ERP AND COMPETITIVE INTELLIGENCE SYSTEMS IN AGILITY OF ORGANIZATION: A SYSTEMATIC LITERATURE REVIEW

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***Abstract*—Business failure of the organization may be caused by its inability to adapt its business operations to the changes in the market requirements. This leads to a conclusion that today's turbulent business conditions impose the need to increase the level of agility of the organization. Agility is defined as the ability of organization to adapt to different business conditions. Thus, a solution should be looked for in the IT systems such as Enterprise Resource Planning (ERP) and Competitive Intelligence (CI). The reason why exactly these two systems have been chosen is their focus of analysis. ERP systems are specialized for the analysis of organization's business operations, and CI systems have been developed in order to analyze the environment. Therefore, the organization can analyze all business operations by using these two systems. The aim of this paper was to determine whether a synergy of these two systems can contribute to higher level of organization's agility. This paper shows systematic analysis of literature which aim was to determine the contribution of the ERP and CI systems to the agility of the organization and to consider the possibilities of their synergy when used parallelly in today's conditions of successful business operations. This was achieved by considering 35 chosen (selected) scientific papers. The results of analysis showed that the ERP systems, according to most of the authors, do not contribute to the agility of the organization, and the CI systems are the ones which are the most significant component of agility. This synergy can exert influence on the modification of existing business policy or establishment of a new one which would be based both on the analysis of previous business operations and the analysis of business environment, and as a result the organization would have higher level of agility. Based on the obtained results, this paper offers theoretical basis for further research, particularly empirical research, which aim would be to determine the degree of synergy that the ERP and CI systems have in some organizations and their correlations with accomplished (achieved) level of agility of those organizations.**

I. INTRODUCTION

In modern business, there is often a great gap between information which are necessary for management of an organization and information which one organization has [16]. Creation and adequate use of information are some of the key factors of rational organization management. Implementation of information systems requires integrity in all aspects of business operations in order to ensure right and efficient information flow within the organization. Software which provides integration between business processes and safe information flow within the organization is Enterprise Resource Planning – ERP. Original purpose of ERP system was to provide flawless integration of information, business processes, technology and staff [25]. Reference [14] claim that the ability of the organization to create and share information is a good source of competitive advantage. This means that the ERP systems have positive influence on the increase of organization's level of competitiveness [23]. However, today's turbulent business conditions force organizations to have certain level of agility besides their ability to create valuable information. Agility is an important factor for the organization's success and it is defined as the ability to recognize various market opportunities and to take advantage of them [8, 4, 32]. Agility is obviously becoming an obligatory requirement which is set before the organizations so a research regarding the following question could be done:

Rq1. Does ERP system promote enough agility for organization in today's terms of business?

Evolution of client-server and e-business technology have considerably facilitated the process of communication and integration of different systems [19, 27]. When combined with these two technologies, the ERP systems represent vital IT resource for the organization [7]. Reference [19] believes that, in modern business, environment exerts strong influence so the organization needs to be able to control this influence. For the same reason, it is necessary to integrate the environment in business operations in order to create a more flexible organization which will achieve better business results. It is well known that the ERP systems contain internal data which cannot be used for identification of trends in one business environment, so the solution should be looked for in other information technologies. The technology which focuses on the monitoring of environment is Competitive Intelligence (CI). Above all, the CI enables organizations to monitor the competitive environment with the aim of identifying opportunities or threats which should be integrated in business operations. Reference [28] claims that the CI is a process of the organization's acquiring of competitive advantage on the market by understanding the environment better. Still, having the information about environment and competitors is little without information about internal operations of an organization. Internal information of the organization can be used for the analysis of a business conducted for a given period of time. These analyses can show the extent to which business goals have been achieved. However, actual

results of the organization's business operations can be seen only when compared to the results of other organizations. According to this, it can be concluded that there is a need for application of both ERP and CI systems. Having in mind the reference [19] assertion that the organizations need a system which would provide them a framework for certain analyses of business operations and environment, it is indicative that further research of the following subject is needed:

Rq2. Does synergy of ERP and CI increase agility of organization?

This paper shows an attempt to emphasize the role of synergy between ERP and CI systems in the process of gaining competitive advantage and increasing agility of organization because those two systems reflect the business success of the organization. Some claim that success of the organization depends on how well it knows its business processes and competitors, and how efficiently it manages them [16]. This paper offers some theoretical standpoints for further research regarding the effects of synergy between the ERP and CI systems on the agility of the organization.

II. METHODOLOGY

In-depth analysis of scientific papers written on the subject of possible integration of the ERP and CI systems was carried out for the purpose of this research work. The papers were searched for in Ebsco, ScienceDirect and Emerald data bases. The following requirements were set during the search of data bases: that scientific papers were written in English, that they were reviewed positively, that they were presented in scientific conferences or published in academic journals in the period from 2000 to 2014. The papers that were analyzed contained in their abstract or keywords the following terms: „Competitive Intelligence" and/or „ERP". Also, strings such as „ERP and Agility", „CI and Agility", „ERP and CI integration", „Synergy of ERP and CI", „Enterprise Application Integration" were used in the search. These topics were found in 135 scientific papers. After that, those papers were selected based on the requirement that the scientific paper should contain information about issues relating primarily to the increase of organization's agility. Thirty-five scientific papers were selected based on that requirement and they were included in the further process of analysis. The process of selection of scientific papers is presented in Figure 1.

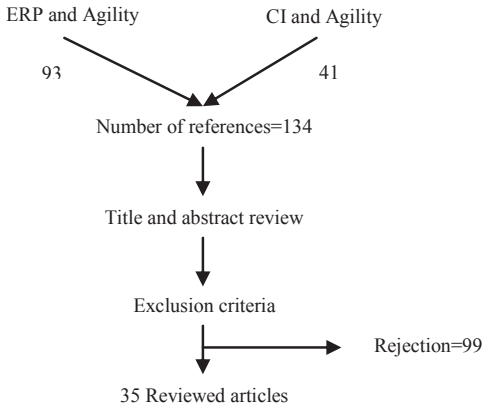

Figure 1. Selection of papers relevant to this research

III. THEORETICAL BACKGROUND

A. Enterprise Resource Planning

Enterprise Resource Planning (ERP) is a software developed with the aim of integrating all business processes of the organization, and by doing this to ensure a comprehensive consideration of business operation using a single data base [19]. It must be noted that the ERP systems are not a uniform solution for all organizations, and they need certain modifications in order to suit different needs [18, 24, 30, 11, 10, 5]. Implementation of ERP systems enables automatization of all business processes of the organization [20, 16, 1, 17] They provide systematization and organization of information about everyday business operations into one data base. This ensures the availability of information which are necessary for further creation of adequate information that in turn support the decision making process [26]. Some authors claim that the ERP systems represent the integration of different applications which aim is to provide support for the realization of business processes and maintain the information flow in the organizations [19, 24, 13]. Moreover, they provide better insight into critical points in the realization of business processes which consequently increases efficiency and productivity of the organization [25, 27]. Based on the given description of the ERP system, it is obvious that this system is focused on internal business process of the organization. However, market uncertainty forces organizations to adapt to different business conditions and changes in the environment. Therefore, organizations need to achieve more flexibility and agility. There is a belief that in spite of high investments in ERP systems, they still do not ensure competitive advantage and agility of the organization [25, 18, 35, 24, 16, 1, 33]. Reason for this may be the fact that the ERP systems were primarily designed to distinguish clearly between the organization and environment in order to minimize its negative influence [14]. On the other hand, reference [16] disagree with that and claim that the true benefit from ERP systems can be gained only by connecting it to the environment which consequently increases agility of the organization. In order to do that, a synergy or integration of EPR system and other systems needs be created [29, 30, 22, 9]. Synergy should enable the organization to use data and information both efficiently and effectively, and to make better decisions which result from adequate response to market changes. Thus, based on the previously said, a synergy between the ERP system and some other technology with strong analytical features for environment should contribute to the success of the organization. Synergy between the ERP and CI systems should provide an integrated functional platform which has direct influence on the decision making process and agility of the organization [6].

B. Competitive Intelligence

Reference [12] think that organizations need to implement the environment in its IT resources in order to survive and advance in today's business conditions. There are also some statements about Business Intelligence (BI) systems becoming increasingly common in the process of achieving more agility [4, 32]. Reference [34] claim that the CI developed into an important field within the BI

which focuses on understanding and measuring of the influence of outside environment on the results of the organization. Some authors believe that only those organizations which have appropriate and coherent information system such as the CI will manage to advance in today's unstable business environment [16, 2]. The CI can be defined as a process of collection and analysis of publicly available information on business environment, competitors and the organization itself, in accordance with the ethics policy [3]. These systems make forecasting of future trends possible, thus increasing the ability of organization to adapt to the changeable conditions of its environment [28]. Thus, efficient application of the CI systems in business operations is the key factor for the organization to develop its agility [28, 15]. Fast decision making and agility depend solely on how progressive is the organization in realizing new opportunities as well as the threats present on the market [16]. Reference [31] say that the application of the CI systems offers exactly that to the organizations. The CI system explores the information related to the environment and competitors from different sources such as the internet, blogs, social and business networks, on-line media and alike. The obtained data are then implemented in current business processes and different modifications of business operations are made. Still, there are some limitations. Considering the fact that the CI systems are focused on the environment and competitors, they primarily use the external data. In order for the organization to survive in an unstable environment and to acquire agility, it is necessary to manipulate with both internal and external data in the decision making processes. This brings us to the conclusion that maximum efficiency of the CI system can be obtained in the cooperation with other information systems.

IV. RESEARCH RESULTS

Market uncertainty imposes constant need for the organization to adapt to the business environment. Reference [16] think that the organizations should be capable of adapting to the changes imposed by business environment in order to survive on the market. The key to success of the organization is its ability to see and react to the mentioned changes [25]. Therefore, agility is the crucial factor for business operations of every organization [21, 22]. Considering the described significance of organization's agility in business operations, Table 1 shows authors of the analyzed scientific papers and their opinions about the influence of the ERP and CI systems on agility.

Authors	ERP	ERP does not provide agility	CI	CI provide agility	synergy of ERP and CI provides agility
	22	6	15	7	8
	62.86%	27.27%	42.86%	46.67%	22.86%
Banker et al (2006)	x	x			
Calof and Wright (2008)			x	x	
Cavalcanti (2005)			x		
Chen and Siau (2012)	x		x	x	x
Davenport, Harris and Cantrell (2004)	x				
Gaidelys (2010)	x		x		x
Gleghorn (2005)	x		x		x
Gong and Janssen (2012)					
Goodhue et al (2009)	x		x		x
Hitt, Wu and Zhou (2002)					
Ketokivi (2006)	x				
Koh and Maguire (2009)					
LaFata and Hofmann (2004)	x				
Lengnick-Hall, Lengnick-Hall and Abdinnour-Helm (2004)	x				
Liu and Wang (2008)			x	x	
Maguire, Habibu and Ojiako (2010)	x		x	x	
Markus (2000)					
Nazir and Pinsonneault (2012)	x	x			
Özkarabacak, Çevik and Gökşen (2014)	x				
Pei-Fang (2013)					
Raschke and David (2005)					
Sambamurthy, Bharadwaj and Grover (2003)	x		x		x
Seddon (2005)	x				
Seddon, Calvert and Yang (2010)		x			
Seethamraju and Krishna (2013)	x	x			
Sharif, Irani and Love (2005)	x				
Swaminathan and Tayur (2003)	x				
Štefánikováa and Masárová (2014)			x	x	
Tallon and Pinsonneault (2011)	x		x		x
van Oosterhout, Waarts and van Hillegersberg (2006)	x		x		x
Vitt, Luckevich and Misner (2002)			x	x	
Xiaofeng and Keng (2011)	x		x	x	x
Wade and Hulland (2004)	x	x			
Zheng, Fader and Padmanabhan (2012)			x		
Zhu, Wang and Chen (2010)	x	x			

Table1. Authors and the subjects examined in their research

Table 1 shows that 6 out of 22 (27.27%) analyzed scientific papers, which were written on the subject of ERP systems, examine their influence on the agility. All authors agree that ERP systems do not contribute significantly to the development of agility. The reason for this is the fact that these systems are focused on internal business operations of the organization, so their strategic role is detecting the critical points in the realization of business processes. This focus on internal business operations of the organization makes them a necessary but insufficient precondition for acquiring the desired level of agility. Organizations have realized the availability of abundance of information within the ERP systems, but the real challenge is to process these data and collect them from the business environment. Collection and processing of data from the environment have come to the center of attention due to the fact that organizations operate at times of high competition (hyper competition). Such business conditions set a requirement for the organizations to do constant monitoring of the environment and competition with the aim to survive and achieve better position on the market. This is supported by Big Data phenomena which considerably influenced the availability of data from external sources. In that sense, the ERP systems should be accompanied with some information technologies which are good for analytical analysis of the environment. IT technology such as the CI system could be a good choice for the organizations. The CI systems enable infrastructural development which helps detecting changes in business environment. Table 1 shows that 46.76% (7 out of 15) of scientific papers written on the subject of the CI confirm that this technology helps in acquiring more agility. On the other hand, there are also some statements about the CI being insufficient by itself for that purpose. The reason for that is that this system does not contain important data on business operations of the organization, like ERP systems do. This means that the application of ERP systems in combination with the CI system can give best results regarding the achievement of desired level of agility of organization, which was also confirmed by 22.86% authors. These two systems can help modify present business policy or create a new one which would be based on the analysis of former business operations and business environment which would, as a result, create more agility of the organization. Synergy of these two systems provides necessary information needed for successful business in modern conditions. Without any of these two, it would be hard to carry out any analyses required for strategic management of the organization. Having in mind that the nature of these two systems is diametrically opposed, since the ERP systems are operational and the CI systems are analytical, integration of these two systems is very difficult. Besides their nature, there is also an obvious difference in the type of data these two systems contain. The ERP systems contain structural data, while the CI systems have non-structural data. In spite of different technological bases of these systems, the integration of data can be achieved by storing them in the Data Warehouse - DW. This way, these systems can be used as the source for BI system which is applied in order to provide efficient and effective analysis of business operations and better decisions. Integration of data from these systems in the DW can give valuable analyses which further enable timely reaction to changes in the environment. DW is actually the result of a synergy of these two systems, and the results of the organization can be assessed only by using the data from both systems. For example, having DW with stored information from these systems can enable qualitative SWOT analysis. Data obtained from ERP system is related to Strengths and Weaknesses (SW), and CI systems provide data on Opportunities and Threats (OT). Feedback of SWOT analysis gives possibility of creating more qualitative information and consequently making better decisions, which emphasizes the strategic role of synergy of these systems. This is only one of the examples of the effects of synergy of these two systems which confirm the significance of their application.

V. FUTURE RESEARCH DIRECTIONS

Results of systematic analysis of literature in this paper give theoretic basis for further research, especially the empirical research, which aim is to determine the level of synergy between ERP and CI systems in come organizations and their correlation with acquired (achieved) agility level. Also, some research in the future should focus on the analysis of those segments of business operations which could benefit the most from the synergy between ERP and CI systems in organization's business operations.

CONCLUSION

ERP systems have simplified, standardized, integrated and automatized business operations, but they have not contributed to the organization in the sense that the organization acquires more agility and can survive in unstable business conditions. It is believed that agility can hardly be acquired by implementing only ERP systems. Most of the organizations have already implemented the ERP system, but great market uncertainty encourages organizations to invest in the implementation and application of the CI systems. The result of synergy of these two systems gives more qualitative information, better decisions, increased productivity, better position on the market, and alike. Having analyzed scientific literature, it was noticed that empirical research on the subject of CI was still scarce. It may be due to the fact that the CI is a relatively new technology. Considering today's unstable business conditions and the fact that the CI technology has been developed to primarily monitor and analyze business environment and competition of the organization then, the significance of its application is obvious. By using CI systems the organization can gain leading market position. Leadership is gained by monitoring the environment in order to determine current trends and opportunities. This way, the organization can ensure its favorable market position which implies the possibility for the organization to be the one that dictates the rules in business and not the one who follows the others. To this end, modification of business policy also needs internal data about business operations of the organization, besides the external data obtained by analysis and monitoring of environment and competition, and those data are provided by the ERP system. This leads to the conclusion that implementation of the ERP and CI systems enable organizations to have proactive business operations. By doing this research of literature, a

theoretical basis was given which emphasizes the importance of the synergy of these two systems..

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