New Implications for Customization of ERP Systems

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Abstract

Enterprise Resource Planning (ERP) Systems are standardized software packages intended to support the majority or all of an organization's processes. Customization of an ERP system is usually required to achieve fit between system and business processes of an organization. Customization options range from setting parameters in the system to developing new functionality by modifying source code. Models describing customization options are a decade old. Since then, the trend is for ERP systems to become more flexible. The feasibility of customization is facilitated and new options for customization are made available. Through in-depth interviews, this research identifies a need for revising existing models. Presents necessary changes and proposes new customization options that should be included in a new model. There is also a need for customization models for different types of ERP systems. This paper therefore also contributes with describing how customization of cloud ERP relates to existing models.

1. Introduction

The Enterprise Resource Planning (ERP) market is one of the fastest growing and most profitable areas in the software industry [1]. ERP systems are standardized software packages that support a variety of business functions. They are built on an assumption of how a business functions by organizing activities and work through pre-defined business processes. Unfortunately, there is often a gap between business requirements and the business logic of packaged software, which can lead to negative business outcomes [2,3]. Alignment between an ERP system and a business is sought either by customizing the system or by reengineering business processes or through a mix of both [4].

ERP implementation projects are ventures and complicated [5] and often exceed budget and timeframes [6]. Customizing is considered one of the most precarious matters when implementing an ERP system [2,7-9]. The cost and complexity of an ERP implementation project increases with the degree of customization [10,11] and a heavily customized ERP system limits maintainability [12] and increases the cost for future system upgrades [2]. At least some degree of customization is however required in almost every ERP system implementation [13].

Despite its importance for implementation outcomes, research on ERP customization is scarce [2]. There is some research describing models for customization options [8,14-16] that are meant to aid practitioners in managing customization of their ERP systems. These models display varying complexity and cost for different customization options. The models are however at least a decade old.

The ERP market has since then evolved and matured and businesses requirements on ERP systems to be flexible and adaptable are higher than ever today [17]. Business requirements and an increased competition on the ERP market drives ERP suppliers to offer more flexible systems. To meet this trend, suppliers are trying to facilitate the feasibility of customization of their systems [18] and are also offering new options for customization.

Another trend within the ERP market is the deployment of ERP through the cloud (cloud ERP) as opposed to on-premise ERP deployment. The main argument for cloud ERP is the economies of scale gained from sharing resources in a multi-tenant environment [19,20]. Research show that customization of cloud ERP potentially presents an even greater challenge than customization of on-premise ERP [21] and customization has been identified as one of the main obstacles in cloud ERP [22,23]. Still, models for customization of cloud ERP systems are lacking [21].

This research investigates changes necessary to existing customization models in order to capture customization options for on-premise ERP systems today. It also investigates if existing customization options are viable for cloud ERP.

The following research questions have therefore been formulated and answered in this paper:
How have on-premise ERP customization changed and what ERP customization options are viable for cloud ERP?

In order to answer the research question a survey research strategy was applied. In-depth interviews with ten companies in Sweden were used to collect data. The paper contributes to research and practice with new knowledge on ERP customization options and gives directions for future research that could be pursued within this area.

The paper proceeds as follows. The next chapter presents an extended background related to customization of ERP systems followed by recent ERP trends and cloud ERP thereby motivating this research. The research method is thereafter described, followed by the results and discussion. The paper ends with conclusions and directions for future research.

2. Previous Research

This section presents a background to ERP customization and recent ERP trends, as well as the new phenomenon of cloud ERP.

2.1. On-Premise ERP Customization

ERP systems are complicated compound systems with its built-in business logic. When an organization is about to implement an ERP system they must understand the impact that system will have on the organization. The benefit of an ERP system can be great [15] but the risks are also high [5,15]. Large implementation projects can cost hundreds of millions of dollars and span over numerous of years. It is therefore important to choose and customize an ERP system wisely, since an implemented ERP will usually run for up a long period of time within an organization [6].

An organization implementing an ERP system have a number of customization options to choose from, ranging from simple configuration of settings to modification of the source code. All ERP systems can to a certain extent be configured to cover a variety of business processes [6]. Still, to create a fit between business processes and system processes configurations are not always enough, and the system then needs to be further customized.

Building on [15] work, [14] suggest a model that consists of three different options for customizing an ERP system: module customization, table customization and code customization. Module customization refers to choosing what ERP modules to implement; table customization involve changing parameters in ERP tables and code customization encompass changing the source code of the ERP system or add custom made modules such as new user interfaces. [16] suggests three customization options, configuration, extension (user exit) and modification. Configuration involves changing settings in tables or files. Extension refers to interface support. Modification is alterations of the system, such as source code changes.

Reference [8] presents the most detailed model for categorization of customization options. It consists of nine different options of customization, described in table one. Roughly, the complexity and cost of customizations increases from top to bottom.

<table>
<thead>
<tr>
<th>Customization option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Changing parameters to modify the behavior of the system.</td>
</tr>
<tr>
<td>Bolt-ons</td>
<td>Extended and packaged functionality developed to function with the ERP system created by a third party supplier.</td>
</tr>
<tr>
<td>Screen masks</td>
<td>Developing new user interfaces.</td>
</tr>
<tr>
<td>Extended reporting</td>
<td>Creating new reports for presentation of data.</td>
</tr>
<tr>
<td>Workflow programming</td>
<td>Making changes in the system workflow.</td>
</tr>
<tr>
<td>User exits</td>
<td>Adding open interface developed program code.</td>
</tr>
<tr>
<td>ERP Programming</td>
<td>Adding applications developed in the ERP system programming language without changing existing code of the ERP system.</td>
</tr>
<tr>
<td>Interface development</td>
<td>Creating interfaces to other systems.</td>
</tr>
<tr>
<td>Package code modification</td>
<td>Making changes in the source code of the system.</td>
</tr>
</tbody>
</table>

Only one recent study was found that mention customization options [6]. The authors claim there are three options typically used when implementing on-premise ERP system. Codeless configuration, which is done in an integrated, often graphical environment built into modern ERP systems, Application development to fill functional gaps with specific applications that should be developed by external partners and Key performance indicators and reports where standard reports in the ERP system must be merged with reports already in use. The authors also stress that “ERP systems never stand alone” [6,p.30] and integration with external systems is therefore an important issue. [6]

2.2. Recent ERP Trends

Major modifications of an ERP system are difficult to realize [12,15] and the traditional advice
is to avoid customization as much as possible [6,15]. On the other hand an organization whose competitive advantage are due to customized processes might lose their benefits if they reengineer their processes after the ERP system. The view of customization as something that should be avoided has, however, started to change. There is an on going trend for ERP systems to become more flexible. Reference [24] argues that, “Real IT innovation comes from tailoring ERP systems to the unique needs of every company” [24,p.5]. Reference [25] noted already in 2007 a mounting interest among vendors to advance ERP systems to better support the user organizations. Businesses today want to be able to easily develop unique features [26] and to meet this requirement ERP vendors are trying to facilitate the easiness of customization of their systems and are also offering new options for customization.

Furthermore, there are several additional drivers that impact the trend towards more flexibility in ERP systems. The growth in the ERP market and that small and midsized (SME) companies have adopted ERP systems at a larger scale [1,18] are two drivers. SMEs have different characteristics compared to large companies and the same considerations in regards to implementation of ERP systems in large organizations do not necessarily apply to SME:s [18,27,28]. One example is the importance for small businesses to rapidly response to changes in the market [18], thus requiring flexibility in ERP system. Many small ERP service vendors have also taken substantial market shares from the traditional ERP vendors [29]. These niche vendors are able to compete on price and time-to-deployment [30] and they also offer new financing terms instead of the traditional license fees to pay for the ERP systems. This creates a need for ERP vendors to offer more flexible systems to stay competitive.

ERP system integration is another factor driving the flexibility trend. Reference [31] state that ERP implementations focus has switched from an internal to an external perspective; focus is now on external stakeholders and the issue of connecting customers and suppliers [31]. Other researchers are in agreement with the need for integrating external information systems with internal ERP systems to make information accessible to partners e.g. [32-37]. This creates a need for ERP systems to be flexible towards other systems.

The knowledge and requirements of ERP customers are more mature due to them having implemented several ERP systems [38]. This impacts the flexibility trend since knowledgeable customers have the capability to place unique and specific requirements on ERP systems.

Advances in technology also impacts ERP flexibility. Technology has matured and evolved [37] and new architectures have been developed such as service-oriented architecture (SOA), which is expected to have a large impact on redefining the ERP market [32]. ERP suppliers are also starting to adapt to new platforms and offer functionality through apps and tablets (e.g. Microsoft Dynamics & SAP).

### 2.3 Cloud ERP

Cloud computing is commonly divided into Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). With cloud delivery models customers can, at least in theory, construct their own IT environments by orchestrating IT services from different vendors [39]. This allows greater flexibility in the packaging and sale of large systems [40-42]. Instead of buying one system for all needs specialized services can be combined on a pay-per-view basis via the Internet. The multitenant architecture, where all customers share the same source code, can however impede flexibility due to the impossibility to modify the source code of specific service applications [43]. Cloud vendors have instead focused on providing extensive configuration capabilities, which makes the need for changes in the source code less needed [21].

In later years ERP as a service i.e. cloud ERP has gained ground. The delivery model most used for cloud ERP is SaaS [44] but PaaS solutions are also becoming more common. The provisioning of ERP through the cloud also differs a lot, from fully multitenant as in for example 24SevenOffice, through a combination of multi-tenancy and single tenancy as in Oracle business suite to the single instance solutions offered by Lawson in cooperation with Amazon.

Compared to other cloud enabled systems, ERP systems are integrated software packages and have multiple services integrated in single software [44]. Configurations in regard to cloud ERP can therefore be expected to have more apprehensions than for other cloud-based systems [44]. Reference [24] argues that cloud might weaken the ability of enterprises to innovate due to customization issues. Further, [45] show that customized software is more strongly supporting innovation capability within a company as opposed to standard software solutions. Compared to on-premise ERP, customization of cloud ERP has been identified as one of the main obstacles [22-23] while advanced configuration possibilities are considered a key factor for success [44,46].

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The feasibility of adapting the system to the requirements of a company need to be addressed by user organizations before a decision for cloud ERP is taken [47]. It is also important, both for customers and vendors of cloud ERP to understand the aspects of customization in cloud ERP to be able to manage their systems efficiently and deliver full value to their businesses [19,44]. Already in 2008 reference [19] stated that ERP vendors, supplying cloud solutions, needed to create a strategy for the enabling of customization by their customers themselves. They get support from [44] who claims that the way forward for customizing ERP in the cloud is to provide web-based tools for customers to perform their customizations themselves.

Through utilizing PaaS technology ERP vendors can provide customers with the possibility of developing applications without downloading and installing any software [48,49]. Customers are thereby provided with the possibility to build customizations themselves. Through Application Programming Interfaces (APIs) and web services cloud ERP vendors can also offer solutions that are easily integrated [50,51].

Two examples of companies that have addressed the customization issues in a successful way are Salesforce with their PaaS solution Salesforce1 and NetSuite incorporated, both large players that started out as SaaS providers. As a way to solve the customization issue for cloud ERP they have started to offer PaaS and/ or IaaS solutions to their customers.

Although several researchers have pointed out the need to consider customization of cloud ERP, none of the previously mentioned categorizations for customization consider cloud ERP. The lack of scientific coverage of the area of cloud ERP systems is also conveyed by [52]. They get support from among others [21] who state that research is needed for building a “clear framework to determine the level of configuration and customization ability of cloud ERP systems” [21,p.13]. [44] also points out the need for research on customization of cloud ERP.

3. Method

In this research qualitative survey research was used as a research strategy. In-depth interviews have been conducted to provide depth and completeness in the information collected [53]. Through interviews a better validity can also be ensured since data can be verified during collection, because in interviews there is a better possibility to clarify, ask additional questions and deepen statements [54].

A total of ten experts from ten different companies were interviewed. Mainly ERP vendors and/or consultancy firms are represented among the ten companies. One user organization is included. Information about the respondents is visible in Table two below.

### Table 2. The experts included in the study and their organizational belonging

<table>
<thead>
<tr>
<th>Organization Description</th>
<th>Expert Interviewed</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERP vendor, one of the largest on the Swedish market</td>
<td>Manager product localization.</td>
<td>1</td>
</tr>
<tr>
<td>Swedish ERP organization that develops and delivers an on- premise ERP system.</td>
<td>Senior developer.</td>
<td>2</td>
</tr>
<tr>
<td>Organization providing a cloud based ERP systems, which has been in used for more than ten years.</td>
<td>Managing Director for Sweden. Previously founder of one of the largest ERP systems developed in Sweden.</td>
<td>3</td>
</tr>
<tr>
<td>Partner organization to one of the largest ERP vendors in the world, the partner organization delivers an ERP system to their customers.</td>
<td>Head of competence department.</td>
<td>4</td>
</tr>
<tr>
<td>Organization delivering bolt-on solutions to one of the largest ERP systems on the Swedish market.</td>
<td>Product manager.</td>
<td>5</td>
</tr>
<tr>
<td>One of the largest IT companies in the world, building several ERP systems for a worldwide market.</td>
<td>Technical advisor for customers and partner companies.</td>
<td>6</td>
</tr>
<tr>
<td>Swedish manufacturing organization with presence in several countries.</td>
<td>Process owner for the ERP system used at the financial department.</td>
<td>7</td>
</tr>
<tr>
<td>A large worldwide organization offering a diversity of different IT services ERP consultancy services are one.</td>
<td>Project leader and implementation consultant.</td>
<td>8</td>
</tr>
<tr>
<td>Swedish medium sized consultancy firm, offering a range of consultancy services.</td>
<td>ERP integration consultant.</td>
<td>9</td>
</tr>
<tr>
<td>Consultancy firm working with a worldwide PaaS solution.</td>
<td>Country manager for Sweden.</td>
<td>10</td>
</tr>
</tbody>
</table>
information and valuable insights on the research topic” are intentionally chosen [53,p.35]. The criteria for choosing companies were that the companies are well known and established ERP suppliers, ERP consultant companies or very experienced ERP users. Criteria for choosing experts to interview were that they work with customizing ERP systems and that they volunteered to participate.

All interviews performed followed the same structure. First, questions were asked to the respondent to find out relevant information about the expert. Then, questions were asked to the respondent to find out relevant information about the organizations ERP related systems and services. Then questions about configuration and customization of ERP systems were posed. The typology suggested by [8] was used as a foundation for discussion about ERP customization options. The typology was chosen because it’s well cited and provides a detailed categorization of ERP customization options. All of the interviews were recorded and after each interview the recordings were transcribed. The results were analyzed by using content analysis to identify patterns in the answers. The findings were also again considered against the work by [6,8,14,16] in order to determine the adequacy of these typologies.

4. Results

In this chapter the results from the interviews are described. First the views of the respondents in relation to the understanding of customization are described. Then the point of view of the respondents on the different customization options and thereby the adequacy of the typology suggested by [8] is described. A few statements and quotes from the interviews have been selected to illustrate the respondents view. The authors have translated all quotes in the result section from Swedish to English.

4.1. The Understanding of Customization

Different levels of customizations are still a common phenomenon in ERP implementation projects. All respondents agree that some customization is necessary in an ERP implementation project today. There is also obvious that the extent of customization differs a lot and that is to a large extent dependent on the specific system implemented. The understanding of customization differed among the respondents. Respondent 1 states that “Customization is setting pre-defined parameters in the system, configuration is modifications in the source code”; respondent 3 are in agreement with this view. Respondent 4 and 5 as well as 8 and 9 instead agree on another view: “Customization is when you have to make changes in the code while configuration is setting parameters in tables and switching functions on and off” (respondent 4).

The differences in the understanding of customization are especially visible between cloud ERP and on-premise ERP. The respondent working with on-premise ERP did to a large extent agree with [8] definition of configuration (setting parameters) although extended configuring options, such as visual workflow configuration, was also visible. The cloud ERP respondents had a different view of what changes are possible to do through configuration but there were also large differences in how different cloud vendors regarded the possibilities of configuration. From only cosmetic changes (Respondent 3) to advanced changes in the database or the creation of trigger events (Respondent 10).

According to respondent 10, working with a PaaS system, configuration enables changes not only by setting parameters but also enables changes in the user interface and database, through drag and drop, and, by creating business rules, triggers and actions without coding. “We get very far by configuring the system before we even need to code, and when code is needed it is often very little actual coding involved” (respondent 10). In the PaaS solution their customers often buy only the development environment, or the platform, and then build all functionality by configuring the system, sometimes without any coding at all.

That configuration enables a larger set of changes in the PaaS solution, compared to on-premise ERP creates difficulties. “It is very difficult for me sometimes when communicating with customers who are stuck in the old fashioned way of viewing customization. Many customizations that require coding in on-premise solutions are possible by configuring the PaaS solution. Since what we offer is so different it is hard to get a common understanding”. (respondent 10)

4.2. Customization Options

The customization options within the [8] typology were perceived different depending on who was answering. Several respondents recognized or were familiar with a number of the names in the typology, such as user exits, but did not agree with the offered definition of them. It was still possible to discuss customization based on the typology made by [8] since most companies had knowledge and recognized most of the customization options.

Based on the customization options in the model suggested by [8] the status for each option is
described in short in the following two tables. The status for on-premise ERP is presented in table three. The viability for cloud ERP is presented in table four.

### Table 3. Status of customization options for on-premise ERP

<table>
<thead>
<tr>
<th>Customization option</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Common customization option. Configuration encapsulates more possible changes than before, e.g. role interfaces. Lack of consensus in regards to definition of configuration.</td>
</tr>
<tr>
<td>Bolt-ons</td>
<td>Common customization option but encapsulates more possible changes than before. Development and dissemination facilitated through marketplaces.</td>
</tr>
<tr>
<td>Screen masks</td>
<td>Old fashioned, not commonly used and has been replaced with other techniques such as web and mobile interfaces. Configuration as to a large extent replaced the need for screen masks.</td>
</tr>
<tr>
<td>Extended reporting</td>
<td>Outdated customization option. Replaced to a large extent with Business Intelligence tools and 3rd party reporting tools.</td>
</tr>
<tr>
<td>Workflow programming</td>
<td>Outdated customization option. Replaced with configurations, workflow layers and workflow engines.</td>
</tr>
<tr>
<td>User exits</td>
<td>Valid and a (very) common customization option. “User exits are the most classical option of customization, and you cannot do implementation projects without using them. They are always safe in regards to upgrades”. (Respondent 8)</td>
</tr>
<tr>
<td>ERP Programming</td>
<td>Status unclear. Differs between different vendors and perceived as an unclear option among the respondents.</td>
</tr>
<tr>
<td>Interface development</td>
<td>Important and common customization option but the naming is outdated. Interfaces are often simpler to develop today due to more tool support such as integration APIs. “Using conventional integration tools such as flat file transfers is today considered an accident at work, instead integration is all about using standard protocols for transferring data and libraries with APIs and web services” (Respondent 9).</td>
</tr>
<tr>
<td>Package code modification</td>
<td>Regarded as a still valid option as well as difficult to perform and should be avoided. “In almost all implementation project some kind of coding is necessary but we try to keep it at a minimum to facilitate upgrades and support of the system” (Respondent 8).</td>
</tr>
</tbody>
</table>

### Table 4. Viability of customization options for cloud ERP

<table>
<thead>
<tr>
<th>Customization option</th>
<th>Viable</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Yes</td>
<td>Most customization is done through configuration in cloud ERP.</td>
</tr>
<tr>
<td>Bolt-ons</td>
<td>Unclear</td>
<td>“Everyone can build an app on our platform; it does not even cost anything. Then you can sell it on the marketplace or sell it by yourself” (respondent 10).</td>
</tr>
</tbody>
</table>

### 4.3. New Customization Options

Several of the respondents expressed a need for having a package customization option that include bundled customizations for specific business verticals (respondent 1, 4, 5, 6 and 10). The reason is that a common offer is to have several pre-developed customizations together in a package deal to speed up the implementation of the system. “What I consider missing is packaging of customizations” (respondent 1). “We work a lot with components, which is smaller packages of functionality; maybe there should be something about packages” (respondent 4). “An app [application] can be a package of customizations, they can be either large or small” (respondent 10).

Mobile platform interfaces such as apps are also considered common today. There is no common agreement on how to regard mobile apps however. Respondent 1 and 5 consider it to be a customization option while respondent 4 and 2 consider it only as an interface on a different platform and interview 3 states that “apps are only a new way to extend the keyboard”.

Respondent 8 and 9 brings up the notion of conversions as a customization on data level. Conversion is used to adapt data to different systems.
to make migration of data from legacy systems and integration between systems with different data models possible (respondent 9). “We use a canonical data model to make the integrations scalable and remove system dependencies, all system specific data are mapped towards the canonical system” (respondent 9). “Our metadata model is available through APIs which makes it easy to map data towards our system or map our data towards others as well” (respondent 10). The suggested new customization options are suitable for both on-premise and cloud ERP; summarized in table five.

Table 5. Suggestions of new customization options for on-premise and cloud ERP

<table>
<thead>
<tr>
<th>Customization options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package customization</td>
<td>Bundled customizations for specific business verticals.</td>
</tr>
<tr>
<td>Conversions</td>
<td>Customization on data level.</td>
</tr>
<tr>
<td>Mobile platforms</td>
<td>Unclear, needs further investigation.</td>
</tr>
</tbody>
</table>

5. Discussion

In this chapter the result is discussed.

5.1. The Notion of Customization

A factor for ERP implementation success is communication [55] and it has even been identified as the most important success factor by [17]. Different nomenclature and interpretations of concepts are aspects that can influence communication negatively.

The perception of what different customization options stands for and how it is used differs among practitioners. Vendors and consultancy firms seem to use their own or system specific nomenclature. This can have a negative impact on ERP implementation projects, for instance, when a customer discusses a possible customization with a supplier.

In respect to cloud ERP, further communication hurdles exist. Extended flexibility and fit can be offered through using only configuration options present in the systems and several of the customization options are shown to be viable at least for certain cloud ERP systems. Communication problems then arises when customers have a traditional and thereby conflicting perception of customization options. This can for instance lead to misunderstanding of time estimations in the projects.

The authors therefore argue that there is a need for system independent consensus regarding constructs and nomenclature within the area of ERP customization. A standard way of naming and describing different customization options do not exist in the Swedish ERP market. An updated model with naming and definition of different customization options can thereby help to improve communication regarding ERP customization.

5.2. Adequacy of Existing Models

Models for customization such as [6,8,14,16] were not well known by the ERP practitioners. The respondents did however seem to regard the notion of using models useful. The dissemination of such models thereby needs to be improved.

Based on the results the authors of this paper claim that the [8] model is not adequate, it does not accurately reflect available customization options for ERP today. The model would need to be revised in order to meet new conditions on the ERP market.

The authors further claim that the model for customization proposed by [14] for ERP customizations presents to broad customization categories to be relevant in this context. The two first categories (module and table customization) can be regarded as valid. The third category (code customization) is valid per se, but it is not sufficiently detailed to provide a comprehensive picture of customization options and thereby less usable. The same applies for [16]. The categorization offered by [6] is also regarded as to broad and does, for example, not include integration, although it is pointed out as an important issue by the authors themselves [6]. Compared to the older models there is a shift in the complexity level of customizations. Changes that required coding ten years ago is to a large extent replaced with configuration options, and thereby less complex to perform.

5.3. Suggested Changes Typologies

Table six below presents suggested changes that need to be considered in a new model for on-premise ERP.

Table 6. Suggested changes to on-premise customization options

<table>
<thead>
<tr>
<th>Customization option</th>
<th>Suggested Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>The definition needs to be updated and more configurable functionalities or levels of configuration need to be included in the definition.</td>
</tr>
<tr>
<td>Bolt-ons</td>
<td>The definition needs to be expanded to include several ways to develop and...</td>
</tr>
</tbody>
</table>
proposing new customization options (packaged customization, conversions and mobile platforms) that should be included in a new model. There is an obvious trend visible in this research of replacing code customization with configuration options, both in on-premise and cloud ERP. The need for consensus regarding constructs and nomenclature within the area of ERP customization is also highlighted.

There is also a need for customization models for different types of ERP systems. In regards to cloud ERP, models need to be designed to conform to their technical platforms and delivery models. This paper contributes with describing how existing customization options relate to cloud ERP. The authors of this paper therefore claim that there is a need for new models for on-premise and cloud ERP customization options. Future research should focus on designing such models. The suggested changes and new customizations options in this paper could be used as a contribution to the first two steps in [56] design science research methodology.

Although the authors claim that new models are the most appropriate way forward, it should be noted that for organizations using old ERP system the existing typologies could still be adequate. Future research should find ways to disseminate models in order to help practitioners to get a deeper understanding of the phenomenon and also in order to move the standardization of ERP software development forward.

5.4. Applicability to Cloud ERP

Two out of the nine customization options in [8] are viable for cloud ERP and four options are unclear if they are viable. None of the existing models are directly applicable to cloud ERP. We are in agreement with reference [21] that a model for customization of cloud ERP systems is needed. This research contributes to building a model by mapping on-premise ERP customization options to cloud ERP (see table 3).

6. Conclusions and Future Research

Customization is important for ERP system success and some degree of customization is required in almost every ERP system implementation. Models or frameworks that defines different customizations options can help the communication regarding ERP customization, but we observed that existing models for on-premise ERP customization needs to be revised. This paper therefore contributes with presenting changes necessary to existing customization models. It also contributes with proposing new customization options (packaged customization, conversions and mobile platforms) that should be included in a new model. There is an obvious trend visible in this research of replacing code customization with configuration options, both in on-premise and cloud ERP. The need for consensus regarding constructs and nomenclature within the area of ERP customization is also highlighted.

There is also a need for customization models for different types of ERP systems. In regards to cloud ERP, models need to be designed to conform to their technical platforms and delivery models. This paper contributes with describing how existing customization options relate to cloud ERP. The authors of this paper therefore claim that there is a need for new models for on-premise and cloud ERP customization options. Future research should focus on designing such models. The suggested changes and new customizations options in this paper could be used as a contribution to the first two steps in [56] design science research methodology.

Although the authors claim that new models are the most appropriate way forward, it should be noted that for organizations using old ERP system the existing typologies could still be adequate. Future research should find ways to disseminate models in order to help practitioners to get a deeper understanding of the phenomenon and also in order to move the standardization of ERP software development forward.

7. References


