International Journal of Engineering & Technology, 7 (4.3) (2018) 530-536

SPC

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research paper



Introducing ERP System as a Condition of Information Security and Accounting System Transformation

Iryna Trunina [1], Olena Vartanova [2], Olena Sushchenko [3], Oksana Onyshchenko[1*]

[1] *Kremenchuk Mykhailo Ostrohradskyi National University*
[2] *Kyiv National University of trade and economics*
[3] *Simon Kuznets Kharkiv National University*
**Corresponding author E-mail:oksanakremenchug@gmail.com*

Abstract

Despite the level of the information technology spread in Ukraine being lower than in other countries ERP systems are introduced both on the levels of commercial and government organizations. Although there is an adaptation to the national and language features of different countries in ERP systems, their introduction into Ukrainian markets relates to a range of difficulties. Information safety issues and the issues of changes in management accounts and business accounting that appear when introducing ERP system are the main difficulties for Ukrainian enterprises. The research of information security considers such main aspects as the network security, the data base (DB) security, the security on the level of application server and the information security on the client's computer. The determination of the main principles of the information security and the suggestion of the stages of building the ERP security control subsystem aim at preventing deliberate or accidental information leak. Features of Ukrainian legislation, differences of Ukrainian business accounting standards from the international ones and the management features should be considered when introducing ERP system. The company executives, in their turn, should understand the urgent need in introducing information technologies, realize that the information system is a management system and not only the system of accounting and should meet the requirements and standards of ERP management.

Keywords: *ERP systems*; *Information security*; *Changes in management accounting and business accounting*.

1. Introduction

Modern economy is characterized by intensive changes and a high risk, it is important for it to accept substantiated managerial decisions and to create an adequate management system as quick as possible. One of the efficient directions of improving the management process is the development and introduction of the latest information-management systems and information technologies. Introducing information technologies causes significant organizational changes by transforming the structure of organizations and the character of business processes, mechanisms of managing labour and production processes. New information technologies of management are important and necessary means that allow receiving, accounting, storing and processing information quickly, qualitatively and safely; reducing significantly the enterprise management personnel; ensuring the enterprise management and personnel with qualitative information in the appropriate time; analysing and forecasting of the enterprise economical activity timely and qualitatively; accepting decisions for all enterprise management issues quickly and qualitatively.

The rapid development of information technologies resembles information revolution that substantially influences the economical activity, manufacturing of goods and products. Fundamental consequences of the information influence on the modern world lie in the fact that information era creates the society which is not only global but also network [1].

In 2002, the first Global Information Technology Report that is issued yearly by the World Economic Forum together with the international business school INSEAD emphasised a tight relation between the information technologies development and the economic prosperity of the country based on the fact that information technologies play a leading role in the development of innovations, enhancing productivity and competitiveness, diversifying economy and stimulating business activities that favour the human life level enhancement. Information technologies has turned to one of the most important factors of economic growth and the information technologies field has become a peculiar engine of the world economy. Nowadays, the information technologies field develops with rapid speed and becomes a guaranty of the sustainable economic development and significant contribution to their GDP in many developed countries.

2. ERP Systems in the World and in Ukraine

Practice of the recent decades shows that the successful activity of the state government in the field of information technologies allows them taking a deserving place in the structure of "new economy" and ensuring long-term perspectives of economic growth. Nowadays, information technologies can be considered not only as a source of increasing export potential due to the development of trade between them but also as one of the most important means of strengthening competitiveness of certain industries and economy in the whole [3].

Analysis of the countries concerning the information technologies in 2016 (on the 7-point scale) allows concluding that Iceland (6.2 points) and Japan, the USA and Norway (6.1 points each) are the leaders among the countries on the introduction of information

Copyright © 2018 Authors. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

technologies. According to the World Economic Forum, Ukraine holds the 100th place among 139 countries that are studied (4.2 points)[4].

Switzerland (6.0 points), the USA (5.9 points) and Israel (5.9 points) are the leaders on the capability of companies to innovate. Ukraine holds the 52nd place (4.2 points) among 139 countries. Japan (6.1 points), the United Kingdom (6.0 points) and Switzerland (6.0 points) are the leaders on the level of usage of information-communication technologies (ICT) by the countries' enterprises to transact with other enterprises. Ukraine holds the 89th place (4.4 points) among 139 countries. Thus, Ukraine remains behind the world leading countries on all levels of introducing information technologies.

Significant lagging of Ukraine in the field of introducing information technologies is explained with the following causes:

– the low level of the information technologies use by population;
– unfavourable environment for IT infrastructure development;
– unfavourable political and regulatory environment;
– unfavourable market and innovation environment;
– low levels of readiness to the use of information technologies from business and state bodies;
– weak influence of information technologies on the economic and social fields.

In 2014 the global report of the World Economic Forum stated [5] that digital information technologies have a direct relation to the economic growth and creation of the workplaces. All-embracing usage of digital information technologies can lead to the creation of over 500 million of workplaces only during the next decade on the developing markets that include Ukraine, since new information technologies significantly influence all industries.

In their turn, such phenomena as technological development and globalization lead to increasing the complexity of organizations that is a feature of recent time [6]. This increasing difficulty requires producing, processing and storing a large amount of information in information systems must ensure these processes every day. Thereby, the introduction of the modern information systems allows ensuring the accounting system transformation that comes especially important in the conditions of the structural transformations peculiar of the transition to the digital economy.

ERP system is one of the modern information systems [7].

This system allows the organizations integrating all business processes, faster reporting and information analysing, as well as giving information in real time [8] [9] [10] [11] [12].

Nowadays, ERP systems, data bases and the Internet are the new forms of organizing operations that will allow the organization integrating activity types and controlling them in real time. The forecast benefits from enhancing productivity and competitive advantages will not appear without a successful organization of ERP systems [13].

ERP systems establish unified standard for information flow management through the data integration. They ensure transparency of the information use by the detailed presentation of the organizational processes and giving information to the functional subdivisions of the company in time [8] [14]. Due to these reasons, ERP systems were enthusiastically welcomed by multinational companies with their global business activities that allowed ensuring a perfect control over the distributed parts from the distance [15] [16] [17].

The crucial factors of the successful ERP system realization are support of the top-management and obligations, education, project management, clear vision and ERP system aims, careful management of changes and interdepartmental communications [18].

Modern information technologies has made the countries more informationally open and the existence of the global information systems allows organizing industry of information services practically without considering the borders. There is a real opportunity for many countries including Ukraine to grow gradually to the level of modern requirements and opportunities of the information society, to the border of the Europe informatization. With some lagging, domestic companies repeat the way of the foreign ones that have already realized that the efficient management of all activity aspects is required for the effective activity on the world and domestic market and it largely depends on the introduction of information technologies.

Nowadays, such concepts of ERP systems are the most vital for Ukrainian enterprises. In fact, they have become world standards and are the information systems of planning and managing all enterprise resources that are needed for conducting sales, manufacturing, purchasing and accounting when fulfilling orders in the production fields, distribution and service delivering. These systems combine the functions of accountability, management, control; and analysis at the same time and realize the best world practices of conducting up-to-date business. It is the company's introduction of ERP system that means the transition to the higher development stage since they allow realizing the company's opportunities more effectively.

This kind of systems is represented on the Ukrainian market mainly by the products of western enterprises: SAP, Oracle, BAAN, PeopleSoft and Platinum. The most widespread software products introduced in Ukraine are those of the foreign companies that meet the international level requirements: "Oracle corporation" (system "Oracle Application") "SAP AG" (system "R/3"), "Scala" ("Scala"), i "Baan Company" (system "Baan IV"). These corporative systems are introduced on the enterprises of different industries allow realizing a standard set of functions and contain a functional set of modules of the enterprise management.

SAP is one of the best ERP system decisions available on the market nowadays along with a small group of other programs of similar type. SAP Company is a leading maker of the standard applied program software meant for industrial enterprises. The National Bank of Ukraine, Integrated Iron-And-Steel Works "Azovstal", PJSE "Poltavaoblenerho", PJSE "Dniproenerho", JSE "Ukrtatnafta", PJSE "Dniprospetsstal" are at the top of the list of Ukrainian enterprises that are the clients of SAP company in Ukraine.

Two main developments of SAP Company are program software called R/2 and R/3. R/2 system functions on the main set of such producers as IBM and Siemens. R/3 system has become a leading product of the company bringing the major part of the SAP total yearly income [19]. R/3 system reflects the world experience of the efficient enterprise and corporative management that allows keeping business process necessary for the activities of any modern enterprise in the wide range, namely financial bookkeeping, expenses accounting, accounting of the fixed assets, project management, production planning and management, investment management, material support, production marketing, handling, invoicing, technical maintenance of the equipment, labour management, circulation of documents.

In each country, which uses R/3 corporative system, it adapts to the national and language features with saving the opportunity of simultaneous usage of several languages and variants of financial legislation. The company product R/3 is introduced on more than 15,000 enterprises around the world. Such famous companies as BMW, Mercedes-Benz AG, Adidas, General Electric, Philips, IBM, Telecom AG and many others are among the SAP's clients.

In Ukraine the corporate system R/3 is used on the PJSE "Zhydachivka Pulp and Paper Plant", on Chornobyl Nuclear Power Plant, in the Ministry of Energy and Coal Industry, on the PJSE "Integrated Iron-and-Steel Works "Azovstal", on the OJSE "Donetsk Integrated Iron-and-Steel Works" before the beginning of the antiterrorism operation in the East of the country [20].

A range of Ukrainian producers of the program software positions their systems as ERP. First, these are the systems: Finexpert, IT-Enterprise, Megapolis, BSI, Bob's World AG, PARUS-Enterprise 8, 1S: Enterprise 8.0.

The development "IT-Enterprise" is oriented on the automatization of large and medium industrial enterprises. This system allows optimizing business-processes of the enterprise and includes

modules of production management (MRPII, MES, and APS), financial management, budgeting and controlling, delivery chain management, quality management, repair management, business and tax accounting, personnel management and salary calculations, OLAP analysis, etc. SPW gasturbobuilding "Zoria" – "Mashproekt", Nyzhnodniprovsk Tube-Rolling Mill, "Rosava" (Bila Tserkva), "Azot" (Cherkasy), Poltava Ore-Dressing And Processing Enterprise, "Khimvolokno" (Chernihiv), etc. work with "IT-Enterprise" in Ukraine. The main advantages of the work the tested business decisions and the procedure of realizing complex automation projects well tested in practice.

Despite the concentration of the latest achievements of the world practice of automating the enterprise management in the above-mentioned systems, their introduction into the Ukrainian markets has a range of difficulties. Information safety issues and the issues of changes in management accounts and business accounting that appear when introducing ERP system are the main difficulties for Ukrainian enterprises.

3. Information Security in ERP Systems

All information storing in ERP systems has an important meaning and any illegal access to it can lead to huge loses up to the business shutdown. That is why every link of ERP system must be reliably protected since the negative outer or inner influence on any of its parts can have the most serious consequences for the activity of the whole organization. The main tasks of the information security are decreasing risks of losing or opening information; accordance with the state and inner corporative norms of information protection; guaranty of privacy of the inner enterprise information; protection of the data integrity.

The modern ERP system has a three-link client-server architecture including the level of databases (DB), the level of applications and the presentation level (meant for users). Data storing is conducted in the database (DB level), their processing – on the application server (application level) and direct interaction with the user is done through the program "Client" with graphic interface (presentation level) the role of which is often played by a web-browser. Ensuring information security must take place on each of these levels. The network structure is a connecting environment for the components on different architecture levels. Thus, the following main aspects can be distinguished in the issues of information security: network security; database (DB) security; application server security; information security on the client's computer.

3.1. Network Security

Modern ERP systems, for example SAP NetWeaver or Oracle e-Business Suite, apply web-standards to build interaction between their components. In this case, HTTPS can be used to protect the traffic. In addition to the traffic encryption, HTTPS can also ensure the user authentication based on the digital certificates.

SAP NetWeaver and Oracle e-Business Suite allow tying the certificate to the ERP system user account. Thereby, user authentication in ERP can be built based on the existing enterprise infrastructure PKI (Public Key Infrastructure) that is meant for reliable functioning of the corporate information systems and allows both internal and external users exchanging information safely [21].

According to the juristic requirements, Ukrainian certified cryptographic security means must be applied [22].

As a rule, the built-in means of the operation system are enough to use HTTPS base on the western cryptoalgorithms (DES, RSA, etc.). Therefore, MS Windows has a built-in HTTPS support based on DES, RSA and other western algorithms. Standard delivery of many ERP systems does not include Ukrainian certified means of information security since a big part of such systems is created by foreign companies – SAP, Oracle and others. Ukrainian cryptography is needed if using ERP systems of foreign production that requires additional software.

There are several similar decisions on the Ukrainian market. The platform SAP NetWeaver can have a Secure Network Communication SNC protocol except HTTPS for protecting traffic and the user authentication. "UALib" is one of the decisions on the Ukrainian market that has correctly realized cryptographic algorithms according to the state standards (the State Standard 34.311-95; the State Standard 4145-2002, he State Standard 28147:2009) [22].

3.2. DB Security

DB for ERP system can be allocated on the same physical server as the application server but, as a rule, one or several separate servers are given to DB. It is reasonable to isolate these servers from the rest of the company computer infrastructure both in software and physically. All DB servers must be separated for the network isolation into one isolated segment of the local corporate network and be accessed only by the application servers [23]. This excludes the possibility of direct access to DB system. The operation system used by the DB management system of the enterprise ERP system must also be adjusted in the way that opens the access to DB only to the application server. Each ERP user must not have direct access to the data base. It is important to take care of the physical DB server – these computers must be allocated in separate rooms with the corresponding access control level.

3.3. Application Server Security

Data processing takes place on the application server and the application server itself ensures user authentication, i.e. forbids or allows access to different information objects of ERP system. SAP R/3 stores a separate account for each user in the system. This account save roles assigned to this user except identifier and password, personal data and other additional information. Based on the assigned user roles, the application server gives access to the different program runs (transaction in SAP R/3 terms). Nevertheless, the authorization detail does not limit to the access to certain transactions and access deny to the others. Since the access to various data can be received within the same transaction. For example, the user can access business accounting of his department but not another one, although the access to these data takes place through the same transaction. The assigned user role comprises a set of rights and the server checks if there is the required right during the transaction. Thus, the availability of the right allows reaching the needed detail level in the access separation.

To protect the information, the roles and their corresponding rights must be based on the clearly determined organizational structure and business processes that the enterprise wants to automate due to the ERP system introduction. Therefore, the organization structure data must be available before projecting the required user roles.

3.4. Information Security on the Client's Computer

Let us consider the potential channels of the information leakage on the ERP user work computer. Security of input-output devices and e-mail must be taken care of to prevent the information leakage.

The user's sign-on into the system must also be paid a significant attention. The traditional approach envisages that the user has a name and a password to sign on the OS and another name and password to sign on the ERP system. This approach has a range of disadvantages: the possibility of spying the password; complex user passwords are often written down on the workplace and it is not difficult for an intruder to find such password; the user must remember minimum two different passwords (for the OS and ERP). The user authentication with the help of digital certificates is an alternative of the traditional approach. Moreover, these or other mechanisms based on PKI are available in the majority of

up-to-date ERP systems. Correspondingly, the realization of Single Sign On concept among the other. Single Sign On envisages that the user goes through the authentication procedure only once when signing on different information systems [21].
Ukrainian enterprises use different additional program software that are installed directly on the client's computer to protect the input/output devices. Such program software includes, for example, "Device Lock". This system allows controlling the user access to all input/output devices – compact disk drives, printers, USB-ports. Some enterprises just envisage installation of compact disk drives and similar input/output devices on clients' terminals.
The mentioned mechanisms ensures security on the system level – on the level of separate components of ERP structure and are the basis of the ERP security system. A special attention must be paid to the reliability, security system management, information leakage risk analysis, electronic document protection.

3.5. ERP System Applied Security

The procedures of renewing workability of the system after breakdowns must be envisages beforehand. The development of the strategy of the reserve copy, renewing after the breakdowns, quick equipment change must be a vital part of the project of ERP introduction. All these procedures must be clearly determined before the beginning of the ERP productive usage.
A massive cyber-attack with the help the virus-encryptor Diskcoder.C (ExPetr, PetrWrap, Petya, NotPetya) in the end of June 2017 is a model example of the low level of readiness among Ukrainian enterprises for unauthorized access to the work of computer networks and vulnerability of information-communication systems on both the state and the separate enterprise levels. It is important to know that the business program M.E.Doc (or more exactly its update from 14 April, 15 May and 22 June) was the main source of spreading the virus. Its support service recommended the users to turn off the antivirus when downloading updates, to ass updates to its "white list" and to install them from the account of the domain administrator. The representatives of the company-developer "M.E.Doc" were informed about the weak places in their systems but they did not react in a proper way [24].
In Ukraine, the program was used by about 500,000 enterprises (it was installed on about a million of computers). Thereby, all of them were endangered by the loss of accounting data because of the lack of the reserve copy strategy, disability to submit tax accounting timely and the problems relating to it. According to the survey conducted by the Chamber of Commerce and Industry of Ukraine, about 50% of enterprise-respondents could not fulfil obligations with contractors, bodies of the State Fiscal Service of Ukraine (SFSU), other state bodies in time. Herewith, before the cyber-attack the Tax Code of Ukraine did not envisage the liberation of the taxpayer from responsibility for untimely fulfilment of these obligations.
The users' actions must be controlled with the help of the ERP security subsystem management to prevent deliberate or accidental information leakage. The control subsystem must be developed for each certain project of introducing ERP depending on the current internal and external requirements. The stages of developing such system include:
- determination of the aims of control and the strategy of tracing risks based on the internal and external requirements of the information security;
- analysis of markets that will be followed;
- determination of all mechanisms and control means available in this ERP system;
- finding the corresponding control means for each risk groups;
- monitoring and accounting the work, i.e. usage of the developed control system.

Analysing the information mentioned above the authors conclude that the latest technologies must be realized in the information security system when introducing ERP systems to ensure reliable security for now and later. The main security principles include:
- analysis and study of the causes of information security violations;
- development of the effective security models that will correspond with the modern development of apparatus and software means;
- development of the methods and means of the correct security model introduction into the existing systems with the opportunity if flexible management, security depending on the requirements, acceptable risk and resource expenses;
- the need in developing means of analysing computer system security with the help of test influences (attacks).

Besides, the roles and obligations of the personnel for information security must be clearly determined on the stage of ERP system introduction that is the key to the success of any security software.

4. Applying ERP Systems in the Accounting Systems of the Company

Functional purposes of the information system components lies in the registration and accumulation of economic information formed in the process of financial-economic activity of the enterprise. The source components ensuring the information system management generate information as a source for managers of all levels in the appropriate forms. Combinations of forming information as a source are multi-variant that is caused by the content of solving managerial problems. The value of business financial accounting, financial accounting, financial analysis, management accounts and internal accounting, budgeting system, management analysis, planning of management aims enhance in such context.
ERP system introduction in the organization is often accompanied by significant changes in the organizational structure and the work methods [27].
Analysing of the references on business accounting studying the ERP system influence on the organizational practices shows that ERP systems favour the change of the business accounting [16] [17] [28]. For example, Quattrone and Hopper (2005) proved that the accounting logics inscribed into the ERP system also causes the difficulties in ERP projects.
According to these conclusions, Wagner et al. prove that the ERP system introduction can cause resistance in organization due to new organization logics that is combined with the ERP system. In its turn, it can cause the configuration change and the ERP system conversion. Dechow and Mouritsen (2005) [16] demonstrate that ERP systems have their own logics inscribed into the system, technical logics, creating new organization borders and moving the old borders through the system structure configuration. These technical logic conditions and tasks are set by the systems and practices in the organization. Thus, the set functional limits, for example, between the logistics and the business accounting dilute and change [16].
Development of the accounting-analytical management process ensuring due to the improvement of the information flows of the ERP system components is a process of continuous directed collection of certain data that are necessary for calculating assessment indicators of the realization of the enterprise management model designation. First, the opportunities of the business accounting must be developed as much as possible and then the effective management accounting system and internal accounting must be developed.
The full automation of accounting allows liberating the work time from performing routine parts of the accounting work. Strictly accounting personnel functions will change into the control ones. The accounting procedures will be done without the direct participation of the enterprise personnel and will be controlled by them. Specialists for accounting and management will have more opportunities to improve the accounting system.

Heinzelmann demonstrates that the complexity of introducing and using the ERP system in the accounting and controlling is not only due to its technical nature but also due to their blending with the conceptual logics (with German accounting logics in its case) [29]. The German accounting logics was a model for designing of the modules of business accounting and management in SAP ERP systems [30] [17]. A range of business accounting researchers state that the German accounting logics is quite specific, distinct and differs from its Anglo-Saxon colleague in the usage of the distinct system with two books. The system of two accounts is considered as an identification feature of German accounting researches and practices [31] [32] in addition to the tools and methods used for expenses and management accounts [33] [34] [35] [36]. The above-mentioned features of the German business accounting logics are realized in the basic model of the SAP ERP system configuration. Therefore, German organizations could easier spread German accounting logics on their non-German subsidiary production units with the help of SAP system [29]. Although, it could be a more difficult task for Ukrainian enterprises.

Unfortunately, the evident ERP system advantages including the accordance with the standards, the complexity of the suggested decision, a rich experience of introduction, high level of support and service can turn out to be disadvantages since the standards may not coincide, the complexity of the decision can reduce the system flexibility, the western experience may not give Ukraine the advantages. The company executive should fully understand the need in introducing information technologies, realize that the information system is a management system and not only the system of accounting and should meet the requirements and standards of ERP management. This is the reason why ERP systems must consider the domestic legislation and the management features.

The accountability functions according to the International Standards of Fiscal Accounting (INFA) with big opportunities for users is written beforehand in the multifunctional ERP systems for big companies Oracle, Microsoft, SAP, SSA GLOBAL (Baan)) and for the systems oriented on the medium enterprises (Platinum, SunSystems, Scala, Exact Globe, Navision) that is the main advantage of these systems over the Ukrainian and Russian program software. It requires Ukrainian enterprises to fully introduce the accounting according to INFA that is not compulsory for many of them. The majority of Ukrainian enterprises conduct accounting according to the National Principles (Standards) of Business Accounting (NP(S)BA) or begin to conduct accounting according to INFA. The double accounting must be conducted when introducing the ERP system (both according to NP(S)BA and INFA). In fact, the enterprise will operate with two accounting systems that increases its cost.

Besides, a range of issues must be solved beforehand. First, there must be conducted the **a**nalysis (of development) of the current company accounting policy according to INFA. This analysis should result in the list of the most problem fields requiring automatization. Then, the specialists develop a mechanism of forming financial accounting, plan of accounts according to INFA depending on the principles of the chosen accounting policy of the company, requirements of the financial accounting. Finally, there is a development of economical operations that are the basis for primary documents according to INFA and the formation of the rules of moving data of NP(S)BA into the accounting system of INFA, determination of roles to separate the rights of access to the system and the establishment of the users' functional obligations. The qualitative analysis of the current business processes of the company should not be forgotten that allows making necessary changes in the ready formed structure of business processes.

The Ukraine economy reformation process requires rethinking of the theoretical and methodical approaches to the enterprise management, development of the improvement measure of the quality of decision for the information ensuring in the field of sustainable development [37]since the business accounting is a source of information for management personnel, the management orientation of the business must deepen. Thereby, there is a need in enhancing information value of the business accounting and ensuring information needs of management. Understanding the role and meaning of the business accounting when taking managerial decision is one of the direction of strengthening its management direction.

The fully functional ERP system becomes the main basis for solving important strategic and management tasks and not only the instrument of automating typical corporative processes, for example, expenses planning or prime cost calculation.

There are no general standards of designing the management accounts system and conducting the management accounts in comparison to the financial accounting with quite general standards (INFA). However, the management accounts automatization is required in current conditions since the help for the top management in reaching the enterprise strategic aim is the final goal of the management accounts. It is possible to realize the controlling function with the use of the famous information system SAP R/3.

Setting the company strategic aims precedes the SAP system introduction. For example, the strategic aims of the National Bank of Ukraine before introducing SAP/R3 are: creating a unified safe information space that allows realizing the general standard set of models, operation and processes that function in the real time mode for financial, material and management accounts; creating a unified integrated decision instead of a big number of local accounting systems for doing complex accounting of all kinds of financial-economic operations and planning the consolidated accounting within this decision; creating the analytical system for m based on the accounting operations in the unified integrated decision; ensuring improvement of the transparency of income and expenses control, operational budget management accounts within the unified integrated decision; enhancing the information trustworthiness and ensuring its accessibility in the real time mode on all management levels.

In nowadays conditions, the Ukrainian practice shows that the results of the management accounts automatization does not usually legitimate expectations. The experts believe that there is an inadequate understanding of the role of automatization in enhancing the enterprise management efficiency system. The experience of the Ukrainian economic objects prove that the problem appears before the start of writing the conceptual plan of the system introduction project.

Any program with the biggest selection of variants of functions is just a tool for working with information and the effectiveness of its usage is not determined by the product quality but by the user competence [38] and the appropriate level of his skills and training [39] [40]. It is necessary to follow advice relating to taking decision on the introduction and further successful use of ERP SAP R/3 in the financial-economic activity of the company from the specialists who became the first to take a risk of realizing the automatization project based on ERP SAP R/3 [41].

The system of management accounts must be introduced at least on the level of local computers with specialists working with them, the principles of management accounts policy and the forms of management accounting reflecting the economic reality and available for adjusting a powerful software in the future must be developed before introducing the information system. When introducing the management accounts system, Ukrainian enterprises should take the assessment of expenses on the management accounts as a basis considering the volumes of its activities and act in such way that the effect of adjusting such system exceeds the expenses on its development and functioning.

First, the positive result of introducing such unified system as ERP SAP R/3 requires a deep analysis of the company business processes, training of the specialists ready to the productive start of the software complex, a distinct cooperation with consulting firms or corresponding advisor for the processes of development and realization of the company tasks, as well as ensuring the technological part of process.

5. Conclusion

Analysis of the data received during the research allows coming to the following conclusions.

The need in introducing the modern information systems allows ensuring the accounting system transformation that comes especially important in the conditions of the structural transformations peculiar of the transition to the digital economy. The relevance of introducing modern information systems is caused by overcoming structural contradictions peculiar of the economy of developing countries including the low level of information technologies use by the population, unfavourable environment for IT infrastructure development, low levels of readiness to the use of information technologies from business and state bodies, weak influence of information technologies on the economic and social fields.

ERP system is one of the modern information systems that allows the companies not only integrate all business processes but also process reporting and information analysis more quickly as well as giving information in real time. ERP systems establish unified standard for information flow management through the data integration. They ensure transparency of the information use by the detailed presentation of the organizational processes and giving information to the functional subdivisions of the company in time. Due to these reasons, ERP systems are successfully applied by multinational companies with their global business activities that allows ensuring a perfect control over the distributed manufacturing and servicing subdivisions. The National Bank of Ukraine, Integrated Iron-And-Steel Works "Azovstal", PJSE "Poltavaoblenerho", PJSE "Dniproenerho", JSE "Ukrtatnafta", PJSE "Dniprospetsstal" are among the companies using ERP systems in their activities. They are big system forming companies that are actively developing.

The undoubted advantage of ERP systems is ensuring security on all levels: Information security, network security, database security, security on the level of application server. The system also ensures information security on the client's computer and prevents information leakage due to the special instrument of authentication. The main security principles are considered to be: analysis and study of the causes of information security violations; development of the effective security models that will correspond with the modern development of apparatus and software means; development of the methods and means of the correct security model introduction into the existing systems with the opportunity if flexible management, security depending on the requirements, acceptable risk and resource expenses; the need in developing means of analysing computer system security with the help of test influences (attacks).

Besides, the roles and obligations of the personnel for information security must be clearly determined on the stage of ERP system introduction that is the key to the success of any security software.

ERP system application in the accounting systems of the companies envisages solving a range of tasks:

- analysis (of development) of the current company accounting policy according to INFA. This analysis should result in the list of the most problem fields requiring automatization;
- development of the mechanism of forming financial accounting, plan of accounts according to INFA depending on the principles of the chosen accounting policy of the company, requirements of the financial accounting;
- development of economical operations that are the basis for primary documents according to INFA and the formation of the rules of moving data of NP(S)BA into the accounting system of INFA;
- determination of roles to separate the rights of access to the system and the establishment of the users' functional obligations.

References

[1] Kastels, M. (2000) *Informatsionnaya epoha: ekonomika, obschestvo i kultura*. Moscow:GU VShE. (in Russian)

[2] *The Global Information Technology Report.* available online: https://www.weforum.org/reports

[3] Trunina, I., "Development of entrepreneurship entity competitive strategy using competence-based approach", *Actual Problems of Economics*, Vol. 11(173), (2015), pp.206–213.

[4] *The Global Information Technology Report.* available online: http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf

[5] *The Global Information Technology Report 2014* available online: http://www3.weforum.org/docs/WEF_GlobalInformationTechnology_Report_2014.pdf

[6] Alves, M. C. & Matos, S. I. A., "ERP adoption by public and private organizations – A comparative analysis of successful implementations", *Journal of Business Economics and Management*, Vol.14(3), (2013), pp.500–519.

[7] Shang, S. & Seddon, P. "Assessing and managing the benefits of enterprise systems: the business manager's perspective", *Information Systems Journal*, Vol.12(4), (2002), pp.271–299.

[8] Davenport, T. "Putting the Enterprise into the Enterprise System", *Harvard Business Review*, Vol.76(4), (1998), pp.121–131.

[9] Fahy, M. & Lynch, R. Enterprise Resource Planning (ERP) systems and strategic management accounting, *XXII Congresso Anual da European Accounting Association*, Bordéus, França, 5 - 7 de maio, (1999).

[10] Granlund, M. & Malmi, T., "Moderate impact of ERPS on management accounting: a lag or permanent outcome?", *Management Accounting Research*, Vol.13(3), (2002), pp.299–321.

[11] Hyvönen, T. "Management accounting and information systems: ERP versus BoB", *European Accounting Review*, Vol.12(1), (2003), pp.155–173.

[12] Scapens, R. & Jazayeri, M., "ERP systems and management accounting change: opportunities or impacts? A research note", *European Accounting Review*, Vol.12(1), (2003), pp.201–233.

[13] Addo-Tenkorang, R., & Helo, P. (2011), Enterprise resource planning (ERP): a review literature report. *Proceedings of the World Congress on Engineering and Computer Science*, Vol. 2.

[14] Koch, C. "The big uneasy", *CIO Magazine*, Vol. 11, (1997), pp. 40–47.

[15] Cooper, D.J. and Ezzamel, M. "Globalization discourses and performance measurement systems in a multinational firm", *Accounting, Organizations and Society*, Vol. 38, No. 4, (2013), pp. 288–313.

[16] Dechow, N. and Mouritsen, J., "Enterprise resource planning systems, management control and the quest for integration", *Accounting, Organizations and Society*, Vol. 30, No. 7/8, (2005), pp. 691–733.

[17] Quattrone, P. and Hopper, T. "A 'time-space odyssey': management control systems in two multinational organizations", *Accounting, Organizations and Society*, Vol. 30, (2005), pp. 735–764.

[18] Tarhini, A., Ammar, H., Tarhini, T., & Masa'deh, R. "Analysis of the Critical Success Factors for ERP implementation from stakeholders perspective: A systematic review", *International Business Research*, Vol.8(4), (2015), pp.25–40, available online: http://dx.doi.org/10.5539/ibr.v8n4p25

[19] Yevdokymov, V.V. "Korporatyvni informatsiini systemy: problemy vprovadzhennia ta analiz efektyvnosti", *Naukovi pratsi KNTU. Ekonomichni nauky*, Vol.16, No.1, (2009), pp.227–235.

[20] Ilienko, R.V. "Vprovadzhennia ta vykorystannia informatsiinykh tekhnolohii u systemi vyshchoi osvity YeS", *Ekonomika i upravlinnia*, Vol. 1, (2015), pp.134–140.

[21] Shangin, V.F. *Zashchita informatcii v kompiuternykh sistemakh i setiakh*, DMK Press, (2012), pp. 172–175.

[22] *Perelik zasobiv KZI, yaki maiut ekspertnyi vysnovok za rezultatamy derzhavnoi ekspertyzy u haluzi KZI*, (2017), available online: http://www.dsszzi.gov.ua/dsszzi/control/uk/publish/article?art_id=111853&cat_id=72110&mustWords=+Перелік+засобів+КЗІ%2C+які+мають+експертний+висновок&searchPublishing=1.

[23] Kharris, Sh, *CISSP.Rukovodstvo dlia podgotovki k ekzamenu*, McGraw-Hill Osborne Media, (2011)

[24] Avakov, A. "Pravookhorontsi prypynyly druhyi etap kiberataky Petya. Zlovmysnyky vykorystovuvaly vrazlyvosti PZ M.E.Doc." , *Debet-Kredyt*, (2017), available online: https://news.dtkt.ua/state/other/44230?utm_source=news_10072017&utm_medium=email&utm_campaign=weeklyletter_subscribers.

[25] "*Yak vplynula kiberataka na vash biznes?" – opytuvannia vid TPP Ukrainy", Torhovo-promyslova palata Ukrainy*, (2017), available online: https://www.ucci. org.ua/press-center/ucci-news/iak-vplinula-kiberataka-na-vashbiznes-opituvannia-vid-tpp-ukrayini.
[26] Podatkovyi kodeks Ukrainy No.2755-VI, (2010), available online: http://zakon3.rada.gov.ua/laws/show/2755-17/ print1499709491287881.
[27] Kallunki, J.-P., Laitinen, E. K., & Silvola, H. "Impact of enterprise resource planning systems on management control systems and firm performance", *International Journal of Accounting Information Systems*, Vol.12(1), (2011), pp.20–39.
[28] Wagner, E.L., Moll, J. and Newell, S. "Accounting logics, reconfiguration of ERP systems and the emergence of new accounting practices: a sociomaterial perspective", *Management Accounting Research*, Vol. 22, No. 3, (2011), pp.181–197.
[29] Heinzelmann, R. "Accounting logics as a challenge for ERP system implementation: a field study of SAP", *Journal of Accounting & Organizational Change*, Vol. 13, Issue: 2, (2017), pp.162–187.
[30] Leimbach, T. "Die geschichte der softwarebranche in Deutschland", *Dissertation, Ludwig-Maximilians Universität, München*, (2009).
[31] Becker, A. and Messner, M. "After the scandals: a German-speaking perspective on management accounting research and education", *European Accounting Review*, Vol. 14, No. 2, (2005), pp. 417–427.
[32] Messner, M., Becker, A., Schäffer, U. and Binder, C. "Legitimacy and identity in Germanic management accounting research", *European Accounting Review*, Vol. 17, No. 1, (2008), pp. 129–159.
[33] Brandau, M., Endenich, C., Luther, R. and Trapp, R. "Separation–integration–and now[…]? An historical perspective on the relationship between German management accounting and financial accounting", *Accounting History*, Vol. 22, No. 1, (2017), pp. 67–91.
[34] Jones, C. and Luther, R. (2005), "Anticipating the impact of IFRS on the management of German manufacturing companies: some observations from a British perspective", Accounting in Europe, Vol. 2 No. 2, pp. 165-193.
[35] Luther, R., Jones, T.C., Saxl, A. Experiencing Change in German Controlling: Management Accounting in a Globalising World, *CIMA Publications*, (2009).
[36] Günther, T.W. "Conceptualisations of 'controlling'in German-speaking countries: analysis and comparison with Anglo-American management control frameworks", *Journal of Management Control*, Vol. 23, No. 4, (2013), pp. 269–290.
[37] Kasych A., Vochozka M. "Methodical support of the enterprise sustainable development management", *Marketing and Management of Innovations*, Vol.1, (2018), pp. 371–381.
[38] Halenko, A.V., Shchypanova, O.V. "Dosvid vprovadzhennia systemy upravlinskoho obliku na ukrainskykh pidpryiemstvakh na suchasnomu etapi", *Ekonomichnyi prostir*, Vol. 48/2, (2011), pp. 317–325.
[39] Zagirniak, D. M. "Educatinal pragmatism divergence in the context of professional qualification conformity", *Scientific Bulletin of Polissia*, Vol.3, (2017), pp. 18–28.
[40] Pochtovyuk, A. B., Zagirniak, D. M., Pryakhina, K. A. "The problems of training of highly skilled engineers in ukraine in the context of international tendencies", *Modern Electrical and Energy Systems (MEES), 2017 International Conference on. – IEEE*, (2017), pp. 340–343.
[41] *SAP Help Portal*, available online:: http://help.sap.com.