

Organizational Resistance to E-Invoicing – Results from an Empirical Investigation among SMEs

Steffi Haag¹, Friedrich Born¹, Stanislav Kreuzer¹, and Steffen Bernius¹

¹ Institute of Information Systems, Goethe University Frankfurt, Frankfurt am Main, Germany
{haag, fborn, kreuzer, bernius}@wiwi.uni-frankfurt.de

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Abstract. In order to improve the governmental efficiency, effectiveness and transparency, an important part of e-government is the digitalization of documents and the processing of these documents through electronic channels. Such a critical document in business process chains is the invoice, which is why the European Commission strives to increase the adoption and diffusion of electronic invoicing (e-invoicing) among public and private sector organizations. However, the adoption rate among businesses is still low and especially very small firms resist using e-invoicing.

By collecting quantitative and qualitative survey data of 416 German companies resisting the usage of e-invoicing, we confirm and explore factors affecting the resistant behavior towards the electronic exchange of invoices and elaborate on differences in those factors with organizational size. In particular among micro firms, the lack of knowledge regarding the theme and procedure of e-invoicing represents the relatively most important influencing factor, while comparatively larger firms also expect huge change management efforts.

Keywords: electronic invoicing, e-invoicing, resistant factors, resistance, SME.

1 Introduction

Electronic government (e-government) is the public sector's use of information technology (IT) to support government operations, engage citizens, and provide government services [33]. Although the term e-government has experienced different definitions and has been linked with multiple goals [21], e-government mainly aims at improving the governmental efficiency, effectiveness, transparency, and responsibility [36]. An important part of e-government to achieve these main goals – in particular related to the improvement of process performance at the government-to-business (G2B) and government-to-government (G2G) level – is the digitalization of documents and the processing of these documents through electronic channels.

A critical document in business process chains is the invoice. Especially within public sectors in Europe the invoicing process is regarded to be one of the processes with the highest potential for improvements resulting in productivity enhancements [8, 13], which is why electronic invoicing (e-invoicing) represents one of the main goals of the Digital Agenda initiative of the European Commission [9]. By switching from the paper-based to the electronic invoicing process, institutions of the public sector expect to achieve cuts in administrative costs, improve the performance of workflows, enhance the process transparency and traceability [1] and guarantee ecological sustainability [27, 28, 35]. According to the European Associations of Corporate Treasurers 243 billion EUR savings could be achieved across Europe by automating organizations and optimizing supply chains through e-invoicing solutions [11].

However, to realize the full potential of e-invoicing it is crucial that all business partners of both the public and the private sector adopt and use the electronic exchange of invoices. But despite the many advantages, the adoption rate of e-invoicing among organizations is still very low [1]. Especially small and medium-sized enterprises (SMEs), given their relative importance for the European economy as a whole [12] as well as their huge share of the public sector suppliers and customers in particular, still resist to use e-invoicing [7].

Likewise, although existing scientific literature on e-invoicing is chiefly concentrated on the identification of success factors and driving forces fostering the adoption and diffusion of the innovation e-invoicing [3, 16, 26, 38], investigations addressing reasons and forces for the non-adoption of e-invoicing are still scarce. In particular, there is a lack of research explaining the resistant behavior of organizations towards e-invoicing, although information systems (IS) scholar agrees that research on user resistance to technology is as important as on technology acceptance [5, 18].

Therefore, the objective of this paper is to empirically analyze factors affecting the resistance to the electronic exchange of invoicing data in order to improve an explicit understanding of the low levels of e-invoicing use at the organizational level. We concentrate our study on SMEs as the most important business partners of governmental institutions by working out similarities and differences in the identified influencing factors of e-invoicing resistance between companies of micro, i.e. with less than ten employees, versus small, medium and large sizes, i.e. with ten or more employees. Using quantitative and qualitative survey data of 416 SMEs resisting the usage of e-invoicing, we particularly address the following research questions:

RQ1: Which factors influence the resistance to e-invoicing among SMEs?

RQ2: Do the reasons of resistance differentiate with organizational size?

To answer both questions, the remainder of the paper is structured as follows: In the next section, we provide an overview of related research in the field of e-invoicing adoption to derive eight factors inhibiting the usage of e-invoicing. Section 3 then describes the applied research method. Afterwards the findings of our empirical investigation are presented and discussed. Section 6 concludes the study by providing limitations and suggesting paths for further research.

2 Related Work and Theoretical Background

In this section, we first present prior scientific literature in the field of e-invoicing with special focus on the research stream of IT adoption and user resistance to delimit and sharpen our own approach. Based on this, we then derive eight factors influencing the resistance to use e-invoicing.

2.1 E-Invoicing Adoption and Resistance

The transfer of structured data in electronic form was already discussed in the 1970s due to the development of the EDI standard and especially EDIFACT (EDI for administration, commerce and transport), which also allowed for electronically transferring invoicing data between business partners. Since then, several different research streams on e-invoicing have emerged in IS research in order to investigate the opportunities and consequences of the electronic exchange of invoices across organizations of all sizes in both, the public and private sector from various perspectives and at different units of analysis. For example, some studies concentrate on the economic impact of electronic invoicing on the business performance within the organization [20], or across companies at the inter-organizational level [24, 25]. Moreover, several studies evaluate the carbon footprint of paper-based against electronic invoicing from an ecological perspective [27, 35].

By far the biggest stream, however, focuses on the identification of drivers and barriers of the electronic exchange of invoicing data to promote the adoption and diffusion of this IT innovation. Most studies within this stream conceptually or empirically investigate factors affecting the intention to adopt e-invoicing as well as the rate of e-invoicing adoption by applying well-known theories and models of the individual and organizational IT adoption and acceptance discipline, for example, the theory of planned behavior by Ajzen (1985) [2, 38], the diffusion of innovations theory by Rogers (1983) [26, 30], or by combining various models [3, 6, 32]. Besides, Au and Kauffman (2001) quantitatively assess the adoption behavior from the perspective of welfare economics taking into account the influence of network externalities [4]. By summarizing the scientific literature on e-invoicing and e-government adoption, Kreuzer et al. (2013) develop a unifying meta-model of influencing factors of e-invoicing adoption at the governmental level [17]. Whereas Juntumaa and Öörni (2011) analyze reasons behind partial IT adoption exemplified within the context of e-invoicing [16], merely Edelmann and Sintonen (2006) explicitly deal with the currently still low adoption rate of e-invoicing and empirically examine the reasons of e-invoicing non-adoption among Finnish SMEs based on real option theory [7].

Moreover, to the best of our knowledge, there is no study explicitly explaining the low levels of e-invoicing use with the action of withstanding the implementation of this innovative technology through the theoretical lens of IT resistance, although IS research agrees that there are different factors making clear the causes of technology acceptance versus its resistance [5, 18].

Within this research paper we analyze which factors influence the resistance to e-invoicing among SMEs in order to promote the development of an explicit under-

standing of the resistant behavior towards the electronic exchange of invoicing data at the organizational level. In addition, we statistically compare the identified reasons of e-invoicing resistance between micro and larger businesses, because none of the existing e-invoicing adoption studies collecting data among SMEs, such as Edelman and Sintonen (2006) or Sandberg et al. (2009), has focused on potential distinctions between inhibiting factors with organizational size [7, 32].

2.2 Factors influencing user resistance to e-invoicing

In particular from those articles identified in the prior subsection encompassing the research stream of e-invoicing adoption, but also from further studies discussed in theory and practice we extracted eight potential factors that influence the resistance to e-invoicing. This section presents them in detail.

One of the most frequently mentioned factor driving the organizations' resistance to e-invoicing is the *lack of knowledge*, which is why we separated this variable into three partitions. First, the lack of IT knowledge in general comprising of the inexperience and limited skills of managers and employees regarding the usage of all kind of information technology [7]. Second, the lack of know-how with respect to the theme of e-invoicing as potential user organizations have so far not got enough information about possible technological solutions of e-invoicing resulting in difficulties with the provider selection [19, 31, 34], as well as the absence of know-how in implementing e-invoicing processes [34]. Third, in particular small organizations may not have tackled and gone into the theme of e-invoicing at all.

Furthermore, user organizations might expect a high *change management effort* when switching from paper-based to the electronic exchange of invoices, for instance, regarding the training of staff involved in the invoicing process or the necessary integration into already existing up- and downstream business processes [28]. This effort may absorb the financial advantages and hence, result in a perceived negative net present value of the e-invoicing implementation [14]. In addition, organizations do often not see e-invoicing as an integrated part of the whole e-procurement process and hence, do not take into consideration the overall financial gains that could be realized with the digitalization [22]. Consequently, firms will resist using e-invoicing.

The fifth factor we could identify refers to *legal uncertainties* [23]. Diverse interpretations and differences in national and European legislation and regulatory requirements regarding, for example, commercial and tax law, but also the lack of common international standards (e.g., XML) for layout and data elements will foster users resisting e-invoicing [1, 19, 31]. In particular, medium-sized international organizations with cross-border activities might be scared off the current legal inequalities and therefore, drop e-invoicing adoption considerations [22]. Besides of legal issues, *concerns with respect to security*, in particular, regarding the authenticity and integrity of invoices might inhibit potential companies using e-invoicing [34].

Finally, the last two factors that might impact the resistant behavior of organizations are based on potential *reservations of internal and external stakeholders* about e-invoicing. On the one hand, the absence of top management support and consequently, no encouragement and pressure with respect to the implementation of e-invoicing

within the company, but also negative attitudes and social influences of employees and colleagues within and across departments might inhibit the adoption and diffusion of e-invoicing [26]. On the other hand, even if internal board and staff members agree to implement a new electronic invoicing solution, there might still be the problem that external supply-chain partners and customers do not want to cooperate in using e-invoices [7, 34]. Therefore, potential demands for a change to the electronic payment process might act as a deterrent to suppliers and customers and expel them to another focal organization.

Next to the confirmation of those factors already discussed in IS theory and practice, our study also contributes to IS research by extending this list and exploring new as well as more fine-grained driving or inhibiting forces collected by the means of an open-ended question in our survey. The next section provides more details about our research method.

3 Methodology

In order to confirm and explore factors of resistance in the usage of electronic invoices, we conducted a survey focused on recipients of invoices. We distributed the survey together with actual paper-based invoices among customers of a manufacturing company striving for sending invoices electronically in future. In a period of four weeks approximately 5000 questionnaires were sent, of which 521 responses from accountants or financial managers could be gathered after eight weeks. To confirm our eight factors mentioned above and explore further relevant factors, we used a mixed method approach in our questionnaire [37], i.e., it contained eight questions about specific resistant determinants (respondents had to mark the appropriate factors with a cross) and offered an additional open-ended question for further responses concerning influencing factors. To separate between adopters and non-adopters of e-invoicing, we additionally asked for the current state of the invoicing process in each firm as well as their willingness to switch to the electronic exchange of invoices. In this work, we focus exclusively on the non-adopters, which resulted in a sample size of 416 participants.

4 Data Analysis

4.1 Demographics

All of our participants reside within Germany and are mainly SMEs and very few large corporations. The average company in this sample has six employees and receives around 250 invoices per year with only 2% of them as electronic invoices. To ensure the comparability of our analysis, we adopted the definition of SMEs suggested by the European Commission [10]. Table 1 displays the categorization according to firm size for both sample and subsamples.

	Sample Size	Adopters	Non Adopters
Micro Firms (<10 Employees)	336	62	274
Small Firms (10 to 49 Employees)	156	36	120
Medium Firms (50 to 249 Employees)	20	4	16
Large Firms (>250 Employees)	9	3	6
Total	521	105	416

Table 1. Sample profile

4.2 Quantitative Analysis

The relative importance of each resistance factor is displayed in Figure 1. The results reveal that the lack of preoccupation with the theme of e-invoicing has a huge impact on innovation resistance and is by far the most important factor in this sample scope. Change management effort is the second largest factor with 17%. 13% of the respondents are aware of e-invoicing, but show the lack of an in-depth know-how of this specific domain. Reservations of business partners, which merely account for 2% of the relative impact, seem less relevant, while reservations from executives have a stronger impact, namely 10%. Furthermore, legal and security concerns are very important hindering factors that have to be tackled. Interestingly, insufficient IT knowledge in general has a rather low impact on resistance with 6%.

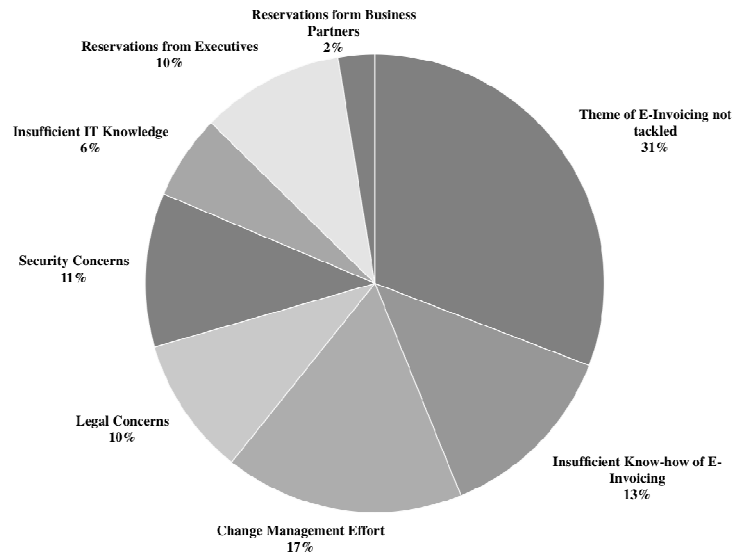


Fig. 1.Relative impact of resistant factors

Second, in order to answer RQ2, we categorized the data by company size in accordance to the European Commission [10]. We decided to focus on micro firms and their specific differences in comparison to larger firms as the structure and processes of companies with less than ten employees should be different to bigger ones and hence, also may require different automation. Half of the factors differ significantly between the two categories, which Table 2 shows. The analysis reveals some insightful differences between the two focus groups. Certainly, the factor ‘theme of e-invoicing not tackled’ remains the most relevant factor across both groups, but its relevance is slightly higher for micro firms. Nevertheless, the difference is significant, just as to insufficient know-how of e-invoicing. However now, the importance among both groups differs to a larger extent. The same is true for the factor insufficient IT knowledge. Both determinants have a higher relevance for micro firms and decrease in impact for larger firms. By contrast, change management effort has a larger relevance for larger firms than for micro firms.

Factors	Relative Impact	
	Micro Firms	Larger Firms
Theme of e-invoicing not tackled*	33%	27%
Insufficient Know-how of e-invoicing*	17%	6%
Change Management Effort**	13%	25%
Legal Concerns	11%	8%
Security Concerns	9%	14%
Insufficient IT Knowledge*	7%	4%
Reservations from Executives	8%	14%
Reservations from Business Partners	2%	2%

*: $p < 0,05$; **: $p < 0,01$

Table 2. Comparison between impact factors across micro and larger firms

4.3 Qualitative Analysis

In addition to the confirmatory nature of our quantitative analysis, which tested the relevance of resistant factors suggested by IS theory and research, we decided to combine our study with an exploratory approach by adding an open-ended question. The participants were encouraged to name further inhibiting factors. We got 91 responses, many of them very insightful contributions suggesting additional dimensions to our existing factors. To extract new forces, we codified the responses into reasonable categories. Table 3 shows the eight most mentioned factors, each with characteristic quotes from the participants.

Many respondents addressed the factor ‘change management effort’ that only includes the expenses for the implementation by mentioning higher operational costs due to two parallel invoicing processes, the lack of process readiness regarding the existing workflow instead of costs as well as low IT readiness of the firm considering the current state of IT systems and infrastructure.

Furthermore, we identify the scope of invoices as a barrier. With a low volume of invoices, the benefits of e-invoicing might not compensate for the upfront investments as well as operational and maintenance costs. The same holds for network effects that might hamper the adoption because of an absence of potential exchange partners and therefore, again, not justifiable costs. Moreover, lack of perceived benefits addresses the insufficient propagation of potential advantages, whereas some of the micro firms and other SMEs even showed wrong assumptions about compliance with regulations concerning accountability and tax law. Finally, our qualitative analysis reveals error-proneness as a hindering factor. Apparently, there is a higher perceived possibility of potential errors with regard to the invoicing process among SMEs.

Explored Factor	Characteristic Responses
Operational costs	"Additional costs for paper and printing, because paper invoices are still necessary." "Printing costs." "Costs for printing the invoice."
Process readiness	"Does not fit our processes." "We want paper invoices because they fit better to our operating procedure." "We then have to print the invoices."
IT readiness	"We do not operate an IT infrastructure." "Internet access too slow." "Our software program is not adapted for electronic invoices."
Network effects	"We would be the only firm that processes invoices electronically." "We only take part if the other suppliers send their invoices per mail, too."
Wrong assumptions	"I have to print the invoices for the tax accountant." "Online invoices are not accepted by the tax office." "Paper-based archiving is mandatory for 7 years."
Scope of invoices	"We just get 4 invoices per month." "We are too small." "Because of the firm size, it is easier when all invoices are received via the same channel: Mail."
Lack of benefits	"Never change a running system...our invoicing process is ideal as it is." "We see no benefits for our company." "Perfect as it is."
Error-proneness	"Invoices get lost in the e-mail inbox". "Invoices may be directed to spam." "Process may become confusing."

Table 3. Factors identified by open-ended question (translated into English)

5 Discussion

To the best of our knowledge, this is the first empirical study to investigate a set of resistant factors to e-invoicing from the different perspectives of micro versus small and medium-sized firms that resist the usage of e-invoicing. Based on a discussion of our results on the overall and subsample level, several implications for theory and practice arise, which will be outlined in this section.

The confirmatory part of our analysis shows, that on the overall level the lack of knowledge regarding the theme of e-invoicing and its underlying process deters SMEs most from using e-invoicing, which was followed by the expected high change management effort. This result is in line with existing studies previously conducted in practice [15, 28, 29] and suggests that managers of SMEs do apparently not know how to implement e-invoicing in their companies or which e-invoicing solution to select from which provider. That is why they may even be not able to assess the effort that emerges when switching from the paper-based to the electronic invoicing process and therefore, they may overestimate the investment necessary for the implementation. Consequently, it is crucial to better inform and teach board as well as staff members in SMEs and to clarify the potential benefits that can arise through electronically receiving invoices. These advantages might even be enhanced if the enlightenment helps to faster reach the critical mass and hence, to exploit potential network effects

of e-invoicing. On the contrary, reservations of external stakeholders merely seem to play a minor role in explaining the resistant behavior of SMEs, which might be the case due to the limited perspective of SMEs regarding their external environment.

When we compare the subsamples of micro firms with the remaining ones, some noteworthy differences between specific influencing factors emerge. Both groups generally face the same barriers for the usage of e-invoicing, but apparently, they put different emphasis on these factors. Our findings show that micro firms, in particular, have not gone into the theme of e-invoicing so far, which might also be the reason why they perceive and assess potential investment costs and security concerns as less important compared to small firms. This implies for practice that providers for e-invoicing solutions should take those distinctions into consideration by addressing firms of different sizes differently, i.e., highlighting the general e-invoicing theme and potentials among micro firms whereas mainly soothing cost and security concerns of the remaining ones.

By taking a closer look at the additionally explored factors identified with the open-ended question the differences in firm size and consequently, in the invoicing volume are stressed even more. Micro firms receive less invoices compared to larger SMEs and hence, the financial advantages that could be realized with the electronic exchange of invoices shrink. Additionally, some firms explicitly mention the lack of perceived benefits of the e-invoicing process. So the question arises, if particularly micro firms can benefit from the electronic exchange of invoicing data at all or if they are even better off with the prevailing paper-based process?

To address this issue, besides of a mandatory enforcement of the e-invoicing adoption procedure, i.e., a legislation-based approach, both, government and e-invoicing provider should think of incentives to SMEs to artificially increase the advantages and hence, reduce their resistance to e-invoicing usage. A possible incentive might encompass, for example, a direct connection and forwarding to the tax accountant and with it, the extension of the electronic workflow with up- and downstream processes. Additional services including simple workflow solutions or archiving should also add value for micro firms. Future research may shed light on those issues.

To sum up, there are several factors influencing the resistant behavior towards the electronic exchange of invoices between business partners, but the relative importance of each factor varies with firm size. In particular, the reasons for resistance of micro firms are significantly different from larger SMEs.

6 Limitations and Further Research

As with any study, this research has several limitations. First, our approach concentrated on a specific set of resistant factors reflecting those discussed in prior theoretical and practical research studies. By adding an open-ended question, we could include additional reasons of resistance in our analysis. Nevertheless, future studies may reveal further factors and complete our list.

Second, even if we were able to ask a huge number of SMEs, our sample focuses on recipients of invoices only, which mainly belong to the manufacturing industry. Fu-

ture research should therefore investigate resistant factors of e-invoicing senders and work out potential differences across industry sectors.

Third and finally, our survey was limited to binary questions regarding the respective single resistant factor. However, to fully investigate the influence of each factor on user resistance to e-invoicing, in future, an extended questionnaire allowing for answers using Likert scale and consequently, the application of regression analysis to statistically test the true effect size of each factor is appropriate.

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