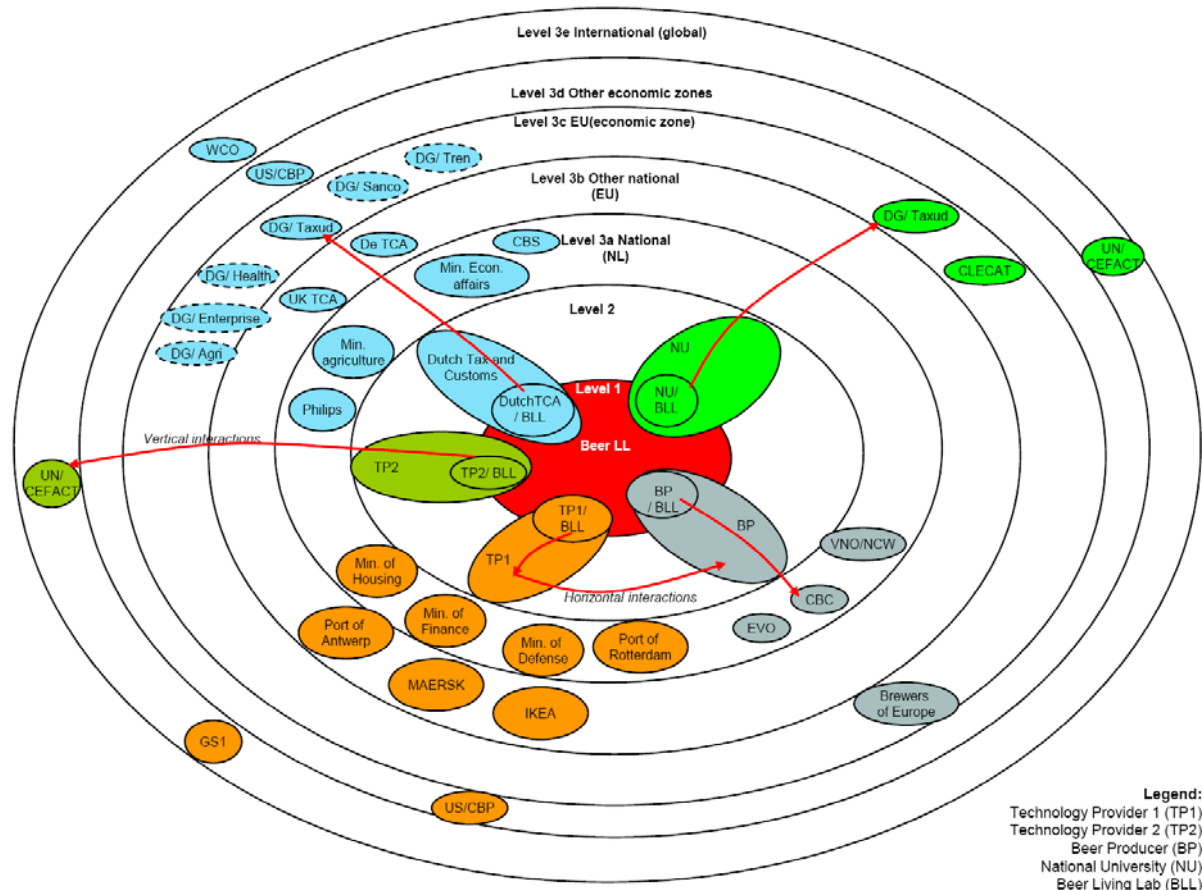

Figure 2. Construction of networks in the BeerLL

Let us now provide some examples to illustrate the mobilization of the network in the BeerLL, using the concepts of levels and horizontal and vertical interactions. To illustrate the mobilization of the network using vertical interactions, we will use an example with Dutch TCA. We observed that the people from Dutch TCA that are involved in the BeerLL have real commitment to spread the results from the BeerLL and to use them as a tool to bring change in the way Dutch TCA works at the moment. They play a very active role in bringing awareness and getting the attention of people in the top management of Dutch TCA. Furthermore, good contacts and collaboration are being established with key players from Dutch TCA, who are directly involved in the setting of the legislation and developing the

systems at the EU level. For example direct interactions with people from the Directorate General for Customs and Taxation of the European Commission (DG TAXUD) have already been established. This illustrates one path of involvement through vertical interactions spanning Levels 1, 2 and 3c of the wider political network. In Figure 2, using arrows we have illustrated other such vertical interactions that took place. It is worth noticing that the same actor (e.g. DG/TAXUD) can also be part of the network of another BeerLL participant (in this case the network of the National University). This means that the same actor is targeted and approached from different directions. Such political involvement is very important, because if the BeerLL concept is to be adopted, this will require legal changes and political commitments also from the EU authorities. Such a network thus plays a crucial role in the attempts to institutionalize the innovation developed in the BeerLL.

In the BeerLL we also identified examples of horizontal interactions. One such example is the interaction that we observed between high-level decision-makers of the "Technology provider 1" with high-level decision makers of the "Beer producer". This illustrates involvement of the network using horizontal interactions at level 2 (i.e. the level of the organizations involved in the BeerLL). These interactions were also very important, as they were directed towards ensuring the commitment of the top management in the organizations involved in the BeerLL and they can be crucial for providing access to the wider network. Part of this wider network includes industry associations which can be very powerful lobbying players.

When examining the network mobilization, several interesting questions that come to mind relate to framing. For example at a conference organized by the Dutch Shippers Association (EVO) it turned out that the BeerLL concept was very well received by representatives of the large multinational companies, even though they operated in different domains. Thus when constructing the network it was found very important to find parts of the network to which the innovators could relate and the basis on which they could relate, so that they can ensure wider involvement. It is worth noting that the framing of the BeerLL when addressing the legislators was different compared to when addressing the multinationals, as these stakeholders have different goals and in order to engage them, it was important to relate to their strategic goals. This also illustrates the view on IS innovations as dynamic and socially constructed entities.

4.2.3   Enactment of institutional arrangements

The third element of the model is the enactment of institutional arrangements. One of the major concepts to which Hargrave and Van de Ven (2006) refer when they talk about enactment of institutional arrangements is political opportunity. Political opportunity structures can be viewed as formal and informal political conditions that encourage, discourage, or in any way affect the movement activities (Campbell, 2002). Reflecting on the BeerLL, we see the concept of political opportunity structures can very well capture and explain some of the developments.

The very set-up of the BeerLL was based on and framed in line with developments that appear in EU and international policy documents. These include the Multi-annual strategic plan of the EU and other policy documents, which outline long term challenges for implementing concepts like the Authorized Economic Operator and Single Window in Europe (DG/TAXUD, 2008). Visions expressed in such documents were very carefully considered in the BeerLL and opportunities were searched as to how to achieve these long-term objectives in a more innovative way compared to the current EU approaches. Looking at a later stage of the BeerLL project, when the BeerLL concept was developed, it was very well aligned with the long-term vision of the EU about Single Window and AEO; it challenges, however the fragmented approach through which EU currently aims to achieve these long-term goals and proposed an alternative.

Going beyond the pilot and searching for possibilities for the BeerLL ideas to be adopted, we identified also other political opportunities. For example, new political opportunities emerged from initiatives such as the action program for reduction of the administrative burden initiative of the Directorate General of Enterprise and Industry of the European Commission. The Action Programme for reducing administrative burdens in the European Union aims at reducing 25% of this burden by 2012[2]. Although this initiative stems from another Directorate General, namely of Enterprises and Industry rather than of Customs and Taxation, it relates very well to the message that the BeerLL actors want to convey. This indicates yet another favourable political condition which encourages innovation developments and their further adoption. Thus, we see how the ideas developed in the BeerLL become aligned and re-framed to fit the larger collective action activities that are currently under way.

---

[2]   http://ec.europa.eu/enterprise/admin-burdens-reduction/home_en.htm

Zooming in specifically on the EMCS developments, we also identify political opportunities to engage specifically in that debate. For example, the European Commission opened several consultation rounds concerning the EMCS specifications and the EU directive on excise. During these consultation rounds, the businesses have no decision power; they play only a consultative role. Though there is a sense of disappointment on the side of businesses about how their advice is taken into account, it does suggest, however, favourable political conditions for change towards an approach that is more bottom-up. Furthermore, whereas during the pilot stage of the BeerLL that took place in 2006 it was envisaged that the EMCS will become obligatory in 2009, it became clear in 2008 that that deadline cannot be kept and the implementation was further postponed with a few years. Such delays provide extra time for the innovators to act.

In the BeerLL we see a clear linkage between the political opportunity and the way the BeerLL concept was framed. By linking the framing of the solution to the political opportunities provided by the long-term EU goals, the BeerLL increases its chances of being heard and that the proposed BeerLL concept to be considered relevant. Furthermore, the BeerLL participants are in a strong position to claim that for specific types of companies (like Authorized Economic Operators), the solution developed in the BeerLL is better suited than the solutions that are currently proposed and developed by the EU and that such solution proposes significant reduction of the administrative burden for companies. We consider that it is very important that the link between the concepts of framing contest and political opportunities is further explored.

4.2.4   Collective action processes

The fourth issue that Hargrave and Van de Ven (2006) address concerns the collective action processes. To recall, building on the technology innovation literature, the authors define the collective action processes as the contested political process through which new technologies emerge. At this moment we know how the BeerLL concept is currently framed and re-framed, we see how the network of actors is involved and we were able to discuss the political opportunity structures that exist at the moment. Furthermore, we observe a number of efforts of the BeerLL participants to reach out to the legislators and to initiate discussions for change.

When analyzing the existing network, the BeerLL participants took a decision that a key actor to target is DG/TAXUD, as this is the body where the legislation concerning customs and

taxation is drafted. A workshop was organized including heads of units and experts responsible for drafting legislation. Although the workshop participants found the BeerLL ideas interesting, they had two considerations. First of all, on the systems side, people were very busy with developing EU-wide systems such as the EMCS; as this process is very time consuming and resource intensive, at that stage it was difficult to spend time on innovative developments. Second, while the European Commission has a coordinating role for eCustoms developments, in the end the Member State governments possess the power, as they would need to agree on proposals that are put forward. One advice that was given during the workshop was at it would be beneficial for the BeerLL participants to approach the Member States directly. On the legislation side, the experts pointed out that they would welcome input and proposals for legislative changes and they can take these into account when drafting new laws.

As a follow-up step, efforts were directed on a national level, where extensive work was done in collaboration with the Dutch government and industry associations. Through the industry associations the major multinationals in the Netherlands became familiar with the ideas of the BeerLL. In meetings with representatives with several of these multinationals, they considered the BeerLL concept as visionary and they saw clear benefits in it. On a major conference including Dutch, British, French and German industry associations, the BeerLL concept was welcomed as very innovative, especially the idea of having a "full pull model". These associations possess a very powerful network and are engaged in strong lobbying activities in Brussels. At the moment there are discussions of how to establish follow-up activities and collaboration between the ITAIDE project (of which the BeerLL is part of) and these associations.

It is still too early to say what the ultimate effects will be, especially as the ITAIDE dissemination and networking activities are just starting. It may happen that the effect of the BeerLL would be to provoke shift in mindset and a new way of thinking about the problems by the different actors engaged within the constructed networks. We already see these processes taking place on a wider scale. In a more optimistic scenario, it may be possible that the legislation is adapted to allow for a more holistic approach and for special treatment of reliable companies. Such scenarios illustrate a synthesis, which is neither the thesis nor the anti-thesis, but something new.

4.3   Reflection on possible conflicts

The central dialectical conflict that we explore in this paper is the confrontation between the EU approach which is fragmented, top-down and does not allow for special treatment of reliable companies and the BeerLL approach which is holistic, bottom-up (with government and businesses acting as equals) and which advocates differentiation between traders. In this dialectic cycle we are interested how collective action is organized to bring the BeerLL innovation in the highly regulated eCustoms environment. Despite the fact that this dialectic cycle is the main focus for our analysis, we observe that many other conflicts and dialectics cycles may be active, which may enable or hinder the collective action processes. We argue that these conflicts need to be identified and further considered.

What we observe in the BeerLL is that, similarly to the mobilization of the network, we need to use concepts which would allow us to make a finer-grained analysis of possible conflicts. To do that, we propose that the levels, as well as the horizontal and vertical interactions proposed earlier, can help to identify the variety of such possible conflicts. The anticipation and mitigation of such conflicts may be an important factor to consider when mobilizing collective actions to bring innovation in the highly-regulated eCustoms environment.

If we take the network model presented earlier, there may for instance be a conflict between the technology provider and the network of his competitors; a conflict between Dutch TCA and the wider EU policies and regulations; or a conflict between the beer producer involved in the BeerLL and the other beer producers. These types of conflicts may hinder the adoption of the BeerLL concept beyond the network of organizations, involved in the development of the BeerLL concept. This illustrates that although we have one focal dialectic cycle that we want to follow, there may be other different types of conflicts.

5   DISCUSSION AND CONCLUSIONS

The main question addressed in this paper is how to bring IS innovation in a highly regulated environment. We took the domain of eCustoms and specifically the BeerLL project as a focus of our investigation and we applied the collective action model of Hargrave and Van de Ven (2006) to see whether it provides a useful conceptual lens for the exploration of such processes. Below we discuss our observations concerning the applicability of the model to

explain the phenomena under investigation and we reflect on the contribution of this paper to the IS innovation research and practice.

5.1   Reflection on the applicability of the collective action model

5.1.1   *Framing, construction of the networks and political opportunism*

In this paper we adopted the definition of IS innovation of Lyytinen and Rose (2003, p. 301) as it is exactly the "novel organizational application of information and communication technologies" we are interested in. The smart container seal is definitely an innovative technology; however, in the BeerLL we are interested not so much in the technology as such, but in the ability of this technology to solve certain organizational issues (in our case eCustoms-related problems). The novel organizational application, however, depends very much on to whom it is addressed: different aspects of this application would need to be highlighted and framed depending on the stakeholders addressed. Therefore, our analysis of the framing used in the BeerLL demonstrates that IS innovations are not fixed entities but that they are subject to interpretation and reinvention; this reconfirms the interactive-processes view on innovation as discussed by Slappendel (1996), as well as other scholars in the IS innovation field.

The framing evolved throughout the alignment and negotiation processes that took place internally in the BeerLL, where the key participants, representing different organizations pursued different, sometimes conflicting goals. The processes of framing continued, however, also when the wider network was involved, as in order to mobilize external actors, the BeerLL participants needed to present the IS innovation in a way that is appealing to these actors. Our findings suggest, therefore, that there is a clear link between framing contests and the construction of networks, where different aspects of the IS innovation needed to be emphasised depending on the different actors that were targeted, for example whether the attempts concerned the government, the businesses, or the technology provider's community.

Our analysis also suggests a clear linkage between framing and political opportunity. As we saw in the case, the BeerLL participants carefully explored the policy documents and initiatives outlining long-term visions for eCustoms development in EU and internationally and they made strategic choices when framing the IS innovation. A fundamental strategic choice was to frame the BeerLL concept as an out of the box solution, not constrained by the

current legislation, as according to the participants that was the only way to bring real improvement in the domain. In addition, several other strategic choices were made: the BeerLL concept was framed very closely in line with the long term objectives of the EU, demonstrating how the BeerLL IS innovation is better able to meet these long term objectives and at the same time criticisms were directed towards the short-term approached and systems introduced in the EU. These strategic choices also influenced on its turn the mobilization of the wider network, as the BeerLL participants sought to align with proactive thinkers and initiatives (both on the government and the business side) who also criticized the short-term approach of the EU to implement eCustoms solutions. This illustrates a dynamic link between framing strategies, utilization of political opportunities and strategic choices for involvement actors in the wider network.

As directions for further research, therefore, we suggest that the linkages between the concepts framing contests, construction of network and political opportunity are further examined. This, apart from theoretically extending the collective action model, can have significant practical implications; further operationalization and understanding of these linkages can provide practitioners in the area of IS innovation with a more precise analytical instrument which they can use for identifying and evaluating different strategic alternatives for action.

5.1.2 Construction of networks

During our analysis we found out that the constructions of network concept as proposed by Hargrave and Van de Ven (2006) is too general and was not able to capture the developments that we observed in the BeerLL. We therefore proposed to extend the model by further operationalization of the construction of networks concept. To do that, we argued to use the additional concepts of levels of actors, as well as horizontal and vertical interactions. We proposed three levels, i.e. level 1 (the level of the IS innovation project, where only specific individuals from different organizations are involved); level 2 (the level of the different organizations, which participate in the innovation project) and level 3 (the wider network, to which each organization participating in the innovation project has access to). We also propose further sub-levels of level 3 moving gradually through the progression of sub-levels as follows: national states, other national states in an economic zone; economic zone; other economic zones; global. The reason for the further sub-levelling is to be able to capture in a

more structured way possible differences in regulatory regimes. In addition, we proposed two interaction types for mobilizing actors from the network, i.e. horizontal, if the interactions take place at the same level and vertical, if the interactions take place across levels.

The idea for multi-level analysis is not new (see Johnston and Gregor, 2000; Lyytinen and Damsgaard, 2001 in the IS field, and Pettigrew, 1990 in the organizational science field). What is new is the specific levels that we define based on our insights from the case. Regarding the interactions, we find the idea of horizontal and vertical interactions in the work of Pettigrew (1990), where he introduces the idea of these interactions to analyze change processes. Whereas the way Pettigrew uses the concept of vertical interaction is similar to the way we use it in this paper, i.e. exploring links between higher and lower levels of analysis, we have inherent differences in the use of the concept of horizontal interaction. In Pettigrew's work, horizontal interactions capture the time dimension, or how changes occur in past, present and future. While the time dimension is definitely important and would be worth exploring in further research, in the network model discussed in this paper we did not include the time dimension, so that we can keep the analysis more manageable. The way we use horizontal interaction in this paper, therefore does not incorporate the notion of time but it focuses on interactions between actors that operate at the same level.

In the previous section we already discussed the links between framing, construction of networks and political opportunities, thus we will not repeat this discussion here. There are some other elements regarding the construction of networks which deserve further attention. The IS innovation that we discuss in this paper requires changes in the regulatory regime at the EU level. The legislation at this level is very complicated to change, as it involves agendas of the 27 member states and in addition to that the agenda of the European Commission. One may ask the question: is it worth the efforts to try to influence this level and what can be gained from that? The answer would depend very much on the specific situation. What we saw in our case is that the forthcoming systems and procedures that are currently on the EU agenda will pose additional new layers of administrative burden, and will create higher dependency of the logistic processes of businesses on government procedures. For large multinational companies which operate world-wide and rely on just-in-time delivery this may lead to disruption of the supply chain operations, additional costs and reduced competitive advantage. In this context, even if the legislative changes are slow, initiating a debate and providing strong proofs-of-concept how IS innovation can help to solve these problems is a

big step forward. A shift in mindset is a necessary condition for further legal changes to be introduced. At the same time, from other domains (e.g. the innovation in the HIV/AIDS treatment discussed earlier) we see that if the problem is really pressing and high on the political agenda, results can be achieved.

It is worth mentioning, however, that in other IS innovation initiatives, legal changes may be required at other levels rather than the EU. For example, in a simpler case, there may be a need for change of a national regulation, or in a more complicated case, there may be a need for change at a higher level (e.g. international). This would mean that the scale and the magnitude of the problems, as well as the efforts for mobilizing collective action can differ. One thing to keep in mind is that moving from national towards international level, the power of regulation seems to fade away and agreements are more difficult to be reached (Henriksen et al., 2008). On the positive side, the move towards the international dimension assumes higher diversity of interests, thus there is a greater chance for the innovators to find parties that would support the innovation. On the negative side, however, international regulations are often high-level and applicability on a national level often depends on the willingness of a specific country to comply. This may mean that IS innovations which require change in national legislation may be easier to be adopted, once the regulatory changes are achieved.

Although it was developed with the intention to operationalize the concept construction of networks, the network model consisting of levels of actors and interactions between them, can also find application for defining strategies for collective action processes, as well as for identification of conflicts, which can hinder such processes. With respect to the former, in the case we see that the BeerLL innovators behave strategically. Once they identified that for the adoption of their IS innovation the legislation at the EU level would need to be changed, they followed a strategy of a direct approach, where they got into a direct contact with representatives from DG/TAXUD. Based on the feedback from these direct interactions, the innovators better understood the power of the individual member states in the decision-making process and based upon these lessons, they revised their strategy. It demonstrates that the innovators were subject to an important learning process. In their follow-up efforts they joined forces with national governments and industry associations, so that they can mobilize a stronger power base, which as a next stage will be mobilized to approach DG/ TAXUD using other channels. This illustrates that innovators can utilize a number of strategies, follow different routes and parts of the network to engage in collective action processes. In this

process, having government actors involved in the collective action process is very useful. These actors can provide the necessary contextual information to understand the developments in the highly-regulated environment and can be very instrumental in the process of framing the innovation concept as such that it can potentially have an impact at the regulatory level. In addition, they can also be a very valuable partner to provide access to other government bodies, which can result in a more powerful network.

It is important to point out that the efforts of the innovators can be disrupted at any moment by actors acting at different levels in the network. The levels of actors, as well as the horizontal and vertical interactions can be used for screening the network and identification of possible conflicts which may hinder the efforts of the innovators. The identification of conflicts is important, as the innovators can look for way to cope with the conflict or can develop strategies to bypass it.

5.2   Implications for research and practice

This paper brings contributions to both IS innovation research and practice. With respect to research, our work can be seen as a response to the call of Fichman (2004) for stepping outside the dominant paradigm of the IS innovation research, as well as the call of Lyytinen and Damsgaard (2001) to extend the IS innovation research with models that account for institutional and political aspects. The collective action model for institutional innovation has not been applied in the IS innovation literature before; hence, our application of the model to the IS domain, as well as the extensions that we propose, add a new and complementary perspective for studying IS innovations from a more political perspective. We propose a number of directions in which further research efforts can be directed to further understand the processes of how to bring IS innovations in highly regulated environments. These include the further exploration of linkages between framing, construction of networks, and political opportunities. We are aware that our study is limited, as it focuses on one case study in one domain (eCustoms). Further research can focus on extending this study to other cases and other domains.

This paper also can be seen as contribution to practitioners, who attempt to bring IS innovation in a highly regulated environment. As the paper points out, next to the technological development of the innovation, broader socio-political processes will need to be considered for adoption to take place. This paper raises a number of questions which

practitioners will need to pay attention to when attempting to bring IS innovation in highly regulated environments. For example: What is the information technology developed and how is it to be applied to a specific organizational problem to create an IS innovation? How is the IS innovation framed to address the interests of the directly and indirectly involved stakeholders? What are political opportunities and how could they be used for the framing of the IS innovation? How to mobilize a powerful network of actors and how is the IS innovation re-framed to attract actors from the broader network? How to make decisions whom to include in that network, depending on, among other things, available political opportunities? At which level to engage in collective action processes for changing the regulation to allow grounds for the IS innovation to be further adopted? What strategies to follow to approach the regulators? Where do potential conflicts which can hinder the collective action processes lie and what strategies are possible to overcome them?

Although we do not offer ready-made answers to such questions, these can provoke practitioners to think about these issues and decide on a course of action. The detailed case description that we provide in this paper describe what choices the BeerLL participants made to address some of these questions and practitioners can use these to get further insight and ideas. When analysing the BeerLL case, we found the levels of actors, as well as the horizontal and vertical interactions as a very useful analytical tool to reason about the mobilization of the network, but also about identification of conflicts. It also provides input for the discussion of the possible strategies concerning with whom to engage in collective action processes. Practitioners can use these analytical categories and the associated visualization to facilitate their analysis as well. It is important to realize, however, that engaging collective action is a highly political, as well as resource and time consuming process. For domains which are highly regulated and for problems which are pressing, bottom-up IS innovations may have much higher potential to bring significant improvement compared to approaches driven by the authorities. In these cases, such efforts can be justified given the potential gains that these IS innovations may bring.

ACKNOWLEDGEMENTS

REFERENCES

Andersen, K. V. (2004). E-government and public sector process rebuilding: Dilettantes, wheelbarrows, and diamonds. Boston: Kluwer Academic Publishers.

Attewell, P. (1991). Technology diffusion and organizational learning: the case of business computing. Organization Science 3(1), 1-19.

Baker, N. R., and Dennis J. S. (1978). Toward a conceptual framework of the process of organized innovation technology within the firm. Research Policy, 7, 150-174.

Barley, S. R. (1986). Technology as an occasion for structuring: Evidence from observations of CT scanners and the social order of radiology departments. Administrative Science Quarterly, 31(1), 78–108.

Benford, R. D. and Snow, D. A. (2000). Framing processes and social movements: an overview and assessment. Annual Review of Sociology, 26, 611-639.

Bijker, W. (1995). Of bicycles, bakelite, and bulbs: Towards a theory of sociotechnical Change. MIT Press, Cambridge, MA.

Binder, A. J. (2002). Contentious curricula: Afrocentrism and creationism in American public schools. Princeton, NJ: Princeton University Press.

Brancheau, J.C., and J.C. Wetherbe (1990). The adoption of spreadsheet software: Testing innovation diffusion theory in the context of end-user computing. Information Systems Research, (1)2, 115-143.

Campbell, J. L. (2002). Where do we stand? Common mechanisms in organizations and social movements research. Paper presented at the Social Movements and Organization Theory Conference.

Carter, L., and Belanger, F. (2005). The utilization of e-government services: Citizen trust, innovation and acceptance factors. Information Systems Journal, 15, 5-25.

Child, J., and Smith, C. (1987). The context and process of organizational transformation Cadbury Limited in its sector. Journal of Management Studies, 24, 565-593.

European Union (2006). EU coherent strategy against fiscal fraud – Frequently Asked Questions, MEMO/06/221, Accessed at http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/06/221&format=HTML &aged=0&language=en&guiLanguage=en (February, 2009)

Cool, K.O., Diericks, I., and Szulanski, G. (1997). Diffusion of innovations within organizations: Electronic switching in the Bell System, 1971-1982. Organization Science, (8)5, 543-559.

Cooper, R.B., Zmud, R.W. (1990). Information technology implementation research: A technological diffusion approach. Management Science, (36) 2, 123-139.

Coser, L. A. (1957). Social conflict and the theory of social change. The British Journal of Sociology, 8 (3), 197-207.

Damsgaard, J., and Lyytinen, K. (2001). The role of intermediating institutions in the diffusion of electronic data interchange (EDI): How industry associations intervened in Denmark, Finland, and Hong Kong. Information Society, (17) 3, 195-211.

DeSanctis, G., and M.S. Poole (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. Organization Science (5) 2, pp. 121-147.

DG/TAXUD. (1998). Report of the high level group on fraud in the tobacco and alcohol sectors. Brussels

ECOFIN (1998). 2095th ECOFIN Council meeting 8682/98 (Presse 157). Accessed at http://europa.eu/rapid/pressReleasesAction.do?reference=PRES/98/157&format=PDF&aged=1&language=EN&guiLanguage=en (February 2009).

DG/TAXUD (2006). Electronic Customs Multi-Annual Strategic Plan (MASP Rev 7), Working document TAXUD/477/2004 - Rev. 7 – EN, 24 May 2006. European Commission, Taxation and Customs Union. → DG/TAXUD (2008). Electronic Customs Multi-Annual Strategic Plan - 2008 yearly revision. Accessed at http://ec.europa.eu/taxation_customs/resources/documents/customs/policy_issues/e-customs_initiative/MASP_strategic_plan_en.pdf (February 2009).

Fichman, R. G. (2004). Going beyond the dominant paradigm for information technology innovation research: Emerging concepts and methods. Journal of the AIS, 5(8), 314-355.

Fountain, J., and Osorio-Urzua, C. A. (2001). Public sector: Early stage of a deep transformation. In A. M. R. F. a. R. Litan (Ed.), The economic pay-off from the internet revolution (pp. 235-268). Washington: Brookings Institution Press.

Hargrave, T. I., and Van de Ven, A. H. (2006). A collective action model of institutional innovation. Academy of Management Review, 31(4), 864-888.

Henriksen, H., Rukanova, B., and Tan, Y.H. (2008). Pacta Sunt Servanda but where is the agreement? The complicated case of eCustoms. In M.A. Wimmer, H.J. Scholl, E. Ferro (Eds.), Electronic Government, 7th International Conference eGov, Springer-Verlag Berlin Heidelberg, 13-24.

Johnston, R. B., and Gregor, S. (2000). A theory of industry-level activity for understanding the adoption of interorganizational systems. European Journal of Information Systems, 9(4), 243-251.

Kautz, K. and Nielsen, P.A. (2004). Understanding the implementation of software process improvement innovations in software organizations. Information Systems Journal, 14 (1), 3-22.

King, J. L., Gurbaxani, V., Kraemer, K. L., McFarlan, F. W., Raman, K. S., and Yap, C. S., (1994). Institutional factors in information technology innovation. Information Systems Research, 5(2), 139-169.

Klein, H. K., and Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly, 23(1), 67-93.

Koh, C. E., and Prybutok, V. R. (2003). The three ring model and development of an instrument for measuring dimensions of e-government functions. Journal of Computer Information Systems, 43(3), 34-39.

Lyytinen, K., and Damsgaard, J. (2001). What's wrong with the diffusion of innovation theory? The case of a complex and networked technology. In Ardis and Marcolin (eds.) Diffusing Software Product and Process Innovations, 173-190.

Lyytinen, K., and Rose, G.M. (2003). Disruptive Information Systems Innovation: The Case of Internet Computing. Information Systems Journal, 13, 301-330.

Maguire, S. (2002). The linked fates of ideas and innovations: Discourse and the adoption of new treatments for HIV/ AIDS. Health Care Management Review, 27, 74–88.

Markus, M. L. (1983). Power, politics, and MIS implementation. Communications of the ACM, 26(6), 430-444.

Markus, L. M., and Robey, D. (1988). Information technology and organizational change: Causal structure in theory and research. Management Science, 34(5), 583-598.

Melville, N., and Ramirez, R. (2008). Information technology innovation diffusion: An information requirements paradigm. Information Systems Journal, 18, 247-273.

Moon, M. J. (2002). The evolution of e-government among municipalities: Rhetoric or reality? Public Administration Review, 62(4), 424-433.

Mustonen-Ollila, E., and Lyytinen, K. (2003). Why organizations adopt information systems process innovations: A longitudinal study using diffusion of innovation theory. Information Systems Journal, 13, 275-297.

Newell, S., Swan, J., and Galliers, R. (2000). A knowledge-focused perspective on the diffusion and adoption of complex information technologies: The BPR example. Information Systems Journal, 10, 239-259.

Normann, R. (1971). Organizational innovativeness: Product variation and reorientation. Administrative Science Quarterly, 16, 203-215.

Norris, D. F., and Moon, M. J. (2005). Advancing e-government at the grassroots: Tortoise or hare? Public Administration Review, 65(1), 64-75.

Orlikowski, W.J. (1992). The duality of technology: Rethinking the concept of technology in organizations. Organization Science, (3) 3, 398-427.

Pettigrew, A.M. (1990). Longitudinal field research on change: Theory and practice. Organization Science, 1(3), 26-292.

Prescott, M.B., and Conger, S., A. (1995). Information technology innovations: a classification by IT locus of impact and research approach. Data Base , 26(2–3), 20–40.

Rogers, E. M. (2003). Diffusion of innovations (fifth ed.). New York: New Press.

Slappendel, C. (1996). Perspectives on Innovation in Organizations. Organization Studies, 17 (1), 107-129.

Swanson, E.B. (1994) Information systems innovations among organizations. Management Science (40)9, pp. 1069-1092.

Tan, Y.-H., Klein, S., Rukanova, B., Higgins, A. and Baida, Z. (2006) eCustoms innovation and transformation: A research approach. Paper at the 19th Bled eConference, eValues. Bled, Slovenia.

Van de Ven, A. H., and Poole, M. S. (1995). Explaining development and change in organizations. Academy of Management Review, 20(3), 510-540.

Walsham, G. (1993). Interpreting information systems in organizations. Chichester: Wiley.

Warren, M. R. (2001). Dry bones rattling: Community building to revitalize American democracy. Princeton, NJ, Princeton University Press.

Wilcocks, L.P., and Lester, S. (1999). Beyond the IT productivity paradox. Wiley, Chichester.