

Monitoring Perceived Usability of ERP Systems in Latvian Medium, Small and Micro Enterprises

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Abstract – Enterprise resource planning (ERP) systems are targeted for managing operational data and improving business efficiency, while their complex interfaces challenge this goal. The purpose of this study is to examine user attitude towards ERP system's usability in Latvian medium, small and micro-sized enterprises. It is part of a broader European users' study, which aims at designing and creating innovative and trendsetting user interface and interaction concepts for ERP systems.

Keywords – ERP system, survey, usability

I. INTRODUCTION

Enterprise Resource Planning (ERP) systems are used to perform daily tasks, which are realized as business processes. Most research about ERP systems does not cover ERP systems themselves, but their surrounding – implementation methods, impact on the organization, analysis of case studies. Usability is not associated with ERP systems [21] and is less considered in the context of ERP systems. However, it forms user satisfaction with the system. User satisfaction is one of main factors, which influences software successful adoption [1], [18], [22].

The poor usability of ERP systems is identified in the industry reports, e.g., [7], [8], [9], [17] and in academic research [4], [23]. The ERP usability studies and surveys are mainly limited to large systems, such as SAP Business All-in-One and Oracle E-Business Suite. These ERP systems are implemented only in a few Latvian enterprises. The Latvian ERP market mainly consists of light ERP solutions. Usability of the ERP systems for small and medium-sized enterprises or tailor-made industry solutions is rarely discussed in the focus of current research.

As a consequence, the authors have conducted a user survey to examine user attitude towards ERP system's usability in Latvian medium, small and micro-sized enterprises. It is part of a broader European users' study, which aims at designing and creating innovative and trendsetting user interface and interaction concepts for the ERP systems.

The next section provides a summary about the ERP systems and ERP usability studies. Section III discusses the methodology. It is followed by the results of the survey. At the end of this paper, conclusions are drawn.

II. RELATED WORK

A. ERP Systems

Enterprise applications are used to perform daily tasks, which are implemented as business processes. A central

enterprise application is the ERP system. It integrates enterprise data and processes. Its implementation is expensive; however, not all employees actively use it [3].

The ERP systems have the following characteristics:

- they integrate most business processes within an enterprise [12];
- data can be accessed in real time;
- there is a common data base – all applications can access the same data base to avoid duplicate data;
- it integrates transactions and planning activities; users can access any enterprise information (according to their access rights);
- all system modules have the same visual outlook.

Besides many advantages, the ERP systems have also several disadvantages:

- ERP systems are expensive [20]; thus, the market of light ERP solutions has expanded;
- incorrect and misleading data decreases user satisfaction with the system and motivates employees to use alternative and parallel solutions [5];
- ERP system replacement is expensive; if an enterprise has implemented SAP ERP, then moving to another ERP vendor is a costly procedure as enterprise data and internal processes are already designed for the SAP ERP system [19];
- customisation of ERP systems is limited [11] and expensive; thus, most enterprises adapt their processes to ERP system requirements [5].

ERP system complexity, incorrect data and employee attitude towards ERP systems are partially caused by ERP usability issues.

B. ERP System Usability

The ERP systems suffer from numerous usability issues [21]. As a result, the term “usability” is not often associated with ERP systems. These systems are typically complex and frustrating to use [23]. Partially this is caused by realized complex processes and general user interfaces, which are targeted for multiple industries [15], [21].

The most cited ERP usability study was conducted in 2005 and the results originated from an interview session with 10 participants. This survey revealed the following usability issues [23]:

- navigation, in terms of finding functionality and information efficiency, was complex and tedious.
- there was limited guidance from an ERP system to ensure accurate navigation and task completion;
- the ERP system lacked the capability to adapt its behaviour to support the users' actions and to ensure task completion;
- users were unable to retrieve frequently accessed data efficiently;
- the presentation of output was difficult to understand and interpret; and
- the user interface (UI) was complex and intimidating to novice users.

Lambeck [14] conducted an ERP usability survey in the Free State of Saxony, Germany. In this survey, small and medium-sized manufacturing enterprises participated. Results of the survey indicated that:

- 70% of users were satisfied with system functionality, but there was a significant potential for improvements with respect to the insight in user-oriented information and its adequate presentation;
- available and established views and forms of interaction were contradictory to the user needs for task-oriented views and their appropriate level of detail;
- users should be aware of dialog structure to process data and perform tasks.

ERP usability problems are analysed in the academic environment and also in the industry. For example, in 2011 IFS North America in collaboration with the Affinity Research Solutions conducted the usability survey of enterprise applications used in medium and large enterprises [10]. The main findings of this study are [10]:

- roughly two-thirds of participants have usability challenges with their enterprise application with more than half citing that the software is not designed with intuitive usability in mind;
- two-thirds of respondents cite tasks and functions within enterprise software that are considered time wasters, such as navigating around different software application products and/or searching for information in a complex navigation system;
- application usability is not viewed as a top priority for respondents when selecting a new system. For most, it is considered with other features. Usability features that are valued most highly are embedded search tools that allow manufacturing executives to find data or a correct part of the application suite to perform a particular function or/and an interface that mimics the intuitive usability of Web-based applications.

ERP usability studies and surveys are mainly limited to large world-wide known ERP packages, which are too expensive and complex for micro, small and medium-sized enterprises. Usability of ERP systems for small and medium-sized enterprises or tailor-made industry solutions are rarely in the focus of related studies.

As a consequence, the authors have conducted a user survey to examine user attitude towards ERP system's usability in Latvian medium, small and micro-sized enterprises.

III. METHODOLOGY

The survey was conceived as an online questionnaire, comprising micro, small and medium-sized enterprises across Latvia in a period of three months (from April to July 2013). The initial data acquisition for the identification and contacting of potential participants was based on enterprise information obtained from the AMADEUS database service [2]. The result set was limited according to the company size (based on the number of employees and categorized to micro, small, and medium-sized enterprises), branch (based on NACE classification and comprising Manufacturing; Wholesale and retail trade; Transportation and storage; Information and communication; Financial and insurance activities; Professional, scientific and technical activities; Administrative and support service activities; Other service activities), country, and availability of a contact option.

A control sample of 1,000 companies for each group of company size was selected. Invitation with the request to participate in the survey was sent to all participants from the list. Each invitation contained summary information about the survey and link to the online questionnaire. All communication was organized via email. If there was no email address in the given list then additional information about the company was looked up on the Internet. However, many emails with invitations were returned by the mail service because either the company did not exist or the email address was changed.

Finally, 65 users participated; however, 6 questionnaires had to be excluded due to invalidity. Hence, the evaluation results are based on 59 data sets.

The structure of the questionnaire comprised four sections to gather information about the enterprise, ERP system, usability, and finally the participant (see Table I). The user's path through the online survey got dynamically adapted according to the position in the company, the availability of an ERP system, and the use of additional software (e.g., spreadsheet applications). Hence, the user paths ranged from 14 (no ERP system and no additional software present, employee user) to 24 questions (availability of ERP system and additional software, CEO/CIO user). For the assessment of most usability aspects, a six-point Likert scale was applied.

In exceptional cases, a five-point Likert scale was used. Table I lists the aspects addressed in each section and the related assessment scale.

TABLE I
SECTIONS AND CONTENT OF THE QUESTIONNAIRE

1 – company	2 - ERP system	3 - usability	4 - participant
☐ number of employees ☐ branch ☐ regional activities	☐ availability of ERP ☐ vendor and name ☐ year of implementation ☐ customizations ☐ additional software ☐ supported divisions	☐ menu types ☐ process knowledge* ☐ consequence awareness* ☐ identification of functionality* ☐ ERP evaluation** ☐ additional application evaluation** ☐ transaction execution ☐ search functionality ☐ system access ☐ mobile devices and usage	☐ role/ position ☐ age ☐ gender ☐ years at a company ☐ years of ERP experience ☐ private use of (mobile) devices

* five-point ordinal Likert scale

**six-point ordinal Likert scale (table question)

IV. RESULTS

This section presents results of the survey and focuses on the usability aspects of graphical user interface.

A. Participants

Approximately 36 percent of the companies questioned work in the manufacturing sector; Wholesale and retail trade is represented by 14%; Information and communication – by 15%; Supply of services – by 10%; Scientific and technical activities – by 8%; Transportation, logistics and storage – by 5%; Financial and insurance activities – by 3%; Other – by 8%. All companies re-present medium, small and micro-sized enterprises. 71 percent of the companies surveyed have 50–250 employees; 14% have 10–49 employees; 10% have more than 250 employees and 3% have less than 9 employees. The participants themselves are classified by their position in the company starting from employees (51%) to department managers (31%) and ending with CEOs or CIOs (17%). Based on 59 answers, only 41% of the companies use an ERP system. 59% of respondents do not use an ERP system.

Firstly, responses from 24 participants, who have an ERP system, were analysed. Additionally, two participants wrote that they did not have an ERP system; however, they mentioned 1C:Enterprise application as an ERP alternative. 1C:Enterprise is an ERP system, but these participants were not included in the first data set as they did not answer the ERP related questions.

Most participants (N=33) do not have an ERP system. Responses from these participants were analysed to understand the reason for not having an ERP system. 1C:Enterprise users, who also marked that they did not use an ERP system, were removed from this data set.

Finally, responses from all 59 participants were analysed to validate if ERP system usability improvement ideas from the related work were appraised by users of micro, small and medium-sized enterprises.

B. ERP System Evaluation

This section discusses results of 24 participants, who use an ERP system. We found a broad range of ERP providers in our survey. Most participants use local ERP systems (Horizon (N=4) and Hansa World (N=1)) or specially developed enterprise applications (N=5). These are followed by Microsoft products – MS Dynamics AX (N=3) and NAV (N=2). SAP, 1C:Enterprise and Optimus are used by 1 participant. 1C:Enterprise is also used by two additional participants, but it is not part of this data set. Six participants did not specify their ERP vendor.

ERP system is used for accounting (N=16; 67%); sales/CRM (N=14; 58%); storage and inventory management (N=14; 58%); production (N=12; 50%); project and document management (N=11; 46%); human resources (N=10; 42%); supply chain management (N=10; 42%).

Only 11 participants answered the question about the period of implementation. According to these responses, 7 companies have been implementing an ERP system since 2009.

Participants rated their ERP system according to the statements presented in Table II. These statements were selected based on literature review about ERP usability issues. The main conclusions are: 1) support functionality for dealing with problems can be improved; 2) ERP systems are not very complex to use; 3) the amount of information and number of details are appropriate; 4) more visualization options can be available; 5) participants' attitude towards many opened windows is not negative. Findings 2, 3 and 5 are contradictory to conclusions of related studies (available in related literature).

However, it seems that there is still room for improvement of those ERP systems because other applications, in addition to ERP systems, are used by 83% of participants. Office products (e.g., Excel) are used by 75% of all ERP users; both special market solutions and individually developed features/software are used by 50% of all ERP users.

TABLE II
ERP AND ADDITIONAL APPLICATION EVALUATION CRITERIA

	Statement	Polarity	ERP system		Additional applications	
			Average value	Standard deviation	Average value	Standard deviation
ERP and additional application evaluation						
1	System offers a wide range of support functionality to deal with problems (e.g., explain causes, offer solutions and assistance).	+	3.69	1.25	3.29	1.18
2	System is very complex, which often makes me feel lost.	-	4.20	1.42	4.57	1.26
3	The amount of information and the number of given details are way too high for my needs	-	4.13	1.34	4.71	1.34
4	System offers numerous and useful visualizations, which I can choose myself (e.g., tables, diagrams, dashboards...)	+	3.56	1.45	2.29	0.66
5	When having opened many application windows simultaneously, I feel hindered or overstrained.	-	4.88	1.21	4.71	1.23
Process knowledge						
6	Do you know all the process steps, which are required to solve your tasks (e.g., to execute a specific transaction)?	+	2.40	0.94	2.00	0.61
Identification of functionality						
7	Do you have problems to find and access all functionalities you need?	+	3.00	0.60	2.18	0.74
Consequence awareness						
8	Are you always aware of the consequences of your actions (e.g., resulting system changes, side-effects, triggered workflow operations)?	+	2.31	0.89	2.56	1.23

The main reason for using additional applications is increased flexibility (N=16, M=1.80, SD=0.49) and the high costs for add-on modules and adaptation of ERP systems (N=13, M=2.17, SD=0.83). Data analysis confirms correlation between ERP evaluation (statement: System offers numerous and useful visualizations, which I can choose myself) and usage of additional applications (N=18, $r=-0.403$, $p<0.1$).

C. Evaluation of ERP Alternative Solutions

This section discusses results of 33 participants, who do not use an ERP system. Only 2 of them have planned ERP implementation.

As alternative solutions to ERP, the companies mentioned: MS Office (e.g., Excel) products (N=20; 61%); customized software (N=15; 46%) or special market solutions (N=4; 12%). They are used mainly for accounting (N=19; 58%); project and document management (N=10; 30%); human resources (N=9; 27%); sales/CRM (N=9; 27%); production (N=8; 24%); storage and inventory management (N=8; 24%); and supply chain management (N=3; 9%).

The main reasons for not implementing an ERP system are the following:

- 1) cost for procurement is too high (N=12, M=2.27, SD=1.08);
- 2) effort in cost or time for implementation is too high (N=13, M=2.33, SD=1.52);
- 3) the system will only grant minor benefits compared to the current situation (N=13, M=2.75, SD=1.42).

Data analysis showed correlation between an alternative application type and participants' opinion about implementation time and costs as the reason for not implementing ERP system (N=26, $r=-0.346$, $p<0.1$).

Participants did not agree that available standard ERP functionality was insufficient or available ERP systems were not specific enough for the industry sector. This group also did not agree with the statement that ERP systems were complex to use.

D. ERP Usability Improvement Options

There are several ideas about improving usability of ERP system, e.g., personalization [16], navigation guide [15], multi-touch interaction [13]. This section discusses users' attitude towards some ERP usability improvement ideas. The analysis includes data from all 59 participants (who use and do not use an ERP system).

Users should be aware of the executed business process to avoid mistakes and should know the location of functionality, which is required for each task of this process. Results of the survey show good results – most of participants know all the process steps which are required to solve their tasks (see Table II). These results are similar to ERP and non-ERP users. However, ERP users have problems to find and access all functionalities they need occasionally (N=15, M=3.00, SD=0.60), while non-ERP users have this problem rarely (N=18, M=2.18, SD=0.74). Essentially, navigation and access to functionality could be improved in ERP systems.

Most survey participants are usually aware of the consequences of their actions in the system (ERP system users: N=17, M=2.31, SD=0.89; non-ERP users: N=19, M=2.56, SD=1.23). Data analysis confirmed correlation between participants' knowledge about process steps and consequences of their actions in the system (N=38, $r=0.378$, $p<0.05$). Participants think that the highest potential improvement would be achieved by adding an adaptable level of detail of information; adaptable amount of information; by adding innovative visualizations and enhancing menu types and structures (see Fig. 1).

V. CONCLUSION

Literature emphasizes the importance of ERP system user interface usability improvements, e.g., [21] and personalization [16].

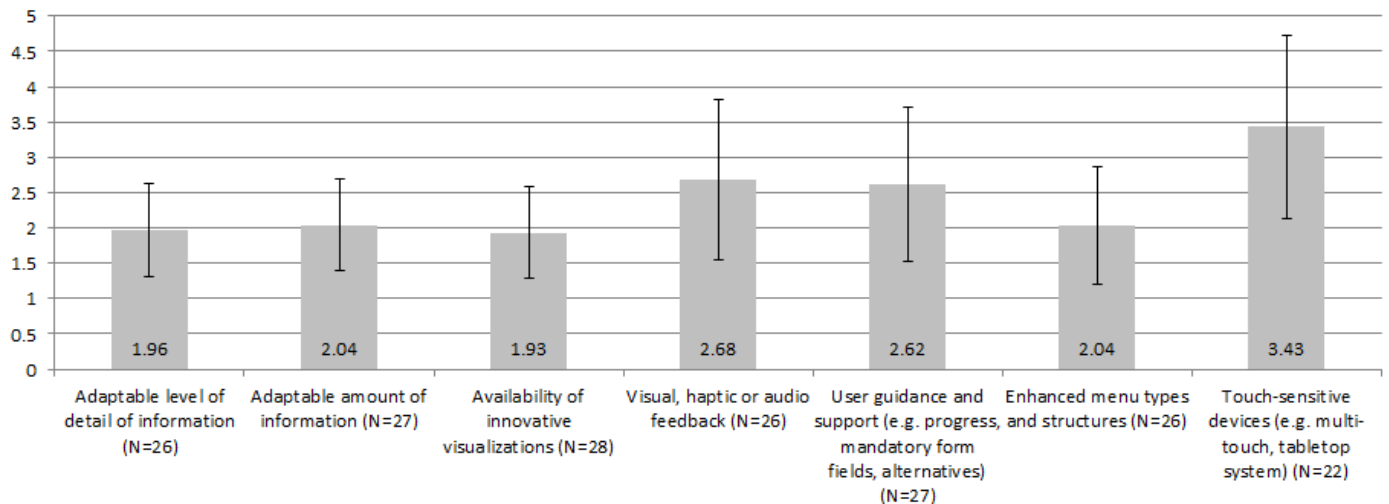


Fig. 1. Mean values and standard deviations of ERP improvement strategy evaluation

A majority of the current ERP usability studies are performed in large countries and in those enterprises, which use internationally known ERP systems. This study explores if ERP usability problems are valid for micro, small and medium-sized enterprises, which dominate in Latvia.

The survey reveals that in this sector traditional ERP systems compete with regional ERP systems, internally/locally developed solutions and other alternatives, e.g., MS Excel spreadsheets. Overall evaluation of the usability problems is not as critical as described in the related studies. However, the broad number of additional applications indicates imperfection of ERP systems. Additional qualitative studies are required to determine if this is caused by deficient functionality or usability problems. Also ERP usability improvement ideas should be differentiated between large ERP packages and light ERP solutions.

According to the involved target audience, the findings above are limited to the situation in Latvian enterprises. The future research will focus on a comparative evaluation of several European countries to determine regional differences and, finally, form a European view on ERP system usability.

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Inese Šūpulniece, Anna Boguševiča, Aleksandra Petrakova, Jānis Grabis. ERP sistēmu lietojamības monitorings Latvijas vidējos, mazos un mikro uzņēmumos

Uzņēmumu resursu plānošanas (ERP) sistēmas tiek izmantotas uzņēmuma ikdienas darbību veikšanai, kas tiek realizētas biznesa procesu veidā. Tās ir monolītas un sarežģītas, jo integrē nozīmīgākos uzņēmuma datus un procesus. Neskatoties uz lielajām ERP sistēmu ieviešanas izmaksām, ne vienmēr uzņēmuma darbinieki aktīvi lieto šīs lietotnes. ERP sistēmu zemā lietojamība ir minēta gan industrijas atskaitēs, gan akadēmiskajos pētījumos, taču vairums no tiem apskata tradicionālās lielās ERP sistēmas, kā SAP. Tikai daži Latvijas uzņēmumi ir ieviesuši kādu no šīm sistēmām, jo tirgū dominē vienkāršoti ERP risinājumi, kas ir piemērotāki vidējiem, maziem un mikro uzņēmumiem. Tāpēc šī pētījuma mērķis ir noskaidrot Latvijā izmantoto ERP sistēmu lietojamības vērtējumu. Pētījums ir daļa no plašāka Eiropas mēroga pētījuma. Piedalīties pētījumā tika uzaicināti 3000 nejauši izvēlēti Latvijas vidējie, mazie un mikro uzņēmumi, no kuriem elektronisko anketu pareizi aizpildīja 59 uzņēmumi. Anketa sastāvēja no 4 daļām ar jautājumiem par uzņēmumu, par izmantoto ERP sistēmu, par lietojamības novērtējumu un pašu dalībnieku. Lielākā daļa respondentu pārstāv ražošanas sektoru un uzņēmumā strādā 50-250 darbinieku. No 59 uzņēmumiem, kas piedalījās pētījumā, tikai 41% izmanto ERP sistēmu. Lielākā daļa izmanto reģionālos vai speciāli izstrādātus risinājumus, pārsvarā grāmatvedībai, pārdošanai un krājumu vadībai. Galvenie secinājumi par literatūrā visvairāk minētajām ERP sistēmu lietojamības problēmām: 1) ERP sistēmu lietošana nav sarežģīta; 2) ir jāuzlabo sistēmas atbalsts problēmgadījumiem; 3) informācijas daudzums un detalizācijas līmenis ir pietiekams; 4) varētu būt vairāk vizualizācijas iespēju; 5) vairāki vienlaicīgi atvērti lietotnes logi nav traucējoši. Taču 83% aptaujāto papildus ERP sistēmai izmanto citus risinājumus, jo tie nodrošina papildus elastību. 59% no aptaujātajiem uzņēmumiem ERP sistēmu neizmanto un lielākā daļa arī neplāno tādu ieviest. Galvenie iemesli ir augstās izmaksas un nepietiekams ieguvums, salīdzinot ar pašreizējo situāciju. Pētījuma rezultāti ir attiecināmi tikai uz Latvijas tirgu. Turpmākā izpēte ir saistīta ar tādas pašas anketas rezultātu salīdzināšanu starp vairākām Eiropas valstīm.

Инесе Шупулниеце, Анна Богусевич, Александра Петракова, Янис Грабис. Мониторинг воспринимаемости и удобства пользования системами ERP в средних, малых и микропредприятиях Латвии

Системы планирования ресурсов предприятия (ERP) используются в ежедневной деятельности предприятия, реализуя операции в виде бизнес-процессов. Они монолитные и сложные, так как интегрируют более значимые данные и процессы предприятия. Несмотря на большие расходы, которые необходимы при внедрении ERP систем, сотрудники предприятий не всегда активно используют данные приложения. Низкий уровень использования ERP систем упоминается как в индустриальных отчетах, так и в научных исследованиях, но большинство из них рассматривает традиционные большие ERP системы, такие как SAP. Лишь некоторые латвийские предприятия внедрили какую-либо из таких систем, так как на рынке доминируют более простые варианты ERP, которые более предусмотрены для средних, малых и микропредприятий. В связи с этим, целью данного исследования является оценка использования ERP систем, используемых в Латвии. Данное исследование является частью более масштабного исследования европейского уровня. Для участия в исследовании были случайным образом отобраны и приглашены 3000 средних, малых и микропредприятий Латвии, из которых правильно заполнили электронную анкету 59 предприятий. Анкета состояла из четырех частей и содержала вопросы про предприятие, используемую ERP систему, оценку использования и самого участника. Наибольшая часть респондентов представляет сектор производства с количеством сотрудников на предприятии от 50 до 250. Из 59 предприятий, принявших участие в исследовании, лишь 41% использует ERP систему. Большая часть использует региональные или специально разработанные решения, в основном для бухгалтерии, продажи и управления запасами. Главные выводы о наиболее часто упоминаемых в литературе проблемах использования ERP систем: 1) использование ERP систем не является сложным; 2) необходимо улучшить поддержку системы в проблемных ситуациях; 3) количество информации и уровень детализации являются достаточными; 4) желательно расширение возможностей визуализации; 5) многочисленные одновременно открытые окна приложения не создают затруднений. Тем не менее, 83% опрошенных дополнительно с ERP системой используют другие решения, так как они обеспечивают дополнительную гибкость. 59% опрошенных предприятий ERP систему не используют, а также большая часть даже не планирует такую внедрять. Главными причинами являются высокие расходы и недостаточное количество преимуществ по сравнению с текущей ситуацией. Результаты исследования относятся только к латвийскому рынку. Дальнейшее исследование предполагает сравнение результатов заполнения таких же анкет среди различных европейских стран.