

Framework for Evaluation of Enterprise Software in IT Service Management of Small and Medium Enterprises

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Abstract

The paper is concerned with problems arising in the process of management of enterprise software integration for better fitting to business needs through evaluation its performance and user's satisfaction. The method assumed to be used on the small and medium enterprises (SMEs) to substitute expensive and high human recourse demanded methods. The paper describes the enterprise software evaluation method which was tested in three SMEs. The method and findings of this work can certainly be useful for SMEs that need to evaluate their enterprise software to clarify how it suits to their business processes and what the end-users experiences in working process.

Keywords: enterprise software; SME; software evaluation.

1. Introduction

Nowadays, enterprise software is attracting more and more organizations because of their usability, simplicity and effectiveness. These characteristics can support cost reduction for user training. But for organizations with less financial and human recourses capacity, a less complicated and less costly enterprise software evaluation method is an advantage. Enterprises use many different kinds of software, but most of that software does not fit a definition of enterprise software. If an employee buys software used by another company as enterprise software, but uses it for his personal needs then it is not be considered as enterprise software [1]. The enterprise software considered in this paper is the specialized integrated suite of software applications that can provide a common data model and processes at different levels and units of the organization.

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The most common examples of enterprise software can be the Enterprise Resource Planning (ERP), human resource management, online billing and Client Relationship Management (CRM) systems, or even the software of an organization's own production.

2. Importance of this Research

The role of small and medium enterprises (SMEs) in a national economy has been accentuated all over the world for their contribution to total productivity and to job opportunities [2]. At the same time, the rapid growth of information and communication technologies (ICT) determines the performance and competitiveness of the SMEs. It is believed that ICTs became a necessity in the management of SMEs in order to survive in the modern business environment. According to Porter's theory, ICTs have the potential to attain a competitive advantage [3]. The main goal of the implementation of ICTs in SME was optimization of the enterprise's operational processes. According to Lucchetti and Sterlacchini (2004) adoption of ICT was the reason for the high growth rate in the US economy during the 1990s [4]. However, some experts argue that because ICTs are now being widely used by enterprises, it has lost its effectiveness as a strategic instrument of a company's differentiation and companies no longer obtain the advantage they did at the onset of ICT [5].

However, most of the organizations do not have clear vision what they need from the enterprise software and what they actually have. In that case having more effective integrated enterprise software gives advantage to organizations. Therefore, increasing the effectiveness of enterprise software is crucial for organizations. Furthermore, such evaluation approach gives the organizations an instrument to make decisions which part of enterprise software must be extended and which part is not needed as well as to understand how users see the application.

3. Objective

The aim of the current work is to propose a quality evaluation method to improve integration of enterprise software in small and medium enterprises (SME) and to clarify the productivity of their software. The motivation for choosing the object quality modeling systems is the current situation, where quality service evaluation is not widely used or does not match with the requirements or capabilities of the SMEs. The quality of the selected area issues are addressed primarily from the perspective of SMEs needs. Does the software that an organization utilizes suit its expectations? Are users satisfied with it? These are the main questions which proposed method pretends to solve.

4. Research Methodology

A measurement procedure should be based on two essential questions: organization's expectations and users' experience. According to these questions it is possible to decide what should be measured. After determining the basic parameters for the measurement, we can then choose the method to measure these parameters. The methods should be selected on the basis of our measurement model, which means that each measured parameter should have its maximum and minimum. We can use methods to measure both negative and positive sides.

Representatives from variety levels and departments were chosen to answer to two questions:

1. What the software should do?
2. How it should perform?

Based on the results of the answers from tested organizations there was created a list of possible parameters.

The Organizations were given an overall score of 10 each to divide it between parameters. There are left four major parameters (table below).

Table 1: List of parameters

Parameter	Score
Functionality	6
Reliability	4
Interoperability	3
Usability	3

The following table describes measurement functions and quality measurement elements for chosen parameters.

Table 2: Parameters and formulas of proposed method

Name	Measurement function and QMEs:	Method
Coverage of SME enterprise software	$x_{cov} = \frac{c}{s}$	s= number of objectives of SME should be covered by enterprise software. c= number of objectives which covered by enterprise software. The value can be in double format.
Stability of the system	$x_{st} = \sum_{i=1}^n \left(\frac{d_i}{d_i + v_i} \right)$	v-sum weight of errors d-monitored days.
Usability (ergonomy)	$x_{us} = \frac{c}{n * m * q}$	c-sum of answers scores n-number of interviewers q-number of questions. m-max point of questions.
System integration	$x_{int} = \frac{Ps}{Pi}$	Ps-sum of integrated software pairs Pi- the number of software pairs which have to be integrated

Coverage and Integration are based on the organization's expectations, whereas the Stability and Usability are related to user experience. There is a difference in scoring an organization's expectation and experience.

Expectation can indicate absence of some needed features, while user experience more precisely considers what is already available.

The principle described in SQuaRE i.e. that “every quality measure employs its measurement function which normalizes the value within 0.0 to 1.0 and makes it interpreted that the closer to 1.0 is better” was followed. [6].

5. Testing method on the organizations

The organizations selected for the research are operating in Kazakhstan. The choice of organizations was based on the procedure of approaching a contact person within that organization, determining if the organization was appropriate to study and requesting permission to run the research in that organization. In exchange for access to certain firms and discussion of their processes, which required commercial confidentiality, I agreed to hide real names. Therefore the firms will be represented by abbreviation. The various types of firms were studied in order to increase the number of practices chosen by a variety of organizations.

This part indicates the organizations that participated in the research and displays some analysis. Initially organizations are identified individually and finally there is common analysis of all organizations.

It was agreed with three organizations that the method would be used in their organizations. Finding suitable participants took about three months. Each organization agreed to present three circles of evaluation.

6. Short Description Of Organizations Participated

The Table 3 gives a short description of the participants. Since participants asked for privacy, the names of organizations were substituted by abbreviations consisting of O- which means “organization” and the two letters from the industry which they represent. The second (OED) and the third (OAG) organization use many seasonal workers. Therefore average annual figures were taken as the number of employees.

Table 3: Description of the organizations

#	Name	Industry	Employees	Persons involved	Enterprise software
1	OIT	IT	11	3	ERP
2	OED	Education	55	5	ERP
3	OAG	Agriculture	70	5	ACC

7. Results and discussion

The participants are from various regions. The First organization (**OIT**) from the table above is from Almaty region, a quite developed region. It works in IT industry, in the area of providing internet to clients. It is a small enterprise with eleven employees in total.

Their end result for three rounds of evaluation shows that they rate the performance of their software quite highly. Most of the values are around 0.8. Performance was rated higher than other measures. Usability had the lowest result. In the coverage, they indicated 24 necessary processes and their software covered 19.4 of them. Unfortunately, the Integration part had very few records. Accordingly, the result was 7 required and 6 solved. The Integration part faced some difficulties. Therefore, it will be discussed in the end of this chapter.

OED – the organization is medium in number of employees but small in assets organization. It is a college. It operates in the area of education and provides services for students.

Their estimation results (table above) are lower than those of the previous organization. They also estimated stability very high. However, they rated integration very low. The remaining graphs are much better. In particular, the estimation of Usability goes up circle by circle.

In the last round the number of necessary processes is 38 and estimation of their coverage is 25.6, which gives a result 0.67. It is not a bad result. However, it is not a desirable result.

The last organization **OAG** is from the agriculture industry. The number of employees is not much more than OED, but in comparison its assets suit that of medium organization requirements. It is mainly aimed at animal breeding. It is also engaged in plant growing.

The Table above describes the results received from OAG. The first thing to notice is that the results from the graph are very similar to the results of the previous organizations. However, Nevertheless, there is greater data from this organization. For example, processes added are 93 which is three times more than the previous organization. Furthermore, all the users entered the data in every circle, whereas in OED some users stopped entering data after first circle. Overall the results given from organizations indicate that they are mostly satisfied with their enterprise software.

The table below shows how many needed processes organizations entered into the database and there is shown mean value for the processes in every round. All responses are above average.

Table 4: Processes entered by rounds

Organizations						
Round	OIT		OED		OAG	
	Count	Average	Count	Average	Count	Average
1	21	0,78	16	0,71	31	0,65
2	3	1	19	0,66	25	0,74
3	-	-	3	0,53	37	0,7

According to discussion with the organization’s representatives, the coverage part was the one most needed. As

was expected, the number of required coverage functions increased according to the size of the organization. The first two organizations filled out the needed functions in the first two rounds. The last organization filled it consistently.

In the Table 5, data from the integration part is represented. This part is fairly questionable. Despite the fact that organizations insisted on the importance of this part, there were few responses from the responsible persons. Collected responses revealed less satisfaction with this parameter.

Table 5: Integration pairs.

Organizations						
Round	OIT		OED		OAG	
	Yes	No	Yes	No	Yes	No
1	4	1	2	3	2	2
2	2	-	-	-	-	3
3	-	-	-	1	1	1

The integration part was poorly completed. But it is interesting to note how the respondents filled the required fields. The OIT filled the integration fields with more advanced terms, while the rest mentioned only reports and other simple requirements for their enterprise software. For example: reports to Tax-officials. OIT indicated some universal integration instruments as an important value. The main reason for this is that OIT is from a more developed region and represents the information technology field.

Table 6: Usability comparison of organizations

Organizations							
Round	User numbers	OIT		OED		OAG	
		Summ	Average	Summ	Average	Summ	Average
1	3	110	7,8571	252	7,2	271	7,7429
2	5	94	7,2308	160	7,619	283	8,0857
3	5	156	7,4286	165	7,8571	281	8,0286

In the table above, one can see the results of Usability part where end-users estimated the software they use. The average number is good for all of the organizations. The ergonomic part was filled by organizations' end-users. Overall, 13 people from three organization participated in the estimation. Most of the results show an increase in the responses round by round. To clarify some aspects, a short discussion was conducted after all three rounds. In the discussion, respondents explained score increase by additional experience with the software.

The table below describes results duration of error registration and average results for the organizations. The stability part shows the highest response from all three organizations. As has been mentioned, the reliability part presents the highest results.

Table 7: Comparison of incidents the organizations

Round	Organizations					
	OIT		OED		OAG	
	Days	Average	Days	Average	Days	Average
1	27	0,9	40	0,84	44	0,8
2	27	0,87	21	0,86	35	0,87
3	27	0,94	25	0,89	30	0,82

These days, most commercial enterprise software works with very few errors due to better development process, but errors can still occur. The problems can be objectively software faults, but also they can be cause of interaction of enterprise software with external factors. Some errors can be not due to a fault of the software but the reason can be poor understanding by users of their software. Also, there were some errors related to the environment. For instance, in one of the organizations there were many errors associated with network problems. The organization had poor network infrastructure. Such problems can be avoided by categorization of the incidents.

8. Method applying

Quality of software is sandwiched between progress in business and technology[7]. If one falls behind, there will not be high quality. This is why quality control of software is important. However, we must not forget about the business which uses it. Business must clearly see their needs and track the experience with software in order to improve or substitute it. Without doubt, the proposed method has it is own limitations. Larger organizations have more comprehensive requirements and this method is inadequate for them, but SMEs can find a lot of benefits from it, such as time saving in formulating initial requirements and lack of complicated documentation.

The method will certainly have a positive impact on organizations since it is based on their expectations and the experience of the users in the organization. It highlights that organizations decide what they need, not the vendors. In many cases, vendors sell products with many non-needed functions which just will take up space in the hardware and memory, and these non-used functions can negatively impact the quality evaluation process. This must be avoided when organizations want to evaluate their software and get more realistic results.

For the enterprise, the method would bring benefits through the possibility of learning and understanding their ICT in the process of evaluation. Organizations can determine their requirements in the process of evaluation. They will gain knowledge gradually. It gives them flexibility to not be focused on only evaluation process.

The main advantage of this method is that organizations do not need to describe all the processes. They can just specify the processes which they need in this moment and, over time, if the problem is resolved; it will stay on the list as unresolved and will not give an additional credit to the software.

9. Conclusion

In this work, the framework for software service evaluation for better integration of enterprise software was proposed. Practically, many SME organizations quite often do not understand in depth their enterprise software. A group of organizations with enterprise software agreed on benefits from proposed method and changed their corporative strategy about software service evaluation. The evaluation process gave them more understanding of the functionality they needed. In the end of the research they could clearly sort out what they have, what they need and formulate the ways to achieve higher level.

10. Limitations

In conclusion, some limitations must be mentioned. The organizations that participated in the research were volunteers so the results from them really depend on what they wished to do depending on their busyness. Therefore, some important aspects of evaluation can be missed. Also, data from only three organizations that have the similar enterprise software were used.

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