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RE-CONCEPTUALIZATION OF TAILORING TYPES AND THEIR IMPACTS: A PERSPECTIVE FOR CONTEMPORARY ERP SYSTEMS

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Abstract

Enterprise Resource Planning (ERP) systems continue to gain importance in today’s tough global environment. Organizations are making large investments in ERP systems because of their promised benefits. Several observations have been made in the literature which suggest that organizations should avoid tailoring the ERP systems as much as possible while implementing and using them. It is assumed that this approach will result in realizing the likely benefits of ERP systems. However, because of ever evolving requirements and individual needs of the organizations, even a ‘Vanilla’ package has to undergo through customization. Literature on the ERP systems provides different typologies of the ERP customizations. However, there is a pressing need for a new and refined typology as the functionality of the ERP packages has matured and advanced over the years. This paper is intended to present the re-conceptualization of the ERP customization typology and, moreover, it aims to develop new assessment criterion that can be used to assess the impact of the different types of customizations.

Keywords: Enterprise Resource Planning, Customization, Tailoring, Typology, Impact

1. Introduction

Implementation of package based Enterprise Resource Planning (ERP) systems can improve the transparency of business processes, supply chain management and enhance the financial control of organizations (Ross et al., 2000; Davenport et al., 2002). On the promise of likely benefits, organizations continue to make large investments in ERP systems. According to Forrester research, the size of ERP market will reach to $50.3bn in 2015 (CBR, 2011). It has been argued that one recommended approach to maximize the likelihood of ERP system success and thereby delivery of benefits, is to avoid package customization (Helo et al., 2008; Parr et al., 2000; Finney et al., 2007; Robey et al., 2006; Brehm et al., 2001; Grossman et al., 2004; Harris, 2000; Turner, 2006). Taking a ‘vanilla’ approach is suggested to be beneficial as it will reduce problems with future upgrades and reduces implementation and maintenance costs (Brehm et al., 2001). However, research shows that due to ever changing business needs and dynamic market environments, ERP systems are rarely installed without some customization (Gargeya and Brady, 2005). Organizations will have their own little niches which they would like to protect and hence the ERP packages get customized. For example, many organizations will customize their systems because of either a mismatch between organizational practices and ERP package functionality or to maintain practices that provide an advantage over competitors (Light, 2005). It appears that implementing a truly ‘vanilla’ system, although desirable, is rarely achieved.

According to a recent estimate, almost 85% of ERP implementations go through some type of customization (Panorama Consulting Group, 2011). Because customization happens at an industrious scale in the ERP industry, several authors have developed different typologies of ERP customizations (Davenport, 1998; Brehm et al., 20001; Luo et al., 2004). However, since the introduction of these typologies, the ERP product has matured and advanced both in terms of functionality and internal
architecture. These typologies although very thorough and detailed but they don’t fit well with the contemporary ERP systems. Therefore, there is a pressing need to re-examine our understanding of customization in relation to ERP systems and the potential to enhance typologies of ERP customizations (Aslam et al., 2012).

Although, organizations have to customize their ERP packages but it is very important to manage the process of customization. Failure to understand the implications of different types of customizations can have a severe effects on the overall ERP package (Markus and Tanis, 2000; Brehm et al., 2001; Brehm et al., 2001; Seidel, 2000; Grefen, 2002; Rothenberger et al., 2009). Previous studies have assessed the impact of different tailoring types (Brehm et al., 2001). However, these studies have done so either too informally or based on the factors that are not relevant with today’s ERP technology. As described earlier, because customization happens at a large scale these days, efforts are required to develop a new criterion to determine the impact of different types of customizations.

The overall aim of this paper is to re-conceptualize the typologies of ERP customization and the criterion to check the impact of an ERP tailoring type. It is expected that it will help the academics to study the modern ERP packages with respect to customizations and their subsequent effects. This study will also be useful for practitioners who can determine impact of a particular type of customization and decide whether or not to perform this customization. This paper predominantly draws on the ERP and customization literature. In the following section, the research background provides a short review of prior ERP package customization, typologies of customization and factors to assess the impact of customizations. Against this background, a new refined typology and a new criterion to measure the impact of different customizations is presented. The paper finishes with a conclusion and directions for future research.

2. Theoretical Background

According to Luo and Strong (2004), customization is a process that involves the alteration of an ERP system to match the organization’s existing business processes. A contrasting, less process orientated perspective is taken by Light (2001) who considers customization as an activity that makes changes or additions to the functionality already available in the standard ERP software. A third view of customization is presented by Davenport (1998) who describes that at the time of ERP implementation, organizations first choose which modules to install. Organizations then undertake table configurations to achieve the best fit with organizational processes. By contrast to the previous views, Davenport (1998) considers customization only in terms of table configuration, alongside wider module customization.

Numerous studies, in the ERP literature, strongly support the idea of not tailoring the system (Parr et al., 2000; Harris, 2000; Brehm et al., 2001; Grossman et al., 2004; Robey et al., 2006; Turner, 2006; Finney et al., 2007; Helo et al., 2008). Having a ‘Vanilla’ system is often described as a critical success factor for organizations implementing an ERP system (Finney et al., 2007). However, due to ever changing business needs and dynamic market environments, the ERP packages require to be customized. There are different ‘drivers’ that can trigger or invoke the customization of the ERP package but broadly, they can be categorized in six main types. A list of these types is presented in table 1.

<table>
<thead>
<tr>
<th>Drivers of Customization</th>
<th>Type</th>
<th>Brief Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiation</td>
<td>ERP packages are generic products. Organizations can perform modifications to these packages to get the competitive edge and to move away from the mainstream (Brehm et al., 2001; Holland et al., 1999; Light, 2005).</td>
<td></td>
</tr>
<tr>
<td>Requirement</td>
<td>ERP package might not have the required functionality. For example, an organization may have a special cost structure for a specific product and this structure may be missing from the package. So a customization might be...</td>
<td></td>
</tr>
</tbody>
</table>
performed by developing the missing functionality and then incorporating it within the standard functionality of ERP package (Light, 2005).

The functionality required by the organization might be different from the functionality in the ERP package. For example, the way an organization performs its MRP tasks (because of its industry needs) may be different from the core structure of MRP in ERP package. So a different functionality may be developed and then re-integrated into the package (Light, 2005).

| Regulatory | Organizations might have to customize the ERP package in order to develop a functionality that will satisfy the regulatory requirements (Soh and Sia, 2004; Kholeif et al., 2007). |
| Resistance | Customizations can also occur as a form of resistance. Users in an organization may not be willing to change their existing procedures. There may also be the fear of downsizing. This may force the development team to do certain modifications to the software (Light, 2005; Golland, 1978). |
| Legacy | Organization might want to keep some of its existing ways of working. For example, an organization may want to maintain the way it pays to its drivers (Light, 2005; Gupta et al., 2004). |
| Benefit | Organization might want to customize the system to realize a certain benefit. For example, to increase operational efficiency, an organization might customize the interfaces in the production area (Light, 2005). |

| Table 1: Drivers of Customization |
Although, organizations have to customize their ERP systems due to different reasons but whilst doing so, they have to be extremely careful in managing customizations. Problems of ERP customizations are well cited in the literature. Often, it has been cited that the organizations had to ‘re-implement’ the system at the time of upgrade because the internal features of ERP packages were customized to an extent that it was very difficult, or in some cases impossible, to install the newer or upgraded version of the package (Markus and Tanis, 2000; Brehm et al., 2001). ERP vendors regularly offer new extensions of ERP packages such as CRM & SCM etc. which can be integrated with the ERP systems. It would be extremely difficult for the organizations to take advantage of these extensions if they have massively customized their ERP systems (Brehm et al., 2001; Seidel, 2000). Additionally, extensive customizations can put a big risk on the project success because of the costs of these customizations and it would also be very difficult to maintain the customized systems (Grefen, 2002; Rothenberger et al., 2009). Therefore, organizations should be careful in doing and managing the ERP customizations so that the ERP package does not become a liability for them in the later stages.

| 2.1. Typologies of ERP customization |
Several authors have developed different ERP customization typologies (Davenport, 1998; Brehm et al., 2001; Luo and Strong, 2004). A summary of these typologies is presented in figure 1.

- **Davenport (1998)**
  1. Configuring Modules
  2. Configuring Tables

- **Luo and Strong (2004)**
  1. Module Customization
  2. Table Customization
  3. Code Customization

- **Brehm et al. (2001)**
  1. Configuration
  2. Bolt-ons
  3. Screen masks
  4. Extended reporting
  5. Workflow programming
  6. User exits
  7. ERP programming
  8. Interface development
  9. Package code modification

| Figure 1: Typologies of ERP Customizations |
Although, there is some consistency between the typologies developed by Davenport (1998) and Luo & Strong (2004), several inconsistencies and contrasting interpretations are apparent across all three
typologies. For example, Brehm et al. (2001)’s typology includes workflow programming. To write industry workflows, may require modification of user exits which is a separate category in the Brehm et al. (2001)’s typology. Therefore, it is not clear whether this customization should either be categorised as workflow programming or as user exits. An additional weakness in these existing typologies is that they may no longer reflect the more sophisticated functionality and internal architecture of contemporary ERP systems. Also, the existing typologies do not take into account recent developments such as service-oriented architectures and cloud computing. Therefore, there is a need to re-examine our understanding of customization in relation to ERP systems and the potential to enhance typologies of ERP customizations. In an effort to address this issue, following is a critical review of the existing typologies and an attempt to re-conceptualize them in relation with the modern ERP systems.

Ten years ago when the ERP product was not much advanced, Configuration could had been categorized as a type of customization but now a days, with the amount of functionality available in the ERP packages, configuration of modules and tables (Davenport, 1998; Luo and Strong, 2004; Brehm et al., 2001) cannot be taken as a type of customization. In modern ERP systems, configuration merely means ‘switching on’ of options pre-built within the standard software i.e. choosing certain options within the package that organization needs and turning them on.

ERP Programming (Brehm et al., 2001), also known as Enhancements, refers to enhancing the functionality in the ERP package through the language provided by the vendor but without going into the core code. In modern ERP systems, usually this enhancement is done either through Bolt-ons (also known as Composite Developments) or through User Exits which are two separate types in the typology of Brehm et al. (2001). For simplification, these two types can be consolidated under ‘Enhancements’. So in Enhancements, the package is enhanced either through composite developments or through user exits by utilising the functionality available in the package or through the language provided by the vendor. For example, in SAP, enhancements can be done using ABAP.

Changes in work flow, these days, are usually done through user exits or through composite developments. Therefore, there is no need of for work flows as a separate typology. Brehm et al. (2001) have also presented Screen Masks and Interface Development as two separate types of ERP tailoring but the researchers are of the view that there is not a significant difference between them. Therefore, these two different types can be consolidated as one single type and can be renamed as Interfaces. The two remaining types of customizations are Extended Reporting and Package Code Modifications (Luo and Strong, 2004; Brehm et al., 2001). Code modifications involve the alteration of the core ERP code. Vendors usually do not allow altering the core code. As stated above, it is a ‘no-go’ area for customers. For simplification and to keep in line with the market terminologies, extended reporting can be renamed as Reports and package code modifications as Modifications. Another type of customization which is not found in existing typologies is the modification of Forms. Vendors might be asked to add or edit different types of forms depending upon the requirement of the organizations. Therefore, we believe that Forms should be incorporated in the typologies of customization.

2.2. The Factors Assessing the Impact of ERP Customization

Brehm et al. (2001) have argued that there are seven different factors that can be used to assess the impact of different types of customization. The first factor is the degree of using a specific type of customization e.g. if a particular type of customization is used extensively, it will have severe effects on the package. While it may be true 10 years ago, when the ERP product was not much mature and when the programmers had to dig deep for any changes but it is not the case now (apart from doing code modifications). These days, the ERP product has become much richer and mature not only in terms of its functionality but also in terms of the architecture as well. Therefore, the degree of use does not determine the impact of a customization anymore.

The second factor to assess the impact, is the usage of different types of customizations i.e. a mix and mash of different customizations. Brehm et al. (2001) advocate that these combinations can indicate...
the complexity and the impact on the ERP package. While this may be true for an overall assessment (apart from doing code modifications) but it will not be useful to determine the impact of any particular type of tailoring.

The next two assessment factors are around: whether a specific type of customization will introduce any bugs into the code and whether it will affect the internal data structures. As described earlier, vendors do not allow clients to go within the core code these days; it is like a ‘no-go’ area. For other types of customizations, not only there are more skills readily available now but there are tools available that can be used to customize ERP packages without going into the code. The next factor is the dependency amongst different tailoring types. Again, this is not an issue which will create anxiety for managers of contemporary ERP systems. Because of the readily available functionality of the product and advancement in technology, usually one tailoring type will not be dependent upon another tailoring type.

According to Brehm et al. (2001), another factor that determines the impact of a certain type of tailoring is the degree to which it can be protected against the upgrades. This is an important matter because if an organization has spent too much time and money on doing a particular customization and at the time of upgrade, the vendor can’t accommodate that, then all the effort made earlier will be wasted. The last factor determining the impact of tailoring is the organizational behaviour and geographical dispersion. The researchers are of view that the behaviour of an organization and its geographical location cannot determine the impact of any tailoring type.

Consequently, the criterion set to gauge the effect of different types of customization by previous studies is of little use for modern ERP systems. For contemporary ERP systems, a new criterion is needed which is developed on the factors that has relevance in today’s ERP industry. The following section attempts to address this need.

3. Re-conceptualization of Typologies and the Assessment Factors

It is apparent from the above discussion that since the introduction of existing typologies, ERP packages has matured significantly. Therefore, these typologies need to be revisited and a new typology should be developed which is well-aligned with the contemporary ERP systems. We propose that the refined typology should incorporate the drivers of customizations as well. In existing studies, the drivers of customizations have been studied on their own. Joining the drivers with the specific type of customizations will be helpful for organizations implementing and updating ERP systems. It will allow them to make more informed decision about the choice of customization. For example, for differentiations purposes, organizations will enhance the functionality of the system either through user exits or through composite developments as opposed to enhancing reports, interfaces or forms. Combining the drivers and type of customizations will also be valuable for academics. Academics can study the influence of the drivers of customizations on the type of customization and subsequently the effects of customization. Consequently, based on the above discussion, we have re-conceptualized the existing typologies of customization in an attempt to produce a refined typology. This refined typology is presented in figure 2. This typology is different from previously existed typologies in many ways. First, it doesn’t have the types of customizations which are no longer considered as ‘a’ type of customization these days. Secondly, it replaces the existing terminologies for different types of customizations with the ones that are used in today’s ERP market. Thirdly, it adds the catalysts of customizations with the types of customization. Finally, this typology fits well with the customizations done on contemporary ERP systems. Also, based on the types and their impacts, customizations have been arranged in low, medium and high categories (Brehm et al., 2001) in this new typology.

It is also evident from the discussion in section 2.2 that most of the factors, described by Brehm et al. (2001), assessing the impact of customizations do not coincide with modern ERP systems. Therefore,
there is a need to develop a new criterion based on different related factors. Consequently, this
criterion can be used to determine the impact of different tailoring types. We postulate that cost is the
first factor that can determine the impact of any tailoring type. Vendors usually charge additional
costs for system tailorings. These costs can turn down the ERP implementation project into a failure
(Grefen, 2002; Rothenberger et al., 2009). Therefore, it is plausible to appraise that the cost of a
customization as it can have a great impact on the overall project.

Next factor to consider is the maintenance efforts required as a result of customization. Generally,
maintenance efforts vary for different types of customization. Required maintenance efforts also vary
from organization to organization. Organizations should also be careful when deciding about
outsourcing the maintenance responsibility (Light, 2001).

Another very important factor that can determine the impact is whether ERP package will be able to
integrate with any future upgrades after the doing the customization. This factor is very critical as it
has been often witnessed that companies which tailor their ERP systems extensively, have to ‘re-
implement’ the ERP software at the time of upgrade (Markus and Tanis, 2000; Brehm et al., 2001).
Attached with this factor, is the ability of the package to integrate with the new extensions of the
package such as CRM and SCM etc. after doing the customization (Brehm et al., 2001; Seidel, 2000).
The last assessment factor is the number of man hours required for the customization. This factor is
directly linked with the maintenance and subsequently to the costs factors as well. The numbers of
hours required also vary based on the type of customization and organization. But, generally, the
higher the customization the more time it will needed and hence more money will be required.

Thus, this newly developed criterion is different from existing criteria as it incorporates the factors
that are relevant and have practical significance to determine the impact of different types of
customization.

<table>
<thead>
<tr>
<th>Drivers of Customization</th>
<th>Types of Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiation</td>
<td>Low: - Reports, - Interfaces, - Forms</td>
</tr>
<tr>
<td>Requirement</td>
<td></td>
</tr>
<tr>
<td>Regulatory</td>
<td></td>
</tr>
<tr>
<td>Resistance</td>
<td></td>
</tr>
<tr>
<td>Legacy</td>
<td></td>
</tr>
<tr>
<td>Benefit</td>
<td></td>
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</table>

*Figure 2: Re-fined typology of ERP Customizations*

4. Conclusions and Future Research

In this paper, an effort has been made to refine and re-conceptualize the typology for different types
of ERP customizations. In addition a new criterion that can be used to assess the impact of different
types of customizations has been developed. It is hoped that this study, with its original insights will
help academics to better understand the process of customization and their related effects. Moreover, this study will also help practitioners to envisage the potential impact of a tailoring type. By envisaging the impact, the IT practitioners can make sure that the package is not customized in a way that may prove troublesome in the future. Future studies need to be conducted: (1) to assess this re-conceptualized typology of customization and (2) to assess the newly developed criterion that determines the impact of different tailoring types. Due to the nature of the research, exploratory research would be most suitable to study the phenomena of ERP customization. The ERP industry can be broadly categorised into three main groups, the vendors that supply the ERP software, the system integrators that facilitate the implementation of the software in organizations and the client organizations themselves (Aslam et al., 2012). For data collection purposes, semi-structured interview approach can be adopted to interview the representative from each stakeholder group. This approach would help to obtain examples of different types of customizations initiated by different types of drivers which can be used to populate the typology with the fitting examples.

**References**


