

INFLUENCE OF INFORMATION SYSTEMS ON BUSINESS PERFORMANCE

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Abstract. Considering increased competition nowadays, businesses strive to gain competitive advantage, increase their economic indicators, work productivity and efficiency, reduce costs and get other benefits through implementation of integrated information systems. By improving internal processes and financial performance of the company, the general business performance could be influenced by the deployment of such information system (IS). In order to identify tangible and intangible benefits of IS implementation, influence on business performance, business processes and areas that are being affected, analysis of scientific literature, research synthesis and generalizations have been made.

Keywords: business performance, enterprise resource planning system, information systems, business benefits, ERP.

Introduction

In our fast moving and continuously changing world, when the needs and preferences of customers change very fast, only the companies that are able to keep up with innovations and adapt to the situation by making the adjustments in its business processes, can expect to keep their performance on the required level and stay competitive. In recent years, the success of any enterprise is directly related to the level and quality of information technologies that are being used in the company and ability to use that information correctly.

The importance of information systems (IS) has dramatically increased during the past decade as an increasing number of businesses have implemented them (Davidavičienė 2008; Paliulis *et al.* 2012). A modern organisation could not be imagined without an efficient information system. Subsequent to numerous researches, no doubts were left that implementation of an information system in an organisation could bring a lot of benefits in dealing with internal and external tasks that a company might face in day-to-day operations and long-term decision-making (Pabedinskaitė 2010).

Continuous technologic development not only resulted in increased performance of hardware and software, lowered the prices and offered a greater choice of information systems for most businesses, but also became yet another factor that promoted the spread of computerized systems all over the globe.

Provided it was implemented correctly, an information system, which was integrated into business processes of an enterprise, is one of the major factors that increase business performance (Pabedinskaitė 2009; Yahaya *et al.* 2004; Merkurjev, Tambovcevs 2009); however, benefits of a specific information system could differ from one company to another, depending on an economic sector, in which the enterprise operates, and business processes, for which the IS was procured.

Estimation of potential benefits of an information system is difficult because of the aggregate amount of direct and indirect benefits, both intangible and tangible.

The main goal of this article is to identify the impact made on a business by deployment of an information system from the theoretical point of view through analysis of scientific literature, comparison and synthesis.

Business performance and IS

Analysis of research made by Awais *et al.* (2012) showed that over the past few decades, companies all over the world started to notice a great need for information systems in the business field. It was hardly possible to ignore the significance of benefits and a possibility to increase business performance through such an investment. It was quickly observed that an IS can help a business to save money, increase the competitive advantage and improve performance, thus creating more profits.

Nowadays, increasing business performance through information technology solutions is a common process. An increase in business performance could be expressed as an intermediate step between an information technology and a business strategy. Figure 1 demonstrates the structure of business performance that lies in-between a business strategy and an information technology in the information system.

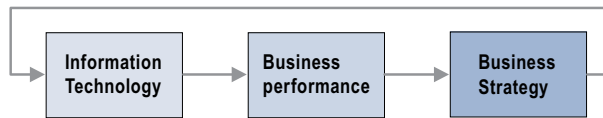


Fig. 1. Position of business performance (compiled by the authors)

The Figure above suggests that business performance can be increased pursuing strategic goals of a business through an information technology. In other words, the use of information technologies in a business could impact on its performance, which could help achieving strategic goals.

The research by Sward (2006) supports this conclusion, suggesting that performance is the result of some benefits brought to separate business units and the organisation as the whole by information technology solutions or related services, expressed in different parameters. All improvements in IT or information systems could result in lower costing business processes and increased efficiency of activities performed by workers. The solutions mentioned above improve the monitoring and coordination inside an organisation (Hendershott 2006). Consequently, it can be stated that the overall impact on business performance could be defined by the analysis of benefits, both tangible and intangible, that were received subsequent to implementation of an information system. This is a frequent economic challenge for all kinds of investments, not specific to IT (Paliulis, Uturytė-Vrubliauskienė 2012). It becomes an issue due to the complexity related to evaluation of investment effects on operational performance of a business. The research by Silvius (2006) suggests that such effects should firstly be understood and later – financially calculated.

According to Merkuryev and Tambovcevs (2009), investments in design and implementation of information systems might be an especially important strategy for a company. This could help achieving competitive advantage and improving the quality of rendered service as well as increasing performance in relation to the strategy of the company.

In order to better understand the influence of information systems on business performance, the definition, components and types of information systems should be determined first.

Types of information systems

Information systems could be defined as a set of components that help collecting process and sharing information and data with the help of software, hardware, core ware and organ ware. According to Nikjoo *et al.* (2011), these kinds of systems are the fundamental principles for economic development of any size of a business, both small and large.

Awais *et al.* (2012) provided few other definitions of information systems, describing them as a combination of an information technology and human resources that use the technology to perform some actions in support of business processes. These could also be named as the application landscape. The notion “information systems” could also be used to describe interaction between users, algorithmic processes, information and technology. Furthermore, an information system could be understood as a semi-formal language that enables an improved decision-making process and supports other actions. The main function of an information system is to process (collect, transfer, store, process, and share) information.

There might be a lot of different definitions for an information system as it might be perceived from different points of view; however, in all cases, they refer to the systems that are commonly grouped into five categories depicted in the Figure 2 (Molla, Heeks 2003; Nowduri 2010; Awais *et al.* 2012; Reddy *et al.* 2009; Chichernea 2009):

- Office Information Systems (OIS)
- Transaction Processing Systems (TPS)
- Management Information Systems (MIS)
- Decision Support Systems (DSS)
- Executive Support Systems (ES)

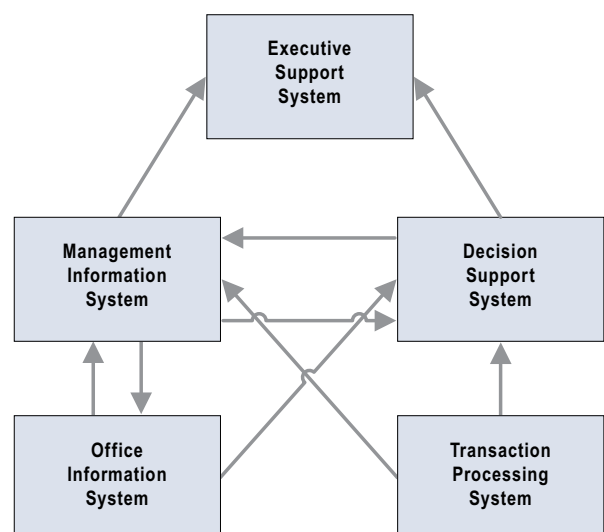


Fig. 2. Classification of information systems (source: Awais *et al.* 2012)

These groups of systems are interrelated in terms of data and information flow. The arrows show the way information is transferred from one system to another; the diagram also represents the object of analysis in each category. Executive support systems receive information from management information systems and decision support systems. Management information systems are using data from office information systems, transaction processing systems and decision support systems. Decision support systems use data from management information systems, transaction processing systems and office information systems. Office information systems are supported by management information systems. Transaction processing systems are the only systems in the network that serve as information “providers” rather than “consumers”.

Different descriptions are suggested in various scientific sources regarding the purpose, functionality and operational areas of the systems provided above. The most relevant explanations of every system are provided to gain a better understanding of the information systems and their influence on improvement of business performance.

An Office Information System (OIS) is an information system that enhances business processes and makes communication between users easier through the use of hardware, software and networks. Using computers and other electronic devices, employees perform most of their task automatically rather than manually (Awais *et al.* 2012). The study by Molla and Heeks (2003) stated, that a Transaction Processing System (TPS) is an information system that collects, stores and processes information throughout a day on everyday transactions. These systems help answering the routine questions of a business. Reddy *et al.* (2009) explained that a Management Information System (MIS) is an information system that is concerned with collection, processing, storing and transferring of important business information to help managers perform activities. A Management Information System provides relevant and timely information that is used in the decision-making process and helps managers to plan and control efficient performance of operations. Research by Nowduri (2010) illustrated, that a Decision Support System (DSS) is an information system that helps users to analyse information, which is helpful for their business, and presents it in a way suitable for decision-making. This helps to make decisions in a more efficient way. Chichemea (2009) claimed that an Executive Support System (ESS) is an information system that is mostly used as reporting software, which transforms business data and information into summarised reports. These reports are mainly used by executive managers for long-term planning and scheduling.

As each of these systems covers a specific business area and supports only specific business processes, it is wise to have them integrated and connected into one information system that would be able to meet the business needs in terms of relevant processes. As an example of integrated information systems, an enterprise resource planning system, which covers various application levels is presented and analysed further in this article.

Enterprise Resource Planning (ERP) system

According to Framinan (2008), enterprise resource planning systems are regarded to be among the best business information technology solutions of the last few decades for most of the large (and numerous medium and small) businesses.

ERP systems were also analysed by Chung and Skibniewski (2007). They stated that such systems are created to process information and enterprise transactions as well as foster integrated production, planning and customer feedback. An enterprise resource planning system is designed to combine all systems operating in different departments of the company. It is one integrated programme that runs one database in a manner that allows different departments and business units to freely share information and communicate with other users. In an organisation, optimization of information and resources used by different business units could be achieved only if systems are integrated. That is considered to be of utmost importance in enterprise resource planning systems (Nikjoo *et al.* 2011).

Merkuryev and Tambovcevs (2009) have concluded that enterprise resource planning systems are fully integrated and cover all activities of a company. They might consist of several modules, such as finance and accounting, human resources management, quality management, sales and distribution, production management, purchasing management, marketing, planning and material management. Different modules and structure of ERP systems are presented in the Figure 3. Next to already named traditional modules, extensions could be installed, such as supply chain management, business data warehouse and customer relationship management (CRM).

Usually, enterprise resource planning systems consist of four levels: a network level, resource level, application level and decision level. The entire structure of an enterprise resource planning system is presented in the Figure 3 (Merkuryev, Tambovcevs 2009).

To gain a better understanding of an ERP system, the description of its four levels is presented.

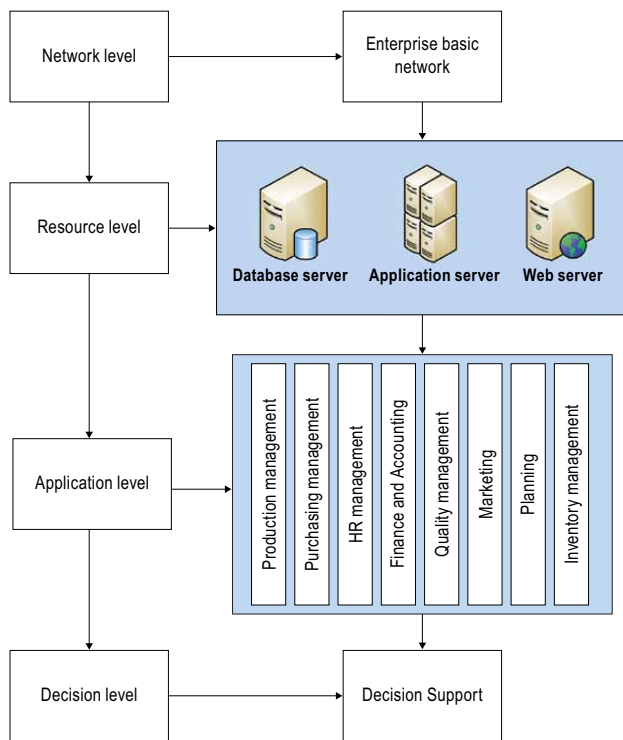


Fig. 3. The structure of an ERP system with four levels (source: Merkurjev, Tambovcevs 2009)

Network level: this level is responsible for smooth flow of internal and external information in the company. The infrastructure of the system depends on this level.

Resource level: this level stores all software, hardware and data required for ERP. It stores database, application and web servers.

Application level: it hosts subsystems used by different business units to perform different tasks. Using these subsystems, managers populate the enterprise resource planning system with information or obtain required information.

Decision support level: on this level, resources – such as data and information – are processed for decision-making. Models and methods for decision-making are employed here as well.

The main goal of an enterprise resource planning system is to combine as many functions and capabilities as possible into one integrated system, which would work using one database, so that all business units could easily get the required information and communicate between each other. If implemented successfully, this approach can bring a significant return on investments (Davidavičienė, Raudeliūnienė 2010; Merkurjev, Tambovcevs 2009). Besides, a correctly implemented system can combine parts of an organisation into an integrated system and give access to clear and common data (Yahaya *et al.* 2004).

An ERP system improves productivity of an enterprise by creating a transaction structure that integrates the key functions of different business groups onto the platform of the enterprise resource planning system (Merkuryev, Tambovcevs 2009). Business managers can make decisions based on information retrieved from the information system. Ordinary workers can gain access to information, thus increasing delegation of authority for more efficient interaction with customers and production decisions (O’Leary 2000).

The research made by Merkurjev and Tambovcevs (2009) showed, that by implementing these systems, companies can achieve competitive advantage. Over the last few years, many companies have invested money into ERP systems and this number has been constantly increasing.

Business performance through ERP implementation

There is no doubt that ERP implementation can foster productivity and increase efficiency. Improved performance can be achieved through different benefits, that could either be easily visible and evaluated or just assumed (Bingi *et al.* 1999; Cronin *et al.* 1994; Koushik, Pete 2000). For example, numerous competitive advantages resulting from ERP systems, including reduction of business costs, quick response to customers and acceleration of corporate connections, have been researched by Cronin *et al.* (1994) and Koushik, Pete (2000). In their paper, Bingi *et al.* (1999) stated that it helps to simplify work processes, hasten corporate responses, increase validity and timeliness of data, and reduce secretarial work processes. While Dykeman (1997) said, that it can also improve the output sales value and lower the inventory turnover rate.

When the Internet value chain is applied to marketing and product-related research, an ERP system may effectively increase a market share of an enterprise, reduce marginal cost, and boost customer satisfaction (Cronin *et al.* 1994).

Tsaia *et al.* (2011) have managed to classify all of the benefits into two categories so that all effects contribute to the performance of a business. The scheme of business performance could be expressed as the Figure 4.

The Figure demonstrates that there are mainly two indicators that might explain the way business performance changed subsequent to implementation of an information system, namely, performance of internal processes and financial performance improvements. Tsaia *et al.* (2011) in their work explained the meaning of these two categories. In essence, performance of internal processes refers to simplification of work processes, improvement of data

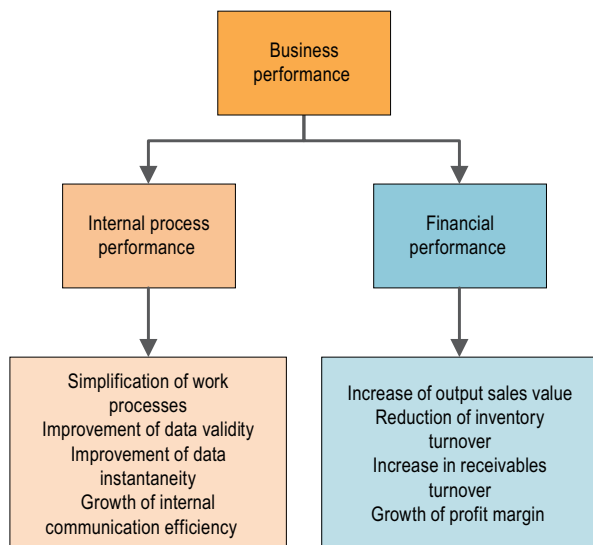


Fig. 4. Business performance groups (source: Tsaia *et al.* 2011)

validity and instantaneity, and the growth of internal communication efficiency. Financial performance refers to the increase in the value of output sales, reduction of inventory turnover, increase of receivable turnover, and growth of the profit margin.

Potential benefits that might be obtained after implementation of an ERP system are enormous and may vary from improved information management to reduced operational and other costs (Davenport 2000). It should be noted that all of those benefits do not manifest immediately or with the purchase or instalment of an information system. Soh and Markus (1995) stated that the benefits might become visible only once the entire organisation starts effectively using IT assets that were bought or created. The process can be long and require a lot of resources, such as money, people and time.

Through better information management, information systems can help individuals or groups of people in an enterprise, or even with customers or suppliers, perform their duties in a more efficient manner, which would lead to emergence of benefits (Davenport 2000; Marchand *et al.* 2000). Peppard *et al.* (2007) noticed that benefits could be received only through managers and users of a company who are using the system both directly or indirectly. In order to justify the money spent on implementation of an IS, benefits should be identified, which sometimes can be hard because of several reasons (Chand *et al.* 2005). Some researches managed to identify different groups, according to which benefits could be easier defined, helping managers to identify the value of this decision for the company (Shang, Seddon 2000; Gattiker, Goodhue 2002; Nafeeseh, Al-Mudimigh 2011; Murphy, Simon 2001).

Research by Shang & Seddon (2000) has found that the benefits of IS can be grouped into five categories: operational, managerial, strategic, IT infrastructure and organisational.

It may take some time to fully observe all of the benefits brought by implementation of the system, thus analysis should be done during the implementation and post-implementation periods (Kim 2009).

Business performance could be increased only once it is defined in detail. The task is to express benefits of information systems in terms that would be easily understood by managers of the company (Gammelgård *et al.* 2006). These researches emphasize the importance of managerial staff for the success of IS implementation process and its further use.

Another suggestion was to group ERP benefits into four categories: those, that improve the information flow between business units, thus improving communication and coordination among employees; those that enable centralized administrative activities, that reduce costs for maintenance of information systems and create possibilities to deploy new functionality of systems; and those, that provide tools for a business to move from inefficient processes towards the best practice processes (Gattiker, Goodhue 2002).

However, usually benefits are categorised into two groups: tangible and intangible. Tangible benefits are those that could be quantitatively measured (Nafeeseh & Al-Mudimigh 2011). In this article, tangible and intangible benefits that influence business performance will be analysed starting with the initial factors that cause changes.

Business enterprises that are planning to invest money in ERP information systems could expect to have tangible benefits shown in Figure 5. They are: inventory reduction, reduction in indirect labour, reduced cycle time, standardized HR information, integrated financial information, improved performance, improved productivity, standardized and faster manufacturing process, reduced quality costs, reduced general administrative costs, possibility for continuous improvement, improved resource utilization, reduced headcounts, reduced maintenance costs, increased profits, reduced waste, IT cost reduction, possibility of lean management for all processes, reduced paperwork and indirect time, personnel reduction, improved customer service, and reduced operational costs.

Intangible benefits received as the result of investments into IT are usually grouped into two categories: internal improvements and the benefits related to customers of the company (Hares, Royle 1994).

As intangible benefits cannot be quantitatively evaluated, Murphy and Simon (2001) have offered to define them as the opposite of tangible benefits. In other words saying, these are the benefits that could not be translated into quantitative value or a business value.

As demonstrated in Figure 6, intangible benefits could also be the outcome of the successful implementa-

tion of an ERP system. They can manifest as: greater flexibility, improved management decision-making process, enhanced teamwork, improved morale, people development, greater adaptability, improved visibility of information, increased user satisfaction, integration, possibility to spot market trends, standardization, internal improvement, and improved cost structure.

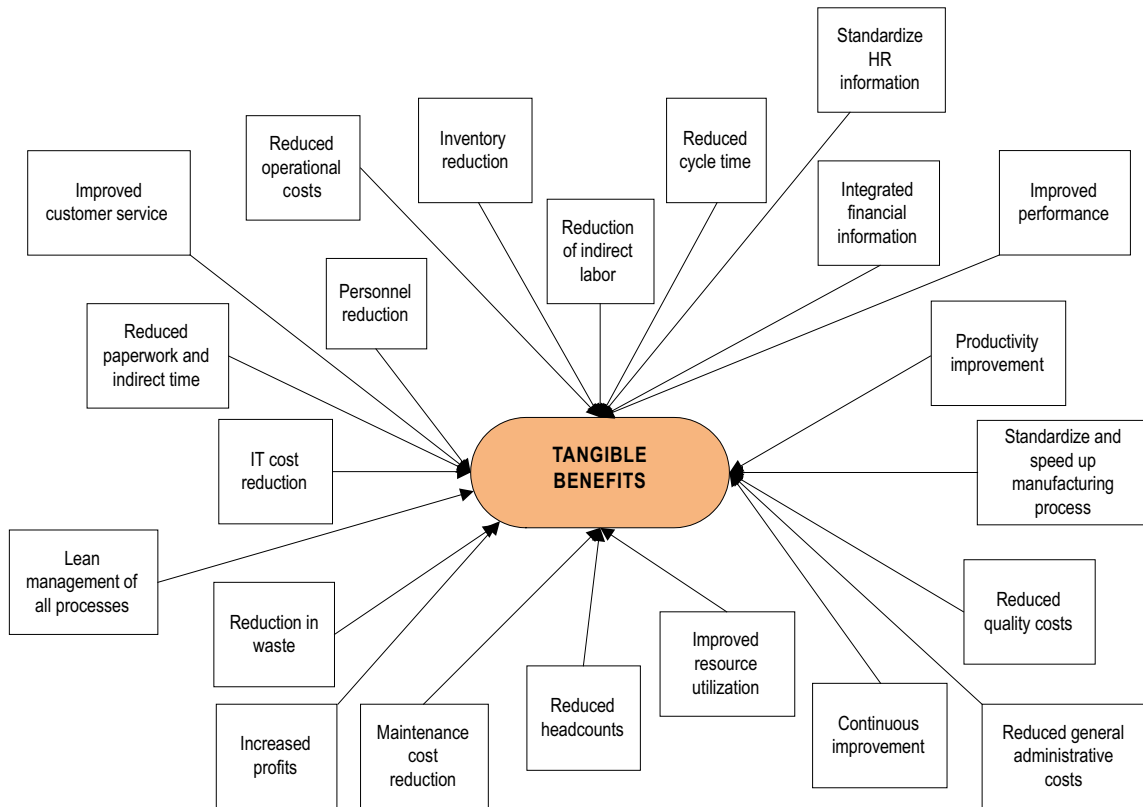


Fig. 5. Tangible benefits of an ERP system (source: Dustin 2010; Jutras 2009; Murphy, Simon 2001)

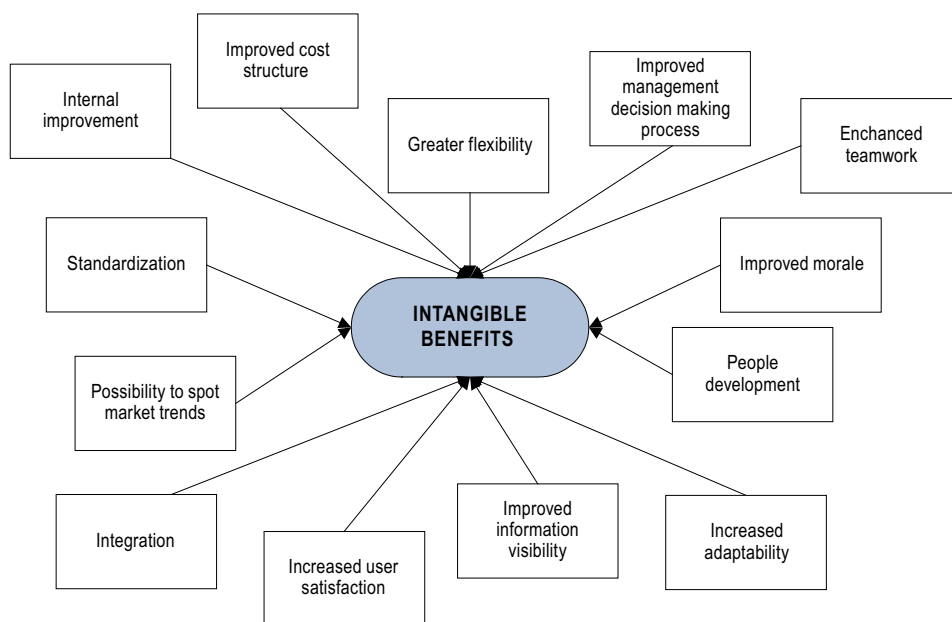


Fig. 6. Intangible benefits of an ERP system (Dustin 2010; Hares, Royle 1994; Murphy, Simon 2001)

Conclusions

Based on the analysis of theoretical aspects pertaining to influence of information systems on business performance, the following conclusions could be made:

- The growing need for information in today's world requires the development of information systems. Every enterprise should follow the news on the latest information technology solutions for business management that appear on the market and offer to improve business management methods and operational productivity, thus increasing competitive advantage. One of information technology solutions that improve the efficiency of a company is information systems.
- Information systems play a crucial role in today's business life. They help improving their goals, targets and strategies. Nowadays, an increasing number of companies invest money into information systems in order to improve business performance. Investments into information systems help a business to transform operational processes and activities so that a higher efficiency could be achieved. Production process, customer service, finance and accounting, information processing and other processes could be improved with the help of information systems.
- Information systems can help identifying and resolving the existing problems and weaknesses of a company. They can bring a lot of direct and indirect benefits, thus increasing the financial stability of a company. Subsequent to implementation of enterprise resource planning systems, both tangible and intangible benefits might influence business performance in one way or another. Identification of such benefits is complex as these factors have been insufficiently researched. Consequently, they should be identified before their impact could be fully evaluated.

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INFORMACINIŲ SISTEMŲ ĮTAKA ĮMONĖS VEIKLOS REZULTATAMS

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Santrauka

Atsižvelgdamos į šiais laikais padidėjusią konkurenciją, įmonės siekia įgyti konkurencinį pranašumą, padidinti ekonominius rodiklius, pagerinti darbo produktyvumą ir efektyvumą, sumažinti išlaidas ir gauti kitokią naudą, diegdamos integruotas informacines sistemas (IS). Vidinių procesų efektyvumas ir finansiniai rodikliai, bendras įmonės efektyvumas gali būti pasiekti įdiegus tokias sistemas. Siekiant apibrėžti informacinių sistemų diegimo įtakos verslo veiklos efektyvumo aspektus, buvo atlikta mokslinės literatūros analizė, sintezė ir apibendrinimas.

Reikšminiai žodžiai: įmonės veiklos rezultatai, įmonės išteklių planavimo sistema, informacinė sistema, verslo nauda, ERP.