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A SAD STORY: THE CASE OF CONSTRAINED INFRASTRUCTURES CAUSED BY IT

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Abstract

Customs is one domain which has faced the need for information systems in a globalizing world. In customs there is a need for close collaboration between business and government in order to build robust technological infrastructures supporting processes related to export and import of goods. This has led to a move towards eCustoms. This case study reports from a longitudinal study of a Danish exporter which has faced the challenges of implementing eCustoms in its daily operations. The introduction of eCustoms to replace the existing customs infrastructure based on the Single Administrative Document (SAD) has led to new challenges for the Danish exporter such as de-standardized procedures and increased reporting. The particular contribution of the study is the observed longing to the “good old paper-based days” where things were more standardized than after the digitalization of the processes. The study is interpreted through the lens of “double infrastructures”. The underlying assumption guiding the study is that eCustoms represents one infrastructure on top of another well established infrastructure of global trade.

Keywords: eGovernment, interorganizational systems, global information systems, cross national studies.

1 INTRODUCTION

One effect of a globalized world is the increased traffic of goods from one country to another. That calls for new customs procedures. The phenomenon customs has been known for centuries and the privilege of duty leverage has been executed by local rulers for ages. The rulers' power scope was often based on features of the landscape such as mountain passes or straits such as the Strait of Gibraltar or the entrance to the Baltic Sea, which could be monitored and governed with relatively few resources such as groups of scouts overlooking the landscape. The scouts could then target caravans or ships with goods via horseback or small boats. With the emergence of national states the customs procedures have developed to more comprehensive and predictable procedures. Furthermore, has the development of technologies led to much more robust monitoring techniques and control mechanisms which have led to an extensive administrative burden for businesses. The domain of eGovernment, of which eCustoms can be seen as a subset, has recognized that IS holds the capacity of reduction of the administrative burden (Lenk 2002) and any reduction in administrative tasks is welcomed by businesses which often consider their interaction with the public sector to be a burdensome task (Fountain & Osorio-Urzua 2001).

What has brought the issue of customs on the information systems (IS) agenda is an increased call for efficiency, security and streamlining of procedures (Tan, Klein, Rukanova, Higgins & Baida 2006). Somehow the current standardized customs infrastructure based on the Single Administrative Document (SAD) has to be improved. It is a general belief that IS hold the capacity of strengthening efficiency, providing tools for security and furthermore being an instrument for streamlining of procedures. This has led to a keen interest for eCustoms from national and supra-national bodies such as the EU and WTO. eCustoms represent a complex mix of stakeholders from national governments, international trade, regulatory bodies and businesses. To increase complexity on top there is the technology dimension which has to accommodate the needs for interoperability, transparency, security and so on. The interorganizational information systems involving public and private parties require robust standards and infrastructures which can support the mutual interest in seamless administration of export and import.

The impact of implementing administrative IS in organizations is well studied and studies that report challenges and problems are numerous (McKeen & Smith 2002). Explanations to the problems organizations face include resistance to change and redistribution of power, limited understanding of systems and poor integration of systems (Markus 1987). At the inter-organizational level one well reported obstacle is standards (Damsgaard & Truex 2000). Standards are crucial for supporting interoperability and ultimately necessary for building robust infrastructures.

In this paper we report on a case study of eCustoms implementation in Denmark. The general purpose of the study was to further the understanding of IT's role in IT-enabled infrastructures. The research was triggered by the discovery that the European move from paper-based administration of customs to digital means of data transfer has created a vacuum of standards. This has led to derogation of an infrastructure built on top a well functioning infrastructure. Contributing to the purpose above, we will in this paper seek to explain how digitalization has generated constraining conditions for an information infrastructure.

Section 2 presents literature dealing with eCustoms and standardization and introduces our analytical tool for the case, the concept of infrastructure. Section 3 presents the applied research approach. Section 4 presents the case of European eCustoms, a move from highly standardized paper-based customs practices to de-standardized eCustoms practices. In Section 5 the case of eCustoms is analyzed in the light of infrastructures. Finally, Section 6 provides some reflection on the case and it delivers our conclusions of the SAD story of eCustoms.

2 THE SIGNIFICANCE OF INFRASTRUCTURES IN THE DOMAIN OF E-CUSTOMS

“International trade is characterized not only by the physical movement of goods across national boundaries but by voluminous paperwork that captures information pertinent to identification, delivery, and government control of transported goods” (Teo, Tan & Wei 1997).

This section will present international trade as consistent of two parallel flows. One is the physical flow of goods and the other is the information flow. We approach the systemic view of these flows as infrastructures. Infrastructures that since long doubtlessly have been bulky and awkward, but still functioned in a harmonized manor.

2.1 The double infrastructures of international trade

Since historic time routes of trade has been utilized to transport salt, glass, gold, spices etc. from one continent to another. Examples include the Silk route to and from the Far East and the Amber road covering Europe from North to South. With technological developments camels and sail-boats have been replaced by planes and cargo-ships which today move goods round the globe basically following the same routes. It is our claim that international trade is an infrastructure, a physical infrastructure. It is “something upon which something else operates” (Star & Ruhleder, 1996) namely the movement of goods. The robustness of the shipping industry infrastructure is well documented (see for example Stopford 1997). It is beyond the scope of this paper to elaborate further on that issue and it is furthermore less relevant in this context where focus is on the administrative procedures related to export rather than on the physical movement of the goods.

It is recognized that the two layers of infrastructure can be difficult to separate. An example is the introduction of a smart seal, the TREC device, which is attached to a container (Baida, Rukanova, Liu, & Tan 2007). The TREC is a container-mounted device which has a mobile receiver tracking the container’s precise location with sensors monitoring environmental parameters in the container, the physical state of the container, and communication modules for exchanging data (e.g., via handheld devices, via satellite, GSM/GPRS or short range wireless). Data which for example can be transferred to customs offices. However, for the purpose of simplicity the two layers are separated and in the remainder of the paper the term infrastructure refers to an administrative customs infrastructure.

On top of the physical infrastructure which secures the movement of goods there is another infrastructure, the administrative infrastructure of customs. Customs deals with the administrative procedures related to import and export. It registers what goes where to who, making sure that tax and excise is paid in the right amount to the right authorities. Customs is regulated thoroughly by national governments and international agencies such as the EU and the World Trade Organization (WTO). The regulation serves as a strengthening of the infrastructure making it more and more fine-grained with respect to security and control. The administrative burden of customs is at large delegated to the businesses and exporting businesses have the responsibility to report the flow of goods but national customs authorities have the right (and obligation) to perform physical control at the site of the exporter.

2.2 Information infrastructures

In IS research infrastructure has often been discussed within the domain of interorganizational information systems (IOS) (see for example Kurnia & Johnston 2000). Most of the literature on IOS appeared in the mid 1990s where there was attention on the benefits of IOS as a tool for improving business performance. By using IOS as point of reference for infrastructure it is taken for given that organizations are able to exchange data electronically via computer based networks using standardized messages (Cash & Konsynski 1985). The Cash and Konsynski article was one of the first academic

works where IOS was defined: “IOS consists of a computer and communication infrastructure that permits sharing of information systems (IS) applications across organizational boundaries” (p.135).

IOS is thus a combination of IS and an interorganizational environment and has as a consequence essentially both technological and organizational characteristics (Johnston & Vitale 1988). The interorganizational environment consists of supply chains, trading partners, standards organizations, industry bodies, transport companies, trade associations, software providers etc. (Kurnia & Johnston 2000). The scope of the systems, the involvement of different organizations with differing goals and the range and nature of possible relationships between the parties involved makes the situation one of extreme complexity (Gregor & Johnston 2001). That is in particular the case in relation to eCustoms which involves public and private organizations and different nations, supranational entities (e.g. EU and WTO), and finally different economic zones (e.g. EU and the US) which have to agree on a standard.

The topic on IT standardization represents a long term issue which has remained unresolved for decades. It has been argued that “Standardization forms a key feature of modernization” (Hanseth, Jacucci, Grisot, & Aanestad 2006). eCustoms is by the EU seen as an modernization project and standardization should accordingly be addressed. One of the well described chapters in that ode relates to EDI, where no standard has been agreed upon so far, and it is highly unlikely that there would be one in the future (Damsgaard & Truex 2000). Although it is recognized that standards and standard-setting agencies are prerequisites for successful implementation of eCustoms, agreeing on international standards and achieving interoperability between different standard-based systems across the EU member states and at an international level remains still a great challenge (Henriksen, Rukanova and Tan 2008). The challenge is among other factors driven by socio-political traits, which influence the collaboration across organizations (Damsgaard & Lyytinen 1998, 2001).

These traits are among others related to the interorganizational and networked aspects which are not centrally controlled by any authority. It involves the linking of organizations which imply that organizational boundaries are lowered leading to increased transparency, the dependency on critical mass and, the dependency of infrastructures to secure efficient and reliable transactions between trading partners (Damsgaard & Lyytinen 1998, 2001). Those aspects have to be considered when studying the drivers and barriers for adoption and diffusion of IOS including eCustoms. It may be technically possible to fulfil the requirements for an IOS outlined by Johnston and Vitale (1988) twenty years ago but the socio-political challenges constraint the building of an administrative infrastructure. This aspect is eminently demonstrated in the case of customs where different stakeholders have different vested interests which are necessarily not compatible with a global standard.

In their study of the tension of flexibility versus standardization of information infrastructure Hanseth, Monteiro and Hatling (1996) discuss the need for shared international standards from a socio-political perspective. They argue that it is possible to have bilateral agreements among a limited number of communication partners. It is however not cost-effective or even possible in the long run if communities are to share an infrastructure based on bilateral agreements. An information infrastructure holds according to Hanseth et al. (1996) seven characteristics: shareable, common, enabling, physical embodiment of an architecture, enduring, scale, and economically sustainable.

Star and Ruhleder (1996) argue that there is a common misconception of infrastructures where they are seen as something which are built and maintained and which sinks into an invisible background but which is still there at hand and completely transparent. In their article they emphasize that an infrastructure is something upon which something else “runs” or “operates” but it is not completely transparent and also often not invisible. Star and Ruhleder (1996) define eight dimensions of infrastructure (see Table 1). Star and Ruhleder (1996) stress that the eight dimensions of infrastructure are without an absolute boundary and furthermore that infrastructure is something which is not stripped of use. The eight dimensions will be applied in the analysis of the eCustoms case.

Table 1 *Eight dimensions of infrastructure. Adapted from Star and Ruhleder (1996)*

Infrastructure dimension	Characteristics of dimension
Embeddedness	Infrastructure is sunk into other structures, social arrangements and technologies
Transparency	Infrastructure is transparent to use and invisibility supports using it. It does not need to be invented each time it is used
Reach or scope	Infrastructure has reach beyond a single event. Its reach or scope is either spatial or temporal
Learned as part of membership	Outsiders of the infrastructure encounter the infrastructure as a target object to be learned about
Links with conventions of practice	Infrastructure both shapes and is shaped by the conventions of a community of practice
Embodiment of standards	Infrastructure takes on transparency by plugging into other infrastructures and tools in a standardized fashion
Built on an installed base	Infrastructures develops based other bases for example do optical fibres run along railways or roads which represent existing bases or infrastructures
Becomes visible upon breakdown	The normally invisible quality of working infrastructure becomes visible with it breaks.

Our presumption is thus that customs can be analyzed as double infrastructures of which the physical flow of goods is one part and the information flow is the other. The information flow we approach by the eight dimensions of infrastructure by Star and Ruhleder (1996). The methodological section below describes our work of collecting and analyzing data to fulfil this setup.

3 METHOD

The study of eCustoms is based on a longitudinal project on eCustoms implementation throughout Europe involving multiple stakeholders from government, businesses, a standardization body (UN), and academia. The project started January 2006. The project is built around the concept of Living-Labs (LLs). Based on collaboration in LL issues are identified and further explored among the involved partners. The present study reports from the specific experiences gained in the third LL of the project which is situated in Denmark. The Danish LL focuses on export of food and involves a major dairy producer (DairyComp), Danish customs (Customs), a Danish software producer (SoftComp), and finally researchers from national and international institutions.

The significance of the two previous LL in the project should not be underestimated. The previous LLs have provided a thorough understanding of eCustoms especially among the practitioners who have achieved an opportunity to share experiences across countries on a more informal basis than normal. The LLs should therefore be seen a cumulative process where all participants learn from each other and bring in the knowledge from earlier LLs and work practices in general.

The data which is used for this paper has been collected via different means including company visits, 9 workshops involving all partners of the project, 5 general project meetings, 4 specific Food LL meetings with stakeholders involved in the Food LL, email exchange after meetings, study of minutes and other written documentation provided by the food producer and the national customs authorities. Minutes of meetings taken by researches have been distributed to all participants for approval and commenting. During the project extensive written reporting in the form of deliverables has been produced due to the character of the project, which is EU-funded. These sources of data provide a robust material for documenting data which in nature is unstructured and qualitative.

The data collected in the project covered many different theoretical perspectives and areas of interest as the project objective is to find a solution to a real world problem. The idea of double infrastructure as theoretical lens was triggered in workshops with DairyComp and Customs. Following the idea 10 interviews were made with DairyCorp (4), Customs (3), the developer of DairyComp's eCustoms

interface, DairyComp's logistics service provider, and one other national customs organization (Swedish customs) to explore the explanatory potential of the infrastructure concept. Interviews were recorded and documented by notes. The interviews were guided by the dimensions of infrastructure and were conducted as iterative process towards saturation – meaning a search for being able to describe European eCustoms as an information infrastructure.

4 FROM PAPER BASED TO ELECTRONIC CUSTOMS PROCESSES IN EUROPE

The inspiration to this paper is based on a dialogue between an exporter and a customs officer which took place during a project meeting in summer 2008:

Exporter: The dream scenario [of eCustoms] would be a return to the SAD [single administrative document].

Customs officer: Yes, that is the ultimate example of standardization.

The small dialogue illustrates the problems of implementing eCustoms with respect to finding a suitable and universal standard for exchange of data.

4.1 The paper-based customs infrastructure

In the 1980's, a company that was an active exporter or importer on the European market had to deal with a set of more than 200 different forms to cover different customs procedures, in different countries and for different modes of transport. As a response to the call for a reduction of the administrative burden for economic operators in an all the time more and more globalized arena for businesses the single administrative document (SAD) and related legislation was introduced in the EU. SAD, specified by the EC in Regulation No 1875/2006 and No 648/2005, presented a general form for all types of customs declarations that was applicable to 18 European countries.

The original SAD was introduced January 1st, 1988. Originally 18 countries did employ the document as standard for their customs declaration. In 1993 the SAD disappeared from trade within the EU as a result of the creation of a common internal market. Ten years later, in 2003, the SAD was reintroduced. The plan was to adapt to the evolution that had occurred since its first creation. The required data to submit was reduced by about a quarter, but perhaps more important was the further diffusion of the SAD as a standard for customs declarations. When the reformed SAD and attached legislation was taken into practice by 2007, the format was adopted by more than 30 countries, including for example Russia.

The SAD was originally a set of 8 copies of the same document printed on carbon paper which was handed out to the different authorities during the journey of the goods. All copies had a specific purpose. The first copy was for the country where export formalities were carried out, the second was used for statistics in the export country, the third copy was returned to the exporter, and so on. Some fields were mandatory to collect for all countries, while some fields were optional to collect. The SAD standardized data was submitted to national customs and with one and the same operation a company could do export clearance, issue the transport document (customs), and prepare the clearance in the country of destination.

4.2 Introducing eCustoms

DairyComp is one of Europe's largest dairy companies with export from several European countries. Major export destinations include the usual suspects Russia, USA, and China but also large customers of milk powder such as Oman and the Dominican Republic. Since a few years, DairyComp submits data needed for customs procedures when exporting from Denmark electronically through the Danish

“e-Export system” which has been massively diffused among Danish exporters (Bjørn-Andersen, Razmerita and Henriksen 2007).

Customs messages can still be sent through a paper based equivalent which it is possible to use for companies who by some reason do not want to or is not able to submit export data electronically. The paper-equivalent is still based on the SAD. The data model is a field by field translation of the SAD-fields that the Danish customs were using prior to the computerization. The e-Export system can be reached through either UN/EDIFACT messages or XML messages. At present there are no international standards for electronic customs declaration messages through XML. Regarding UN/EDIFACT directory D96.B is used. The sent messages are based on a range of UN/EDIFACT documents.

Regarding data meaning, the e-Export system benefits from being a direct derivation from the SAD, since the need for specifying data meaning was highlighted already when the SAD was introduced. A substantial amount of work was already done by UN/CEFACT, ISO, and the EC/TAXAUD to specify the meaning of data. Also for such fairly interpretable fields such as “product description” there are appropriate guidelines on how to provide and interpret data.

According to Regulation (EC) No 648/2005, member countries of the European Union are expected to implement systems that can handle automated risk analysis of exported and imported goods by June 2009. Simultaneously the European customs organizations are implementing or revising eCustoms.

Besides the mandatory fields the SAD presents a number of optional fields that national customs can demand if they want to. In reality, this have in led to that different XML schemas are used for the data transfer related to export declarations. Although not investigated, it is very unlikely that any two European countries would have implemented exactly the same XML schema without purposely collaborating on the matter. Consequently, although not deviating from the stipulated data model the transferred data differs from country to country. Besides the differences in data model, eCustoms also differs in the mode of transfer between company and customs, as well as in timing of implementation. New regulation is implemented at different dates in each country.

The DairyCorp delivers a very illustrative example of the de-standardized processes within a small geographical scope. DairyCorp also has business activities in Sweden an it exports from Sweden too. The two branches of DairyCorp have implemented different versions of eCustoms solutions in order to live up to national standards and regulation. Both the Danish and the Swedish eCustoms solution build on the SAD, but the implementation still differs from each other

The SAD reform was introduced as a step towards digitalizing customs operations into a process that by the EU is named eCustoms. The European eCustoms project has a span that covers development of customs processes until 2013. In a first phase of the eCustoms project, submissions to national customs were to be possible via electronic data transfer. The outcome of that development is that almost every country that before applied the very same, standardized SAD for customs clearance now have developed individual eCustoms solutions that enforce companies to set up individual export processes for each country where the company is exporting from. In short, the introduction of eCustoms has led to a de-standardization of European export processes. Ultimately leading to a breaking of an infrastructure which had demonstrated its robustness during the paper-based days but which had been lost in the process of digitalization because each and every country has developed its own system based on standards which are not interoperable beyond its borders.

5 FROM PAPER BASED CUSTOMS TO ECUSTOMS: LOSING THE INFRASTRUCTURE IN THE DIGITALIZATION

As our field data suggests while one infrastructure, the administrative customs infrastructure, goes through radical and extensive changes the corresponding, physical trade infrastructure tries to keep on as usual. International trade is steadily increasing due to the general demands in the markets. But as

Table 2 Eight dimensions of infrastructure applied on the eCustoms infrastructure

Infrastructure dimension	Characteristics of dimension
Embeddedness	<p>Infrastructure is sunk into other structures, social arrangements and technologies</p> <p><i>The dimension of embeddedness is lost because the SAD is not supported by the technologies adopted by the different exporting countries. Business is going global with international trade networks, delocalized operations but customs organizations are still to some extent working in national silos.</i></p>
Transparency	<p>Infrastructure is transparent to use and invisibility supports the use of it. It does not need to be invented each time it is used</p> <p><i>Infrastructure differs from country to country. For a company used to export to one European country has to relearn when exporting to another European country. The eCustoms infrastructure of today is not invisible but has to be manipulated and maintained by humans in order to fulfil its task.</i></p>
Reach or scope	<p>Infrastructure has reach beyond a single event. Its reach or scope is either spatial or temporal</p> <p><i>The eCustoms infrastructure is intended to be a backbone for all trade processes in and out of Europe. By interfacing with exporting companies' systems, data from internal systems and export data should flow seamlessly and without human intervention.</i></p>
Learned as part of membership	<p>Outsiders of the infrastructure encounter the infrastructure as a target object to be learned about</p> <p><i>Russian customs adopted SAD but will not adopt eCustoms that match each European country. For transit goods, goods that only passes through the EU on its way to a non-EU destination, the EU has managed to develop one single system. This system and its output is recognized by Russia as valid proof for the control of goods. Thus, a well functioning eCustoms infrastructure for Europe has potential of being recognized.</i></p>
Links with conventions of practice	<p>Infrastructure both shapes and is shaped by the conventions of a community of practice</p> <p><i>Customs builds on an extensive tradition of trade processes. In regions (i.e. Scandinavian countries) they resemble to each other. eCustoms will further the tradition. As eCustoms systems are implemented and have to be used by exporting companies they stipulate the conventions of practice.</i></p>
Embodiment of standards	<p>Infrastructure takes on transparency by plugging into other infrastructures and tools in a standardized fashion</p> <p><i>The different national eCustoms systems have different interfaces to exporting companies. Exporting from all European countries would require 27 different interfaces. The eCustoms systems follows the same process flow but have differences in the data model, the way of transferring data, and the timing of implementation. The consequence is that all systems that basically performs the same task and fulfils the same purpose needs to be treated as completely different systems.</i></p>
Built on an installed base	<p>Infrastructures develops based other bases for example do optical fibres run along railways or roads which represent existing bases or infrastructures</p> <p><i>eCustoms builds on Internet, XML and web-technologies. Both companies and customs organizations already use Internet for various purposes. In Denmark it is possible to use Internet and the FTP protocol to upload messages for keeping control of what is exported and when.</i></p>
Becomes visible upon breakdown	<p>The normally invisible quality of working infrastructure becomes visible with it breaks.</p> <p><i>The differences have become visible after the migration to eCustoms. DairyComp has to implement different solutions for eCustoms in each country where they export to. When the implementations are working at both DairyComp's site and at the national customs organization data is available when needed without any human intervention. When any of national eCustoms systems breaks down DairyComp has to put their export processes in that country on hold and fall back on paper-based procedures..</i></p>

captured by Star and Ruhleder (1996) the double infrastructures are interrelated and a rupture in one of the structures causes problems in the dependent infrastructure. Table 2 presents an overview of eCustoms according to the eight dimensions of infrastructures by Star and Ruhleder.

5.1 Consequence of the constraining infrastructure

eCustoms in the EU is being introduced due to several different reasons. One of them is to reduce the administrative burden for companies who have business throughout Europe (TAXUD, 2007). By harmonizing and digitizing customs processes increased security and control should lead to a decrease in the administrative burden for pan-European companies – not the opposite. In the light of this objective we analyzed the consequences of national differences in regulation implementation.

The consequence of eCustoms implementation for DairyComp can be summarized as follows:

- A need for several export departments – one for each country.
- Different system modules reporting to each customs respectively.
- Additional system development costs of >100 000 Euro per new export country.
- Additional maintenance costs, which normally are substantially larger than the development cost for IT systems.

Today not all national customs require DairyComp to do electronic reporting in their export declarations, therefore DairyComp has chosen not to if not required. The reason is that the development and future maintenance cost of extending the existing system with a module for handling electronic export declarations would far overshadow the efficiency gains. DairyComp investigated the cost of developing such a module and had an offer of about 100,000 Euro. Costs which are not directly serving as a means for improving production process but rather just contributing to the improvements of the infrastructural technologies (Carr 2004).

This represents a paradox in relation to the overall eGovernment discourse where the belief is that implementing of initiatives such as eCustoms is a means if streamlining processes (Andersen 2004). The implementation of eCustoms only on a partly basis leads to reduction in work because the procedures of traditional paper handling has to be maintained along with the new electronic reporting procedures which are not standardized.

5.2 Revisiting the standardizing effect of IT

As mentioned above do Hanseth et al. (2006) state that “Standardization forms a key feature of modernization”. They do however similar to the eCustoms study observe that efforts towards standardization led to de-standardization. They state: *“The end effect was the undermining of the order-making and increased disorder where efforts and actions taken toward standardization and stability lead to an opposite result.”* (Hanseth et al. 2006, p. 567).

The idea of the European eCustoms initiative is to have a harmonized set of export processes in all European countries. Assuming that the outset is successful by 2013 which is the currently targeted date, the level of standardization should have reached the levels of the highly structured procedures driven by the paper-based SAD-form. Figure 1 highlights that the constraining of an existing, well-functioning infrastructure is followed by a transition phase in which the degree of standardization drops significantly. With the perspective of double infrastructures it becomes apparent that any dependent infrastructure suffers from the obstacles created by the move towards the implementation of de-standardizing practices such as eCustoms.

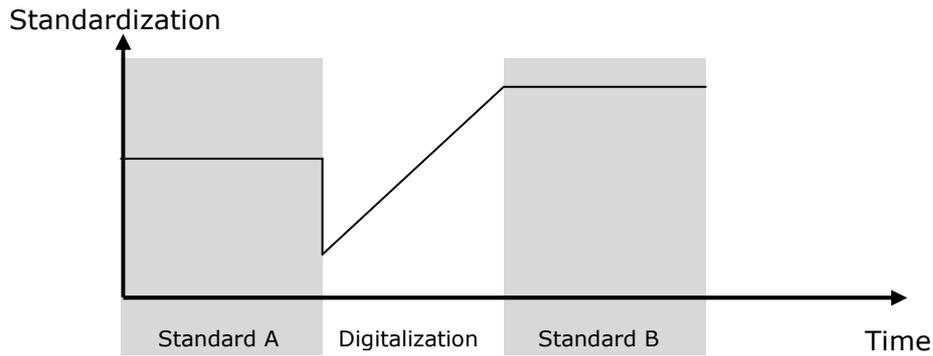


Figure 1 The life-cycle of the customs infrastructure supported by the SAD

6 DISCUSSION AND CONCLUSIONS

Based on longitudinal interaction with different stakeholders in eCustoms we make the following contributions. We introduce the concept of double infrastructure and show its relevance for understanding how the transition to eCustoms affects international trade. Using the infrastructure concept, we have also been able to explain how one specific eCustoms project, the European eCustoms project, disrupts an existing infrastructure and constrains the corresponding physical infrastructure. Based on our findings, we question the well established assumption that introduction of IT per se leads to higher levels of standardization. Our research suggests the presence of a transition state in which current infrastructures may constrain the corresponding physical infrastructure due to the introduction of IT. The finding extends the current understanding of the interplay between information systems and physical infrastructures in the concept double infrastructures.

Interactions between government and business differ in nature and often have conflicting goals (Thompson, Rust & Rhoda 2005). Businesses want to reduce the administrative burden and government wants to increase control and security. IT has been seen as the panacea to solve this conflict. In the eCustoms case IT can be the means which breaks the vital infrastructure which is prerequisite for lifting the administrative burden thereby solving the burdensome interaction between businesses and government. The administrative infrastructure is broken but exporting businesses are still carrying out the activity. The reason is simple: export of goods is the foundation for many businesses and the interaction with public sector is just seen as a burdensome relationship (Fountain & Osorio-Urzua 2001). Furthermore, the introduction of the concept of eCustoms is just another burden which businesses have to deal with in their interaction with public sector.

Throughout the world governments, national customs organizations, international collaboration organizations and interest organizations are approaching digitization of customs processes. Some parts of the world have come further than others (e.g. Singapore, ASEAN) while others are only just started to approach the idea. Devolving an efficient infrastructure for customs processes is becoming a key challenge for competitiveness of nations and regions. For example, the EU has noted that its food industry is poorly equipped to tackle the increased globalization (Wijnands, Van Der Meulen, & Poppe 2007). The move towards eCustoms is one constituent action in addressing this issue. Thus, the presence of efficient eCustoms infrastructure becomes a democratic principle and a prerequisite for developing countries to compete in a globalized world. As the eCustoms being developed worldwide are based on IS to increase security, traceability and control the absence of such systems will effectively exclude regions without eCustoms from the international trade scene.

With regard to the magnitude of consequences that the move towards eCustoms has for governments and businesses, we encourage more research into the subject matter. One specific contribution that could substantially improve the work with eCustoms (and other similar eGovernment initiatives) is an increased understanding on how effective Regulations are when it comes to IS and where their limitations lay. The current understanding on what can be achieved by regulations is still very limited. Additional perspectives on the transition and its effects are needed. Finally, we also see a need to further the understanding of how the transition can be achieved. Logically applied IS research should be able to play a key role in the transition, but if so there is a need to develop strong relationships with exporters, logistics service providers, customs organizations and other national and international stakeholders. Here the growing interest in IS research as a design science is a prospectus development that we see could be beneficial for improving international trade.

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