

Adoption of High Impact Governmental eServices: Seduce or Enforce?

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Abstract. The adoption of high impact governmental e-services is not obvious. Especially small and medium sized companies hesitate to invest and adopt. Non-adoption endangers the realization of the 25% reduction objective within the EU's Lisbon Agenda of the administrative burden of businesses by 2012. On the other hand governmental organisations gain from the use of these e-services. In several cases this is the underlying argument behind the legal enforcement of the use of governmental e-services. In the study reported in this paper we answer the question which factors influence the adoption of these high impact governmental e-services. The designed research model has been tested in an empirical business-to-government context. In contrast to several business-to-business studies we found that especially organisational readiness is a hampering factor for the adoption of these governmental high impact e-services. These findings question the effectiveness of governmental enforcement strategies.

Keywords: high impact governmental e-services, adoption of innovations, governmental pressure, reducing the administrative burden of businesses.

1 Introduction

The Ministerial Declaration of the eGovernment Conference 'Transforming Public Services' formulates targets to be included in the Action Plan for eGovernment under the framework of i2010 [1]. One of these targets concerns: delivering *high impact services* designed around customers' needs. When adopted, integrated and used these kind of services lower transaction costs for businesses and speed up service delivery¹. In the e-business W@tch 2006/2007 edition the European Commission underlines the importance of governments promoting ICT adoption to the further development of e-business [2]. The adoption of these high impact, and often complex, e-services however is not obvious. Especially small and medium sized companies hesitate to invest and adopt. This is one of the reasons behind the legal obligation of the Danish Electronic Invoicing system. After years of seduction policy the Dutch Tax Administration in 2005 choose to enforce electronic tax filing by businesses [3].

The question is *which factors influence the adoption of these high impact governmental e-services?* Many of these systems when adopted contribute to the reduction of the administrative burden businesses suffer [4]. A 25% reduction of this

¹ This paper focuses on businesses.

administrative burden by 2012 is an important objective within the EU's Lisbon Agenda. Gaining knowledge helps to design effective ICT introduction strategies and provides new insights into the role of government as a launching customer.

This question is scientifically interesting as well. Little empirical research has been conducted with respect to this business-to-government domain yet. Answering this question asks for the design and testing of business oriented theories and models within the governmental context. In the next paragraphs we present successively the theoretical background of our research and our research model and methodology used. We present results of the first empirical test of the research model and discuss their implications for practitioners and researchers.

2 Theoretical Background

In this study we define high impact services as electronic transaction processing based on mutual data exchange which is an integrated part of existing business management systems. Systems supporting the delivery of high impact services can be characterized as inter-organizational systems. The transaction processing concerns frequent data exchange with regard to e.g. tax filing, social security payments, e-invoicing, customs declarations and statistics. This in contrast with web forms based, non-integrated data exchange with regard to occasional transaction as e.g. permits and the registration of a new company. Extensive research has been conducted regarding these kind of systems and services in the business-to-business context. Many of these studies have used a general MIS perspective or a more specific electronic data exchange perspective. Several meta-analysis have been executed summarizing research results [5], [6], [7].

Less empirical research concerning these high impact services has been conducted within the governmental context². Teo at al. [10] in 1997 studied the mandatory adoption by traders of the TradeNet system in Singapore. Kuan and Chau [11] in 2001 studied the adoption of the ValuNet system of export declarations in Hong Kong.

The application of research results from the business-to-business domain leads to four main aspects characterizing the application of high impact services in the business-to-government domain.

Benefits and effects of high impact services. It has been widely acknowledged that inter-organizational information systems reduce communication costs and improve communication between (business) partners [12], [13]. In many cases these benefits concern first order effects related to the processing, storage, transportation and sharing of data. Second order effects on the other hand demand more complex changes of organizational processes and organization.

Organization of the electronic relation. The electronic data exchange relation between businesses and government can be characterized as an electronic hierarchy [12]. The provider of this kind of a relation is more than others capable of realising

² This confirms with Grönlund's observation that "the field is indeed immature, because theory generation and theory testing are not frequent ... and only a few of the cases where theories are either tested or generated concern the role and nature of government" [9].

significant benefits. It is not un-imaginary that governmental organizations profit more from the introduction of high impact services than businesses do [3].

Organizational impact. The application of high impact systems including electronic data exchange has consequences for business organizations. Integration with existing information systems e.g. offers possibilities for cost savings, the so called electronic integration effects [12]. Especially smaller companies find it hard to realise these efficiency benefits [5], [14].

Power and trust. Power and trust are important factors influencing the actual realisation of benefits. The avoidance of mutual dependencies is an important explaining variable for the hesitation of businesses to implement an inter-organizational system [7]. In asymmetric hierarchical relations the use of power is in many cases the main reason for the adoption of an inter-organizational system [14]. Forced adoption in few cases leads to the implementation of integrated systems.

These four themes provide the context for research concerning the application of governmental high impact e-services. While on the one hand benefits do seem very attractive, on the other hand a lack of trust and reluctance to investments might hamper the adoption of governmental high impact services. In this study we applied the theoretical perspective of the adoption of innovations. An innovation is an idea, practice or object that is perceived as new by an individual or other unit of adoption [8]. High impact systems are indeed innovations to many SME's: application of these kind of systems introduces new goals and complexity, influences organizational procedures and systems and changes the organization's external relationships.

In the next paragraph we present an overview of theories and models that can be used to study the adoption of high impact governmental e-services. Based on this analysis we elaborate one of these models into our research model which we applied in an empirical test.

3 The Adoption of High Impact Services: Theories and Models

Diffusion of Innovations Theory

The central theme of Rogers' DOI theory [8] is the diffusion of innovations within social systems. Rogers defines adoption as: a decision to make full use of an innovation at the best course of action available. The perceived attributes of innovations *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability* are expected to influence the adoption and diffusion rate of the innovation within the social system. These attributes have been used in many studies concerning the adoption of (inter) organizational information systems. Several researchers however question the applicability of the theory for studying organizational adoption of the adoption of complex inter-organizational systems. Henriksen [5] e.g. concludes that these attributes mainly address internal issues of the innovation from the point of view of voluntary adoption based on perceived needs and preferences. On the contrary, the adoption of high impact e-services is influenced by external (legal) power issues and the organizational willingness to invest in a relationship with governmental organizations. This is one of the reasons researchers use richer adoption models while studying the adoption of complex inter-organizational information systems.

Technology-Organization-Environment model

Tornatzky and Fleischer [15] have developed such an alternative model to study the adoption of technological innovations by organizations. The model contains three variables influencing the adoption decision making process, see figure 1. The *environmental context* is specified by the business sector, governmental influence and competitors. The *organizational context* consists out of the adoption firm size, leadership, formal structure and quality of personnel. The *technological context* is divided into variables addressing the available infrastructure and technology and indicates the degree to which the organization is willing and capable of adopting the technological innovation.

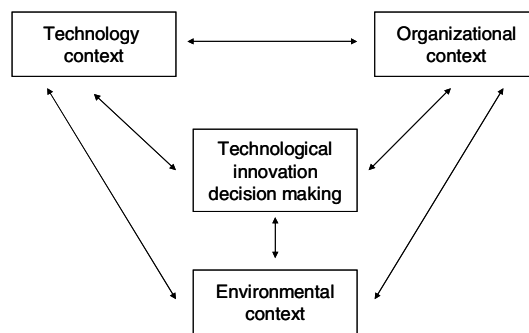


Fig. 1. The Technology-Organization-Environment model, source: [15]

At the beginning of the 21st century several studies have been using and refining this Technology-Organization-Environment model [5]. Kuan and Chau [11] show that adopters experience a higher governmental pressure than the non-adopting firms. Chau [16] in the same research domain concludes *influence by the government* does not hamper adoption. Zhu et al. [17] have based their Electronic Business Adoption Model on Tornatzky and Fleischer's model. They conclude that *firm size* is a significant adoption factor. They also show *competitive pressure* has a significant positive relation with the decision to adopt.

Adoption Model for Electronic Data Interchange Systems

Iacovou et al. [18] have developed a model focussing on the adoption of inter-organizational systems and more specifically electronic data interchange systems by small and medium scale businesses. The model consists of three factors expected to positively influence the organizations adoption decision, see figure 2. The *perceived benefits* are a specification of Rogers' innovation characteristic relative advantage. *Organizational readiness* refers to the degree to which means are available in terms of financial resources and IT knowledge and experience. *External pressure* relates to the specific inter-organizational character of the system in which dependency, power and trust between partners play a role. The applicability of the framework is empirically demonstrated using the results of seven case studies.

Van Heck and Ribbers [19] were the first to empirically validate the model with respect to the adoption of edi systems in the Netherlands. Their study shows that with

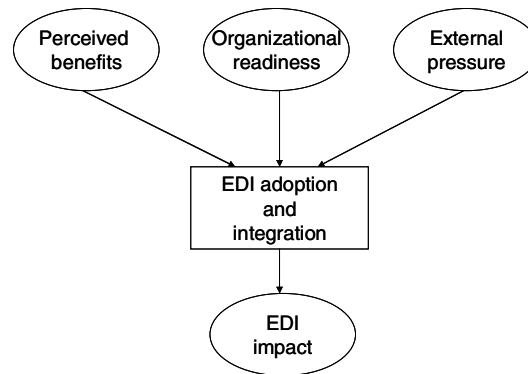


Fig. 2. Adoption model for EDI systems, source [18]

respect to adopters *organizational readiness* has no relation with the adoption decision. The variables *expected benefits* and particularly *external pressure* had a significant positive relation with the adoption decision. Chwelos et al. [20] refined and expanded Iacovou's model. Their empirical study showed that especially *perceived benefits, financial resources and IT sophistication* had a positive relation with the adoption decision. Grandon and Pearson [21] expanded the model towards application and adoption of e-commerce by SME's. Opposite to their expectation *organizational readiness* appeared not to be an explaining adoption factor. *External pressure* was an explaining factor for the decision of SME's to adopt e-commerce.

4 Research Methodology

In the study presented in this paper we chose to build upon Chwelos' elaborated version of Iacovou's adoption model. We consider Chwelos' model as a more detailed specification of the technological, organizational and environmental aspects of Tornatzky and Fleischer's model. Our *research model* consists out of three explaining variables: external pressure, perceived benefits and organizational readiness. External pressure is specified in terms of the factors governmental pressure and competitive pressure. Organizational readiness is specified in term of the factors adopter characteristics, IT-readiness and financial readiness. We hypothesised that the three explaining variables have a positive relationship with the decision to adopt a high impact governmental e-service.

The operationalisation of the items competitive pressure, perceived benefits, adoption decision, IT readiness and financial readiness has been based on Chwelos' validated questionnaire [20]. Specifically for our research we added questions with regard to governmental pressure, adopter characteristics and perceived disadvantages (opposite to the perceived benefits). *Governmental pressure* has been divided into items stimulating (positive stimuli) and regulating (negative stimuli) the adoption decision. Positive stimuli are e.g. the distribution of free software, technical support or adequate information provision. Regulating measures are e.g. lower quality of service of paper procedures and the legal obligation of electronic data delivery.

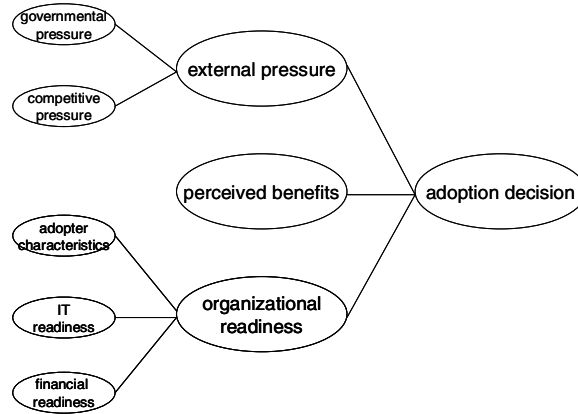


Fig. 3. The research model

Adopter characteristics have been modelled in terms of firm size and the degree of outsourcing of administrative tasks. *Perceived disadvantages* have been partially based on Rogers’ attributes compatibility and complexity [8].

The reliability of the model and related questionnaire due to time pressure has been analysed afterwards. Table 1 presents the Cronbach alpha’s of the research variables.

Table 1. Reliability of the items

Research variables	Cronbach’s α
Governmental pressure	0,898
<i>Stimulation</i>	0,948
<i>Regulation</i>	0,619
Competitive pressure	0,890
Perceived benefits	0,984
Financial readiness	-
Adopter characteristics	-
IT readiness	0,937
Adoption decision	-0,24

The reliability of the variable adopter characteristics as a construct could not be calculated. In the analysis process we used the results of the separate items firm size and outsourcing. The variable financial readiness didn’t contain sufficient useful scores. No further statistical analysis have been executed based on this variable. The (sub) factor regulation scores within the grey reliability zone between 0,6 and 0,7. We chose to include this sub factor in some of our statistical analyses.. Because of the low correlation of the sub-constructs it was not possible to compose the variable adoption decision into one construct. As a consequence we had to use the separate items in the analysis process. The other variables show high reliability scores.

Correlation analysis showed (very) strong relations between the variables stimulation, regulation, perceived benefits and IT-readiness. These relationships can

be explained by the frequent appearance of ‘benefits’ in the related questions. By the way, a similar correlation appears between the variables IT sophistication and perceived benefits in the underlying model by Chwelos [20]. This is not reported in their research paper.

The *population of our survey* consisted of importing and/or exporting companies with a yearly turnover of more than 400.000 euro, 25.000 companies in total. The source of our data collection was the Dutch statistics department’s file with business respondents to their survey of international trade statistics in 2004. Based on the EU Intrastat system and the directive 638/2004 on intracommunautary statistics businesses are obliged to file trade related statistics to their domestic statistics department. The Dutch statistics department developed a specific software system Interactive Registration of International Trade Statistics (IRIS). This high impact e-service has been the specific research object of this study. Our research population had been separated into groups of IRIS users (adopters) and users still using paper forms (non-adopters). Following a procedure of aselect sampling we selected 105 businesses which we invited to participate in our survey. The total response at the end of the data collection phase was 25%: 26 completed forms, 16 of which by adopters and 10 by non-adopters. The respondents can be categorized by firm size, see table 2.

Table 2. Respondents firm size, n=26

Firm size (employees)	Respondents (amount)	Respondents (%)	Businesses (Dutch %)³
0 till 4	2	8 %	85%
5 till 9	5	19%	6%
10 till 49	7	27%	7%
50 till 99	7	27%	1%
100 or more	5	19%	1%

Eighteen of the twenty-six respondents are industrial companies. The response shows an overweight of medium sized (10 till 99 employees) and large companies, related to the overall Dutch spread of business. One explanation can be found in the characterisation of the total population: companies executing international activities with a yearly turnover of more than 400.000 euro are in most cases ‘larger’ companies. An other explanation could be the fact that smaller companies didn’t have/take the time to respond to our questionnaire.

5 Results

The data collected have been analysed with the SPSS program. Caused by the low response rate a total path analysis on the relations within the model, as conducted by Chwelos et al. [20], could not be executed. This research therefore has a qualitative and exploring focus.

³ Based on a total number of 720.000 business in the Netherlands in 2005: www.statline.cbs.nl.

Perceived Benefits

Variance analysis does not indicate statistical differences between the groups adopters and non-adopters with respect to the variable perceived benefits. The absolute scores of both groups to the questionnaire however differ clearly. The adopters score above the average⁴ $x_{avg}=4$, indicating most benefits have a slight positive effect on the adoption decision. Especially *direct benefits* like e.g. reduction of data entry, less paper work, higher accuracy and more ease of use ($x_{avg}=5,07$) have the highest scores.

Within the sample only the item *perceived disadvantages* in the variance analysis indicates a significant difference between the groups adopters and non-adopters ($F=6,55$, $p < 0,05$). The individual scores in the questionnaire show that perceived disadvantages have a greater influence on the adoption decision of non-adopters than on the adopters' decision. Non-adopters indicate they have been influenced by perceived disadvantages not to adopt. The disadvantages 'too complex' ($x_{avg}=6,00$) and 'compatibility problems' ($x_{avg}=5,80$) have the highest average scores and the highest impact on the decision not to adopt.

Firm Size

Table 2 showed that 27% of the respondents is a small company (0 till 9 employees), 54% is a medium sized company and 19% is a large company with 100 or more employees. In table 3 adopters and non-adopters are compared with regard to their firm size.

Table 3. Firm size of adopters and non-adopters.

Firm type	No. of employees	Adopters	Non-adopters
Small scale	0 till 4		2
	5 till 9	2	3
Medium scale	10 till 49	2	5
	50 till 99	7	
Large scale	100 or more	5	

Adopters are statistically significantly larger than non-adopters⁵. The groups adopters and non-adopters also differ significantly⁶ in the degree to which they outsource administrative tasks: non-adopters outsource more (6 out of 10 respondents) than the adopters (1 out of 16 respondents). Six out of the seven outsourcing respondents are small companies, indicating that all but 1 small business respondents outsourced their administrative tasks.

IT-readiness

Non-adopters perceive their IT-readiness as being 'neutral' whereas adopters perceive their IT-readiness as being 'reasonably mature'. Both groups differ in the degree to which they expect IT to contribute to business goals. Adopters score higher on all suggested goals. The largest difference concerns the expected contribution of IT to *cost reduction*. Adopters score this item as being a 'very important' contribution of IT

⁴ In the used Likert-scale of 1 till 7 $x_{avg}=4$.

⁵ $p=0.0002$; the related t-test has been executed based on data presented in table 3.

⁶ $p=0.003$, based on chi square test.

($x_{avg}=6,29$); non-adopters score more average ($x_{avg} =4,78$). This is a statistically significant⁷ difference.

Governmental pressure

Adopters and non-adopters differ in the degree to which they perceived *pressure to adopt* by the statistics department. The options in table 4 are ranked in a climbing order of pressure.

Table 4. Perceived governmental pressure, n=25⁸

Perceived pressure	Adopters	Non-adopters
No encouragement	5	1
Received information	8	1
Stat.dep. advised adoption	2	2
Stat.dep. asked to adopt	1	5
Benefits offered	-	-
Disadvantages if non-adoption	-	-

Non-adopters clearly perceived a stronger pressure to adopt the IRIS system than adopters. This difference is significant⁹. Figures indicate that in most cases adoption was voluntarily: adopters hardly perceived any encouragement, instead the receiving information proved in most cases to be sufficient. Despite a higher perceived pressure to adopt, non-adopters however do not adopt. This higher perceived degree of pressure can also be explained as being an effect of the non-adoption decision itself. Non-adopters in 2004 and 2005 became subject of new and focussed 'promotional' actions by the statistics department whereas adopters after their voluntary adoption were not 'pressured' anymore.

Next to that respondents have been asked to indicate the degree to which *stimulation and regulation* had influenced their decision to (non)adopt this governmental e-service. Adopters more than non-adopters perceived all stimulating and regulating items to influence their adoption decision. Non-adopters e.g. score all but one items below the average $x_{avg} =4$. Non-adopters distinguish however the *stimulating* item 'user and systems management support', which they score with $x_{avg} =4,50$ above the average. The less IT-ready non-adopters apparently are best influenced by stimulating measurements that support their weak spots in stead of measurements that impose extra pressure. This could also be part of the explanation of the strong correlation between the variables IT-readiness and stimulation.

The *regulating* item 'difficulties obtaining a license' showed the largest gap between the group scores. This measure seems to influence adopters the most ($x_{avg}=5,30$) whereas its influence on non-adopters is the least of all ($x_{avg}=3,50$). This example illustrates again the fact that higher pressure does not positively influence the adoptions decision of non-adopters.

⁷ $p=0,08$, the related t-test has been based on the underlying individual answers to the related item in the questionnaire.

⁸ The data of one of the non-adopters on this item of the questionnaire could not be used in further analysis; leaving 25 useable scores.

⁹ $p=0,01$, the related t-test been based on the underlying individual answers to the related item in the questionnaire.

Competitive pressure

Competitive pressure is not perceived to influence the adoption decision by one of the groups. Both groups indicate that these kind of governmental e-services do not support their competitive advantage ($x_{avg}=2,00$ and $2,22$). Adopters and non-adopters did not perceive imposed pressure by their competitors to adopt this kind of e-services ($x_{avg}=1,62$ and $2,00$). Chwelos et al. [20] in their study on the contrary show that competitive pressure was one of the best explaining variables of the decision to adopt inter-organizational edi systems. An explanation is the fact that Chwelos' study had been conducted in the commercial business-to business environment whereas our study has been executed in the non-commercial business-to-government context.

6 Conclusions

In this research we formulated and tested the hypothesis that perceived benefits, external pressure and organisational readiness have a positive relation with the decision of SME businesses to adopt high impact governmental e-services. Due to a low response rate were we not able to execute a statistical path analysis on the research model. New studies can address this open issue. The qualitative and supporting statistical analysis however provide us with first insights into the adoption behaviour of businesses in the business-to-government context.

1) Adopters perceive a significant higher contribution of the use of IT in general to their ability to cost reduction. The item *perceived disadvantages* significantly differentiates the group adopters and non-adopters: non-adopters perceive more disadvantages especially in terms of complexity and compatibility.

2) In most cases adoption appears to be a voluntarily decision. Non-adopters perceive a significant stronger pressure from the statistics department to adopt than adopters. These non-adopters perceive the most influence of stimulating measurements relating to user and systems management support.

3) Contrary to the results of Van Heck and Ribbers [19] and Grandon and Pearson [21] this research shows *organisational readiness* to be the most impacting adoption factor. The strongest evidence in this research indicates the fact that non-adopters are not able to adopt these kind of high impact governmental e-services. Non-adopters are smaller than adopters and more often outsource administrative tasks than adopters. These companies perceive more disadvantages than adopters and indicate the need of assistance on their weaknesses: systems management and use. The stronger perceived governmental pressure does not motivate non-adopters to take the adoption hurdle.

The results of this study in that respect confirm the findings of Chau's study within the governmental context [16]. Chau concludes that "the ability to adopt is more important than the benefits of the adoption" In his research hampering factors for adoption were "lack of knowledge and skills, unsatisfactory internal IT support and non-positive attitude towards adoption". Despite a bias to larger organisations in our study, we draw similar conclusions. We in fact suspect that in reality these factors in case of smaller companies will be even more obvious.

Comparison of these results with findings in the B-to-B context, see e.g. paragraph 3, leads to the strong suggestion that (especially smaller) businesses follow another

adoption approach towards governments than towards fellow businesses. Expected benefits and external competitive pressure seem important adoption factors in the B-to-B context. The competitive factor stimulates businesses to follow an *offensive strategy*: companies have to invest to gain benefits, to be competitive and to remain a business partner. Within the B-to-G context companies on the contrary seem to tend to a more *defensive strategy*. A lack of organisational readiness makes them reluctant to invest in the use of high impact governmental e-services and thereby in a long term relation with governmental organisations. Given the fact that in many cases governmental organisations are the ones gaining from the use of high impact services, the tendency will grow to legally enforce adoption rather than seduce businesses.

7 Implications

This research presents a first version of an instrument supporting the analysis of the adoption of high impact governmental e-services, founded in the theory of the management of information systems and the adoption of innovations. The empirical studies can be regarded as a usability test within the context of the business-to-government relation, not performed before.

To practitioners these findings implicate that the introduction of high impact government e-services is not an easy job. Next to internal governmental barriers there is a business related hurdle to take: the readiness of small and medium scale companies. This research challenges those involved to develop alternative adoption strategies. In our opinion three important elements must be part of those strategies: (1) a clear segmentation of businesses involved, (2) a clear and objective elaboration of benefits to be gained by individual businesses, (3) the role of intermediary business organisations. Examples in Scandinavian countries show how these intermediary parties can help to bridge the gap between governments and individual businesses.

To scientists this study provides a new research model and empirical findings on the basis of which further research can be founded. The model could e.g. be tested in another business-to-government domain or could be elaborated with variables concerning the role of software distributors, the availability of open standards or trust in government. The aspect of trust in this context has hardly been studied. Our second recommendation for further research concerns the usability of segmentations, the channel preferences of businesses and the impact of the use of specific channels on e.g. the administrative burden of businesses.

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