

Increasing the Adoption of E-Procurement Services at the Municipal Level¹

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ABSTRACT

Despite high potentials and sophisticated goals set by federal policy-makers, local authorities are reluctant to move procurement to the Internet. This paper investigates the reasons of this phenomenon by presenting insights from a positivist multiple-case study among thirteen German municipalities. Our results suggest that perceived risks and benefits, acceptance among local businesses and neighboring municipalities are the strongest determinants for adoption. In order to tap the full potential of eprocurement in the public sector, federal policy-makers on the one hand should encourage pioneering municipalities to demonstrate other municipalities that eprocurement positively impacts public procurement and on the other hand should foster standardization of procurement platforms, thereby attracting more enterprises to build up the capabilities of using these platforms.

KEYWORDS: *Government-2-government, e-procurement, public sector, adoption theory, case study*

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INTRODUCTION

Moving public procurement to the Internet raises high expectations. Governments are the largest buyers in the European Union accounting for 16% of the European Gross Domestic Product (European Commission, 2004). Apart from process and product cost savings as well as transparency enhancements for contracting authorities, policy makers believe that the Internet could help overcoming local boundaries and foster the completion of the European internal market. Despite these potentials, observers note that e-procurement uptake is not as high as expected among local authorities who account for the majority of public contracts in Europe (European Commission, 2004). A recent survey of 63 large cities in Europe highlights that sophisticated procurement services are the exception rather than the rule (Hogrebe et al., 2009). Although tender notices are increasingly published in online databases, the targeted capability to complete entire procurement processes online is far from being implemented at the municipal level.

While several federal procurement agencies in Europe have used the introduction of eprocurement as an opportunity to centralize the sourcing and purchase activities of local authorities, the centralization of public procurement is hardly practical in federalist countries like Germany where federalism implies largely independent local authorities (Henriksen and Mahnke, 2005). Although previous research examines eprocurement adoption at the state and federal level (e.g. Moon, 2005), we argue that local authorities are a distinct unit of analysis due to their size and close connection to citizens' and local businesses' needs. Therefore, this paper addresses the question *which factors influence the adoption of eprocurement at the municipal level of federally organized countries*.

The process of understanding begins with the concepts, terms, and jargon of the phenomenon under investigation. Therefore, the legal framework and concept of eprocurement is presented in the following section. Section three presents the reviewed literature. Based on that, a conceptual model on e-procurement adoption is developed in section four. The conceptual model is the starting point for the qualitative analysis presented in section five. In the first part of section five, the case study research design is introduced. In the second part, the results of the analysis are reported and discussed including practical implications and future research directions.

E-PROCUREMENT

Legal Framework

In contrast to the private sector, public procurement requires a bureaucratic procedure to be followed as it is regulated by regional, national and international agreements. At the German municipal level, public procurement awarding procedures are predominantly determined by the three Contracting Rules for the Award of Public Contracts (VOL/A1/VOB/A², VOF³).

The Contracting Rules contain detailed regulations about the embodiment of the tendering procedures. Essentially, there are three distinct procedures applicable to award a public contract, namely the open procedure, the restricted procedure and the discretionary awarding procedure. While the open procedure allows any interested provider to request and obtain the contract award documents and to submit a bid (§3(1) No. 1 VOB/A, §3(1) No. 1 VOL/A), the restricted procedure allows only a limited number of providers to participate (§3(1) No. 2 VOB/A, §3(1) No. 2 VOL/A). Thereby, a public request for information should precede the restricted procedure. In a public request for information providers are invited to apply for participation by providing information about their competences and capabilities (Stoll, 2008).

As opposed to the open and restricted procedure, the discretionary award of public contracts does not involve any specific formal rules (§3(1) No. 3 VOB/A, §3(1) No. 3 VOL/A, §5(1) VOF). In a discretionary awarding procedure, contracting authorities consult the providers of their choice and negotiate the terms of contracts with one or more of these. Just as the restricted procedure, a public request for information can precede the discretionary award of a contract if appropriate.

Another opportunity to purchase supplies and services is to award framework agreements between a contracting authority and one or more suppliers in advance (Ruff, 2009). Framework agreements establish the terms governing contracts to be awarded during a given period. When a framework agreement exists, contracting authorities can request the respective supplier to supplement its tender as necessary (Christmann et al., 2004). Finally, if public supply and service contracts are of particular small value, municipalities can purchase supplies and services directly without any price comparison.

Contracting authorities can request evidences from providers proving that they are competent, capable, and reliable to fulfill the contract (§8(3) No. 1 VOB/A, §7(4) VOL/A). Candidates can be excluded from the awarding procedure, e.g. if they entered into liquidation or if they did not pay taxes or social charges (§8(5) No. 1 VOB/A, §7(5) VOL/A). To reduce the costs for candidates to provide these evidences, the VOB/A explicitly allow the use of a central database which stores evidences about capabilities and competences of potential candidates (§8(3) No. 2 VOB/A).

Moreover, contracting authorities can request the respective supplier to supplement its tender as necessary based on framework agreements or can purchase supplies and services directly without price comparison if the contract size is marginal (Christmann et al., 2004). The specific circumstances and characteristics of the public contract determine the applicable tendering procedure.

The Contracting Rules explicitly allow the use of electronic means throughout the whole public procurement process (§16(4) VOL/A, §16(3) No. 1 VOB/A, §4(6) VOF). Moreover, decisive criteria for tools to be used for electronic communication are set: the tools must be non-discriminatory, generally available and interoperable with the ICT

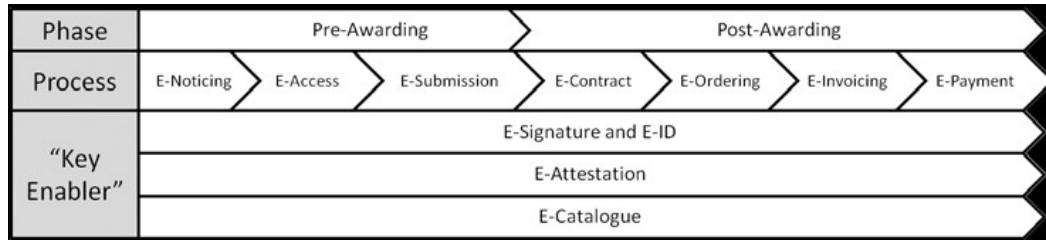


Figure 1 Building Blocks and Key Enablers of E-Procurement
based on (Christmann et al., 2004; Mondorf and Wimmer, 2008; Ruff, 2009)

products in general use (§16(5) VOL/A, §16(3) VOB/A, §4(7) VOF). As such, the Internet is permitted as a medium of transferring electronic bids, request to participate or other documents in the context of awarding public contracts.

Building Blocks and Key Enablers

A full and legally compliant eprocurement process between economic providers and contracting authorities requires a considerable number of functionalities available to a municipality. These functionalities can be assigned to three categories, namely pre-awarding phase process steps, post-awarding phase process steps and key enablers (see Figure 1).

The pre-awarding blocks are required to carry out the awarding procedure over the Internet (Christmann et al., 2004). In case a public notice is part of the tendering procedure, the public notice is announced to candidates on an Internet platform (enotification). The public notice includes among information about the requested supplies, services or works, an electronic contact address from which further information can be requested (§17(1) No. 2 VOB/A, §17(1) No. 2). In order for candidates to obtain this information electronically, contracting authorities provide an electronic access to contract and supporting documents (eaccess). The pre-awarding phase ends with the submission of bids (esubmission) (Ruff, 2009).

The building blocks of the post-awarding phase are required to implement the public contract (Christmann et al., 2004). After the contracting authority selects the winning bid, both parties electronically conclude a contract (e-contract) (Kosilek, 2004). If the contract does not directly cause the delivery of the procured good e.g. in case of a framework agreement, the contracting authority selects and orders the required products from an electronic catalogue (eordering). After the completion of the public contract, an electronic invoice is sent from the provider to the contracting authority (e-invoicing). Finally, the invoice is settled using an electronic payment system (epayment) (Stoll, 2008).

In order that candidates can submit their bid electronically, three key enablers are needed. Contracting authorities are required to process electronic evidences which prove that providers are competent, capable, and reliable to fulfill the contract (e-attestation) (§8(3) No. 1 VOB/A, §7(4) VOL/A). Additionally, the electronic exchange of information

is required to guarantee integrity of data and the confidentiality of bids or requests to participate (§21 VOB/A, §21(1) Nr. 2 VOL/A, §4(8)). Therefore, municipalities require to be capable of processing bids that are accompanied by an advanced electronic signature or a qualified electronic signature as defined in the German Law on Electronic Signatures⁴ (e-signature) (§21(1) VOB/A, §21(1) Nr. 2 VOL/A, §4(9) VOF). Moreover, an electronic catalogue is required to exchange product information throughout the whole procurement process (ecatalogue). While in the pre-awarding phase the catalogue is the basis for an offer, in the post-awarding phase the catalogue is the basis for the implementation of the contract (Schubert, 2002).

Having introduced the key concepts, terms, and jargon of eprocurement at the municipal level, the next section provides the theoretical foundation for our study of eprocurement adoption among German municipalities.

ADOPTION THEORY

A variety of research streams which are related to eprocurement adoption at the municipal level can be identified in the literature. Comprehensive research is conducted on the **adoption and diffusion of IT-based innovations** (Jeyaraj et al., 2006). There is a rich but diverse body of theoretical work used to guide both individual and organizational adoption and diffusion research.

Researchers have proposed several theories to examine the **adoption behavior of individuals**. Most of the underlying theories are adopted from psychology (e.g. Theory of Reasoned Action, Fishbein and Ajzen, 1975) or sociology (e.g. Innovation Diffusion Theory, Rogers, 2003) and tailored to information systems context. The most prominent theories are the Technology Acceptance Model (TAM) of (Davis, 1989) and the Innovation Diffusion Theory (IDT) of Rogers (2003). Both TAM and IDT utilize attributes of an innovation to predict IT acceptance and are successfully applied in studies on technology adoption.

However, the literature suggests that individual adoption theories may be inappropriate, when the innovation context and the units of analysis become more complex and specific (Chau and Tam, 2000). Therefore, different theories have been formulated to examine technology adoption at the organizational level (Jeyaraj et al., 2006). These theories typically deal with either the intention to adopt or the actual adoption. While the difference and relationship between behavioral intention and actual behavior is well documented in research (Ajzen and Fishbein, 1980), the goal of this study is to explain the actual adoption of eprocurement at the organizational level.

Swanson (1994) expects systematic differences in actual adoption and evolution patterns among types of organizational innovations. Just like eprocurement, Electronic Data Interchange (EDI) aims at integrating suppliers and customers in an Inter-Organizational System (IOS) (Hart and Saunders, 1997). The **research on EDI adoption** was

mainly motivated by the fact that small organizations are particularly reluctant to implement EDI. Existing studies reveal that small organizations are more concerned with the activities of their trading partners than with the characteristics of the technology as such (Bouchard, 1993). Reviewing prior works on EDI adoption, Chwelos et al. (2001) find that three factors influence adoption: Namely readiness, perceived benefits and external pressure. They argue that while the benefits of EDI or external pressure may motivate the adoption of EDI, engaged organizations must have organizational capabilities and willing trading partners before EDI is adopted.

The literature on technology adoption is mainly developed for and applied to the private sector. However, public and private organizations are different in many aspects (Rainey et al., 1976). Considering these differences, many adoption factors need to be redefined when the unit of analysis is a public organization (Kamal, 2006).

Several works can be identified that offer explicit theories or models of **egovernment evolution and development**. However, a common critique is that these models assume that governments will increasingly adopt more and better egovernment (Coursey and Norris, 2008). While the adoption of information services is progressing rapidly, the movement towards integrated and transactional egovernment is progressing much more slowly, if at all. The growing literature on egovernment adoption is reviewed by Titah and Barki (2006). Apart from IT design characteristics, adoption is influenced by managerial practices as well as organizational and individual characteristics.

The adoption of eprocurement in the public sector is studied by researchers from two different perspectives. One major stream of research focuses on **success factors of regional or national eprocurement initiatives**.

The debate about the level of centralization of computing infrastructure is important to many areas of egovernment. Caudle et al. (1991) argue that differences among private and public organizations are reflected in several information system issues that are unique to information systems in the public sector. While private organizations often treat information systems as proprietary and use them as a competitive advantage, the public sector can use technology transfer strategies to increase sharing of applications and technical assistance among public organizations. However, such a strategy assumes that all involved actors are rational and share the same ideas in improving the overall performance of the public sector (Ramanathan, 2004).

There is controversial debate about the degree of centralization of decision making, i.e. who decides on demand and suppliers. Gurbaxani und Whang (1991) analyze this trade-off from an economic perspective. They argue that in the optimal organizational structure the internal coordination costs are at a minimum. As eprocurement reduces decision information costs more than the agency costs, public procurement should be further centralized within the public sector (Ramanathan, 2004).

Henriksen and Mahnke (2005) analyze low take up rates of a centralized procurement system in Denmark. They argue that although the economic rationalities behind adoption of the system are widely shared across the public sector, this is not enough for adoption. The authors conclude that centralized eprocurement solutions contradict with decentralized procurement power and propose that the political structural context needs to be considered as much as the potential benefit to better explain eprocurement adoption.

Apart from centralization versus decentralization issues, Vaidya et al. (2006) propose several success factors for the implementation of eprocurement initiatives. Based on a literature review, they identify involvement of end-users and suppliers, process re-engineering, and system integration as the most important success factors.

Another stream of research focuses on **contextual factors that influence the adoption of eprocurement**. Based on secondary data, Reddick (2004) analyzes the extent of eprocurement adoption in American state governments. He shows that a high management capacity and a low tax capacity are positively related to eprocurement adoption. Reddick (2004) argues that fiscally stressed and managerial innovative state governments see eprocurement as a new mechanism to reduce costs and save resources and hence, are more active in adopting various eprocurement tools.

A similar study on American state governments is conducted by Moon (2005). Moon (2005) shows that state government size, procurement professionalism, empowerment of the central procurement unit and managerial innovation orientation are important determinants of eprocurement adoption among state governments. He argues that a larger state government is more likely to adopt because it has more resources to pursue eprocurement adoption. Moreover, state governments with centralized and professional procurement units are more sensitive to new ideas, tend to value managerial characteristics like efficiency and effectiveness and are thus more active in adopting eprocurement. He argues that it is much easier to take an adoption decision when a strong leadership of the central procurement unit is involved.

CONCEPTUAL MODEL

The lack of studies on eprocurement adoption at the municipal level precludes the option of directly building on existing theories. A review of the literature suggests that the Technology-Organization-Environment (TOE) Framework as proposed by Tornatzky and Fleischer (1990) may provide a useful starting point to explore eprocurement adoption (Chau und Tam 1997a). According to the framework, a technological innovation decision is mainly driven by the organizational, technological and environmental context of the organization. The technological context includes the technical equipment and processes that are internal and external to the firm. As opposed to the technological context, the organizational context refers to the characteristics and resources of the organization including the firm's size and degree of centralization. Finally, the external environmental context



Figure 2 E-Procurement Adoption Model

refers to the conditions that are largely out of the organization's control including the macroeconomic context and the regulatory environment (Tornatzky and Fleischer, 1990).

Recalling previous research and the differences of private and public organizations, the framework is adapted to the specific context of public procurement (see Figure 2). As further described below, the three contexts were relabeled into *Relative Advantage*, *Organizational Readiness* and *Facilitating Environment* in order to emphasize their role in the actual adoption decision (see Chau und Tam 1997 for a similar approach).

Organizational Readiness. The organizational context which refers to the characteristics and resources of the firm is labeled *Organizational Readiness* to reflect that organizational factors lay the foundation for the successful adoption of eprocurement among municipalities (Iacovou et al., 1995).

The impact of eprocurement is influenced by the level of integration in existing IT systems. However, integration is costly due to organizational reorganization and costs for

hardware and software. In the context of EDI adoption, Chwelos et al. (2001) show that while benefits and external pressure motivate adoption, motivated organizations must have capabilities like Financial Resources or IT Sophistication before the technology can be adopted. Resulting, the following propositions are put forth:

Proposition 1a: The financial resources available are positively associated with the degree of eprocurement adoption.

Proposition 1b: The degree of IT know-how and competences is positively associated with the degree of eprocurement adoption.

Previous research reveals that further organizational characteristics need to be considered studying adoption of eprocurement at the municipal level (Moon, 2005; Reddick, 2004). Apart from available resources, public managers need sufficient resources and mandate of the political leadership to successfully adopt eprocurement. As argued by Henriksen and Mahnke (2005), the political structural context needs to be considered as much as the economic rationalities to better explain eprocurement adoption. Politicians whose primary objective is to support local providers are unlikely to support public managers improving transparency and competition through eprocurement. In contrast, when local politicians give fairness and cost-effectiveness goals priority over concerns for local providers, it is more likely that eprocurement capabilities are further developed.

Proposition 1c: The degree of politicians' commitment to modernize public procurement is positively associated with the degree of eprocurement adoption.

Moon (2005) shows that the empowerment of the central procurement unit is another important determinant of eprocurement adoption. The empowered employees decide on the public supplies, services and works that the organization requires and from which supplier it is procured from. He argues that it is much easier to take an adoption decision when a strong leadership of the central procurement unit is involved. As a result, the following proposition is put forth:

Proposition 1d: The degree of procurement centralization is positively associated with the degree of eprocurement adoption.

Relative Advantage. While previous research on eprocurement mainly focuses on organizational factors, technological factors are rather unattended. The technological context is labeled *Relative Advantage* to reflect that decision-makers mainly assess the risks and benefits of eprocurement adoption when a decision needs to be made.

The *Relative Advantage* is defined as the degree to which eprocurement is perceived as being better than paper-based procurement. According to Rogers (2003), the *Relative*

Advantage is one of the strongest predictors of an innovation's rate of adoption in a social system. Therefore, the following propositions are put forth:

Proposition 2a: The perceived benefits of adopting eprocurement are positively associated with the degree of eprocurement adoption.

Proposition 2b: The perceived risks of adopting eprocurement are negatively associated with the degree of eprocurement adoption.

Facilitating Environment. The external environmental context is labeled *Facilitating Environment* to reflect the supporting characteristic of external factors on eprocurement adoption. The *Facilitating Environment* refers to the conditions that are largely out of the municipality's control but positively influence a municipality's adoption decision.

The lack of IT equipment and competences in particular among small enterprises is a key barrier of egovernment proliferation (von Lucke, 2002). From an economic perspective, the power in particular of small enterprises over municipalities converges to zero as administrations can easily substitute providers (Hart and Saunders, 1997). However, the political structural context may affect public manager's concerns when the support of local providers is an important politico-economic goal that is given priority (Kosilek, 2004). As a result, the following proposition is put forth:

Proposition 3a: The degree of eprocurement acceptance among local providers is positively associated with the degree of eprocurement adoption.

According to Rogers (2003), the exchange of experiences among peer organizations like neighboring municipalities or the state government reduces uncertainty and is fundamental for the diffusion process (Rogers, 2003). Adopting peers may encourage or even pressurize municipalities to adopt as well because the more public organizations join a shared initiative the more it attracts other public organizations and providers to join. As a result, the following proposition is put forth:

Proposition 3b: The degree to which peer organizations provide experiences about eprocurement is positively associated with the degree of eprocurement adoption.

As discussed in section two, the way public procurement is carried out at the municipal level is influenced by the legal framework set by international, national and state authorities. A legal framework that clearly fosters the use of electronic means throughout the whole public procurement process positively influences the adoption of eprocurement. Conclusively, the following proposition is put forth:

Proposition 3c: The degree to which the legal framework fosters the use of eprocurement is positively associated with the degree of eprocurement adoption.

QUALITATIVE ANALYSIS

The qualitative analysis follows the multiple-case study method as proposed by Yin (2008) to further elaborate on the conceptual model. On the one hand, corroboration of the proposed influence factors is sought. On the other hand, the investigation aims at identifying additional influence factors by inductively incorporating practitioners' feedback. Throughout the research process, rigorous strategies are used to improve the overall quality of the research design and thus the credibility of the results.

Case Study Design

As opposed to survey research, case study research aims at generalizing results using analytical rather than statistical generalization (Yin, 2008). If all examined cases provide compelling support for the set of propositions, the theory is likely to be transferable to comparable cases with similar determining factors.

The number and selection of cases is central to the design of a case study (Benbasat et al., 1987). Studies grounded on one versus studies based on a large number of cases typically pursue different research goals and are driven by different shapes of the empirical universe under investigation.

The purpose of a single-case study usually is to understand the internal mechanisms of the case and to generate a theory on the phenomenon under investigation (Gerring, 2006). For this reason, single case studies are most commonly used in the initial phase of knowledge accrual (Benbasat et al., 1987). Opposed to that, a study with a large number of cases is often applied in the later stage of knowledge accrual and somewhat restricted testing in- and output effects (Gerring, 2006).

Besides research goals, design decisions are also driven by the shape of the population under investigation. Yin (2008) argues that the rationale for conducting a single-case as opposed to a multiple-case study is when the case represents a revelatory, critical, extreme or unique unit of analysis. Just as well, a large number of homogenous cases provide strong support for conducting a cross-case analysis.

Germany comprises of 16 federal states and within these states there are altogether more than 11.000 municipalities. Due to their right of local self government the municipalities are widely independent with respect to choosing the means of communication, both of each other and of the above federal levels. This stands in contrast to centrally organized system (e.g. France) where municipalities more strongly depend on decisions taken by the central government.

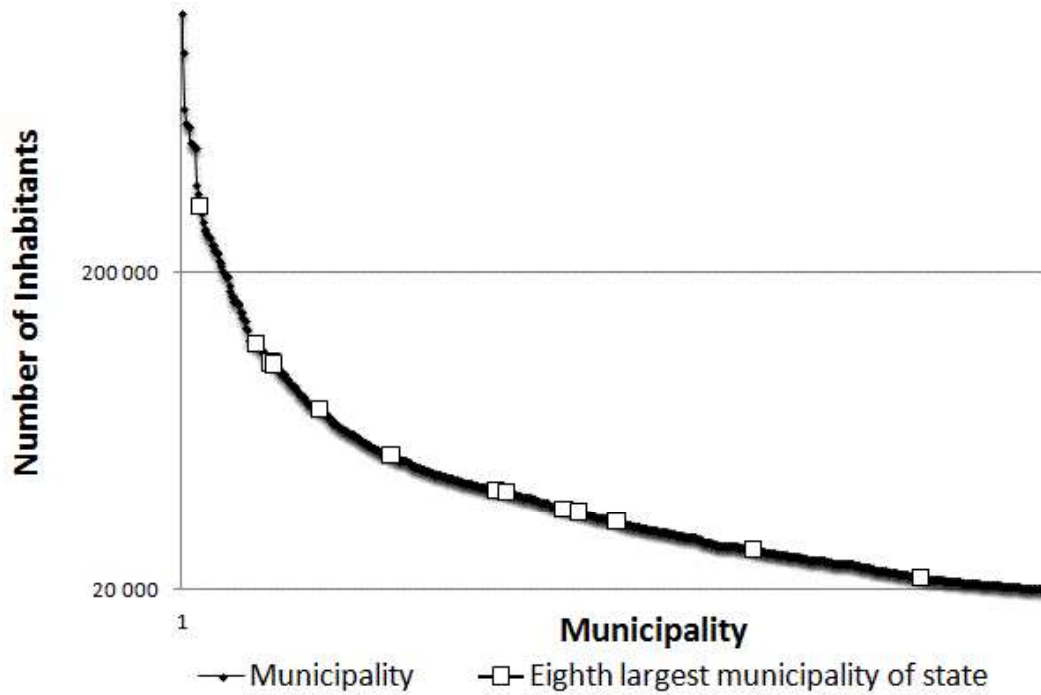


Figure 3. Population size distribution of German municipalities
(more than 20.000 inhabitants, city states excluded)

In order to reduce biases and analyze eprocurement adoption from different perspectives, municipalities are selected as follows: From each German state – except for the city states Berlin, Bremen and Hamburg – the eighth largest municipality is selected. The eighth largest municipality of each state is selected as this ensures to some extent representativeness, with respect to municipality size and state affiliation (see Figure 3). Due to the fact that municipal and state levels are intertwined, city states are judged as being incomparable with respect to responsibilities, and are excluded from the investigation. As a result, four large (more than 100.000 inhabitants), four medium- (between 100.000 and 40.000 inhabitants) and five small-sized (less than 40.000 inhabitants) municipalities are selected. By analyzing similarities across municipalities, thirteen cases are assumed to provide a rich basis testing propositions and identifying additional determinants of eprocurement adoption at the municipal level.

Data Collection

The multiple-case study took place within four weeks between February 17th 2010 and March 15th 2010. In six cases interview partners were either repeatedly unavailable or refused to participate in studies as a matter of principle. In that case, the next larger municipality within the state was selected. In four states, the seventh largest municipality was assessed. Only in one state, two municipalities declined to participate and the sixth largest municipality was selected.

Each case was investigated based on a semi-structured telephone interview with an official. The interview partner was required to be either responsible for a significant area of public procurement within the municipality or to have insights in all procurement relevant decisions. As a result, officials with different backgrounds and competences were interviewed. Two interview partners were in charge of an eprocurement project; three respondents were head of the central procurement department; three interviewees were head of the public construction department; and five interview partners were head or a responsible person of the central services department.

A case study protocol was used to purposefully guide the researchers during data collection entailing field procedures and case study questions. The field procedures gave attention to the situations and problems with which the investigators were confronted when they were approaching the unit of analysis and while data collection was carried out (Merton et al., 1990).

According to Benbasat et al. (1987), confidentiality and benefits to the organization are two important issues that need to be addressed in order to gain cooperation. As respondents were interviewed by telephone, this task was particularly difficult. The benefit to the municipality was assured by offering respondents access to the final research results. Confidentiality was guaranteed by ensuring that participants' identity is kept secret and by allowing respondents to revise the draft interview transcript. Before the interview started, the respondents were asked for recording permission. Except for one respondent who preferred to answer the questions in writing form, interview partners agreed that the interview is tape-recorded. An interview guide governed the goals, tactics and techniques that are required to focus questions while leaving space for new ideas and opinions beyond the theoretical boundaries of the investigation (Gorden, 1987). The interviews were held on telephone for an average of 25 minutes. The interview guide kept interactions focused while allowing individual experiences to emerge and thus best uses the limited time available in the interview situation (Patton, 2002).

The case study questions entailed queries about the respondent's responsibility within the municipality, the degree of eprocurement adoption and contextual factors. Moreover, open questions allowed the respondent to argue about additional factors influencing eprocurement adoption.

The overall quality of the case study protocol was improved by conducting four pilot cases. The pilot cases were randomly selected out of the tenth largest municipalities of the 13 states. The results led to some minor modification of the case study protocol with respect to the order of questions. Moreover, the field procedures were optimized in order to be even more persuasive to potential interview partners. Quality measures were taken to reduce the possibility of process bias through the following procedures: rotating interviewers, selecting transcribers for the interview materials differing from the interviewers, rotating transcribers of the interview materials, selecting two coders differing from the transcribers.

Data Analysis

The goal of the data analysis was to present the contextual and data richness of the study, establish a clear chain of evidence and state and define the reasoning (Benbasat et al., 1987).

The interview transcripts were analyzed using the computer-assisted data analysis software Atlas.ti⁵. Following the recommendations of Boyatzis (1998) a coding scheme was developed from theory including one code for each of the nine determinants introduced in the conceptual model. Apart from developing codes from theory, a data-driven approach was taken to explore and identify additional influence factors. This was conducted through scanning and annotating the parts within the transcripts that gave answers, which were not covered by the coding scheme, to the question “what influences the adoption of e-procurement at the municipal level”. In doing so, *Employee Acceptance* could be determined as another determinant mentioned by more than one interviewee as influencing eprocurement adoption. *Employee Acceptance* refers to the degree to which employees are capable and willing to use eprocurement tools.

The codes were summarized in a coding scheme and amended by the following elements: label, definition of the determinant, rules on occurrences to be coded or excluded and examples of text passages applicable for inclusion. This scheme was used to train two coders enabling them to identify occurrences of the determinants within the interview transcripts. A quote was coded each time the respondent argued that he or she perceives that one of the factors within the scheme is influential for the adoption of eprocurement.

In the penultimate step, the developed codes were applied on all thirteen interview transcripts by the first coder. To ensure reproducibility, all transcripts were coded by a second independent coder and reliability of codings was calculated using Holstis’ (1969) CR percent agreement in the final step:

$$CR = \frac{2MC}{C_1 + C_2}$$

CR: Coder reliability	C_1 : Number of codings by coder 1
M: Number of matching codings by both coders	C_2 : Number of codings by coder 2

The measure is commonly used in content analysis (cf. Barringer et al., 2005; Zhu and Kraemer, 2003) to measure inter-coder reliability and utilized in this study due to its simple and fast applicability. There is no common absolute number of these coder agreements which is found to be satisfactory in the academic discussion on reliabilities. This is due to large differences especially in the units of analysis and coding but also in coding schemes, complexity of the evaluated contents and coder experience on the topic. Nevertheless, Mayring (2000) proposes a reliability of at least 0.7 for acceptable results and Frueh (2007) gives a range of 0.75 to 0.85 as reachable with very well defined coding rules. The overall reliability calculated in this empirical work results in 0.83 of coder agreements.

Table 1. Occurrences of Coded Determinants

Determinant	PRs*	PA*	PBs*	PI*	EA**	FRs*	PC*	CE*	LF*	IS*
Number of Interview Partners who mention Determinant	9	8	7	7	6	6	6	5	1	0
Relative Number of Interview Partners who mention Determinant	69%	62%	54%	54%	46%	46%	46%	38%	8%	0%
(*) Determinant of the conceptual model					(**) Additional Determinant identified in the study					

RESULTS

The final matrix of results (see Table 1) lists the number of interview partners who mention a determinant as being influential in decreasing order. For each determinant the most representative citations from the interviews is provided in this section.

Perceived Risks (PR) is the strongest determinant for the adoption of eprocurement and is supported by 69% of the participants. The main risks that impede a stronger diffusion of eprocurement at the municipal level are financial and legal risks.

Security issues are not insignificant. Tendering procedures have to be set up in a way that ensures confidentiality and authenticity. A procedure, which involves an electronic signature may have a high security standard but this standard implies on closer examination additional costs. As contracting authorities are incumbent on securing mandatory standards, they are also exposed to additional liability risks (Municipality 11:5).

The second strongest determinant is *Provider Acceptance (PA)*. 62 percent of interview partner mention this determinant as being influential.

The acceptance among small construction firms and manufacturers respectively would be low, since the vast majority of firms are incapable [to use eprocurement]. This is totally logic. If we call for tenders, window makers, cabinet makers and painters apply. They are unable to submit a bid electronically. They sometime still have old personal computers from the nineties for accounting purposes (Municipality 10:5).

Perceived Benefits (PB) and *Peer Influence (PI)* are the third and fourth strongest predictors of adoption. They are deemed as influential by 54 percent of interviewees.

I believe that the county or a central task force at state level could pioneer the field. But as long as not even public road construction contracts on state level are

awarded electronically, we do not have a special interest to promote it (Municipality 8:3).

The adoption of electronic tendering certainly improves the speediness of procedures. To a certain extent, it will also lead to cost savings due to less paper consumption (Municipality 7:3).

Apart from IT Sophistication, organizational factors (i.e. *Employee Acceptance (EA)*, *Financial Resources (FR)*, *Political Commitment (PC)* and *Centralization (CE)*) only moderately influence the adoption of eprocurement. At least 5 of the 13 interview partners mention these determinants as being influential.

I have to admit that innovations are hard to introduce in the public administration in particular if public employees do not perceive any advantage (Municipality 12:2).

The budgetary position is absolutely bad. We get a biennial budget for 2010 and 2011. The budget proposal was rejected by the district committee. Thus, we do not have any budget and have to save about 240 million Euro in the planning period 2010–2014. You can imagine that no financial resources are available for additional actions (Municipality 4:1).

We are willing to be active in this area but it is hard to convince [...] politicians of the necessity. When you look at the potholes on the streets, nobody from the city council asks for electronic tendering. Potholes clearly have priority. There is no benefit for the city council to introduce electronic tendering (Municipality 13:2).

Our problem is that we do not have a central procurement unit, which addresses the topic. [...] If you have a central procurement unit in place, knowledge could be concentrated and the problem sorted out (Municipality 13:3).

The weakest determinant of adoption is the *Legal Framework (LF)*. Only one interview partner states that the LF impedes further adoption of eprocurement.

The tools are not the problem. The idea had been mooted once but was then dismissed when we got the economic stimulus package. We have realized that we barely publish anything anymore. By the end of 2011, we are back to where we have been two years ago. And then we will see how we will proceed (Municipality 2:2).

Finally, *IT Sophistication (IS)* is not supported as a determinant of adoption by any interviewee.

DISCUSSION

Four determinants were identified which are suggested by most of the interviewees as having large impacts on the adoption of eprocurement on the municipal level.

The perceptions of risks and benefits to adopt eprocurement are the strongest and third strongest determinants respectively. Electronic procedures have to meet the same legal requirements with respect to secrecy of bids and traceability as paper-based procedures. While the direct benefits of eprocurement adoption are predominantly shared among municipalities, eprocurement is unlikely to be widely adopted in the German public sector as long as existing solutions are perceived as heterogeneous, immature and costly.

Apart from the technological perspective, municipalities are mainly concerned about their local business community. In particular small handicraft businesses in the area of construction lack competences and resources to participate in electronic procedures. From the perspective of providers, the access to a tendering platform involves a considerable human asset specific investment as providers have to engage resources to become familiar with the functionalities and business opportunities of the electronic platforms (Williamson, 1986). The multitude of heterogeneous solutions in the public sector on the one hand and initial asset specific investment costs for providers on the other hand are supposed to further hinder the diffusion of eprocurement at the municipal level.

Peer Influence is the third strongest determinant of eprocurement adoption. The qualitative analysis reveals that municipalities want larger peer organizations like the state government or neighboring cities to pioneer the field as they have more resources to pursue eprocurement adoption. As long as larger peer organizations have not adopted eprocurement, municipalities will apply a wait-and-see strategy until a dominant design of eprocurement emerges. In contrast, when the majority of peers already use eprocurement, non-adopting peers may feel encouraged to adopt as well based on the experiences provided.

As the exchange of experiences among peers is fundamental for the diffusion process, we provide policy-makers with two recommendations. On the one hand, pioneering municipalities should be subsidized and encouraged to demonstrate other municipalities that eprocurement positively impacts public procurement. This action is likely to reduce risk perceptions, increase benefit perceptions and improve acceptance among peer organizations. As indicated by several interviewees, municipalities rely on the experiences of peer organizations rather than on best practices developed at the federal level. On the other hand, we suggest that policy-makers foster standardization among procurement platforms and thereby attracting more enterprises to build up the capabilities of using these platforms.

The existing legal framework was not perceived as a barrier of EProcurement adoption at the municipal level. As the legal framework already entails regulations about using

electronic means, this may not be so surprising at first sight. Future work should rather concentrate on the question if and how eprocurement adoption can be reasonably increased by requiring certain capabilities to be available.

The strongest determinants of eprocurement adoption are environmental and technical factors. The overall weak consensus across municipalities about the role of organizational factors might be partly explained by a known bias of qualitative interviews as the only evidentiary source. Respondents were unlikely to assess their own organizational situation as the key barrier of adoption (Webb et al., 2000). This became especially evident when interview partners were asked about the competences of their IT department. All interview partners tended to answer this question diplomatically and stated that the existing IT infrastructure and IT competences do not impede the adoption of eprocurement.

Further possible limitations need to be kept in mind when interpreting the findings of this study. They are briefly given below with counter measures which were already applied during the research process. We followed replication logic to ensure external validity by using multiple-case studies as proposed by Yin (2008). This approach attempts to duplicate conditions, which was aimed for by using the eighth largest municipality of each non-city state. Therefore conditions are not completely comparable, since sizes of municipalities under analysis are varying. However, this might be seen as contributing to generalizability.

To ensure construct validity the interviewees were asked to review the transcripts. No changes were requested by respondents. Nevertheless, multiple sources of evidence might further enrich perspectives and generalizability (Yin, 2008). Having only one type of key informants and one key informant at each municipality might lead to biased results. Interviewing more than one informant from different departments within a municipality or even experts from outside (e.g. suppliers of municipalities) might tackle this problem (Phillips, 1981).

For reasons of manageability, reliability numbers are calculated following Holsti's (1969) simple coder agreement, which is used by most content analysis and case study papers. It does neither take into account numbers of codes influencing reliabilities or agreements occurring on incident nor small numbers of occurrences as the basis for calculation. These challenges might be addressed by more advanced measures of reliability such as Krippendorff's alpha (Hayes and Krippendorff, 2007).

CONCLUSION

This study focused on determinants of eprocurement adoption at the municipal level. Based on the existing literature, a conceptual model was developed, which was further elaborated by collecting and analyzing data from a multiple-case study of 13 German municipalities. Our results show that perceived risks and benefits, acceptance among

local businesses and neighboring municipalities are the strongest determinants for adoption.

The analysis improves our understanding of eprocurement adoption behaviors at the municipal level and allows us to suggest actions to be taken by policy-makers. In order to tap the full potential of eprocurement in the public sector, federal policy-makers on the one hand should encourage pioneering municipalities to demonstrate other municipalities that eprocurement positively impacts public procurement and on the other hand should foster standardization of procurement platforms, thereby attracting more enterprises to build up the capabilities of using these platforms. Rigorous strategies were used throughout the whole research process and showed satisfying reliabilities. A large scale quantitative study should be conducted to test the generalizability of our results.

REFERENCES

- Ajzen, I., and Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Barringer, B. R., Jones, F. F., and Neubaum, D. O. (2005). A Quantitative Content Analysis of the Characteristics of Rapid-growth Firms and their Founders. *Journal of Business Venturing*, 20(5), 663–687.
- Benbasat, I., Goldstein, D. K., and Mead, M. (1987). The Case Research Strategy in Studies of Information Systems. *MIS Quarterly*, 11(3), 369–386.
- Bouchard, L. (1993). Decision criteria in the adoption of EDI. *Proceedings of the 14th International Conference on Information Systems* (pp. 365–376). Presented at the 14th International Conference on Information Systems, Orlando, Florida.
- Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. Sage Publications, Inc.
- Caudle, S. L., Gorr, W. L., and Newcomer, K. E. (1991). Key Information Systems Management Issues for the Public Sector. *MIS Quarterly*, 15(2), 171–188.
- Chau, P. Y. K., and Tam, K. Y. (1997). Factors Affecting the Adoption of Open Systems: An Exploratory Study. *MIS Quarterly*, 21(1), 1–24.
- Chau, P. Y. K., and Tam, K. Y. (2000). Organizational adoption of open systems: a 'technology-push, need-pull' perspective. *Information & Management*, 37(5), 229–239. doi:10.1016/S0378-7206(99)00050-6
- Christmann, K., Huland, D., and Meißner, B. (2004). *Einkaufen für Kommunen: Modern, wirtschaftlich und rechtssicher* (1., 2004 ed.). Jehle.
- Chwelos, P., Benbasat, I., and Dexter, A. S. (2001). Research Report: Empirical Test of an EDI Adoption Model. *Information Systems Research*, 12(3), 304–321. doi:10.1287/isre.12.3.304.9708
- Coursey, D., and Norris, D. F. (2008). Models of E-Government: Are They Correct? An Empirical Assessment. *Public Administration Review*, 68, 523–536. doi:10.1111/j.1540-6210.2008.00888.x
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319–340. doi:10.2307/249008
- European Commission. (2004). *The access of SMEs to public procurement contracts*.
- Fishbein, M., and Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research*. Free Press.
- Frueh, W. (2007). *Inhaltsanalyse: Theorie und Praxis (in German)* (6th ed.). Konstanz: UVK Verlagsgesellschaft.
- Gerring, J. (2006). *Case Study Research: Principles and Practices* (1st ed.). Cambridge University Press.
- Gorden, R. L. (1987). *Interviewing: Strategy, Techniques, and Tactics* (4th ed.). Chicago, Ill.: Dorsey Press.

- Gurbaxani, V., and Whang, S. (1991). The impact of information systems on organizations and markets. *Communication of the ACM*, 34(1), 59–73. doi:10.1145/99977.99990
- Hart, P., and Saunders, C. (1997). Power and Trust: Critical Factors in the Adoption and Use of Electronic Data Interchange. *Organization Science*, 8(1), 23–42.
- Hayes, A. F., and Krippendorff, K. (2007). Answering the Call for a Standard Reliability Measure for Coding Data. *Communication Methods and Measures*, 1(1), 77–89.
- Henriksen, H. Z., and Mahnke, V. (2005). E-Procurement Adoption in the Danish Public Sector. *Scandinavian Journal of Information Systems*, 17(2), 5–26.
- Hogrebe, F., Blinn, N., and Nüttgens, M. (2009). Survey of E-Government Portals in European Capitals and Large Cities: A Benchmarking Study of G2B-Services. *Proceedings of the 8th International Conference on Electronic Government* (pp. 188–197). Linz, Austria: Springer-Verlag.
- Holsti, O. R. (1969). *Content Analysis for the Social Sciences and Humanities*. Reading: Addison-Wesley.
- Iacovou, C., Benbasat, I., and Dexter, A. S. (1995). Electronic Data Interchange and Small Organizations: Adoption and Impact of Technology. *MIS Quarterly*, 19(4), 465–485.
- Jeyaraj, A., Rottman, J. W., and Lacity, M. C. (2006). A review of the predictors, linkages, and biases in IT innovation adoption research. *Journal of Information Technology*, 21, 1–23. doi:10.1057/palgrave.jit.2000056
- Kamal, M. M. (2006). IT innovation adoption in the government sector: identifying the critical success factors. *Journal of Enterprise Information Management*, 19(2), 192–222. doi:10.1108/17410390610645085
- Kosilek, E. (2004). *Elektronische Beschaffung in Kommunen* (1st ed.). Eul Publishing House.
- von Lucke, J. (2002). E-Government - Barriers. In J. Reinermann and J. von Lucke (Eds.), *Electronic Government in Germany*, Research Report [in German] (2nd ed., pp. 65–93). Speyer.
- Mayring, P. (2000). Qualitative Content Analysis. *Forum: Qualitative Social Research*, 1(2), 1–10.
- Merton, R. K., Fiske, M., and Kendall, P. L. (1990). *Focused Interview: A Manual of Problems and Procedures* (2nd ed.). Free Press.
- Mondorf, A., and Wimmer, M. A. (2008). Interoperability in e-tendering: the case of the Virtual Company Dossier. *Proceedings of the 2nd International Conference on Theory and Practice of Electronic Governance* (pp. 110–116). Cairo, Egypt: ACM. doi:10.1145/1509096.1509118
- Moon, M. J. (2005). E-Procurement Management in State Governments: Diffusion of E-Procurement Practices and its Determinants. *Journal of Public Procurement*, 5(1), 54–72.
- Patton, M. Q. (2002). *Qualitative Research & Evaluation Methods* (Third.). Sage Pubn Inc.
- Phillips, L. W. (1981). Assessing Measurement Error in Key Informant Reports: A Methodological Note on Organizational Analysis in Marketing. *Journal of Marketing Research*, 18(4), 395–415.
- Rainey, H. G., Backoff, R. W., and Levine, C. H. (1976). Comparing Public and Private Organizations. *Public Administration Review*, 36(2), 233–244.
- Ramanathan, S. (2004). Diffusion of eProcurement in the Public Sector - Revisiting Centralization versus Decentralization Debates as a Twist in the Tale. *ECIS 2004 Proceedings*. Presented at the ECIS, Paper 114.
- Reddick, C. (2004). The growth of e-procurement in American state governments: a model and empirical evidence. *Journal of Public Procurement*, 4(2), 151–176.
- Rogers, E. M. (2003). *Diffusion of Innovations*, 5th Edition (5th ed.). Free Press.
- Ruff, A. (2009). *Public Electronic Procurement: Elektronische Vergabe und Beschaffung von Lieferungen und Leistungen der Kommunal-Verwaltung über Internet* (1st ed.). GUC Gesellschaft f. Unternehmensrechnung u. Controlling.
- Schubert, O. (2002). Von der Vision zum Betrieb - Kriterien für die Auswahl von Vergabesystemen. In F. Gehrmann, H. Schinzer, and A. Tacke (Eds.), *Public E-Procurement: Netzbasierte Beschaffung für öffentliche Auftraggeber* (pp. 165–179). München: Franz Cahlen.

- Stoll, P. (2008). *Der Einsatz von E-Procurement in mittelgroßen Unternehmen: Konzeptionelle Überlegungen und explorative Untersuchung* (1st ed.). Gabler.
- Swanson, E. B. (1994). Information Systems Innovation among Organizations. *Management Science*, 40(9), 1069–1092.
- Titah, R., and Barki, H. (2006). E-government adoption and acceptance: a literature review. *International Journal of Electronic Government Research*, 2(3), 23–57.
- Tornatzky, L. G., and Fleischer, M. (1990). *Processes of Technological Innovation*. Lexington Books.
- Vaidya, K., Sajeev, A. S. M., and Callender, G. (2006). Critical factors that influence e-procurement implementation success in the public sector. *Journal of public procurement*, 6(1/2), 70.
- Webb, E. J., Campbel, D. T., Schwartz, R. D., and Sechrest, L. (2000). *Unobtrusive measures* (Rev. ed.). Thousand Oaks [u.a.]: SAGE.
- Williamson, O. E. (1986). *Economic organization: firms, markets and policy control*. Brighton, Sussex: Wheatsheaf Books.
- Yin, R. K. (2008). *Case Study Research: Design and Methods* (4th ed.). Sage Publications, Inc.
- Zhu, K., and Kraemer, K. L. (2003). E-commerce Metrics for Net-enhanced Organizations: Assessing the Value of E-commerce to Firm Performance in the Manufacturing Sector. *Information Systems Research*, 13(3), 275–295.

NOTES

1. Contracting Rules for the Award of Contracts for Public Supplies and Services (“Verdingungsordnung für Leistungen, Teil A”) on 29th December 2009, Federal Gazette (“Bundesanzeiger”) No. 196a
2. Contracting Rules for the Award of Contracts for Construction Services (“Vergabe und Vertragsordnung für Bauleistungen, Teil A”) on 20th March 2006, Federal Gazette No. 94a
3. Contracting Rules for the Award of Contracts for Professional Services (“Verdingungsordnung für freiberufliche Leistungen”) on 18th November 2009, Federal Gazette No. 185a
4. Act on Digital Signature (“Signaturgesetz”) as amended and promulgated on 22nd July 1997, BGBl. I 1997, p. 1870
5. ATLAS.ti Scientific Software Development, Version 6.1, <http://www.atlasti.com> (accessed 28th June 2011)