EFFICIENT ENTERPRISE MANAGEMENT BY BUSINESS PROCESSES AUTOMATION

Monika Łobaziewicz

The John Paul II Catholic University of Lublin,
Department of Economics and Management, Al. Racławickie 14, 20-950 Lublin, Poland
Email: mmlobaza@kul.lublin.pl

Abstract. The speed of doing business today is growing exponentially. Therefore, it is the demand for shrinking response times in business processing, workflow and lines-of-business systems within an enterprise. Consequently organizations are generating incredible amounts of information round the year. They are continuously engaged in the creation, management and sharing a wide variety of data in a wide variety of forms, structures, formats and documents. Vast percentages of this data remains unstructured - databases, files, records, archives, statistics - out of reach of proper capability to deliver meaning for business efficiency or advantage. Business Process Automation (BPA) represents the efficient management of structured and unstructured data in an integrated fashion, helping enterprises to better manage and deploy information for operational productivity. The aim of paper is to explain how business process automation influences on the enterprise management efficiency improvement by B2B system implementation resulting from application of integration platform based on B2B model using Electronic Data Interchange standard and Web Service technology.

Keywords: Business Process Automation, Electronic Data Interchange, B2B system, management effectiveness.

JEL classification: M15.

1. Introduction

Business Process Automation (BPA) has been still an actual paradigm for enterprises management. It helps them adapting information flow processes to new requirements and challenges that are crucial for business transactions and cooperation. With use of professional IT systems like B2B platforms and standards, e.g. Electronic Data Interchange (EDI), it propagates more cohesion between the bewildering variety of IT systems, technologies and applications, strives to unlock vital data and releases it to efficient workflow engines and services for better processes ability.

It allows an enterprise to release it workforce from information management to focus on developping its core competencies, business relationships to achieve economic benefits. Besides, there are two crucial advantages also achivied - better accountability and higher employee satisfaction.

Therefore, the aim of the paper is to explain how Business Process Automation influences on the enterprise management efficiency improvement by B2B system implementation resulting from application of integration platform based on B2B model using EDI standard.

The main contributions of this paper are the following:
- organization that operates on BPA by developing B2B system using web technologies and EDI standard provide e-Business as a new model of business cooperation and culture,
- explanation how B2B interactions with use of EDI standards link internal and external business processes,
- explanation how to enhance the existing processes value with B2B interaction and how it influences on the effectiveness of process oriented enterprise management.

To verify the scientific assumptions, it has been used a case study as the research method based on the following tools, data and information:
- assumptions of the B2B system conception as a result of pre-implementation analysis,
- B2B system documentation made 'during and after' its implementation including its functional as well as technical and technological description,
- users' operations evidenced in the system.

The research were made in the form of an original data analysis contained in the B2B system documentation in Best Construction Ltd., Poland.

The structure of the article consists of theoretical research supported by the literature study. To confront theory, the empirical research were conducted as a case study. Some open issues and research opportunities presented in the paper are also identified on the basis of the author's professional knowledge and opinions.

2. Current trends in Business Process Automation

Business Process Automation (BPA) links process design to application integration services in order to foster the business process implementation and to allow for the execution of workflows that involve multiple heterogeneous IT applications (Melchert et al 2004). This trend is still going on and encompasses internal as well as external business processes with customers, suppliers, partners, internet-based technologies and standards for networked, electronic systems (Johnson 2001). Activities integration intermeshes efficiently the myriad internal and external business processes through advanced IT systems, e.g. B2B or sophisticated applications. In order to interact with a trade partner, an organization must not only be able to send and receive messages and carry out conversations according to a specific standard, but also be capable of coordinating the internal business processes with the external interactions. As a result, the solution must handle 'long-living' processes that span multiple systems and people, including business activities integration and technologies from cooperating enterprises. By BPA an enterprise manages processes throughout their cycle and gains visibility into their performance, identifying 'critical points' and improvement opportunities. The solutions based on BPA must provide process-model versioning, check-in/check-out, and indexing tools for designing, storing, and retrieving process definitions.

For the efficient BPA, it is crucial IT technology with use of EDI standard because it is implemented in different kind of management systems (e.g. ERP), IT business applications that are integrated in business platforms, e.g. B2B systems. From this point of view, the author experience shows that Web services technologies are gaining great popularity as they provide exciting connectivity between contrasting applications and unrelated systems. In conjunction with XML, Web services allow applications to share information and data across technologies delivering real time information and data to employees without geographic or time limitations,

covering entire gamut's of related and unrelated business systems.

Via a Web service, the information can be accessed and presented automatically and dynamically in the workflow solution. The end-users become more efficient as their time is now spent on completing tasks rather than looking for data or information. In essence, Web services allow developers to build workflow with a common language, platform and protocol (Nowak 2005). Coupled with Microsoft.NET framework, it gives a workflow solution the ability to:
- manage the process itself, which in turn manages people, relationships and what they do,
- deal with various applications on disparate systems or platforms,
- provide the end-user with dynamic data up-dates.

Microsoft .NET framework has been developed as a means to connect systems and improve the flow of information, making it convenient for enterprises to share and integrate existing systems and information as well as extend functionality by using XML and Web services. As organizations move forward, they find that information sharing is fundamental to automating business processes across platforms and departments or groups. As a business grows, it consistently adds the processes, the number of systems it uses and the business partners. For building automatic workflow solutions, .NET provides an ideal tools for interoperability and information sharing. With .NET, passing data from one system to the next becomes seamless and requires minimal programmatic manipulation, with the added ability to deliver Web and wireless-based computing.

Summing up, the need for a close alignment of business process integration and integration capabilities on the IT level has lead to a convergence of business process modeling and enterprise application integration software in the shape of business process automation (Melchert et al. 2004).

3. Business Process Automation via B2B systems

Undoubtedly, Business Process Automation (BPA) is implemented in e-Business solutions that stands for "electronic business," which means communication and doing business processes automatically through the Internet. E-Business is defined as "the use of electronically enabled communication networks that allow business

enterprises to transmit and receive information" (Fellenstein, Wood 2000). From a business perspective, the shift toward increasingly automated business processes and communications based on the transfer of electronic data is designed to achieve greater efficiency in the enterprise management. When an organization engages in e-Business, it completes electronic-based business events (i.e., the complete elimination of paper documentation during business processes in favor of more efficient electronic-based communication using EDI). These electronic-based business events entail the interconnection of the underlying back-office processes of collaborating organizations (trade partners), effectively eliminating the errors associated with a paper-driven process. In this model operates B2B systems in which the potential business value of streamlining inter-enterprise business processes has fuelled a renewed interest in process management technologies (Dayal *et al.* 2001).

A literature review shows that a great deal of research in the area of B2B concerns such issues as integrated strategies and models of e-Business (Hartman *et al.* 2000; Afuah, Tucci 2003; Combe 2006; Pastuszak 2003; Chmielarz 2007; Olczak, Urbaniak 2005), Net Readiness (NR) – readiness to run business on the Internet (Pastuszak 2003; Molla, Licker 2005), standards of B2B platforms (Albrecht *et al.* 2007; Zhang, Yin 2009).

Consequently, relevant business processes across participating organizations are integrated for efficient functioning of business in the market. This kind of integrated business process is called collaborative business process (Chen, Hsu 2001). As enterprises exert to be agile in adapting their business processes to market dynamics, they have to develop collaborative interactions and dynamic e-business solution bindings (Leymann, Zhang 2005). Business Process Automation implemented in B2B systems requires process modelling that is an indispensable part of translating business processes into IT language, as it bridges the business and technological requirements, what consequently initiates the effectiveness of enterprise management system. B2B systems are focused on efficiency and effectiveness of external, cross-enterprise processes. While IT management systems as ERP support internal business strategy, B2B opens the door to new strategic opportunities, which forces the enterprise to take one step further to move from its own system model to the extended system model. According to A. Simon and S. Shaffer (Simon, Shaffer 2002), there are two main types of B2B systems:

– directed on the chain of supplies – such approach allows enterprises to create interfac-

es offering mutual communication. Apart from carrying out processes as ordering of deliveries and shipping on the Internet, services connected with them, e.g. electronic handling orders, electronic payments, electronic handling complaints are provided in the system;

– focused on the market – transactions, which take place within processes, are carried out in a dynamic environment, e.g. the amount and storage of goods, products, business partners are shaped in a flexible way. The enterprise together with business partners creates marketing strategies.

It should be emphasized that a company can transform itself into e-Business based on B2B system by simply buying a piece of software and adding it to its existing infrastructure but it is wrong and dangerous. Companies need to carefully assess the impact of new e-applications and Internet on the IT environment and the overall business. A real e-Business facilitates accurate delivery promises, enables overnight order fulfillment, and allows real-time, self-service information, all of which require very tightly integrated business systems (Shepherd 1999). Moreover, BPA implemented in B2B implicates changes in a management culture. CEO must set the tone for the kind of corporate culture that adopts e-initiatives. Trust is a part of that culture, not only with internal employees but also with the entire supply chain and extended enterprise (Grossman 2004; Kwon, Suh 2004).

Therefore, e-Business is not a matter of technology but merely a door-opener towards new fields of business, more efficient structures and leaner processes. What a company requires to make it stand out from the crowd in the market and to create additional customer benefit is ideas and a vision for new and innovative business models.

4. EDI in Business Process Automation

E-Business strategy supported by B2B system requires significant data and workflow management such as web-based customer or trading exchange interfaces that generate huge volumes of incoming and outgoing data on customers and their interactions. Operating in multiple exchanges may require increased attention to platforms and the different information technology applications facilitating transactions and exchanges as Electronic Data Interchange (EDI), defined as the computer-to-computer exchange of business data (i.e., documents) in structured formats that allow their direct

processing with use of wide range of telematics tools (Kondratowicz 1997). EDI involves translation standards including formats and codes for each transmission type, called a transaction set, as well as, standards for combining several transaction sets for transmission. The interface is accomplished through a leased or dedicated communication line with each trading partner or through a communications network in which one of the partners receive electronic documents by the computer system. Because EDI requires a cooperation between IT management systems, companies need to have an open systems approach, especially when participating in many exchanges. From BPA point of view, EDI by its electronic communicates is a kind of tool that enables the automatic transformation of business process data.

5. BPA based on B2B system and effectiveness of enterprise management

Every enterprise performs many business processes that are supported with IT solutions. In result, they are more or less automated that has an impact on the enterprise management system in correlation with its effectiveness. On the base of a literature review, it can stand that BPA allows to increase the efficiency and effectiveness of certain business processes, e.g, sales, the process of marketing decisions (Brady *et al.* 2002) and also to integrate the work of various functional areas within an enterprise management structure (McDonough *et al.* 2001; Leenders, Wierenga, 2002). Therefore, the effectiveness of enterprise management should be evaluated on different levels: economical, operational and organizational.

Due to the fact that the effectiveness is perceived through numerous criteria and assessed according to different measures, the economical effectiveness of management is understood as a relation between obtained results and expenditure, as well as the relation between the goal of activity and means necessary to achieve the aims of the processes (Skrzypek 2000). The operational effectiveness is related with the processes' effectiveness evaluation, the cost and time reduction achieved by process automation. The organizational efficiency is assessed on the basis of technology used to build B2B systems automating business processes, methodology of their implementation, infrastructure performance (server platform, operating system, environment in which applications are built and run), as well as management method adopted after implementation of IT system by the administrator.

As a result, BPA based on B2B model enables to improve economical indicators, increase of management structure flexibility, quick response to the environment changes, especially in case of customers' needs and business partners requirements (Basl 2011).

The effectiveness of enterprise management due to B2B system can be measured by means of a indicators assigned to particular processes, i.a.: time of documentation workflow between cooperating enterprises, cost and time of orders/deliveries/sales/complaints processing, costs of inventory storage, time of inventory turnover cycle, cost of conducting marketing actions, or operative costs of business activity. In order to define the size of the results, the measurement, analysis and assessment of determinants should be made during the phase "before the implementation" and "after the implementation" of B2B system.

6. Effectiveness of management system in Best Construction by Business Process Automation in B2B platform

Best Construction LTD. makes comprehensive building services for civil engineering, shopping centers, halls, developers and public institutions. A part of building works, mainly related to sanitary, electrical and reinforced concrete structures are entrusted to subcontractors with whom the company has signed agreements. Due to the nature of the building industry, where sales is based on one-off contracts, it is difficult to have number of 'loyal' customers. For this reason, the sale depends on the company credibility and high quality services. The decision to implement B2B system has been determined by the need to solve the following problems that Best Construction encountered in collaboration with its business partners:

- high number of errors in orders sending to suppliers due to different forms of orders, depending on the each supplier. There are mistakes in a letter code indicating ordered goods which makes the need to correct orders, often return the goods and wait for another delivery;
- inefficient documentation flow, in particular with regard to orders addressing. With a large number of purchase transactions, which is not unusual in construction companies, orders are sometimes made in a wrong form (for the another supplier) and then send to the wrong recipient. This causes delays in the delivery and makes it difficult to build reliable relationships with customers;

– a large number of redundant commercial information (price lists, catalogues, discount lists) causes information chaos in the purchasing department. In addition, the order of a new material requires time to review the price list or directory, sometimes to negotiate a discount. There is a need to simplify it;

– lack of access to information about the availability of goods in the supplier's warehouse at the time of issuing the order, particularly in relation to the goods for which the company has more than one supplier. Sometimes, the order is sent to the supplier that after the acceptance inform the company about long waiting because of the lack of goods in the warehouse, while it turns out that this problem does not exist with another supplier;

– delays in the transmission of invoices for deliveries. It is particularly important between the ends of months. For example, invoices incoming three weeks after the end of month cause a need to do tax adjustments by Best Construction, which hinders the work of the accounting department;

– activity scale and a volume of orders addressed to the suppliers indicates the necessity to reduce supply costs by aggregating and optimizing procurement with volume discounts. Analyses have shown that at least one in 10 deliveries could be "saved" taking into account the aggregation of orders for the same range of volume in tight intervals. Optimal deliveries scheduling and discounts would require a reliable, constantly updated statistics about the orders addressed to the suppliers.

7. B2B platform architecture in Best Construction

B2B system has been designed as a platform for electronic handling of purchasing and supplying processes in the directory model, integrating the Best Construction internal management system with external systems of suppliers defined as business partners. Number of suppliers in the system was limited by Best Construction to actively cooperating with the enterprise. It has been designed that access to the B2B platform receives a supplier that signed the agreement with Best Construction as the system administrator and the platform owner.

From the architecture and structure system point of view, it has been designed B2B software, which consists of three basic elements:
– interface for the buyer,
– interface for suppliers,
– EDI for ensuring an efficient communication between buyer and supplier.

The interface for the buyer enables employees of Best Construction to log in the panel where a user makes the order for supplies or services from a 'closed' basket of goods specified by the system owner. The additional duty for a worker is to indicate (in the case of choice) suppliers for the contract. The software allows to define a basket of goods, assigning suppliers with goods and commodity groups, a history overview, creation of reports and statements concerning orders and transactions with the supplier.

The Interface for suppliers allows them looking into the basket of goods, submitting tenders, giving advice, making a history review, creating of reports and statements relating to the Best Construction completed orders.

The role of the application ensuring an efficient communication between the buyer (Best Construction) and suppliers (trade partners) makes Electronic Data Interchange (EDI). Its work is one of the main sources of benefits generated by B2B system, replacing traditional documents by electronic documents in EDI standard. The basic elements of the document created in this standard are data fields representing individual information components. The data correlated logically with each other make a segment and a set of specific segments that creates a message which is equivalent to a paper form. The message also is "packaged" in e-envelope containing such information as the header at the start of the message and footer that ends a sequence of messages.

Communication, which is under the electronic exchange system, is composed of several essential elements:
– data preparation for the document in EDI, which can be done in three ways: manually enter the data (via an interface), exports from a database or another application (in this case the enterprise management system) or the automatic creation of EDI document through the application. The third approach is based on a tight collaboration system applications with internal applications of the participating companies, which manage the processes making in their companies. For example, a storage application in Best Construction responsible for monitoring the states of minimum goods sends a

command to the system for ordering goods and inform the software responsible for management purchases. This process can take place without the conscious participation of the human factor because applications communicate with each other without a user intervention;

– file content with the required data is translated into a standard format for EDI and appropriate elements, segments and messages. After 'treatment' the document is sent to outbox and then through the Internet to the recipient's inbox. The receiver makes the same steps in a reverse order, whereby the transaction can be done also without human intervention. In case of ordering automatically is sent an acceptance transaction set.

8. Impact of B2B system on effectiveness of management system in Best Construction

B2B platform implementation in Best Construction get many advantages not only for the company but also for its business partners. The system is based on the full business processes automation, therefore costs of its use are reduced by costs in terms of working hours per employees (users). In addition, the exchange of standardized documents within EDI is characterized by high accuracy and reliability whereas transferring information.

In relation to the defined needs of Best Construction, B2B system implementation using EDI enabled:

– elimination of errors in orders resulting from editorial errors - orders are made by online catalogue using the codes, while the operation code indicating translation provider is carried out automatically by the system,
– the standard order form for all suppliers significantly reduced the time of making orders. Sending this document automatically to the providers eliminated addressing errors,
– all suppliers are automatically informed about the order requirements of a new material. In response to the notification, the supplier may submit an offer which in Best Construction system appears as a request for possible approval and submission,
– checking the availability of goods indicated on the order through the automatic statement to a supplier's storage application and informing the employee preparing the order about their availability or their lack in the supplier warehouse,

– elimination of delays in the transmission of commercial and accounting documentation related to the transaction settlement,
– working with real data and making detailed statistics for ongoing orders, quick change of their status,
– optimization the structure of suppliers (reducing their number) and optimization a discount policy from suppliers (aggregation of orders and optimal use of volume discounts),
– decreasing of the average monthly cost of doing business by 15% compared to the base value,
– shortening the average time of complaints by 50% compared to the base value.
– In addition, implementation of the B2B platform with Business Process Automation in Best Construction generated the time saving, the increase of reliability between the company and its suppliers. From a psychological point of view they changed their role in business relations from "suppliers" to "business partners" what started changes in the development of inter corporate business culture.

9. Summary and conclusions

Business Process Automation states inherent part of electronic business that is an entrepreneurial challenge. The research and the author professional experience shows that there is no such thing as a straight road to being an "E-Business company". Implementation of B2B system is one of the solutions that helps enterprises to adopt a dynamic approach generating quick learning effects and, thus, directly addressing the ever-present insecurity. Surely, process-oriented integrated systems, as B2B support companies in running business effectively, to predict better a behavior of market players. From the management point of view, it is essential to tackle e-Business with an approach covering the entire company, to set priorities in order not to create stand-alone solutions and not to get stuck in dead ends to define clear business objectives and performance criteria.

The example of Best Construction has shown that e-Business based on BPA generated following benefits: processes and activity costs cutting, time saving, better transparency in internal and external process management, communication improvement with suppliers, making processes with real data, creating closer ties with business partners, enhancing company image.

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