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Abstract

This article studies value assessments of IT solutions in public as well as in private contexts and aims to identify benefits of business-to-government innovations. The work analyzes the case of the implementation of European common e-customs solutions. Over the last few years, e-customs has become a widely studied topic within the European Union. However, only a little research has been conducted in order to identify benefits of such IT innovations. For this reason, this paper is dedicated to the value assessment of e-customs solutions. Within the framework of a European funded project, the study was conducted collecting data from interviews and workshops involving stakeholders coming from public as well as private organizations. By applying a theoretical value assessment framework, four main areas of improvement due to common e-customs solutions' implementation were identified: increased security, reduction of administrative burden, facilitated compliance, and better communication. This article contributes towards value assessment research and in particular to a standardized e-customs solution as an example of business-to-government innovations.

Keywords: e-customs, value assessment, public value, private value, case study research, living lab research.

1 Introduction

European government aims to achieve safe trade enabling secure import and export: the European Union has promoted many initiatives that aim to provide a simplified trade within the community. One of those initiatives is the Multi-Annual Strategic

Plan (MASP, (European Commission, 2007)) that has as its goal the implementation of a common standardized electronic customs system among all 27 member states. Several authors studied the e-customs case highlighting local solutions and new applications (Baida, Liu, & Tan, 2007; Baida, Rukanova, Liu, & Tan, 2007; Baida, Rukanova, Wigand, & Tan, 2007; Bjørn-Andersen, Razmerita, & Henriksen, 2007; Rukanova, Henriksen, Raesfeld, Stijn, & Tan, 2007).

The MASP presents an e-government model that provides high-level technical and functional specifications. However, procurement of information technology and implementation of e-customs solutions are not specified leaving the adoption as a matter of the EU member states. For this reason, e-customs solutions and their adoption process are studied. The European funded project Information Technology for Adoption and Intelligent Design for e-Government (ITAIDE, IST-027829) aims to develop e-customs solutions that can enhance business-to-government collaboration and to analyze future adoption of these solutions. In order to understand how potential stakeholders can be interested in such innovations, it is necessary to identify how they can benefit from them. In other words, the value of e-customs solutions has to be assessed for public as well as private organizations.

Based on the ITAIDE case, this work aims to assess the value of e-customs system innovations for private and public sectors. The value assessment is conducted based on the value assessment framework suggested by Liu, Derzsi, Raus, & Kipp (2008). The framework gives guidelines on how to assess the value of IT innovations in the context of business-to-government systems.

The article is structured as follows. Section 2 provides an overview on the theoretical background. Then, Section 3 gives an overview on the research approach and presents the ITAIDE project. Next, Section 4 is dedicated to the application of the proposed value assessment framework on the ITAIDE case, i.e., on the implementation of e-customs IT solutions in a European country. The value assessment is conducted for two main stakeholders: a multinational business company representing the private domain and the tax and customs authority representing the public domain. The discussion and conclusion part, Section 5, resumes the results highlighting strengths and weaknesses of the application of the value assessment framework and gives an outline on future research.

2 Theoretical framework

Literature provides many overviews on value assessment related to both private and public sector organizations. Several frameworks were elaborated for the value assessment of IT innovations in the private (Aladwani, 2002; Murphy & Simon, 2002; Shang & Seddon, 2002) as well as in the public sector (Cole & Parston, 2006; Cresswell, Burke, & Pardo, 2006; Emerson, Wachowicz, & Chun, 2000; Foley, 2006; Moore & Khagram, 2004). These frameworks are meant to be applied either in the private or in the public sector so that a transfer between both sectors can be difficult. This research gap was fulfilled by recent studies of Gouscos, Kalikakis, Legal, & Papadopoulou (2007) who presented a conceptual framework for modeling quality and performance in the e-government field combining private and public

stakeholders' needs. The common denominator of various approaches is the following set of value categories for value assessment: financial, social, operational, and strategic value. However, none of the mentioned frameworks consider all these categories. In contrast, more recent studies (Liu, Derzsi, Raus, & Kipp, 2008) presented a further value assessment framework that takes into considerations all the mentioned value categories: the authors defined the four value categories, introduced an analytical top-down approach, and developed a value matrix that combines private and public sector's requirements. In their work, the authors provided an exhaustive literature review that shows previous studies in the private and public context as well as their link to the above mentioned categories given by a classification. Based on this classification, the authors concluded that a common framework is missing. Therefore a new value assessment framework is needed in order to classify the value of a business-to-government innovation for both private and public stakeholders.

The new value assessment framework proposed by Liu, Derzsi, Raus, & Kipp (2008) integrates values understandings of both sectors and it is meant to be used by experts in assessing values of business-to-government IT innovations.

The **value categories** consider strategic, operational, social, and financial values. *Strategic value* implies impacts on personal or corporate influence on government actions, policy, and influence on political parties or prospects for current or future public offers, including impacts on political advantages or opportunities, goals and resources for innovation or planning. *Operational value* emphasizes improvements, realized operations and processes. *Social value* impacts on society as a whole or community relationships, social mobility, status, and identity. Social and psychological returns include increased social status, relationships, or opportunities; increased safety, trust in government, and economic well-being. It also includes typical issues from the private sector like, e.g., employee satisfaction. *Financial valu*e impacts on current or anticipated income, asset values, liabilities, entitlements, and other aspects of wealth or risks to any of the above.

The identification of values is done **top-down** by going through three levels of analysis, namely goal areas (GAs), key performance areas (KPAs), and key performance indicators (KPIs). According to the authors, *goal areas* are areas where stakeholders' key objectives are described in a rather generic way. The scope of these goal areas is to provide a top level of analysis. For each goal area the four value categories presented are analyzed and a set of key performance areas and key performance indicators is provided. *Key performance areas* are areas for business success factors. A key performance area can be assessed by providing *key performance indicators* which are qualitative or quantitative measurements.

In order to combine the four value categories with the three levels of analysis, the authors introduced a **value matrix** (see Table 1) that is meant to be created for every stakeholder for whom it is requested to perform a value assessment. The matrix is structured as follows: in the columns the goal areas are put in relation to the value categories that represent the rows. The combination of the columns (goal areas) and rows (value categories) gives an overview on key performance areas which are defined by key performance indicators. The value matrix has to be developed for every stakeholder, in our case for the public and the private sector considering different stakeholders' goals.

Table 1: The value matrix

		Goal areas (GAs)		
		GA1	*GA…*	*GAn*
Value categories	*Strategic*	KPAs	KPAs	KPAs
	Operational	KPAs	KPAs	KPAs
	Social	KPAs	KPAs	KPAs
	Financial	KPAs	KPAs	KPAs

3 Research approach and case background

Eisenhardt (1989) argues that building theory from a limited number of cases is effective. Dedrik & West (2003) confirm her theory stating that it is helpful to develop a framework through a qualitative study of a specific adoption case in order to understand adoption decisions. Considering these assumptions, this research is based on a case study approach in order to collect qualitative data.

The framework of this study resides in the European funded project ITAIDE. In this project stakeholders coming from academy, industry, and governmental institutions are involved. The main goal of ITAIDE is to provide a concept for a new e-customs system contributing to Single Window (SW) as well as Authorized Economic Operator (AEO). Single Window is a methodology for standardized business processes and business information exchange; in Recommendation no. 33, the United Nations Centre for Trade Facilitation and Electronic Business defines a single window as '*a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfill all import, export, and transit-related regulatory requirements. If information is electronic, then individual data elements should only be submitted once. This may also provide a platform for coordinating controls among the agencies involved and payment of relevant duties, taxes and fees*' (United Nations Economic Commission for Europe, 2005, p. 3). Authorized Economic Operator is a certification given by the customs office of a European country that enables an industry to simplify trade. Legislation stipulates that customs authorities shall grant to reliable traders the status of 'authorized economic operator' (World Customs Organization, 2006). The idea is to grant the AEO status to reliable operators including those that are also compliant with respect to security and safety standards and can, therefore, be considered as 'secure' traders. Those traders should have a specific status, which would grant them the status of secure members of the supply chain and would identify them as most reliable trading partners. Both topics are addressed by the European Union which developed an electronic customs strategy (European Commission, 2007). The European customs strategy aims to reduce administrative burden of trade transactions and increase security and control mechanisms enabling a paperless environment for customs and trade, i.e., to develop a common standardized e-customs system.

Basing its work on SW and AEO, ITAIDE is researching testing its findings on four living labs located in four European member states. In each living lab ITAIDE project

members strongly collaborate with both governmental institutions and business partners. Government is represented by tax and customs offices of the four European countries while business partners are represented by four different industries. Living labs are considered as research and development context: they bring together multiple stakeholders from different domains with the purpose of aligning particular interests and perspectives (Kipp & Schellhammer, 2008).

In this article one of the four living labs serves as a case of research. The case study took place from June 2007 to October 2008. It tried to understand the value of new e-customs solutions, i.e., how the private and the public sector can benefit from them. In order to reach this goal, three day-long workshops and several semi-structured interviews were conducted. The workshops and the interviews were carried out with representatives of the private as well as the public sector. The private sector was represented by personnel of the export department of one Danish multinational company whose products are sold in more than 100 countries. The public sector, i.e., customs and tax authorities from the EU member state where the living lab took place (Denmark), was represented by departments' heads and experts in functional areas, such as recipe control, VAT assessment, AEO analysis, border security and control, as well as in IT areas. This study is based on the value assessment framework presented in Section 2. In order to apply the framework in an accurate and precise manner, first a value matrix for each of both stakeholders is developed and second the value is assessed.

The next section will show the application of the value assessment framework on one ITAIDE living lab.

4 Results

In this section the results of this research are presented. The value assessment framework proposed by Liu, Derzsi, Raus, & Kipp (2008) is applied on the ITAIDE case, i.e., on the envisioned implementation of a common web-based e-customs system. The research is based on the findings of a study conducted in one ITAIDE living lab where private and public sectors were involved. Two main stakeholders were the topic of research: a Danish multinational business company operating in the food sector and the Danish tax and customs office. The value for both organizations is analyzed and presented in the next sections.

Since the implementation of a web-based common EU customs system has not taken place yet, the private and the public sector's representatives could only guess about the future situation. It was not possible to measure the assessment using key performance indicators since concrete data and figures were not available. For this reason, key performance areas are analyzed based on interviewees' guesses and ratings.

However, a first step towards the value analysis of such significant IT change in the customs field took place giving a categorization of potential benefits.

Interviews and workshops' results lead to the expectations presented in Section 4.1 and 4.2.

4.1 Value assessment for the private sector

The value assessment started with the definition of goal areas and key performance areas. The Danish business company's personnel representing the private sector identified four major goal areas: security, reduction of administrative burden, compliance, and communication.

After interviews and elaboration of collected data, a case-specific value matrix was created (see Table 2) enabling the categorization of value categories, goal areas, and key performance areas.

The interviewed business company identified nine key performance areas: (1) fulfillment of safety regulations (thanks to the AEO status); (2) increased services' quality; (3) harmonization of different systems; (4) harmonization of regulations and procedures; (5) improvement of data exchange; (6) less people involved for the same work; (7) faster process cycle time; (8) communication with EU customs offices; (9) information sharing with EU customs offices.

These areas are distributed in the value matrix according to each value category. In the following each goal area is analyzed.

Security is a critical factor for trade and its improvement is one of the main goals of the EU. According to the interviewed business company, a common web-based European customs system improves security of international trade since the system facilitates safety regulations' fulfillment helping business companies to obtain the AEO status. Indeed, the business company stated that a common e-customs system can influence the company from the *strategic* and the *financial* viewpoints contributing to the fulfillment of safety regulations enhancing the trade security and reducing monthly irregularities by approximately 50-75%. Consequently more orders can be executed faster with the contribution of fewer personnel reducing costs by 25-50%.

One of the main scopes of a new e-customs system is to **reduce administrative burden**. Interviewees stated that the elimination of paper-based customs documents and their electronic replacement constitute a significant improvement of trade procedures. According to interviewees' argumentations, from the *strategic* point of view, the achievement of a paperless environment improves the services provided by the private sector by 50-75%. Furthermore, considering *operational* goals, the business company identified four main areas of improvement. First, the harmonization of different systems may strongly improve the actual data sharing since the new system leads to a complete paperless environment. Second, the quality of services improves by reducing errors and irregularities during the export process. For example, the interviewed business company aims to reduce errors down to 1%, e.g., 10 errors every 1000 export declarations. Although it is difficult to give precise data of errors documentations and precise estimations for potential reduction, participants of the workshops estimated a possible reduction of 25-50%. Third, considering that nowadays data exchange between business companies and EU customs offices is done mainly manually (email, telephone, and fax), a standardized system improves

information sharing quality. Finally, the export process cycle can be faster (interviewees estimated around 25-50%).

Also the *social* aspect is influenced by the reduction of administrative burden. Fewer people can do the same work, i.e., the finalization of customs clearance. The business company foresees a personnel reduction by 5%. This affects *financials*. For example, nowadays, the interviewed business company employs 30 people for customs clearance at a yearly cost of 70.000€ per employee; a reduction of 5% means therefore a savings of around 100.000€ per year. Additionally, the business company identified three further areas that may influence the financial aspect: faster process cycle time, harmonization of different systems, and improvement of data exchange. Although the interviewed business company sees some cost reduction related to these three areas, it was too difficult to make firms predictions at this stage since the implementation has not taken place yet. However, it is estimated that implementation costs are high but, on the contrary, running costs can be lower than the actual costs.

Together with security and reduction of administrative burden, **compliance** is the third goal area that was identified. The interviewed business company is already compliant to current regulations otherwise it could not export. However, harmonization of regulations and procedures through Single Window affects its compliance process. Nowadays, it may happen that a business company does not know every export regulation and procedure and therefore has to do many trials in order to have a compliant export declaration. An automated system can avoid this trial-and-error approach and a business company can be compliant in a more effective way. This affects business companies not only from the *strategic* but also from the *financial* point of view since time can be saved and export execution processes are faster.

Communication and improvement of information sharing between business companies and EU customs offices are the last identified areas of improvement. According to the business company assertions, communication and information sharing between companies and customs offices may differ. If a company has to communicate only to the local customs office, communication does not constitute an issue. However, if a company has to communicate to customs offices of other EU member states, communication might be difficult because of different languages as well as different customs procedures. A common European e-customs system can harmonize and standardize all export procedures enabling electronic communication and information sharing. New e-customs solutions can replace old systems improving the export execution process from the *strategic* and *operational* perspectives reducing the execution time and increasing the technology.

Table 2: Value matrix of the private sector

		Goal areas (GAs)			
		Security	*Reduction of administrative burden*	*Compliance*	*Communication*
Value Categories	*Strategic*		• Increased services' quality	• Harmonization of regulations and procedures (SW)	• Communication between EU customs offices and business companies
	Operational	• Fulfillment of safety regulations (thanks to AEO status)	• Harmonization of different systems • Increased services' quality • Improvement of data exchange • Faster process cycle time		• Communication between EU customs offices and business companies • Information sharing between EU customs offices and business companies
	Social		• Less people involved		
	Financial	• Fulfillment of safety regulations (thanks to AEO status)	• Harmonization of different systems • Improvement of data exchange • Faster process cycle time • Less people involved	• Harmonization of regulations and procedures (SW)	

4.2 Value assessment for the public sector

As in the case of the private sector, the value assessment started with the definition of goal areas and key performance areas. As the private sector, stakeholders representing the public sector identified four major goal areas: security, reduction of administrative burden, compliance, and communication/collaboration.

By elaborating collected data, key performance areas were identified and categorized along the value matrix. Danish tax and customs office's personnel identified eleven key performance areas related to four goal areas: (1) transparency of EU trade; (2) improvement of information quality; (3) single access point for VAT; (4) increased services' quality; (5) harmonization of different systems; (6) improvement of data exchange; (7) faster process cycle time; (8) less people involved; (9) communication between EU customs offices; (10) collaboration between EU customs offices; (11) access to information of other EU customs offices.

The value matrix for the public sector (see Table 3) shows how key performance areas are distributed along goal areas as well as value categories. Each goal area is then analyzed.

Security is one crucial area of improvement. According to participants' expectations, the *strategic* and *social* viewpoints are not affected. However, from the *operational* and *financial* viewpoint, a web-based common EU customs system can make European trade more transparent facilitating customs controls. Participants in the workshops stated that the risk analysis, which is usually done by the customs office for every export request, can be done in a more efficient way reducing its costs and accelerating the export execution process. Additionally, interviewees stated that quality of shared information between the customs office and business companies, i.e., between public and private sector, can improve so that less control is needed. This affects costs since the needed time for manual check decreases. This envisioned to-be situation can be reached in 2-3 years.

The last key performance area, which can improve security, is the introduction of a single access point. Nowadays, exporters have to import the same data for three different scopes: export declaration, VAT declaration, and statistics report. Export declarations have to be fulfilled for every export. In contrast, in many European countries, VAT declaration and statistics reports are done quarterly. This multiple data entrance can lead to errors so that wrong VAT amounts are paid. A control is done by the tax office based on a risk analysis but it is not possible to check every company and therefore irregularities may occur. According to interviewees' estimations, a single access point can avoid multiple data entrance decreasing irregularities by approximately 75%. This has financial implications since on the one hand correct VAT amounts are paid and on the other hand the tax and customs office can execute faster controls.

Reduction of administrative burden is one of the most important topics and affects all value categories. The first identified key performance area corresponds to the quality of services provided by the tax and customs office. The quality of services improves since an automated system can handle standardized messages and data exchange (*strategic* and *operational* viewpoints). Business companies enter data correctly increasing the efficiency of the tax and customs office by reducing the time invested in correcting wrong export declarations. Indeed, representatives of the tax and customs office stated that many export declarations are not fulfilled correctly because business companies do not always use standardized data. In contrast, an automated system avoids this uncertainty so that the tax and custom office can accelerate the export process time granting faster export permissions; therefore, business companies are more satisfied. This leads to an improvement of the public sector's image (*social* viewpoint).

The second recognized key performance area is the harmonization of different systems. Nowadays, only a little data exchange between local tax and custom offices and business companies is automated. In addition, information sharing between EU customs offices is not automated at all. According to the envisioned future situation, different European-wide systems can be harmonized enabling a 100% automation of information sharing. This leads not only to an *operational* improvement but also to a *financial* relief. Indeed, the tax and customs office foresees that development and implementation costs can be very high but on the contrary running costs are low. Tax and customs offices make a big investment in the short term, but in the long term they

save costs. Unfortunately, at this early stage it was not feasible to make cost calculations.

The third key performance area is process cycle time acceleration. This affects three aspects: *operational*, *social*, and *financial*. Because of the execution time acceleration, delays can be avoided increasing the satisfaction of the tax and customs office. Additionally, according to participants' guesses, because of time saving, export process costs may go down by approximately 15%.

The fourth key performance area is the improvement of data exchange between tax and customs office and business companies as well as between tax and customs offices of different European countries. This affects the *operational* viewpoint since fewer steps are needed for data exchange, increasing the efficiency of information flows.

Last but not least, fewer people are employed (*social* aspect) and therefore personnel costs decrease (*financial* aspect). However, the tax and customs office's personnel stated that they do not decide on employees' reassignment since this is a decision taken by the Ministry of Finance. For this reason it is difficult to make an estimation of costs reduction.

Compliance does not seem to be a crucial aspect from public sector's perspective. Indeed, only one key performance area was identified: harmonization of regulations and procedures thanks to Single Window (SW). It affects the public sector from the *strategic*, *operational*, and *financial* but not from the *social* point of view. The main scope of SW is to reduce the number of non-compliant regulations and procedures to zero. Irregularities decrease so that time is saved; this leads to costs reduction and improvement in efficiency.

The last goal area identified by the tax and customs office is the improvement of **communication and collaboration** between customs offices of different European countries. EU customs offices have interest in better communication and collaboration. Nowadays, EU customs offices communicate by telephone, emails, fax or having periodic meetings. An automated communication system can improve not only *strategic* and *operational* aspects but also *financial*. Since EU customs offices face the same issues and need meetings in order to understand the most efficient way to use new information and to discuss common topics related to the new system, the interviewed tax and customs office foresees a costs increase. Additionally, employees' satisfaction increases because of better information sharing (*social* aspect).

The second key performance area is the improvement of access to the information of other EU customs offices. According to workshops' participants, information which can be accessible after an implementation of a common EU customs system is information about exporters and information about export flows. The interviewees stated that in their opinion exporters' information does not increase, but that higher communication and collaboration can improve export information flows (*operational* aspect). Better information access influences costs since data collection costs decrease (*financial* aspect).

The last mentioned key performance area is the integration of new EU member states (*social* point of view). New EU member states can adopt a new common system that

allows them to be immediately aligned with other European countries without major issues so that integration time decreases.

Table 3: Value matrix of the public sector

		Goal areas (GAs)			
		Security	*Reduction of administrative burden*	*Compliance*	*Communication / Collaboration*
Value Categories	*Strategic*		• Increased services' quality	• Harmonization of regulations and procedures (SW)	• Communication between EU customs offices • Collaboration between EU customs offices
	Operational	• Transparency of EU trade • Improvement of information quality • Single access point for VAT (no fraud)	• Harmonization of different systems • Increased services' quality • Improvement of data exchange • Faster process cycle time	• Harmonization of regulations and procedures (SW)	• Communication between EU customs offices • Collaboration between EU customs offices • Access to information of other customs offices
	Social		• Increased services' quality • Faster process cycle time • Less people involved		• Communication between EU customs offices • Completely new EU member states
	Financial	• Transparency of EU trade • Improvement of information quality • Single access point for VAT (no fraud)	• Harmonization of different systems • Improvement of data exchange • Faster process cycle time • Less people involved	• Harmonization of regulations and procedures (SW)	• Communication between EU customs offices • Collaboration between EU customs offices • Access to information of other customs offices

After the value analysis of the private as well as the public sector, first conclusions can be drawn. First, both sectors identified the same areas of improvement; the only exception is that the public sector recognized a potential improvement not only in the communication but also in the collaboration. Second, the key performance areas seem to be quite similar, like, e.g., transparency of European trade or harmonization of regulations and procedures thanks to a SW-based system. Finally, both sectors foresaw a considerable investment in such system but recognized that its benefits justify the expenditure.

5 Conclusions and future research

The studied case examines value assessment of business-to-government IT innovations. After applying a value assessment framework, the value of e-customs solutions' implementation was assessed for private as well as public sector. The case study showed interest in such solutions and benefits in different areas were recognized by the stakeholders. Four areas of improvement were recognized: increased security, reduction of administrative burden, facilitated compliance, and better communication. In these areas, strategic, operational, social, and financial aspects were analyzed showing potential benefits and changes that e-customs systems can deliver.

Although the application of the framework took place successfully, there exist some limitations. First, the value assessment is based on envisioned scenarios so that results could be biased. Second, although two different stakeholders were elaborately analyzed, there are many other players in business-to-government innovations, such as, e.g., other governmental institutions or IT providers, who were not considered because of time restrictions. Third, it was not possible to analyze key performance indicators because of lack of data and information so that precise figures were not presented.

Nevertheless, the conducted value assessment shows important results and gives a first analysis. This analysis can be extended by further research and be an example for similar value assessments in the context of business-to-government innovations.

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