

What Are The Determinants Of The Attitude Of Civil Servants Toward Using e-Public Procurement? - The case of Belgium

1. Introduction

The current organizational environment in all sectors, including the public sector, has become increasingly volatile, difficult to control and completely uncertain. Globalization, restructuring and new technology developments have brought tremendous challenges marked by the short life of products, exacerbated competition and clients who are becoming increasingly more demanding. Thus, today, due to the influence of these multiple changes at all levels, organizations need to adopt a continuous readaptation process to survive in this changing world (Choi & Ruona, 2011; Reginato *et al*, 2016).

One of the major changes that took place in the public sector is digital transformation, such as technologies of e-procurement and online tax filing. In fact, currently, to communicate with a new generation of citizens who never knew a world without Wi-Fi and social media, public organizations have no choice but to incorporate new technologies into their operations and processes (Heinze *et al.*, 2018). Digital transformation is also dictated by budget cuts and calls for more efficiency in public services. However, digital transformation entails a range of immediate and extensive impacts on public-sector organizations. The transformation remodels organizational processes, work tasks, job design, organizational structure, knowledge and skills, values, attitudes and the behavior of employees (Gurtoo & Tripathy, 2000; Hon *et al.*, 2011). For these reasons, the success of digitalization projects is tremendously determined by their sincere and wholehearted adoption by an organization's members (Gurtoo & Tripathy, 2000). Hence, public organizations need to pay particular attention to their employees' support and acceptance of digital transformation (Choi & Ruona, 2011).

What are the determinants of the attitude of civil servants toward the adoption of digitalization projects? In this article, this research question is addressed with a case study on the digitalization of public procurement in Belgium.

Public procurement refers to “*the purchase by governments and state-owned enterprises of goods, services and works*” (OECD, 2017). Given that public procurement accounts for a substantial portion of taxpayers’ money, governments need to carry it out efficiently and with high standards of conduct to ensure high quality service delivery and safeguard the public interest (OECD, 2017). The dematerialization of public procurement is one of the most innovative public management initiatives in Europe today (Alomar & De Visscher, 2019). It can be defined as “*the integration of digital technologies in the replacement or redesign of paper-based procedures throughout the procurement cycle*” (OECD, 2017). Given this definition, e-procurement represents a radical change for civil servants in charge of public procurement procedures (public buyers). Since governments want to accelerate the digital transformation of public procurement by minimizing public buyers’ resistance to change, it is important to identify and analyze the determinants of buyers’ attitudes toward accepting e-procurement.

The added value of this article is threefold. Theoretically speaking, on the one hand, the author contributes to the limited and scattered academic evidence about e-procurement adoption in the public sector. Although a rich body of literature exists regarding the organizational adoption decisions of e-procurement systems and their impact on organizational performance, little is known about the factors that affect the adoption of these systems by civil servants. Moreover, e-procurement digitalization is a type of digital transformation occurring in public organizations: by identifying the determinants of civil servants’ attitudes toward adopting e-procurement, the author contributes to the subfield of

public administration and public management research that examines digital transformation processes.

Practically speaking, the results of this article are useful for practitioners involved in the transformation of public procurement. There is a practical need to investigate and analyze the attitude of public buyers toward e-procurement in Belgium to promote the wholehearted use of the new system and thus to minimize sabotage and the unfaithful appropriation of technology, as well as the resulting costs associated with such behaviors. This is also crucial to ensure improved organizational effectiveness in this important field, which is increasingly seen as a strategic tool for achieving key policy objectives, from budget accountability to spending efficiency.

This article will follow the usual structure in which the conceptual and theoretical basis of this study—inspired by the literature on technology acceptance and innovation diffusion—will first be presented. In the next section, the study context and methods will be described; the test of the theoretical model is based on the triangulation (Creswell, 2006) of the data resulting from a quantitative survey and a focus group of Belgian public buyers involved in the digitalization of public procurement. From the analysis of the data, the author draws some conclusions and suggest an agenda for future research.

2. Concepts & Theory

With the growth of technology needs in the 1970s and the increasing failures caused by users' resistance, predicting digital systems acceptance and adoption has drawn the attention of many researchers (Chuttur, 2009). Based on Reasoned Action Theory (RAT) and Planned Behavior Theory (PBT), Davis (1985) developed the Technology Acceptance Model (TAM).

According to Davis's (1989) Technology Acceptance Model (TAM), three main factors can explain the user's motivations to adopt a given system, namely, the user's attitude toward

adopting the system, the perceived usefulness of the system, and the perceived ease of the system's use (Chuttur, 2009). While attitude is the main determinant of a user's adoption of a given system, it is influenced by perceived usefulness and perceived ease of use. These two beliefs are in turn influenced by external variables such as system characteristics.

Some researchers have suggested focusing on the behavioral intention to use technology rather than on attitudes (Koh *et al.* 2010). Davis *et al.* (1989), in particular, found that perceived usefulness and perceived ease of use have a direct influence on the intention to use. Others, however, argue that replacing attitudes with behavioral intentions to use is not a suitable solution, especially in mandatory settings, i.e., when the use of technology is compulsory (for legal reasons, for example). Koh *et al.* (2010), in particular, found that "captive users' attitudes toward system use play a pivotal role while intention to use loses much of its explanatory power." In mandatory contexts, removing the attitude construct can lead to an inaccurate representation of the phenomenon (Yousafzai *et al.*, 2007). Captive users must use the system regardless of their intention; thus, the relations between intention and use, on the one hand, and attitude and use, on the other hand, are not necessarily correlated (Koh *et al.* 2010).

Many researchers have successfully applied the technology acceptance model in various empirical contexts, such as mobile banking (Lule *et al.*, 2012), learning management systems (Alharbi, 2014), and e-learning (Park, 2009). Thus, researchers have tried to enhance the model's explanatory power by testing new variables such as subjective norms, image, job relevance, output quality, etc. Over time, the technology acceptance model has become a leading model in predicting and explaining technology acceptance and use (Chuttur, 2009). In the research presented in this article, the technology acceptance model is used to account for the attitude of Belgian public buyers toward the digitalization of public procurement.

Our research model builds on theoretical developments in the field of technology acceptance presented above as well as on exploratory interviews held with six experts in public procurement, e-procurement and information technology in Belgium (see Appendix I). The research model relies on seven main constructs, whose definition and theoretical basis are summarized in Table 1. In the remainder of this section, the author introduces the research hypotheses linking these constructs to each other before depicting the research model in Figure 1.

Table 1: Definition and theoretical basis of the variables of the research model

Variable	Definition	Theoretical basis
Attitude (AT)	<i>“An individual’s positive or negative feelings about performing the target behavior”</i> (Fishbein & Ajzen, 1975)	Reasoned Action Theory TAR (Fishbein & Ajzen, 1975); Technology Acceptance Model TAM (Davis, 1989)
Perceived Usefulness (PU)	<i>“The degree to which a person believes that using a particular system would enhance his or her job performance”</i> (Davis, 1989)	TAM (Davis, 1989)
Perceived Ease of use (PEOU)	<i>“The degree to which a person believes that using a particular system would be free from effort”</i> (Davis, 1989)	TAM (Davis, 1989)
Facilitating Conditions (FC)	<i>“The degree to which an individual believes that an organizational and technical</i>	MAT3 (Venkatesh & Bala 2008); Unified Theory of Acceptance

	<i>infrastructure exists to support the use of a particular system”</i> (Venkatesh et al., 2003)	and Use of Technology UTAUT (Venkatesh et al., 2003); Model of PC Utilization MPCU (Thompson et al, 1991)
Employees Involvement (EI)	<i>“The behavioral engagement of users in information system development activities”</i> (Kappelman, 1995)	(Kappelman, 1995); (Barki & Hartwick, 1994); (Rahim, 2008); (Cosentino & Johnson, 2008)
Subjective Norms (SN)	<i>“A person’s perception that most people who are important to him think he should or should not perform the behavior in question”</i> (Fishbein and Ajzen 1975).	Reasoned Action Theory, (Fishbein et Ajzen, 1975); (Mathieson, 1991); MAT2 (Venkatesh et Davis, 2000); UTAUT (Venkatesh et al., 2003)
Compatibility (COM)	<i>“The degree to which using an innovation is perceived as consistent with the existing sociocultural values and beliefs, past and present experiences, and needs of potential adopters”</i> (Rogers, 1995)	(Rogers, 1995); (Karahanna et al., 2006); (Moore et Benbasat, 1991); (Taylor & Todd, 1995)

Perceived Usefulness (PU):

According to the original version of the TAM, perceived usefulness is one of the most important determinants of the attitude toward use. Davis (1989) defined it as the extent to which the user believes that using a system will improve his or her work performance. Several previous studies have shown that perceived usefulness positively influences attitudes toward using a system, such as in a field study conducted in the banking industry (Brown *et al.*, 2002) and in an empirical study of e-public procurement adoption by enterprises in Belgium (Alomar & de Visscher, 2017). The author therefore formulates the first hypothesis as follows:

H1: Perceived usefulness has a direct positive effect on the attitude of public buyers toward using e-procurement.

Perceived Ease of Use (PEOU)

Perceived ease of use represents, along with perceived usefulness, the core of the technology acceptance model. Davis defined perceived ease of use as the degree to which a user believes that using a system is devoid of effort. The original version of the TAM assumed the existence of a direct influence of perceived ease of use on attitude (Davis, 1989). This relation has been supported empirically by many previous studies, such as those of Aboelmaged (2010) in the field of e-procurement, Yu (2012) in the field of mobile banking and Hammouri *et al.* (2021) in health insurance administration. Therefore, the second hypothesis can be stated as follows:

H2: Perceived ease of use has a positive direct impact on the attitude of public buyers toward using e-procurement.

System Compatibility (COM)

Several previous studies have examined and confirmed a significant relationship of compatibility with attitudes toward using a system, such as Kamarulzaman *et al.* (2013) and Kassim & Hussin (2013) in the field of e-procurement in Malaysia and Kanchanatane *et al.* (2014) using a questionnaire-based field survey of 430 participants in the field of e-marketing. Following our exploratory interviews and for the purposes of our study, we adapted the definition of compatibility as follows: "the extent to which e-procurement is perceived to be compatible with the needs and past experiences of public buyers." To test the impact of this factor, the author states the third hypothesis as follows:

H3: Compatibility has a direct positive impact on the attitude of public buyers toward using e-procurement.

Facilitating Conditions (FC)

This factor has been mentioned by several studies as a determinant of the behavioral intention to use or of actual use behavior (Venkatesh *et al.*, 2003; Dwivedi *et al.*, 2019; Kai Kit *et al.*, 2021). However, to the best of our knowledge, no studies have examined the potential relation between facilitating conditions and attitudes toward using a new system. For the purposes of this study, FC refer to the availability of resources, technical support and adequate training to help public buyers better use e-procurement. We suggest that FC can encourage a positive attitude among public buyers toward using an e-procurement system. Thus, the author decided to integrate this variable into the research model to examine its impact:

H4: Facilitating conditions positively influence the attitude of public buyers toward using e-procurement.

Subjective Norms (SN)

Subjective norms relate to the impact of the social environment on behavior. SN were proposed as a direct determinant of intention by the theory of reasoned action (Fishbein &

Ajzen, 1975) and the theory of planned behavior (Ajzen, 1985). Both theories represent a key theoretical basis for the initial development of the TAM. Subsequently, SN were used by many studies in the field of technology acceptance, such those by Venkatesh and Davis (2000), Venkatesh et al. (2003), Venkatesh (2008), etc. In these studies, a significant impact of SN on the behavioral intention to use a system was confirmed. However, as in the case of FC, the relation between SN and attitudes has not been examined. The author therefore states the fifth hypothesis as follows:

H5: Subjective norms have a positive influence on the attitude of public buyers toward using e-procurement.

Employee Involvement (EI):

Employee involvement has been identified in the literature as one of the main factors that influences the acceptance and use of technology. In his qualitative study on e-procurement adoption by municipal employees in Australia, Rahim (2008) mentioned that active *EI* in the e-procurement system implementation process has a positive impact on the system's adoption by employees. This was justified by the fact that *EI* basically gives employees a feeling of ownership toward the new system and consequently reduces their resistance to change. In our context, *EI* refers to the availability of information about a system on the one hand and the active participation of public buyers in development on the other hand. On this basis, the sixth hypothesis can be formulated as follows:

H6: Employees' involvement will have a positive effect on their attitude toward using e-procurement.

Age and experience

The relation between age and experience and technology acceptance has been mentioned and examined in multiple ways in several previous studies. Some works have examined and confirmed their effects as moderating variables that influence the relationship between the

intention to use and some of its determinants, such as ease of use, subjective norms and facilitating conditions (Venkatesh and Davis, 2000; Venkatesh et al. 2003; Venkatesh, 2008; Yu, 2012; Venkatesh et al., 2012). Lu *et al.* (2006) examined and rejected the direct effect of age on the intention to use. The author decided to integrate these variables into his research model to test their potential direct influence on the attitude of public buyers toward using e-procurement. Therefore, he proposes the following hypotheses:

H7: The older the public buyer is, the less positive his or her attitude toward using e-procurement will be.

H8: The longer the public buyer's experience with e-procurement is, the more positive his or her attitude toward using e-procurement will be.

Figure 1: Here

3. Context and methods

3.1- The empirical context: e-procurement in Belgium

Since 2005, the Federal Public Service Policy and Support has developed many e-procurement applications to enable public buyers and companies to digitize public procurement procedures such as e-notification, e-tendering, and e-awarding. In recent years, these efforts have led to a significant increase in e-procurement use among public buyers and businesses. However, Belgium is still lagging behind, both with regard to its own objectives and at the European level (OECD, 2017). The new public procurement law of 17 June 2016 entered into force and transposed new European Directives 2014/24/EU and 2014/25/EU. According to the new directives, the use of e-procurement has become mandatory since October 2018. Hence, public buyers are obliged to follow the digitalized procedures starting

from this date. However, our interest in examining the determinants of public buyers' attitude toward using e-procurement can be justified by the fact that *“employees who do not wholeheartedly accept the innovation can delay or obstruct the implementation, and resent, underutilize or sabotage the new system (...). [Therefore], understanding mandated use lies in the desire to minimize sabotage and unfaithful appropriation of technology, and the resulting costs to organizations associated with such behavior”* (Brown et al, 2002).

3.2- Research design

This research involved three steps of data collection and analysis. First, an electronic survey on the attitude of public buyers toward using e-procurement (dependent variable) as well as on its determinants (independent variables) was sent to a random sample of 2000 public buyers at all levels of the Belgian government. The respondents were asked to express their degree of agreement or disagreement with 28 questions using a 7-point scale, where 1 = strongly disagree, 4 = neutral, and 7 = strongly agree. The relevance and semantic content of the questions were revised with three experts in public and electronic procurement. The questionnaire was drafted in two versions, French and Dutch, the two official languages of Belgium, and then uploaded to the internet using Google Drive services. To obtain an acceptable response rate for the questionnaire, the author limited the number of his questions to the minimum possible. For this reason, our study is not able to practically examine the influence of all the variables included in the original TAM and its extensions. Thus, we had to select the most important and relevant variables for our case study. The selection of these factors was made on the basis of six exploratory interviews held with experts in public procurement and information technology. During these semistructured interviews, the author discussed the pertinent literature and empirical context and then identified the most important potential factors that may influence procurement adoption by public buyers. The research model was able to explain approximately 60% of the total variability in public buyers'

attitudes toward using e-procurement, which means that the selected factors were important. Table 1 relates each variable of the survey with its definition, theoretical basis and measurement scale, while the survey questionnaire is presented in Appendix II. Second, a focus group with the main stakeholders involved in the digitalization of public procurement in Belgium was organized. As Morgan (1998) mentioned, the focus group approach is essentially a method of listening to people and learning from them. The method combines three of the common strengths of qualitative research methods, namely, exploration and discovery, context and depth and interpretation. Our focus group aimed to answer two main questions: (1) *What is the attitude of public buyers toward using e-procurement?* (2) *How can we explain this attitude? How can we promote a more positive attitude among public buyers toward using e-procurement?*

Following our exploratory interviews and expert advice, a panel representative of all actors involved in the digitalization of public procurement at the federal, regional and local levels was established and invited to the focus group. Only one focus group and session were realized. The session lasted approximately two and half hours (see Appendix 3). An external moderator mediated the focus group. One session was held. The data were thematically analyzed (Paillé & Mucchielli, 2016): we summarized and processed the data to respond, step by step, to the research questions. To do so, we decomposed the data into “themes” and sometimes into “subthemes” with NVivo version 11. We proceeded as follows. First, we took all the factors that were identified in the quantitative part of this work and created a node (i.e., a collection of references about a specific theme) with the same name for each factor. Each time a citation related to one of these themes was found, it was coded in an adequate node in NVivo. Similarly, each time we found other themes related to our research question (i.e., themes that were not identified in the quantitative part of this research), we created a new node. Each factor mentioned in the discussion was considered qualitatively validated under

the condition that it was not rejected or contested by other participants. A list of themes representing factors of the attitude of public buyers toward using e-procurement resulted from this process at the end of the day. Third, the findings resulting from the survey and focus group were triangulated (Creswell, 2006) to increase the range of determinants identified by the study as well as to assess their robustness. Creswell (2003) proposes several types of mixed methods models, such as triangulation, complementarity design and explanatory design. Triangulation consists of obtaining different but complementary data on the same subject to better understand the given research problem. The complementarity design is used to answer different questions that require the collection of data of a different nature. In explanatory designs, one methodology is followed by others to explain what was found in the first place.

Although these models are interconnected, we believe that the triangulation model is the most adequate in our research case. According to Denzin (1978), methodological triangulation can be defined as “using more than one research method in measuring the same object of interest, for example, using participant observations as well as questionnaires” (Oppermannt, 2000).

One of the first applications of triangulation in the social sciences can be traced back to Campbell and Fiske (1959). The authors argued that more than one method should be used in the validation process to ensure that the variance reflects that of the trait and not that of the method. Thus, the convergence or agreement between two methods "enhances our belief that the results are valid and not a methodological artifact" (Bouchard, 1976: 268, as quoted by Jick, 1979). The attitude of civil servants toward e-procurement represents a complex and multidimensional phenomenon: it is influenced by factors of a different nature (individual, organizational, technical, financial, political, legal, etc.), for which we must collect data of a different nature, both qualitatively and quantitatively, to understand. In addition, the qualitative part of the research not only aims to explain the quantitative data but also to

supplement them, which makes our method more similar to triangulation than to the explanatory model. This approach has been used and validated by several previous studies in the social sciences, such as those by Risjord et al. (2001) and Berger et al. (2010). The research design is illustrated in figure 2 below.

Figure 2: Here

4. Analysis and results

4.1- Quantitative survey

The test of our research hypotheses is based on the analysis of 220 responses from public buyers in Belgium. While 17 responses were received from the federal level, 146 were received from the local level and the rest were received from the regional level (43 responses) and from some nonprofit organizations subject to the public procurement legislation (14 responses). As we used the database of FPS Policy and Support (BOSA), all the participants were the main users of e-procurement systems within their organizations. This means that all participants had used the e-procurement systems at least once.

To test our hypotheses empirically, a multiple linear regression analysis was performed. However, we took several steps to check for possible violations of the assumptions underlying the analysis.

First, a linearity test was performed. According to our ANOVA table, we find that the values concerning the deviation from linearity are not significant for each of our independent

research variables. Thus, it can be concluded that there is a linear relationship between the dependent variable and the independent variables (see Table 2).

Table 2: Results of the linearity test

Variable	Sig. deviation from linearity
PU	,161
PEOU	,315
FC	,115
EI	,336
COM	,108
SN	,569

Next, a multicollinearity test was performed using the variance inflation factor (VIF) test. As shown in Table 3, the VIF values do not exceed 3, which means that there is no multicollinearity between independent variables (O'Brien, 2007).

Table 3: Multicollinearity test results

Variable	VIF
UT	2,098
FU	1,774
CF	1,513
IE	1,193
COM	1,751
NS	1,712

With respect to normality, the Shapiro-Welk test was performed. The results show that this test did not produce a statistically significant result ($\text{Sig} > 0.05$). Therefore, we can accept the null hypothesis and conclude that the dependent variable is normally distributed.

A factor analysis was performed to confirm our eight independent variables. Based on a valid result from the Kaiser–Meyer–Olkin test (Kaiser–Meyer–Olkin Measure of Sampling Adequacy = .862 – Sig.000)¹, a factor analysis with Varimax rotation was performed. The criteria used to identify factors were that each item should load 0.50 or higher on a specific factor and have a loading equal to or less than 0.35 on other factors (Igbaria et al., 1995). The result of this test confirmed the existence of six factors with eigenvalues of > 1.0 that accounted for 71.40% of the total variance. However, as Table 4 shows, four items did not meet our selection criteria, namely, FC4, SN1, EI1 and COM3. These four factors were not considered when analyzing the data. Our measurement scales were thus found to be unidimensional and factorially distinct.

Table 4: Factorial analysis/Varimax rotation with Kaiser normalization

Items	Component					
	1	2	3	4	5	6
PU1	,799					
PU2	,801					
PU3	,838					
PU4	,786					
PEOU1					,695	
PEOU2					,750	
PEOU3					,778	
FC1		,710				
FC2		,791				
FC3		,776				

¹ A value of greater than 0.60 may be considered sufficient for the application of factor analysis (Hair *et al.*, 1998).

FC4	,112	,494	,299	,316	-,205	-,266
SN1	,230	,105	,557	,578	,121	,025
SN2				,643		
SN3				,664		
SN4				,716		
EI1	,159	,228	,535	,483	,317	-,067
EI2						,830
EI3						,890
COM1			,768			
COM2			,629			
COM3	,514	,228	,555	,206	,179	,072
Eigenvalue	8,71	2,13	1,98	1,58	1,31	1,05
Cumulative % of variance	37,59	49,29	56,47	62,43	67,20	71,40

To ensure the reliability and internal consistency of our measurement scales, Cronbach's alpha was calculated on factor scores. The results obtained show an alpha coefficient above the recommended threshold of 0.70 for each of our scales, except for system compatibility. However, the compatibility of the system has only two items, so the alpha is not very significant in this case (Lederer *et al.*, 2000). In addition, these two items were significantly correlated ($p < 0.001$), so we decided to leave them in the analysis. Table 5 shows the descriptive statistics and Cronbach's alpha results.

Table 5: Descriptive statistics and Cronbach's coefficient alphas

Items/Scales	Average	Std. deviation	Cronbach's Alpha
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AT1	4.286	1.486	,843
AT2	4.855	1.548	
AT3	5.877	1.377	
AT4	5.391	1.385	
PU1	4.750	1.629	,917
PU2	4.832	1.475	
PU3	4.841	1.401	
PU4	5.350	1.501	
PEOU1	4.250	1.343	,793
PEOU2	4.273	1.526	
PEOU3	4.050	1.592	
FC1	3.363	2.012	,792
FC2	4.600	1.921	
FC3	5.886	1.427	
SN2	5.132	1.542	,801
SN3	5.318	1.510	
SN4	4.300	1.666	
EI2	3.786	1.500	,786
EI3	3.736	1.672	
COM1	5.263	1.323	,678
COM2	5.223	1.361	

To test our research hypotheses, a multiple linear regression analysis was performed. As shown in Table 6, the value of $R^2 = 0.592$ means that the independent variables, all together, can account for 59.2% of the total variance in the attitude of public buyers toward using e-

procurement. Perceived usefulness remains the strongest determinant of attitude ($\beta = ,384$, $p < 0.001$), followed by system compatibility COM ($\beta = ,193$, $p = 0.002$), subjective norms SN ($\beta = ,151$, $p = 0.005$), perceived ease of use (PEOU) ($\beta = ,132$, $p = 0.038$) and finally facilitating conditions ($\beta = 0.121$, $p = 0.043$). Thus, we validate Hypotheses H1, H2, H3, H4 and H5. In contrast, we note that the influence of employee involvement (EI) on attitude is not significant ($\beta = ,090$, $p > 0,05$). Hypothesis H6 is thus rejected. By the same token, age ($\beta = -0.003$, $p > 0.05$) and experience ($\beta = -0.078$, $p > 0.05$) do not show a significant influence on the attitude of public buyers toward e-procurement. Hypotheses H7 and H8 are thus also rejected.

Table 6: Regression analysis results

Hypothesis	Coefficient t (β)	t value	Significance (p)	Result
H1: PU	,384	6,054	0,001	Validated
H2: PEOU	,132	2,264	0,038	Validated
H3: COM	,193	3,330	0,002	Validated
H4: FC	,121	1,124	0,043	Validated
H5: SN	,151	2,644	0,005	Validated
H6: IE	,090	1,878	0,262	Nonvalidated
H7: Age	-,003	-0,065	0,948	Nonvalidated
H8: Experience	-,078	-1,527	,128	Nonvalidated

4.2- Results of the focus group

We obtained 27 pages of transcribed discussion and 8 pages of complementary notes. Most of the information discussed during the focus group was strongly related to the objectives of our study. The data were thematically analyzed (Paillé & Mucchielli, 2016) as mentioned in the research design section above. Figure 2 illustrates our results.

Figure 3: Here

4.3- Triangulation and discussion

The analysis of the quantitative data showed that five factors have a significant influence on the attitude of public buyers toward using e-procurement, namely, perceived usefulness, system compatibility, subjective norms, perceived ease of use and facilitating conditions. These five factors could explain 59,2% of the total variance in our dependent variable. In contrast, employees' involvement, age and experience did not show a significant relation with the attitude of public buyers. Concerning the qualitative results, as shown in Figure 2, the participants mentioned 12 factors that can influence the attitude of public buyers, namely, age, political support, a lack of information, attitudes about hierarchy, low-value contracts, resource availability, perceived usefulness, attitudes about businesses, perceived ease of use, the centralization of e-procurement applications, and the imposition of e-procurement use and training. The table below shows the global quantitative and qualitative results.

Table 7: Triangulation of results

Factors	Results of the survey	Results of the focus group
Ease of use	Impact validated	Confirmed
Usefulness of e-procurement	Impact validated	Confirmed

Employees' involvement	Participation in the development of the system	Impact rejected	Not Validated
	Information availability		Validated
Facilitating conditions	Training	Impact Validated	Confirmed
	Availability of resources		Confirmed
Subjective norms	Attitude about businesses	Impact validated	Confirmed
	The position of the hierarchy		Confirmed
	The position of colleagues at work		Not confirmed
System compatibility		Impact validated	Not confirmed
Age		Impact rejected	Validated
Experience		Impact rejected	Not confirmed
Mandatory use of e-procurement		N/A	Validated
Centralization of e-procurement applications		N/A	Validated
Public contract size		N/A	Validated
Political support		N/A	Validated

By comparing the quantitative results with the qualitative ones, we can divide the identified factors into four categories as follows:

- **Factors that were validated quantitatively and then confirmed qualitatively as determinants of the attitude of public buyers toward using e-procurement.** This category includes perceived ease of use, perceived usefulness, facilitating conditions and subjective norms.

Perceived ease of use and perceived usefulness in turn represent the core of the technology acceptance model developed by Davis (1989). Their importance as determinants of public buyers' attitudes has been confirmed by our study quantitatively and then qualitatively. We quote the following:

"The use of electronic tendering has led to greater transparency and consequently to avoiding the risk of errors and corruption" ... "We have saved on paper, printing, copying, time, and so on... all documents are now available online quickly and for free."

"They (the public buyers) think that we need to develop powerful and easy-to-use e-procurement applications..." ... "There are some employees who are afraid of using computer tools... afraid of going online and making mistakes" ...

Furthermore, our study confirms the central position of facilitating conditions in the digitalization process, whereas resource availability and training were mentioned 15 and 6 times, respectively, as the main determinants of the attitude toward e-procurement use among public buyers. Notably, when the focus group moderator asked the first general question of our discussion, *"What are, in your opinion, the main obstacles that can influence the attitude of public buyers toward using e-procurement by public buyers?"*, the first answer was *"the training aspect."* Similarly, participants agreed that resource availability is an important determinant of attitude. However, the participants recognized that e-procurement adoption and use do not require significant technical/financial/human resources. This is why, according to our participants, this

factor does not represent a real concern regarding the actual conditions of work. We quote the following:

“The use of e-notification and e-tendering does not require a high-performance PC... a PC must be equipped with an ID card reader, which costs about ten euros from Media Market... so, I think that there is no financial problem with adopting e-procurement” ... “Regarding human resources availability... I don’t see any problems at this level.”

Regarding subjective norms, our results confirm the importance of the position of the hierarchy on the one hand and the position of the business on the other hand. The participants agreed that the reluctance of businesses, especially small enterprises, might negatively influence the public buyer’s attitude. We quote the following:

“I think that administrations are afraid that companies do not know how to get started” ... “the problem is often at the level of very small suppliers who are afraid to sign electronically... they think that if we go through e-tendering, we can lose our direct contacts with the administrations...”

Consequently, the influence of subjective norms was validated quantitatively and qualitatively. It is therefore crucial to find the necessary means to motivate top managers in public administrations and companies to adopt e-procurement.

Our results thus confirm the results of several previous studies in the field of technology acceptance regarding the importance of these factors as determinants of technology acceptance in different technological contexts, including the public sector (Aboelmaged, 2010; Brown *et al.* 2002; Yu, 2012; Kanchanatane *et al.* 2014).

- **Factors that were validated quantitatively but that were not confirmed qualitatively**, namely, system compatibility. This factor was examined in the quantitative component and showed a significant influence on the attitude of public

buyers. This means that the more a system is compatible with the needs and past experiences of public buyers, the more positive public buyers' attitude toward the system will be and vice versa. This result confirms the findings of many previous studies on the importance of this factor as a determinant of the user's attitude toward technology acceptance (Rogers, 1995; Karahanna *et al*, 2006). However, this factor did not appear in the focus group discussions.

In fact, the absence of a given factor from the focus group discussions does not necessarily mean that it is not an influencing factor. This absence can be justified by the fact that people tend to highlight negative issues that cause them problems rather than mention positive aspects of their work. The general statistics from our survey related to system compatibility support this point of view. Approximately 70% of the participants view the compatibility of the e-procurement system with their needs and experience at work positively. Consequently, we can assume that compatibility is a determinant of public buyers' attitudes; however, it does not present a concern for them in terms of their actual work conditions.

- **Factors that appeared as determinants of public buyers' attitudes during the focus group discussion but were not validated quantitatively.** This group includes the employees' involvement and age.

Concerning age, while many previous studies have confirmed its effects on a user's attitude toward using technology (Yu, (2012); Venkatesh *et al.*, (2012)), other studies have rejected this relation (Lu *et al.* 2006). According to our quantitative results, age did not show a significant influence on the attitude of public buyers toward using e-procurement. The evidence regarding the impact of age thus remains mixed. However, this demographic factor appeared twice as a determinant of attitude during the focus group discussions. Hence, being mentioned two times by only two participants

provides an indication that the impact of age exists but that it is very limited. We quote the following:

“Older people, both in government and at the political level, often do not master computers, which can increase their resistance to change.”

With regard to employees' involvement, the measurement scale consists of two items:

(1) the active participation of employees in the system development process and (2) the availability of information about the system. Although several previous studies have confirmed the importance of this factor as a determinant of technology acceptance (Rahim, 2008), our quantitative results do not reveal any significant relation between public buyers' involvement and their attitude toward e-procurement. However, two participants of our focus group highlighted one of these two items four times during the discussion as the main reason for resistance to change among public buyers, namely, a lack of information. We quote the following:

“I believe that we need to improve the advertising and visibility of e-procurement... there is strong resistance to change because e-procurement is a procedure that people do not know well... they don't dare go forward spontaneously.”

- **New factors appeared during the focus group discussions but were not examined quantitatively.** As mentioned above, to obtain a good response rate, we voluntarily limited the length of our questionnaire. As a result, we were not able to examine all potential factors influencing our dependent variable. Hence, the focus group helped us highlight several important factors not examined in the first part, namely, the mandatory use of e-procurement, the centralization of e-procurement applications on a single platform, low-value public procurement contracts and political support. With regard to the mandatory use of e-procurement, this factor was mentioned nine times by six participants as a determinant of e-procurement acceptance by public

buyers. Participants agreed that imposing the use of e-procurement through regulation can play a positive and crucial role in accelerating the transition to e-procurement. We quote the following:

“I think that imposing the use of e-tendering is a good idea” ...

“I believe that the legal obligation is important. We know now that we must prepare ourselves for the mandatory use of e-procurement... otherwise, we will have problems”...

With regard to the centralization of e-procurement applications on a single platform, nine participants mentioned the importance of this factor. The participants agreed that one of the strengths of the e-procurement implementation strategy in Belgium, compared to those of other countries such as France, is having a single platform for e-procurement. We quote the following:

"We are lucky in Belgium because we only have a single platform."

Moreover, the participants highlighted the advantages of this centralization as follows:

(1) Centralization reduces the costs related to the development and maintenance of these portals. We quote the following: *"... Having multiple e-procurement systems is not cost-effective for citizens or public administrations. All these systems need development and maintenance."* (2) Centralization promotes the use of e-procurement by users. We quote the following: *"The argument that finally convinced entrepreneurs to use e-procurement was that everything is centralized."*

With regard to low-value public procurement contracts, this factor was considered a major obstacle to the transition to e-procurement for several reasons:

Low-value procurement contracts are usually awarded following negotiated procedures without prior publishing. These contracts are hence excluded from article

14 of the law of 17 June 2016, which imposes the use of e-procurement. We quote the following:

"The problem of dematerialization is the low-value contracts, which are generally awarded through the negotiated procedure without prior publication... if we want to find a sandwich supplier for a school for example, we will not publish this on a website."

Participants pointed out that the majority of public contracts awarded by small contracting authorities at the local level are low-value contracts. We quote the following:

"(In small municipalities), almost all public procurement contracts are of low value."

This element can explain an important part of the question of why e-procurement use at the local level has remained very low.

With regard to political support, three participants highlighted the crucial importance of this factor three times during the discussions. The participants agreed that political support may be considered the cornerstone of the digitalization process. We quote the following:

"I think that a decision at the political level is very important" ... "If there is no political decision, we will not be able to make progress" ... "I asked the Flemish Region, 'What do you advise us to do?' and they answered, 'You should start from a political decision with a clear regulation and a global vision.'"

Although our case study focuses on e-procurement in Belgium, this article contributes to our understanding of civil servants' attitudes toward digital transformation processes more globally. While the influence of some identified factors on civil servants' attitudes is exclusively related to the procurement context, such as "low-value public procurement contracts," the impact of other factors, such as usefulness and ease of use, may be generalized

to a variety of digitalization processes. Interesting examples of such factors also include the legal imposition of e-transition, the centralization of all related services into a single platform and political support.

Finally, the positive attitude of civil servants toward new digitalization projects represents an important driver of their success; however, it is not the only driver. Many other factors can impact an e-transition, such as organizational acceptance and environmental impact.

Analyzing these factors may be a very interesting subject for future studies.

5. Conclusion

Change is not easy in any area of life. When changing how an organization functions every day, employees are bound to face challenges. These challenges, if not identified and treated, may create a negative attitude among employees toward using the new system. While in a voluntary adoption context, attitudes have been shown to correlate with the behavioral intention of users and subsequently with use, in mandatory use settings, the user's attitude toward using a technology and his or her intention to use that technology will likely be unrelated. This is justified by the fact that, in mandatory use settings, such as those explored in our case study, employees will use the new system to maintain their jobs regardless of their intention to use. However, they may develop a negative attitude toward the new system. Consequently, employees who do not wholeheartedly accept the new project can delay or obstruct its implementation and resent, underutilize or sabotage the system. That being said, our article focused on the analysis of civil servants' attitudes toward the adoption of digitalization projects and, in particular, e-procurement in Belgium. We relied on a mixed quantitative–qualitative methodology following the triangulation model proposed by Creswell (2006). Based on data gathered from a survey of 220 Belgian civil servants at the federal, regional, and local levels and from a focus group of the main actors concerned in public

procurement digitalization in Belgium, this study qualitatively and quantitatively confirms that digital transformation can be better used by civil servants when they perceive the new digital system as a useful tool that is easy to handle and when they are encouraged by their social referents, especially their hierarchical leaders and by businesses (here, e-procurement clients). Our findings also highlight the importance of facilitating conditions that can help civil servants better learn and understand the new system and its added value to their jobs and organizations (training, effective information diffusion, technical support, etc.).

Our findings show that without imposing an e-transition, things will not progress positively: employees, generally, will not try to use the new system because they do not like to change their work methods. What is interesting here is that while we tried to examine attitudes toward use, we observed that use itself may influence employees' attitude positively. In other words, while initially before using a new system, attitudes toward it may be negative among employees, when they begin to use it effectively (by legal imposition), they may develop a more positive attitude toward it. Thus, we can conclude that part of the attitude toward the use of a new system may be generated by imposing its use. We should, however, insist here on several important points: the usefulness and ease of use of the new system are crucial to helping develop a positive attitude after a system starts to be used. A transitional period in which employees can use old and new methods together with a clear direction toward the mandatory use is thus necessary. Our findings also show that the centralization of all services into a single platform is a crucial element that will help create a positive attitude toward a new system. This is also related to perceptions of the usefulness of the system. By centralizing all services to the same place, employees will find it more useful to enhance their performance and easier to complete their job tasks. Finally, for each digitalization process in the public sector, political support occupies a central role: *"I think that a decision at the political level is very important" ... "If there is no political decision, we will not be able to make progress."*

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Appendix I – Exploratory interviews

1. Christian Henrard: Project manager of Federal Public Service e-procurement in Belgium.
2. Christine Mahieu: Project manager of Directorate-General Digital Transformation – Federal Public Service Policy and Support in Belgium.
3. Danielle Pregardian: Responsible for public procurement at SPI, the Economic Development Agency of Liège Province.
4. Iyad Khaddam (PhD): Specialist in the field of human-computer interaction (computer systems).
5. Legal advisor: Specialist in public procurement at the Belgian Building Agency (Régie des Bâtiments).
6. Director at PwC Belgium: Specialist in public e-procurement.

Appendix II – Survey

1. What is your age?

2. How many years of experience do you have with the e-procurement system?

- Less than a year
- Between one year and two years
- More than two years

3- What is the name of your organization?

4- Perceived usefulness (PU): adapted and operationalized from Davis (1989), Venkatesh & Bala (2008) and Venkatesh *et al.* (2012)

- Using the e-procurement system allows me to accomplish my tasks faster
- Using the e-procurement system reduces the risk of errors in my work
- Using the e-procurement system improves my efficiency at work
- In general, I find that using the e-procurement system is useful for my work

5- Perceived ease of use (EU): Adapted and operationalized from Davis (1989), Venkatesh & Bala (2008) and Venkatesh *et al.* (2012).

- I find that interacting with the e-procurement system does not require much effort from a mental (intellectual) point of view
- My interaction with the e-procurement system is clear and understandable
- In general, I find that the e-procurement system is easy to use

6- Facilitating conditions: adapted and operationalized from Venkatesh *et al.* (2012).

- I have the material resources to use the e-procurement system
- I have received adequate training to learn how to use the e-procurement system
- One person in particular (or a group) is available to help me in case of difficulties with using the e-procurement system
- In general, I think that the organizational environment supports the use of e-procurement

7- Subjective norms (SN): Self-developed based on the literature, especially the studies of Venkatesh & Bala (2008) and Venkatesh *et al.* (2012).

- The top management team of my organization encourages me to use e-procurement
- My direct supervisor is in favor of using the e-procurement system
- My coworkers think that I should use the e-procurement system
- Public procurement customers (companies) want us to use the e-procurement system

8- The involvement of employees: Self-developed and inspired by the study of Kappelman (1995).

- I am well informed about the implementation steps of the e-procurement project
- I can make proposals concerning the development of the e-procurement project
- I think that my proposals will be considered by decision-makers when making decisions

9- Compatibility of the system: Adapted and operationalized from Karahanna *et al.* (2006).

- The use of the e-procurement system is compatible with the procedures I am used to following in the context of public procurement
- The e-procurement system is compatible with the semantics (vocabularies) of traditional public procurement
- The e-procurement system is compatible with my needs at work

10- Attitude: Adapted and operationalized from Koh *et al.* (2010):

- The e-procurement system makes my work more interesting
- The use of e-procurement fits well with the way that I like to work
- I think that using the e-procurement system instead of the traditional (paper) procurement procedures is a good idea
- In general, the use of e-procurement fits with my working style

Appendix III

List of focus group participants.

Organization	Role within the organization
Federal Public Service Policy and Support (BOSA)	Project Manager
3P ²	Chief Technology Officer (CTO)
Ordiges	Chief Executive Officer (CEO)
Wallonia Region	President of the strategic committee to support the SPW dematerialization project Legal Director at SPW (Public Procurement Department)
Easybrussels	Project Manager
Belgian Buildings Agency	Attaché - E-notification Service
Equal Partners	Lawyer – public procurement field
The city of Namur	Head of Support Services Department
The city of Liège	<i>Conseiller en Organisation</i>
The municipality of Chastre	Legal service agent

² 3P and Ordiges are private e-senders that offer back-office e-procurement services for public administrations