Intentsions to Adopt Open Source Software ERP Systems –
A Case Study of Four Swedish Municipalities

Monika Magnusson
Department of Information Systems and Project Management,
Karlstad University, Sweden
Monika.Magnusson@kau.se

Abstract
Theoretically, open source software (OSS) seems perfect for public information systems development due to the public sectors' often scarce budget. Especially interesting are information systems (IS) with a large number of users such as enterprise resource planning (ERP) systems where the license fees for proprietary products are often substantial. Until now however, there are few reports of public organizations actually adopting OSS ERP systems. This study aims to use case study research to increase the understanding of the public sectors' low adoption rate and the factors that impact the intentions to adopt an OSS ERP system. The results indicate that the system's functionality is essential; OSS ERP systems are not perceived as fully developed for large organizations such as municipalities. Neither is the OSS consultancy market considered mature enough. OSS ERP systems are therefore not seen as a realistic alternative to proprietary ERP systems in the studied organizations.

1. Introduction

Open source software (OSS) now exists for many of the most common types of software ranging from servers to office programs, although the former is more widespread than the latter [4]. OSS means that the source code is available for programmers to view, read, modify and re-distribute [35]. This offers benefits such as lowered cost for software, along with flexibility and avoidance of vendor lock-in [19]. In countries such as Brazil, France and Italy, the public sector is an early adopter that promotes the use of OSS [6]. The public sector, with its limited budget, constant demands for lowered expenditures, and large number of users, can potentially make important savings on license fees by using OSS. Many governments have in fact decided to promote the use of OSS for several years [16]. Sweden’s largest IT magazine Computer Sweden [7] argued in their editorial page that it ought to be common practice for the public sector to always evaluate OSS when adopting new information systems, and if two equally satisfying solutions exist, OSS should be preferred. Lee [20] reaches the same conclusion.

Swedish municipalities are highly autonomous in their decisions of IT usage and the extent of OSS adoption varies. While Swedish municipalities use Linux for servers, OpenOffice in schools, and Drupal for web publication, there are no reports of OSS ERP systems being used. However, a number of OSS ERP systems now exist on the market, potentially offering cost savings. As public expenditures affect the welfare of its citizens, it is important to understand why the municipalities, despite these theoretical advantages, have not adopted OSS ERP systems. The purpose of this study is to contribute to theory building in the field of OSS adoption. The research question being investigated in this article is: What are the major impacting factors for the intentions to adopt an OSS ERP system in a Swedish municipality?

2. Literature review

Earlier studies of the adoption of OSS or ERP systems have used different research models as a starting point. Among them is the technology acceptance model (TAM) [12, 1]. One weakness of TAM is that it fails to explain contextual influences. The importance of studying the context has been acknowledged in several studies [32, 17]. It is reasonable to believe that the intentions towards adopting OSS ERP systems are influenced not only by the innovation itself but also by factors both inside the organization and in its external environment [see for example 28, 32, 10]. A variant of the TOE (Technology, Organization and Environment) model, focusing...
on innovation rather than technology, will serve as an overall research model for this study (see figure 1).

2.1. Environmental factors

Tornatzky and Fleischer [32] acknowledge three influencing factors in the external environment. These are the industry characteristics and market structure; the technology support infrastructure; and government regulation. A distinct quality of municipalities is the breadth of services that they offer. Often, these services involve complex interactions between several public organizations. Some services, such as permits and licensing, place high demands on data security. Another matter that could complicate the adoption of an ERP system is the steady growth of e-services. There are thus significant demands on a municipal ERP system regarding functionality, number of (heterogenic) users, compatibility, web integration, security etc.

Among the municipal processes that an ERP system can support are budget preparation, order handling, accounting, invoicing, payroll, tax handling, procurements, inventory control and processes for Customer Relationship Management (CRM).

As for technology support infrastructure, results from a study by Li et al. [21] indicate that access to external human capital is essential for the intent to adopt OSS. Access to external expertise becomes especially important as cut-backs are made in the municipalities’ internal IT departments.

The Swedish government’s acquisition process prescribes non-discrimination and equal treatment of vendors and that OSS should be evaluated on the same basis as proprietary products. A recent pre-study of public procurement of software indicates that the use of OSS is increasing, as 67% of the respondents planned on acquiring OSS products [25].

2.2. Organizational factors

Among the organizational features that have been acknowledged to impact the adoption of technological innovations are organizational size and resources in financial means, time and skilled personnel [32, 10, 21]. Holck et al. [18] argue that in an organization that has little competence in OSS, a migration to OSS will be perceived as a high-risk option. This could be the case in some public organizations, as Waring and Maddocks [35] suggest that the recent out-sourcing trend might have left the government IT departments de-skilled and without competence to develop OSS and other software. An effect of this could be that “central departments may be tied into proprietary software for the foreseeable future” [35] (p.422).

Other potentially impacting characteristics are innovativeness [10] and risk aversion, criticality of IT operations [21] and satisfaction level with existing computing systems [5]. Satisfaction with existing computing systems had an important impact on the adoption of open systems in the study of Chau and Tam [5]. Organizations that were satisfied with their systems were less inclined to adopt an open system than organizations that were less content. Simon [30] claims that several earlier studies suggest that open systems and OSS (both building on open interfaces) are intimately connected.

2.3. Innovation factors

Among the perceived attributes that have been found to influence the adoption of innovations in general are the innovation’s perceived relative advantages in comparison with existing technology or competing innovations [28]. Further, compatibility with organizational values, norms, experiences and needs is expected to affect the adoption along with the perceived complexity in learning and using the innovation [28]. Other important features include how easy it is to try out or experiment with the innovation prior to its adoption (trialability) and the extent to which the innovation is visible to the adopter (observability) [28].

It is reasonable to believe that the attitudes towards adopting an OSS ERP system are formed not only by the perception of OSS ERP systems but also by how the adopter perceives ERP systems in general as well as OSS in general.

2.3.1. Characteristics of ERP systems. An ERP system integrates business processes throughout an organization, thereby improving speed, efficiency and accessibility of information flows [9, 12]. One
benefit of ERP systems is the possibility to reach a unified enterprise-wide view of the organization [33]. This both requires and enhances interdepartmental cooperation and coordination, hopefully leaving organizations better prepared to respond to changes in the marketplace.

According to Umble et al. [33] (p.244) “a successful ERP project can cut the fat out of operating costs, generate more accurate demand forecast, speed production cycles, and greatly enhance customer service”.

However, the success of an ERP system is not to be taken for granted. Due to their enterprise-wide character, ERP systems are difficult to implement. The implementation is risky, costly, complex, time-consuming, and may require changes in the organizational culture [33]. Among the risks identified are escalating costs, shortage of skilled people, a high degree of organizational change and low user acceptance [26]. Das Neves et al. [9] (p.45) claim that the acquisition of an ERP system is “a high-expenditure activity and if a poor choice is made, it can adversely affect the organization as a whole, even jeopardizing its very existence”.

Table 1. Factors affecting the selection of ERP systems, in descending order.

<table>
<thead>
<tr>
<th>Most important selection criteria for ERP systems among Canadian firms [27].</th>
<th>Most important selection criteria for ERP systems among Turkish firms [2].</th>
</tr>
</thead>
<tbody>
<tr>
<td>System functionality</td>
<td>Fit with parent/allied organizations</td>
</tr>
<tr>
<td>System reliability</td>
<td>Cross module integration</td>
</tr>
<tr>
<td>Fit with parent/allied organization</td>
<td>Compatibility with other systems</td>
</tr>
<tr>
<td>Available business best practice in the system</td>
<td>References of the vendor</td>
</tr>
<tr>
<td>Cross module integration</td>
<td>The vendor visions for its products and services</td>
</tr>
<tr>
<td>System using latest technology</td>
<td>Functionality</td>
</tr>
<tr>
<td>Vendor reputation</td>
<td>System reliability</td>
</tr>
</tbody>
</table>

In fact, Kumar et al. [27] (p.794) argue that the implementation of ERP systems is “a much more complex exercise in innovation and change management than any other software package or advanced manufacturing technology”. Kumar et al. [27] investigated which criteria Canadian firms found important for the selection of an ERP system. A similar study was performed in Turkish firms by Baki and Çağar [2]. Among the most important factors in both studies were system functionality and system reliability but also factors that had to do with compatibility and system integration, see table 1.

2.3.2. Characteristics of OSS. Although OSS has become widespread and recognized, Gallego et al. [13] claim that the users’ acceptance of OSS has received little attention. Among the identified benefits from OSS are long and short-term savings, reliability, scalability and customizability [35]. Simon [30] (p.234) claims that OSS “has provided interoperable, flexible, and secure solutions for governments”. Some also argue that OSS support democracy in society because it uses open standard and thus do not require the citizens to have specific software to be able to access information [3]. Furthermore, the possibility to see the actual source code has been mentioned as a democratic advantage, although a source code typically cannot be understood by just anyone.

According to Comino and Maneti [6], OSS may in some cases be technically superior to proprietary software, as OSS is considered to have a higher degree of security and stability. Access to the source code also increases the flexibility and renders possibilities to customize the software. It is therefore surprising that Goode [13] found that 36 % of the Australian top managers in his survey perceived a lack of relevance for their business. Moreover, 18 % claimed that there were minimal or no requirements for OSS inside the organization. One reason for the low requirements for OSS might be that the organizations are content with their commercial software [5]. Furthermore, the cost of migrating to OSS, also called the switching costs, can have a negative influence on the intent to adopt [4; 21].

Another possible explanation for low requirement for OSS is given by Comino and Maneti [6]. They claim that a weakness in the OSS movement is that contrary to proprietary software, the creators of OSS might not have an obvious interest to market their product. A large number of the potential users of OSS might therefore lack knowledge of its existence or how its business model works. For the potential adopters, a low observability on the market also means fewer chances to evaluate the innovation’s qualities.

2.3.3. Characteristics of OSS ERP systems. Due to their enterprise-wide nature, OSS ERP systems doubtless belong to the OSSs that are especially demanding to implement. Välimäki et al. [34] found in their study of Finnish municipalities that ‘account software’, which are an essential part of ERP systems, was the least used software category for OSS. However, Serrano and Sarriegei [29] claim that the
advantages also are larger for OSS ERP systems than for other applications. According to the authors, the increased adaptability of OSS is especially valuable for ERP systems because these have to be adjusted to organizations’ shifting business processes and local regulations. Further, the freedom from depending on a single vendor is a major benefit [29]. Serrano and Sarriegi [29] also claim that OSS ERP systems are especially advantageous because of the often substantial license cost for proprietary ERP systems. Public organizations such as municipalities often have a large number of users and could thus, theoretically, save large amounts on licenses for ERP systems.

A prerequisite for cost savings is that the license fees for proprietary ERP systems will not simply be exchanged for consultancy costs for implementing, adapting and upgrading an OSS ERP system. Johanson and Sudzina [19] argue that the savings are less obvious for organizations that cannot customize the ERP systems themselves. The fees paid for consultants may outweight the savings made on licenses fees of proprietary ERP system [19]. Moreover, the size of an organization such as a municipality can also impede the adoption. Municipalities, with many ‘organizations within the organization’, have a highly complex structure. Kim and Boldyreff [23] argue that: “because of the high complexity associated with large organizations’ business processes OSS ERP might never be suitable for them”.

3. Method

3.1. Research design and environment

As previous research brings limited insights on which factors influence the intentions to adopt OSS ERP systems in the public sector, this study is exploratory in nature. A case research method was therefore adopted to enable an investigation in a real-life context of a large number of variables [36] that may affect the intentions to adopt.

This study was initiated as a part of a Swedish R&D project run in 2005-2006. The overall goal of the project was to spread knowledge of OSS. A specific goal was to develop a generic requirement specification for a municipal ERP system and to match the identified requirements against the open source ERP system Compiere. Compiere was founded in 1999 and is the most widespread OSS ERP system [15]. No other OSS ERP system was evaluated during the project.

Four municipalities in West Sweden, referred to as Municipality A, B, C and D, served as reference organizations in the project. The project manager, who worked at an OSS consultancy firm, was responsible for the operative work. The specificaiton of requirements focused on functionality for accounting and budgeting. Current work practices were studied and representatives from the municipalities’ financial departments were interviewed by the project manager with regards to their needs and requirements on an ERP system. From the requirement specification, some changes in functionality were made in Compiere and graphical interfaces were developed along with a model for system integration. This adapted version of Compiere formed a desktop pilot for a municipal OSS ERP system. Still, some development remains to be done. The project manager estimates that the desktop pilot includes approximately 70% of the necessary functionality for a Swedish municipality.

At the end of the R&D project, the municipalities were invited to see some of the components of the adapted version of Compiere. They were also handed a copy of the requirement specification and the final report of the project. However, none of the four municipalities in the project have chosen to implement Compiere or any other OSS ERP system during or after the project.

3.2. Selection of cases

All the four reference organizations were selected for the case studies. A larger number of cases might have given richer insights, but according to Eisenhart [11] four cases can be sufficient. The reason for choosing these organizations was that, due to their participation in the R&D project, they had the opportunity to consider the adoption of an OSS ERP system, which might not be the case in other municipalities. To the author’s knowledge, no Swedish Municipalities have yet adopted OSS ERP systems, nor have any similar projects been executed. This assumption is based on interviews and meetings with representatives from the Swedish Association of Local Authorities and Regions (SALAR) that the project manager performed in 2005-2006 and a shorter telephone interview that the author held with an IT strategy manager at SALAR in June 2010.

The number of inhabitants in the studied municipalities range from approximately 3900 to nearly 11600 (see facts from 2007 in Table 2). A common feature among them is that they all are situated next to Karlstad, the largest municipality in the region.
### Table 2. Facts on case study organizations.

<table>
<thead>
<tr>
<th>No. of Citizens</th>
<th>No. full-time IT employees</th>
<th>Use of OSS</th>
<th>Years with current ERP system</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>11500</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>B</td>
<td>9000</td>
<td>2</td>
<td>Linux server</td>
</tr>
<tr>
<td>C</td>
<td>11400</td>
<td>4</td>
<td>None</td>
</tr>
<tr>
<td>D</td>
<td>3900</td>
<td>2.75</td>
<td>Linux server</td>
</tr>
</tbody>
</table>

Two of the municipalities; C and D, have the same ERP system. Follow-up interviews with the IT managers in August 2010 revealed that municipalities A and C have shared an IT department since January 2010. All of the municipalities are using the same ERP systems as in 2007 and no changes are planned at the moment. However, municipality A has started using Linux on thin clients in their schools and municipality D has adopted OpenOffice.

### 3.3. Data collection and analysis

Data were collected through in-depth interviews. The interviews were performed in May-June 2007, approximately six months after the project ended. The reason for this approach was to allow for potential OSS ERP system adoption decisions to emerge and mature. To capture the attitudes both at the business and the IT level, both the financial manager and the IT manager at the municipalities were interviewed. However, the IT manager in municipality C was on long term sick leave and his replacement did not feel experienced enough in the matter to answer the questions. As a result, four financial managers and three IT managers were interviewed. The selection of respondents was based on information from various municipal representatives regarding which roles would have the primary responsibility for selecting and adopting an ERP system.

The interviews, which lasted for approximately 1-2 hours, were recorded and later transcribed. Four interviews were performed by telephone and three interviews took place face-to-face at the respondents’ offices. The interviews started with open-ended questions on the factors that have the most important impact, either as driving or hindering, on the adoption of an ERP system according to the respondents. An interview guide was also used, covering areas such as; current ERP systems (e.g. year of usage, functionality, and satisfaction with); process for changing ERP systems (e.g. actors, and requirements on a new ERP system); OSS (e.g. knowledge of, current usage, perceived advantages and disadvantages with OSS); internal and external enablers and inhibitors; and intentions to adopt an OSS ERP system. Short follow-up interviews were held by telephone. Also the project manager for the R&D project was interviewed.

Further, written documentations from interviews and meetings with the four municipalities and central Swedish authorities that the project manager in the R&D project attended have been used as background information. The material was analyzed by the help of pattern coding, memos, with-in and cross cases matrixes [24]. The emerging factors in the empirical data were then compared to influencing factors in earlier research.

### 4. Case findings

In this section, the results from the case analysis are presented. To clarify in which direction the different factors impact the intention to adopt, the concepts of drivers and barriers will be used. There are no obvious differences between the opinions of the financial managers and the IT managers, although the latter identify a few more drivers for the adoption of OSS in general. Neither are there any major differences in impacting factors or their perceived magnitude between the two municipalities that in 2007 have some OSS (B and D) and the two non-adopters (A and C).

Several of the financial managers and IT managers claim that they were skeptical from the start to the possibility of launching an OSS ERP system for municipalities. None seems to have become more optimistic during the project. One IT manager claims to have been positive towards OSS ERP systems at the start of the project, but at the time of the interviews not even he could identify any clear advantages. One of the reasons for this can be that the municipalities’ involvement in the pilot project was very limited. They had few opportunities to see, try and learn of an OSS ERP system. Nevertheless, none of the respondents currently see any important drivers for adopting an OSS ERP system. Neither do they believe that an OSS ERP system would be taken into consideration if they were to adopt a new ERP system.

### 4.1. Impacting factors in the environment

#### 4.1.1. Closed data standards in proprietary products

An important experience from the R&D project was that the closed standards used in many proprie-
tary products complicates system integration with an OSS ERP system or even makes it impossible in practice. Vendors of special purpose information systems also often sell ERP systems. In the pilot project, these vendors refused to reveal the source code of the interfaces, thereby complicating system integration. The complexity of implementing an OSS ERP system is therefore perceived as high. Complexity has a negative impact on the intentions to adopt an innovation [28]. The biggest obstacle for OSS in a study of Finnish municipalities was non-compatible software [34]. An ERP system that is difficult to integrate with other systems is of little use to the users. The reluctance to reveal the interface source code of other software thus tends to lock-in users to their proprietary vendors.

4.1.2. Lack of external OSS expertise. A couple of the respondents expressed concerns over the support of OSS products. One of them questioned who will have the overall responsibility to secure that different IS will work smoothly together. Another respondent pointed out that although the source code might be free, one cannot expect the same to be true for desired changes in the software. Lee [20] agrees that there are no guarantees that anyone wants to fix bugs or make changes for free. One of the IT managers expressed that unless there is a reliable support organization to go with the OSS, they would not consider changing such a business-critical system. “We would rather pay – expensive!” Others respondents however, did not believe that the difference was especially significant, merely a change of consultants.

The municipalities are free to choose their own IT infrastructure, and technology support is either handled inside each municipality or out-sourced. A common opinion is that there are not enough competences and resources to support an ERP system from the internal IT department. Neither is the availability of external OSS expertise perceived to be sufficient. The companies offering OSS support are considered to be too small. One of the IT managers states that “There must be a proper base of technicians available. Not just 3 or 4 persons that might be sick or on leave”. In general, the IT managers are more worried than the financial managers about access to external expertise. Notable is that at least one consultancy firm in the region is specialized on OSS support.

4.1.3. Inter-municipal cooperation. The four municipalities cooperate with each other on IT matters. They have for example developed a joint strategy for IT security. One of the reasons for their participation in the pilot project was an interest in investigating the possibility to also cooperate on ERP systems matters. Cooperation means that resources could be shared and thus costs saved. Despite an obvious desire to cooperate, several of the respondents claim that it has been difficult to reach concrete results. One obstacle is their heterogenic use of software. For example, these four municipalities use three different ERP systems. However, the respondents claim that the responsibility for developing an OSS ERP system adapted to municipal tasks should lie at the highest national level. Such an inter-municipal collaboration is currently missing according to the respondents.

4.2. Impacting factors in the organization

4.2.1. Satisfaction with current ERP system. The municipalities’ existing ERP systems were all implemented several years ago. All of the respondents claim to be satisfied with their systems, the IT managers perhaps more so than the financial managers. Municipality A even collaborated with the vendor in the development of the ERP system they are using. They have continued to cooperate with the vendor in systems improvements. A satisfaction with current systems makes an organization less inclined to adopt open systems [5] – you know what you have. As long as the current ERP system is satisfactory the relative advantages for migrating to an OSS ERP system are perceived to be low. The major source for satisfaction in the studied municipalities is that all of the systems are considered to be ‘problem free’ to a large extent. The ERP system are in other words perceived as reliable, which was important at the selection of ERP system in both the studies of Kumar et al. [27] and Baki and Çakar [2]. An expression that several of the respondents used was that the systems just ‘kept on running’. This is an important feature as problems or breakdown in the ERP system immediately results in major costs as a large number of users cannot perform their work.

4.2.2. Earlier negative experiences. One of the municipalities had “struck a mine” prior to their existing ERP system when in 1996 they implemented a rather unknown ERP system from a small vendor. The system had serious malfunctions and the supports from the supplier were deficient. This made it necessary to replace their ERP system after only two years. Both the financial manager and the IT manager believe that the experiences from two such major change processes in a short period of time would deeply affect the will to replace the existing system. In similar situations the adoption of any ERP system is bound to be associated with high complexity.
4.2.3. Lack of internal resources. The lack of resources is another barrier. All of the respondents claim that they lack the time, financial resources and knowledge it would take to develop and implement an OSS ERP system that is fully developed and integrated with other systems. The small number of IT staff does not allow for the software development or comprehensive customization that the adoption of a current OSS ERP system would mean. The knowledge of OSS is in general small in the studied municipalities. None of respondents know of any OSS ERP system, not even Compiere that was used in the pilot project. Some of the respondents perceived OSS to be technology-focused rather than user-friendly and easy to use. A common opinion among the respondents was that OSS ERP systems are still in their infancies and not fully developed. According to Kim and Boldyreff [23], it is questionable whether OSS ERP systems will ever be suitable for large organizations like municipalities due to their complex business processes. Holck et al. [18], on the other hand, argue that in organizations with a low level of competence in OSS, the migration will naturally be perceived as high-risk option.

The respondents feel that if an OSS ERP system is to be fully developed and implemented, a number of municipalities, and preferably SALAR need to participate. Further, external resources need to be added. Some of the respondents emphasize that such a decision should start at, or be supported by, the political level. One of the respondents feels however, that the interest for OSS is modest at the political level of the municipality.

4.3. Impacting factors from the innovation

4.3.1. The change effort involved. Major barriers for the adoption of an OSS ERP system are the effort and the resources involved in changing such a widespread and business-critical system as an ERP system. The respondents in this study find an ERP system implementation risky, costly, complex and time-consuming as Umble et al. [33] declare. One of the financial managers states that ‘there are a lot of other issues to deal with before one starts to consider changing an ERP system that works’. The IT manager in another municipality agrees: “To change an ERP system is something so terrible that there isn’t an organization that would expose itself to that if it isn’t necessary. It’s a huge, huge job”.

A poor choice of ERP system can, like Das Neves et al. [9] argue, negatively affect the entire organization. However, also a successful implementation consumes a lot of time, resources and energy. Several respondents claim that there is always a resistance to this type of change, regardless of whether the ERP system is OSS or not.

4.3.2. Immature product for the target group. The respondents also feel that it is too early to adopt an OSS ERP system. Several of them specifically state that they do not want to be first-movers. One of the IT managers argues that it is ‘mentally too early for all decision makers’. An argument for this is that OSS ERP systems are not yet tried out in similar organizations. Several also claim that OSS ERP systems are still not fully developed. According to the project manager of the R&D project, this is a correct observation regarding Compiere as it contains approximately 70% of the functionality that the municipalities require. This is naturally a major barrier as for example Kumar et al. (2003) found systems functionality to be the most important selection criteria for ERP systems in the studied Canadian firms.

Lacking functionality is not necessarily a disqualifying character as one of the aforementioned benefits with OSS is the ability to develop the source code after the organizational needs [35]. A common opinion among the respondents was, however, that a small municipality cannot afford to adopt something that might not work or still is at the ‘experimental stage’, as it takes a lot of resources to test and develop a new system. Incomplete systems will score low in perceived relative advantages, thus lowering the incentives for adoption [28].

A major barrier also originates from the OSS concept itself. When no one owns a product, no one markets it. As Comino and Maneti [6] point out, this tends to result in a uniformed market. Several of the respondents, both financial managers and IT managers, admitted that they had little knowledge of OSS.

4.3.3. Complex systems integration. The respondents in this study were highly aware of the importance of system integration. This supports the results of Baki’s and Çakar’s [2] study, in which all of the three most important selection criteria for ERP systems had to do with compatibility and the possibility to integrate systems and organizations. Almost all of the respondents mention the complexity in the municipal information handling and how an ERP system therefore must be able to ‘talk’ to other IS. Several respondents believe that a standardized software environment with products from the same vendor, or at least of the same type, would facilitate system integration and maintenance.

4.3.4. Absence of license fees. Some of the respondents mention the lack of license cost as a driving force. They fear however that the total cost of migrat-
ing to OSS ERP system might still be high due to necessary adjustments in the software, system integration, learning time and need for support from external consultants. These so-called switching costs have earlier been identified as important reasons for vendor lock-in to commercial products [6]. Moreover, one of the financial managers claims that cost savings are not sufficient. According to the respondent, the system also needs to offer new functionality and enable increased efficiency in business processes to motivate a migration to an OSS ERP system. This is in line with what Lin [22] argues. According to Lin, system customization, flexibility and better performance are the keys to success.

4.3.5. Freedom from vendors. The respondents express a positive attitude towards OSS but have in fact adopted extremely few OSS products. Only two of the municipalities used OSS in 2007, in both cases a Linux server. All of the respondents claim to sympathize with the concept of OSS. The reasons for this are mainly that they perceive that OSS increase the competition on the software market and reduce vendor lock-in. There is however an obvious contradiction in their attitudes. While they want to avoid vendor lock-in, a concentration to a few brands or vendors is also considered to be desirable as it facilitates internal software integration and maintenance.

5. Discussion

5.1. Implications for theory

This study extends current literature on OSS adoption by identifying factors that impact the intentions to adopt an OSS ERP system in a municipal context. Furthermore, it confirms that generic technology adoption models, like the research model in this study, are valid for studying OSS ERP systems in a public sector context. The results indicate that factors in all of the three studied categories in the research model (environment, organization and innovation) have an important impact. Among the identified factors that have reached relatively little attention in earlier OSS adoption literature is the fact that closed data standards impedes the implementation of OSS ERP systems. This is a common problem for organizations all over the world. Another factor seldom mentioned in literature is that OSS ERP systems do not yet fill the needs for municipalities, at least not in Sweden. Neither has the current research body spent much time discussing the importance of reliable external expertise for such a complex and business critical system as an OSS ERP system. A summary of the identified impacting factors is shown in Table 3 (Inspired by [10]). Factors marked with a ‘-’ have a negative or hindering impact on the intentions to adopt while factors marked with a ‘+’ have a positive or driving effect.

A number of impacting factors identified in earlier research could also be confirmed in the study. Those are the importance of functionality [2, 27] and that satisfaction with current software seems to hinder the adoption [5]. The interest of changing “a winning concept” is small due to the change effort involved. Much of the resistance to adopt an OSS ERP system expressed in this study probably has more to do with shifting ERP system than the migration to an OSS ERP system.

Another world-wide barrier is probably the lack of resources. Cut-backs are being made in IT departments. One plausible result of this is that the municipalities will be “tied into proprietary software for the foreseeable future” as Waring and Maddocks [35] put it, at least for complex systems like ERP systems that take a lot of time and effort to implement.

<table>
<thead>
<tr>
<th>Contexts &amp; factors</th>
<th>Impact</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed data standards in proprietary software</td>
<td>-</td>
<td>Impede integration with OSS</td>
</tr>
<tr>
<td>Lack of external OSS expertise</td>
<td></td>
<td>Low product visibility, lack of support for business critical system</td>
</tr>
<tr>
<td>Inter-municipal collaboration</td>
<td>+/-</td>
<td>Possibility of sharing resources</td>
</tr>
<tr>
<td><strong>Organization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Satisfaction with current ERP system</td>
<td></td>
<td>Lowering the motivation to adopt</td>
</tr>
<tr>
<td>Negative experiences</td>
<td></td>
<td>Lowering the motivation to adopt</td>
</tr>
<tr>
<td>Lack of resources</td>
<td></td>
<td>Lack of IS expertise and time impedes OSS customzation</td>
</tr>
<tr>
<td><strong>Innovation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Change effort required</td>
<td></td>
<td>Resource demanding, lowering the motivation to adopt</td>
</tr>
<tr>
<td>Immature product</td>
<td></td>
<td>Missing functionality</td>
</tr>
<tr>
<td>Complex systems integration</td>
<td></td>
<td>Standardized software environment preferred</td>
</tr>
<tr>
<td>Absence of license fees</td>
<td>+</td>
<td>Possible reduction in costs</td>
</tr>
<tr>
<td>Freedom from vendors</td>
<td>+</td>
<td>Reduces lock-in effects</td>
</tr>
</tbody>
</table>

Table 3. Factors impacting the intention to adopt an OSS ERP system.
5.2. Implications for practice

For OSS ERP systems to succeed in a municipal context, a number of things need to happen. First, there need to be OSS ERP systems of equal or better quality than today’s proprietary products. So far, the latter seems better attuned to municipal needs. A fully functional product needs to be developed and tested for large public organizations. It seems highly unlikely that any single municipality will take the risk of leading the way.

Second, the market for OSS support needs to mature and reach a sufficient body of expertise in OSS ERP systems. Technical support for OSS is increasing [35], still new firms may need to establish and market themselves. Traditional IS consultancy firms will probably experience conflicting interest from the proprietary software vendors that are their present collaboration partners. An alternative might be for national bodies like SALAR to build their own pool of technical competence. However, to reverse the public sector’s out-sourcing trend is not uncomplicated [35]. Third, municipalities need to start purchasing IS that build on open standards to facilitate systems integration. The studied municipalities’ inability to gain access to the interface source code from their current vendors reinforces the lock-in effect that is already apparent due to long-term relationships. If public organizations wants to be able to use OSS in the future, they need to join-up and put pressure on their vendors to include the interface source code for proprietary software in the purchase, or, even better, to use open standards.

Organizations wanting to promote OSS in municipalities ought perhaps to begin with well-established and less complex products than ERP systems. In general, the municipalities could benefit from more information on OSS products and the OSS business model. Once again, the initiative for this should come from central governmental organizations. Websites on the Internet, where municipalities can test OSS adjusted to their needs, is one possible way to increase the observability, trialability [28] and knowledge of OSS. Furthermore, ‘good examples’ from other municipalities should be made public.

5.3. Limitations and directions for further research

There are limitations that ought to be considered when interpreting the findings in this study. Due to the small number of cases and the small geographical spread, it is possible that the study suffers from regional bias. For example, the availability of external OSS expertise may vary between countries and regions. So could the extent and nature of inter-municipal collaboration. Also, the fact that all of the studied municipalities are quite small in size may affect the results. Larger municipalities can be expected to have more resources and be more experienced with OSS. This might have an impact on the perception of the change effort required to implement, customize and integrate an OSS ERP system. Also, larger organizations are more innovative in general [28].

Future research could perform similar studies in other countries and also incorporate larger municipalities and more actors inside the organizations. The studies should preferably also include interviews with politicians and in-depth studies of governmental policies and regulations to deepen the understanding of the external environment.

6. Conclusions

This study sought to empirically identify the major factors impacting the intentions to adopt an OSS ERP system in a Swedish municipality. A few relative advantages such as possible cost savings for license fees and decreased vendor reliance are identified but so far they are outweighed by the barriers. Among the most urgent matters to solve for OSS ERP systems to be adopted in public organizations are the lack of functionality for the municipalities’ needs, the lack of OSS expertise and the closed data standards in proprietary software.

While the Danish Board for Technology [8] already argued in 2002 that OSS is a serious alternative to proprietary software in government, this still needs to be proven for ERP systems. There is still a long way to go before an OSS ERP system is implemented in a Swedish municipality, according to the respondents in this study. Although the studied municipalities are few and fairly small, the deficient functionality for municipal tasks of current OSS ERP systems, or at least with Compiere, is also severe for larger municipalities and municipalities in other countries.

It seems fair to conclude that municipalities, with their dependence on tax money, limited resources and recurring cut-backs, are probably not the venture-some adopter that will show the way for OSS ERP systems. Rather a ‘wait-and-see’ strategy might be the natural choice.

References