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INFORMATION MANAGEMENT IN DISPERSED ENTERPRISES WITH THE USE OF BUSINESS INTELLIGENCE

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Introduction

The development of civilization, information and knowledge is changing the approach to management. Information and knowledge have become the main resource of the organization, which determine the success of the company, gaining competitive advantage and spotting emerging opportunities and threats. Information and knowledge management has become an important factor management in general, as well as in the implementation of individual processes in the organization. An important role in the management of information and knowledge and effective use of the potential of these resources play a new and still developing ICT solutions and systems. They allow to reach the information that have been hard to see, and the possibility of their use in making rational decisions is very limited. An additional difficulty in this area is the fact that as a result of constant changes in the economy, globalization, free movement of capital, people and resources of the organization, information processing is carried out in a dispersed manner. Businesses, branch offices and works can be located in different places, and the generated data may have a different size and shape.

The article shows the role played by business intelligence solutions in information management in dispersed enterprises. The first part presents the essence of information management. Next, the focus is put on the essence of dispersed enterprises. The third part shows the evolution of the integration of information systems, until the advent of systems, business intelligence and cloud computing. The last part of the article describes two case studies.

1. The essence of management information

Assuming that "information is regarded as one of the key factors by which a company can shorten the response time to changing conditions in the environment" [1], particular attention should be given to information management. R. Zygała says that "information management is conscious behaviour of people, aimed towards optimizing the role of information in achieving the objectives of the organization" [2]. According to I. Pawełoszek information management practice includes activities related to the three essential elements of the company, such as information resources, staff, businesses and the technical means of information processing [3]. Wherein the information management efficiency depends largely on the integrity and cooperation of these factors.

One of the tasks of enterprise information management is the development of knowledge. This conviction was expressed many years earlier: "progressive

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cooperation of human activities and complication of the economic life make the amount of information necessary to control and manage economic system, that is, for the purpose of decision-making, increases exponentially over time"[4].

R. Zygała shows the approach to information management, which is a concept of information orientation (IO) developed by D. A. Marchand[5] which deals with the behavior of information workers, the used technology and information management. The basis of the approach is a system of key performance indicators occurring in the enterprise. The studies conducted by D. A. Marchand pointed to the existence of competence affecting the effective use of information and its management. Fifteen competences has been divided into three areas of information management relating to [5]:

1. Human Behaviour - the first group of qualified, 6 of the 15 employee competencies that should be included in the behavior of managers. They affect the values shown by them in relation to the use of information and it is possible to distinguish here: proactivity, sharing, transparency, control, formalization, integrity.
2. Practice of information management - the next five competencies designed to make efficient the use of the information relates to the potential of the company to make the best use of the information throughout the information lifecycle. This group has the following competencies: identification of information, information processing, maintenance of information, organizing information, information gathering.
3. Practice of information technology - the last 4 competences relate to the proper use of the available information infrastructure in the areas of management, innovation, business processes and operations.

The idea behind the method is to show the dependencies that exist between the way of information management, the behavior of employees to the information and the technology used and the impact on the overall efficiency of the company. This efficiency can be measured by the increase in market share, the level of innovation and increase of the company's reputation. The approach to information management through orientation on information integrates all levels of management and applies to all levels of activity (operational, tactical and strategic level).

Information management covers a very wide range of activities related to information in a broad sense against the background of the company. Examples of such activities include:

- "building information environment that will be conducive to achieving the objectives of the company,
- the formulation of a strategy for information processes and its integration with the company's strategy and strategies of computerization,
- ensuring effective control of the information environment with the use for this purpose methods of internal audit specialized on this environmental ,
- ensuring optimal quality of information in decision-making processes,
- building a system for measuring and assessing the effectiveness of the information environment,
- incorporation of practices of information management in the processes of generating, processing and utilization of knowledge in the enterprise"[2].

In the theoretical part of the paper the beginning of the operation of information management in companies has been signaled. One of the main concepts of information management has been quoted. Attention has been paid to the range of activities including the management of enterprise information.

2. Information management in dispersed enterprises

A characteristic feature of the functioning of modern enterprises is geographical dispersion. Globalization, development of ICT solutions (information and communication technology) and the free movement of capital, people and resources, caused that individual elements of the organizational structure can be located in different places around the world. In one country the production facility may be located, in another one management department, finance and accounting, and in another country finished products store.

Dispersal may concern not only homogeneous businesses in legal or ownership terms. Dispersal occurs in cases of partnership, cooperation, mergers, companies and corporations. Enterprises enter into relationships with other independent entities in order to achieve specific goals and objectives. Corporate purposes, which may not be achieved by individual actions are often implemented as a result of producing a synergistic potential of cooperating entities [6]. Thus, the collaboration between companies is becoming an inherent feature of management, and the resulting structures often take the form of network organization or inter-organizational networks. In the first case, the company formed a kind of the joint venture agreement, not leading to the creation of any structure or legal entity. The network is so in this case the agreement. The second category makes up the network that do not stop at the conclusion of the contract, but lead to the creation of new forms of cooperation, which as a new legal entity acquires rights and incurs liabilities in its own name [7].

Cooperation in the form of networks offers great opportunities for both, the configuration and coordination of cooperating organizations and individuals and the benefits arising from the effect that arises from the creation of organizational links, integrating a number of dispersed activities, to expand the reach and impact area, as well as a better flow of not only knowledge, but also skills, new ideas and experiences. This brings an increase in the efficiency of network organization in achieving its objectives and allows to build a positive potential, which is a source of creative and innovative solutions decisive for the success of achievements across the organization network [8].

Development of cooperation, cooperation between enterprises and inter-organizational networks may have different character. W. Czakon pointed out the most important directions in this area [9]:

- competition among groups of companies resulting in the emergence of a market competition of whole communities instead of competition of individual companies;
- restructuring of large organizations linked to competitive pressure, the requirements of shareholders and the need of flexibility;
- the phenomenon of interaction among many enterprises as commonly found in economy practice.

The consequence of the dispersion of the organizational structure within a single legal entity or network organization or a cross-organizational network is dispersal of areas of generation and information processing.

Individual companies and network nodes generate data of the transaction nature (sales volume, order supplies, etc.), As well as the necessary information for decision making, tactical and strategic management (reports, analyzes). Information management processes, are relatively simple to implement in a situation where they are concentrated in a single database (eg. The ERP system), or within a single enterprise. In a situation of dispersion, many branches and networks, these processes become prohibitively difficult. The information may have a different format, may come from different systems and database engines. From the point of view of management there is still time factor. Information stream with delay, which makes even more difficult to make decisions, current operations and planning. Network structures cope with this problem by integrating information systems, electronic communications, the Internet and private networks (VPN).

3. The role of *Business Intelligence* systems in dispersed enterprises

One of the ICT solutions that support information management in dispersed enterprises are Business Intelligence systems. One definition says that it is "business management term used to describe applications and technologies which are used to gather, provide access to analyze data and information about an enterprise, in order to help them make better informed business decisions" [10]. From the point of view of the intelligent organization, Business Intelligence systems are not a new technology, but a natural direction of the development of management information systems. Business Intelligence solutions using ICT for more effective decision-making mainly in the area of the organization's strategy, but also at the tactical and operational level.

The key technology used in Business Intelligence systems is a data warehouse (DWH). DWH and ETL (Extract, Transform, Load) tools and analytic and reporting applications and allow linking the capabilities of dispersed systems in organizations that previously operated independently. They focus on supporting a variety of business functions, decision support at all levels of management, using the process approach and advanced analytical techniques. The general scheme of the system Business Intelligence is presented in Figure 1.

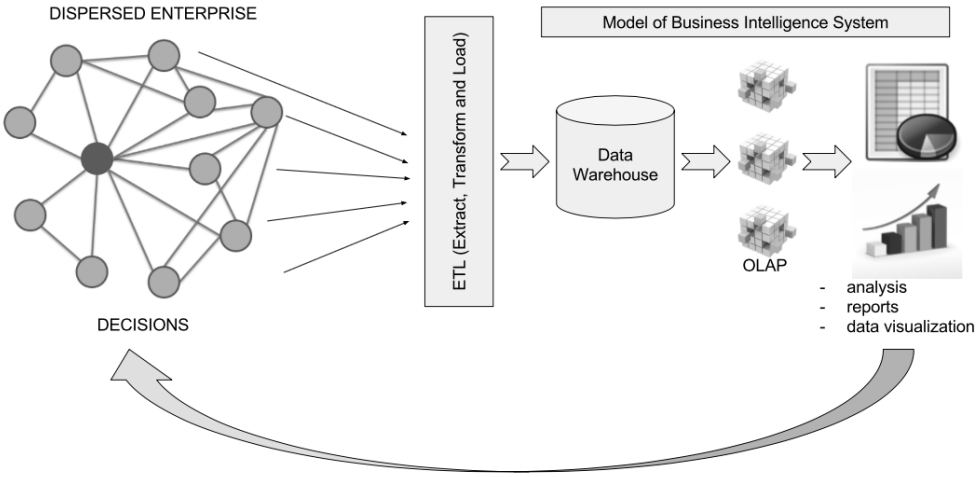

Figure 1. Model of Business Intelligence System for dispersed enterprises
Source: Own study

The source of data for BI systems are transactional systems, decision support systems, corporate portals, ERP, CRM, GIS, SCM, etc. Information from these systems due to the dispersion and heterogeneous databases, have ability to function on a variety of hardware platforms and operating systems They do not have the potential that could be of importance from the point of view of intelligence organizations. These systems fulfill the tasks placed against them, they are an important part of the management of the passage organization, but from the point of view of corporate strategy, decision-making, the development of knowledge, their importance is limited. Therefore, the information flowing from them are properly converted (ETL) to a common format and feed the data warehouse. Data to be integrated in HD are subjected to their different analyzes and the necessary reports are based on them. The main technologies for data analysis in data warehouses are: OLAP (Online Analytical Processing), data mining, data mining, data mining, etc.

In dispersed enterprises data analysis using data warehouse and computer analysis is the basis for the search for compounds and relationships that can not be seen in any way. It is estimated that "by 2015, more than 85% among the 500 largest companies will be unsuccessfully analyzing their data sets in order to provide a competitive advantage. Referring to this forecast, enterprises have a need to develop towards new technologies based on knowledge discovery - Data Mining" [11].

The most important benefits for dispersed organizations resulting from the implementation of Business Intelligence solutions are:

- the ability to access data and information from various sources easily,
- shortening time needed to prepare business analyzes,
- streamlining planning processes,
- increasing the flexibility of the organization,
- visualization and data aggregation,
- the opportunity to explore the relationships and correlations between data,
- earlier and more relevant analysis of trends,
- improving the efficiency of business processes,
- the ability to make decisions in real time.

Business Intelligence systems for a long time have been considered as a solution very expensive and thus, exclusively for large organizations. Recent years have brought a big change. Currently, these systems are increasingly being implemented in small and medium-sized enterprises. Number of implementations is steadily growing on the Polish and global market. According to Gartner's report published in 2014, BI applications market in 2013 amounted to 14.386 billion US dollars, which was an increase of 59.55% compared to the previous year [11].

It should be noted that the rise in popularity of BI is associated with the growing popularity of solutions operating in the Cloud Computing model. Thanks to the "cloud", applications are cheaper, easier to deploy, and thus more flexible and efficient.

4. Information management using Business Intelligence - a case study

The benefits of using BI solutions will be presented on the basis of two case studies covering the following implementation:

- BP petrol stations – Comarch BI
- Cooperative Trade in Goods - Teta BI system.

These companies operate in networks, are dispersed and for a few years have been using Business Intelligence solutions. In the first case the BI system supplier is Comarch SA, in the second one - Unit4 Poland (formerly Teta). Both suppliers are leading manufacturers of this type of systems in Poland.

Solutions implemented in the petrol station network of BP is one of the most interesting case study in the portfolio of Comarch SA company. Originally it covered implementation of gas stations owned by BP, which were located in Polish territory. The aim of the project was to integrate customer data. As a result, data of more than 650 thousand customers in 450 petrol stations in Poland were integrated. This resulted in a significant increase of the level of customer service and reducing service time.

Success which was the use of BI in Poland, resulted in subsequent implementation in other European countries in which BP has a network of petrol stations. Business Intelligence systems were therefore also in Spain, Portugal, Luxembourg, France, Germany and Switzerland – Figure 2.

Figure 2. Comarch BI systems in BP petrol station network
Source: www.comarch.pl

The effects of implementation are very positively evaluated by BP: “The data that are made available by Comarch Business Intelligence, allow us for much more efficient planning and management, than it used to be. By regularly providing the necessary reports, we can fully inspect the condition of the company at the weekly meetings of the managers of the station. This allows us to more easily identify and prevent undesirable phenomena and to use all available opportunities. By deploying BI platform, we can focus on making the right decisions instead of preparing periodic reports”[12].

The second example concerns the Cooperative Trade in Goods (SOT), which specializes in trade of dairy products in Poland and abroad. SOT functions as a producer group in the form of cooperatives. Its owners are seven dairy cooperatives scattered throughout the country. The structure of the company operates ten warehouses from which the goods are sold to customers throughout Poland - Figure 3.

Fig. 3. Disperesion of warehouses of SOT company
Source: www.sot.pl

The SOT company needed support primarily in the area of sales. Dispersal of wholesalers and entities owning SOT, caused difficulties in planning, reporting and management. The task posed against Teta system was delivering BI data much faster than before, which can be analyzed in different systems. “Currently, our Commercial Departments have access to the latest data, which are updated at night, so that they can better adapt their sales strategies” - Says Marcin Jankowski, Head of IT at SOT. – “Analysis and reports convert faster and more efficiently, and sales representatives can spend more time on their core business”[13].

Before the implementation of the system, many decisions were based on incorrect assumptions and were subjected to high risk of error. “With the implementation of the system TETA BI, decision-making processes have been reduced, and access to data has become free. This is the biggest advantage - when there is the need of access to some information it is possible to simply take it, without worrying that it is necessary to ask someone for it or that charge a transaction system will be loaded. This information is available from stock and requires only a few clicks” - Says Marcin Jankowski, Head of IT at SOT. More case studies can be consulted on the websites of manufacturers of software [14].

Summary

This article attempts to demonstrate the role that Business Intelligence systems can play in the management of information in dispersed enterprises. Dispersion of the organizations and functioning in a network is becoming more and more common model of cooperation. This is due to the benefits that can be derived from cooperation by all entities. Dispersion, however, is a significant barrier in effective information management. In the work (article) it was indicated as Business Intelligence systems integrate information flowing from the many entities into one cohesive data warehouse, which is the basis for building reports and analysis of the management. Through the mechanisms of the data warehouse it is done on-line, without delay. Presented practical examples show that the implemented Business Intelligence systems help to improve information management. The dispersion of the BP petrol station and SOT warehouse did not allow for automatic acquisition of information and data necessary for decision-making processes. Therefore, they carry the risk of error. Decisions could be based on erroneous assumptions. Currently, BI provide data. Employees can focus on their responsibilities instead of creating time-consuming analysis and reporting.

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