

EFFECTIVENESS OF BUSINESS PROCESS MANAGEMENT IN B2B MODEL

Łobaziewicz M.*

Abstract: A dynamic progress in development of ICT technologies based on B2B, as well as their application in order to improve business processes carried out between enterprises and their business partners, have gained much importance during recent years. It was influenced by such factors as developing and tightening national and international cooperation, high competitiveness, time pressure and striving for improvement of customer and business partners service quality. While the reference books provide many titles referring to the effectiveness of processes, it turns out that there is not enough research on the volume of this effectiveness on the economic, operational and organizational level, measured after having applied B2B system.

Taking into consideration the above reasons, the paper provides an analysis and an assessment of the level of enterprise's business processes effectiveness, resulting from application of integration platform based on B2B model and created using selected ICT technology of Electronic Data Interchange type.

Keywords: B2B, business process management, ICT, Electronic Data Interchange (EDI), Web Technologies

Introduction

Applying B2B model, including Web Technologies, in SME's sector in Poland has been dynamically expanding for the last several years. A dynamic technical and technological development, progressing informatization of SME' companies, expansion and tightening of national and international cooperation, high competitiveness, time pressure, aiming at improvement of customer and business partner service quality, they all contribute to the fact that, apart from internal processes automation, the automation of external processes based on business to business model (B2B) is gaining more importance. Enterprises which have implemented advanced ERP systems are particularly interested in such model. This form of carrying out processes in chain of supplies is used by various business enterprises, i.a. chains and their suppliers, wholesalers, manufacturers and subcontractors, logistics service providers and their customers, thus enterprises cooperating with a wide range of their business partners. A group of companies interested in electronic and automated form of carrying out business processes is constantly growing, which on the other hand may contribute to the development of new applications and technologies of electronic business. As a result, there may be noticed a certain type of dualism, consisting in the fact, that due to the automation of business processes, the costs of cooperation between cooperating enterprises are lowered, the relations between them are significantly improved (external

* **Monika Łobaziewicz, Ph.D.**, The John Paul II Catholic University of Lublin
✉ corresponding author: ml@un.pl

effectiveness), as well as the costs of internal processes of an organization decrease and the quality of their management improves (internal effectiveness). Moreover, the owners and participants of business processes carried out in B2B model directly receive data and information on processes' progress, they work on actual data online – and not using archived data in offline.

According to the author's knowledge, there is lack of studies devoted to the efficiency of business processes management which are carried out in B2B model including ICT technologies with usage of *Electronic Data Interchange* (EDI) standard. It is also confirmed by opinions presented in foreign publications (e.g. K.P. McCormack & W.C. Johnson 2002, A. Tchokogue, C. Bareil, C.R. Duguay 2005). Foreign researchers notice that some attempts in studying the efficiency of business processes carried out in B2B model have been already made, however they have been only theoretical and not supported by the empirical studies conducted in enterprises. The research concerning e-business carried out in Poland and in other countries has mainly focused on such problems as: strategies and models of e-business (e.g. A. Hartman, J. Sifonis, J. Kador 2003, A. Afuah, C. L. Tucci 2003, C. Combe 2006, Z. Pastuszak 2007, W. Chmielarz 2007, A. Olczak & M. Urbaniak 2005), Net Readiness (NR) – a readiness to run business on the Internet - (e.g. Z. Pastuszak 2007, A. Molla i P. S. Licker 2005, A. Hartman, J. Sifonis, J. Kador 2000), B2B platforms standards (e.g. C. Albrecht, D. Dean, J. Hansen 2007, XL. Zhang, XD Yin, XD 2009), the management of a virtual organization (e.g. M. Warner, M. Witzel 2005, W.M. Grudzewski, I.K. Hejduk 2002, M. Brzozowski 2010).

On the other hand, in terms of the processes management, the publications are mainly devoted to presentation of process-based organization, concepts and models of the processes management (e.g. P. Grajewski 2007, E. Skrzypek i M. Hofman 2010, T. Neubaer 2009, S. Balasubramanian & M. Gupta 2005, A. Bitkowska, K. Kolterman, G. Wójcik, K. Wójcik 2011), as well as IT languages and tools used to manage processes (e.g. R. Gabryelczyk 2006, T. Kasprzak 2005, M. Lasek, B. Otmianowski, M. Pęczkowski 2005, M. Weske 2010).

To sum up, there is a research gap that requires to be filled up with a new knowledge of economical, organizational and operational effectiveness as a result of the process management made in an automated way in the B2B model.

Taking into account the above factors, the following assumptions can be made:

1. Automation of business processes carried out in B2B model with usage of Electronic Data Interchange (EDI) shows dualism from the point of view of such criteria as external and internal effectiveness.
2. The level of business processes effectiveness in B2B model depends on the degree of internal processes automation in cooperating enterprises.
3. Effectiveness of business processes automation in cooperating enterprises is influenced by applied ICT technologies and IT management systems.

Thus, the main goal of the paper is an analysis and an evaluation the level of effectiveness of business processes in an enterprise, as a result of applying

integration platform based on B2B model created with usage of a selected ICT technology on the example of Biolanic LLC. (limited liability company).

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 (pre-implementation analysis)
- the 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
- interviews with managers on the base of a questionnaire.

The research were made in the form of an original data analysis contained in the B2B system documentation in Biolanic and information collected during the interviews with managers from the company. The questionnaire of interviews were constructed in the form of several questions related to the impact of the B2B system on the economical, operational and organizational efficiency of business processes and internal as well as external benefits that BIOLANIC achieved due to B2B system.

The research issues determined the structure of the article which consists of theoretical research supported by the literature study and the empirical research based on a case study. As a result of the literature study, it was discussed issues related to the efficiency of business processes in three dimensions: economical, operational, organizational and types of B2B model. The empirical research was used to verify the assumptions that have been formulated on the basis of the literature study. The article ends conclusions and presents directions for further research. As noted in the introduction, the research issue relates to the current problems related to the management of business processes in B2B model, therefore the research results can be used not only by scientists, but also by the managers who have a need to improve the management of external processes carried out in the cooperation with business partners.

Effectiveness of business processes in the theory

The effectiveness is interpreted differently by scientists and practitioners. Due to its ambiguity, it is measured on the basis of many factors. From the point of view of research issues, the author focused on the effectiveness around business processes carried out within an enterprise, as well as in “enterprise –business partner” context.

According to E. Skrzypek [24], there is an economic effectiveness defined as a relation between achieved results and expenditures, as well as a relation between the goal of activity and means necessary to achieve it. In this context, the effectiveness is often viewed as a factor allowing to achieve competitive advantage, and through the ability of an organization to carry out the strategy and aims of the enterprise, it constitutes a significant tool to measure the effectiveness of management [24] Furthermore, economic effectiveness is a proven factor in an

organization's success, it depends on internal and external environment, its innovativeness, as well as people, and the quality of their work.

Another type of effectiveness is an operational effectiveness, which is related to the assessment of processes efficiency, cost reduction, and shortening the duration of processes, also due to their automation. It can be measured for instance on the basis of documents flow between cooperating enterprises, cost decrease, time of carrying out orders/deliveries/sales/complaints, storage costs, time of inventory turnover cycle, or costs of marketing activities. In order to define the size of these effects, measurement, analysis and evaluation of factors should compare periods "before" and "after" implementation of planned changes. According to P. Drucker [9], the operational effectiveness depicts resources, which are used while carrying out processes. Carrying out activities irrelevant to the effects of processes is nonproductive and absorbs 80-90% of costs.

The next category is an organizational effectiveness, which is assessed on the basis of introduced organizational changes, the way of their implementation, efficiency of infrastructure and management, which was adopted after implementation of changes. In this context, the effectiveness is strictly related to proficiency of managers, and it is assessed on the basis of the degree of goals achieved by the organization, through activities and decisions of managers. According to M. Bielski, the greater a degree of carried out goals, smaller expenditure and shorter time needed to achieve these goals are, then the better efficiency of an organization is [4]. According to G. Rummler and A. Brache's [22], if an enterprise on the level of organization as a whole does not manage effectiveness, then the maximum of what it may expect is only an insignificant improvement of results, and the activities taken up on different levels are pointless. In J. Zieleniewski [31] opinion, organizational effectiveness may be understood as a quantitative attribute of an activity, which is reflected in a relation of functional effects achieved by an enterprise within a certain time, and heading towards fulfilling recipient's needs, and outlay incurred within a certain time necessary for acquiring this effect.

In the light of the above and in relation to the effectiveness, there are two points of view: internal, which is focused on internal processes and efficiency connected with it, as well as external, taking into account opinions of customers and business partners on perceived by them values. According to E. Skrzypek [25] effectiveness may be achieved when it is understood as an indispensable element of organization development, which implies that the real nature of effectiveness is a process comprising phenomena within an organization, as well as between it and its environment. The effectiveness of processes should be then assessed from the point of view of their contribution to achievement of organization's goals, and not as an individual efficiency of specific employees or activities [26]. Owing to the above, it may be stated, that as a result of changes in an organization (e.g. goals, size, customer's needs, business partners' needs), functions of processes of a new organizational system optimization alter as well.

Model of B2B business relations

B2B solutions are based on a model integrating different IT management systems, which are used by cooperating enterprises while running their business activity. The present economic circumstances force changes in cooperation standards so far, and instead of traditional documents, enterprises use e-documents and e-notices, which are results of business processes carried out together. Systems created in B2B model are characterized by a high level of management systems integration, which means that enterprises work on one platform with an integrated database. Due to ICT technologies used to create them, especially EDI, a direct communication between IT systems of partners takes place, while simultaneously limiting the human factor as an intermediary channel in data and information flow. Owing to this, employees of cooperating enterprises work on “alive” data and information updated on a regular basis. Furthermore, an organizational e-structure is created, which works on the Internet. Work in off-line is replaced by work online. As a result of such relation, the degree of complexity of business processes and tightening relations between business partners grows, which implies that there is an increase of demand for dedicated B2B systems with module solutions based on the web according to specified technological standards. Used format needs to enable an easy integration with other applications of Web Services type (which are the products of the same or other company), so that while connecting a range of IT components, a full business process could be created.

In B2B system an enterprise as the owner of processes fulfills the role of the administrator, whereas business partners become participants of processes and at the same time users of the system, who were attributed rights to perform certain activities. From the point of view of the process approach, the users carry out steps or tasks in the process, which in this model became an external process.

According to A. Simon and S. Shaffer, there are two main types of B2B systems [23]:

- directed on the chain of supplies – such a concept allows enterprises to create interfaces offering mutual communication. Apart from carrying out such processes as ordering, 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;
- directed 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.

Originally in B2B system, processes of the enterprise should be integrated with processes of business partners.

In practice, both types of B2B systems often complement each other, creating mixed solutions. It stems from the fact that the processes are interrelated, they depend on many parameters, and form a certain pattern.

According to B2B system, processes of the enterprise should be integrated with processes of its business partners [21]. The right moment for defining the degree, range and the way of integrating external processes in terms of e-business activities is the stage of pre-implementation analysis, which should also comprise internal processes of an enterprise in relation to its business partners, as well as it should determine technologies, standards of network cooperation and IT systems [14]. This stage is intended for planning and it is extremely significant for later created functionalities of B2B system, costs of its creation, utilization and efficiency. Moreover, it influences carrying out and managing processes in the future. Therefore, in order to achieve a satisfying profitability level of applying B2B system, the attention should be put to key factors related to business processes, cooperation with business partners, customers and technology. Research conducted by Center for Research in Electronic Commerce in University of Texas in Austin allowed to distinguish the following factors [21]: systems integration, information technology-oriented approach of customers and suppliers, processes concerning customers and suppliers, and the level of e-business awareness among customers and suppliers.

In terms of process approach carried out along with application of information technologies, the professional books present the view that the enterprise cooperating with business partners in B2B model is treated as the virtual organization applying in a creative way ICT technologies, and especially, as an organization running business activity with Internet. Such approach becomes less common because ICT technologies should be treated as tools used to create B2B applications, and not as the core of organization's functioning [6].

Another important aspect in B2B model is the ability of enterprises, achieved with advanced ICT technologies, to process automatically and very fast large amounts of information, as well as a possibility to define optimal quantities which will be stored in B2B system databases [10]. Moreover, an important role is played by the possibility of directly introducing changes in management systems, e.g. ERP, and owing to that employees and managers work on actual data. Processes are dynamic, not static. It is one of the fundamental differences between e-business and a traditional way of running business activity.

Studying the effectiveness of business processes carried out in B2B model on the example of Biolanic LLC'

Characteristics of the enterprise activity

Biolanic LLC. is a subsidiary of Bio Chemical Luxembourg Holding S.A. – an international company, which is one of the world's chemical producers. The basic type of company's business activity is distributing products of the Russian company Orgkhim to tire and rubber manufacturers. Those receivers have accepted

' Compiled on the basis of source data provided by Biolanic LLC., as well as author's own materials, who participated in planning B2B system.

products of Orgkhim company in technical terms, and several of them have signed long-term trading agreements based on the pricing formulas and agreed annual amounts of products delivered to their factories. Products of Biolanic are delivered to, i.a.: The Goodyear Tire & Rubber Co., Continental AG or Hankook Tires. In terms of signed agreements, Biolanic company committed itself to start a system of warehouse management – VMOI (Vendor Managed Own Inventory) in every factory of receivers. In order to ensure the regularity of supplies to all receivers, and especially those located in Western Europe, Biolanic has signed an agreement with Vopak company on leasing of storage containers in its terminals in Kotka, Finland and Antwerp, Belgium.

Architecture of B2B system and applied ICT technologies

From the Biolanic LLC. point of view, an implementation of B2B system is an answer to the following needs of the company and its business partners:

- limiting time needed to handle complaints, and thus increasing the level of satisfaction of key business partners
- the necessity of eliminating frequent faxes/telephone calls informing about the status of an order
- the necessity of significantly limiting errors and mistakes in orders, thus eliminating repeating dispatches and handling returned goods
- increasing transparency of relations with business partners through passing complete information on warehouse inventory to them, and making it possible to monitor the status of the order
- decreasing the number of paper documents gathered in relation to every order or complaint
- limiting the time needed for delivery of an order, and especially shortening time period between registering an order and a date of invoice payment – thus, shortening the time of cash rotation and optimizing use of capital
- the need of a tool to effectively implement and settle loyalty programs, promotional campaigns and debt recovery programs
- tailoring catalogues/price lists to the needs of particular groups of customers (dealers, wholesalers, intermediaries, domestic/foreign customers)
- the need of an easy presentation of a price list in a selected currency.

Taking into account the above needs, the B2B system implemented by Biolanic consists of the following elements:

1. The center of the system – it is built with a translation and communication application responsible for transferring documents between the systems of Biolanic and its business partners. Data is transferred in standardized XML formats using WebServices communications protocol.
2. The translation and communication applications connect with business partners systems using API (Application Programming Interface) algorithms responsible for import/export function call in connected IT management systems, as well as automation of management of sessions between the systems. Partner's systems are composed of their ERP systems, as well as elements of B2B system, which

are used by them on the basis of the rights attributed to them (e.g. systems of placing orders electronically, or extranet networks). The existence of these elements, substantially simplifies necessary activities in terms of business processes of “enterprise-business partner” type because some of the functions, which normally would have to be programmed, are solved through existing “system endings” of the partners, e.g. registering an order from Biolanic in the system of Orgkhim does not require connecting directly to the ERP system of the partner, because it is enough to connect with electronic system of placing orders of the supplier and register the order in this service, which will carry out itself all other technical steps related to registering the order in ERP system of Orgkhim company.

Implemented by Biolanic B2B system uses modern advanced ICT technologies with usage of Electronic Data Interchange (EDI) and systems integration. Particularly, the system automatically carries out activities being the part of business processes of the company and its business partners, which are the following:

- directly transferring information on quality parameters of the delivery, date of loading, prices and sales amounts between Biolanic and suppliers’ ERP systems
- direct communication between the systems servicing VMOI warehouses (consignment warehouses) maintained by Biolanic at customer’s, as well as the systems servicing Biolanic warehouses located in Belgium and Finland and warehouse system of Biolanic,
- electronic transfer of invoices and other delivery documents to customers
- receiving orders from customers in an electronic form, and then automation of the process of order acceptance.

Innovativeness of applied solutions particularly consists in exchanging activities requiring traditional communication between the employees of cooperating enterprises (fax, telephone, email) with activities carried out electronically in an automated way without the participation of the user on the other side.

A very important aspect of analyzed IT solution is using EDI (Electronic Data Interchange) standard. From the point of view of generating benefits for the enterprise, the key aspect is standardization of sent information and safety in communication. The process of automation is achieved through automating import/export function call in integrated systems in such a way, so that calling these functions would not engage an employee on the side of business partner.

Influence of B2B system on the effectiveness of business processes

Solutions applied in terms of B2B system contributed to increasing the effectiveness of business processes carried out by Biolanic with cooperating enterprises. This was possible due to time and cost saving through:

- eliminating mistakes generated by people while copying the content from supplier’s documents (quality parameters of a delivery, items codes, quantities, prices);

- elimination of probability of making a mistake while filling in forms in receiver's systems, which as a consequence eliminates a possibility of delivery to the customer being rejected due to giving wrong parameters;
- significant reduction of communication costs (consumption of paper, toners, ink, post office and courier services) in terms of handling documents related to processing an order;
- limiting the time needed between issuing a document in a system of a given platform user and inserting it in partner's system from previous 2-3 days period to no time;
- optimizing the Biolanic inventory level due to the access to constantly updated information on stock on hand in consignment warehouses and manufacturing plans of the supplier;
- automatic updates of warehouse inventory in ERP system, which facilitates planning dispatches, organizing shipping, current management of a warehouse, and reacting faster in case of any problems.

Owing to the fact, that B2B system has been functioning in Biolanic for less than a year, carried out analysis of economic effectiveness was based on forecasted assumptions. The analysis also proves that, as a result of B2B system implementation, the studied enterprise expects the increase of annual sales revenues of about 2%. These benefits are generated by the time saved while processing orders for partners comprised by the system and devoted to other additional commercial activities. Two receivers are responsible in total for about 8% of sales revenues in Biolanic (turnover with those partners is currently at the level of PLN 4 000 000 midyear). Additional 4 days (fall from 16 to 12) saved on processing orders for partners are statistically 4 days, constituting 25% of released working time which may be devoted to acquire new orders.

Conclusions

The research on the effectiveness of business processes carried out by Biolanic LLC. in relation with its business partners leads to the following conclusions:

- increasing revenues of Biolanic and its business partners through: sales increase, market share increase, the number of customers and number of orders growth, processing orders 24 hours a day, 7 days a week
- reducing costs of running a business activity – reducing costs of handling orders and organizational costs
- automation of the system of notices on products and marketing actions of the company – electronic B2B system is a very quick channel and constitutes a very convenient way of informing partners about new products, promotional campaigns, sales of goods which leads to minimizing warehouse inventory
- a possibility of collecting precious information about business partners in an continuous way– operations in the system carried out by partners give a possibility of thorough analysis, in order to select their segments, preferences and better adjust Biolanic's services to their needs

- individualization of an offer – the analysis of preferences allows to create customer's profile and providing them with an offer fulfilling their requirements and individual preferences
- shortening time of orders/deliveries – a possibility to quickly reach a partner – electronic access channels constitute an ideal carrier of information and facilitate carrying out full orders for current partners, as well as new ones, interested in Biolanic's offer
- convenient communications – owing to EDI technology, B2B system means very fast and easy access to information exchanged between enterprises
- increasing the satisfaction and loyalty of business partners towards the company
 - availability 24 hours a day, 7 days a week provides partners with psychological comfort and constitutes a great convenience ensuring access to Biolanic's offer from a convenient place and at a convenient time, and furthermore ensures safety and it is user-friendly
- increase of company's value, its modernization and raising its level of innovativeness – B2B system enforces competitive position of the company, both: on the domestic and international market.

Research has shown that implementation of B2B system constitutes an important stage in Biolanic company development. It gives a possibility to expand the area under company's influence, modernize carrying out business processes and reinforcing its competitiveness at the domestic and foreign level.

Summary

At present the effectiveness of business processes in B2B model is an important aspect of enterprises' activity, regardless of dynamics of the environment they are functioning in. Calculating such rate as "average monthly revenue from carrying out business processes automated by B2B system" combined with a rate defined as "decrease of average monthly cost of carrying out processes" causes many problems, because usually enterprises do not keep economic accounts of processes. It turns out that automation of processes through applying innovative technologies and cooperation standards substantially influences the improvement of effectiveness of processes related to the cooperation of several business entities, thus processes carried out in B2B model. There are many IT companies operating on the market which offer many efficient and beneficial solutions (systems or applications) supporting the improvement of effectiveness of external processes through their automation. On the basis of the selected enterprise, the paper presents the way how management of processes in B2B model may be supported and what may be the economic, organizational or market-related benefits resulting from it. In order to do this, the functionality of a dedicated B2B system was discussed, and thus it was presented how processes may be effectively planned, carried out, controlled and what employees, customers and business partners of an enterprise gain after implementing such a system. From the point of view of researched

enterprise, only processes which are carried out by the company in B2B model using dedicated system working in the Internet environment, have been touched upon in this paper.

The literature and empirical studies conducted by the author and her practical knowledge built on the base of the participation in B2B systems implementation show that it is worthwhile to continue the research process related to the issues presented in the article. It turns out that the Polish companies do not make analysis of the benefits achieved due to the B2B systems because this kind of IT systems is something new for Polish enterprises. The interviews made with a number of IT companies creating and implementing such systems also support the assumption that the technology used to build the B2B systems, IT business management systems and business applications associated with them have the influence on the production costs of the B2B systems and then the lower costs of business processes supported by the system.

System users and IT companies emphasized that they find the such research useful especially if they are carried out on a larger scale that allows to develop an integrated model of evaluating the effectiveness of the processes including three levels: economical, organizational and operational, carried out in the B2B model.

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EFEKTYWNOŚĆ ZARZĄDZANIA PROCESAMI BIZNESOWYMI W MODELU B2B OPARTYM O TECHNOLOGIE INTERNETOWE

Streszczenie: Dynamiczny postęp w rozwoju technologii ICT opartych na modelu B2B i ich zastosowanie w celu usprawnienia procesów biznesowych realizowanych pomiędzy przedsiębiorstwami i ich partnerami biznesowymi w ciągu ostatnich lat nabrały dużego znaczenia. Wpływ na to mają takie czynniki jak rozwój i zacieśnianie współpracy krajowej oraz międzynarodowej, wysoka konkurencyjność, presja czasu, dążenie do poprawy jakości obsługi klientów i kontrahentów. O ile w literaturze przedmiotu można znaleźć wiele pozycji dotyczących efektywności procesów to okazuje się, że brakuje badań o wielkości tej efektywności na poziomie ekonomicznym, operacyjnym i organizacyjnym mierzonej po zastosowaniu systemu informatycznego typu B2B.

Biorąc pod uwagę powyższe przesłanki, w artykule dokonano analizy i oceny poziomu efektywności procesów biznesowych przedsiębiorstwa w wyniku zastosowania platformy integracyjnej opartej na modelu B2B zbudowanej z wykorzystaniem wybranej technologii informatycznej ICT typu *Electronic Data Interchange*.

Słowa kluczowe: zarządzanie procesami biznesowymi, efektywność, B2B, ICT, Elektroniczna Wymiana Danych (EDI)

有效性的業務流程管理 B2B 模式的

摘要：在發展的基礎上的 B2B ICT 技術的，以及他們為了提高開展企業及其業務合作夥伴之間的業務流程應用程序的動態進展，已經在最近幾年獲得了很大的重視。它是由等因素的開發和緊縮國家和國際合作，高競爭力，時間壓力，爭取改善客戶和業務合作夥伴的服務質量的影響。而參考書提供了許多頭銜指的是流程的有效性，事實證明，沒有足夠的研究這個效果對經濟，運營和組織層面的卷上，並在應用 B2B 系統後測量。

考慮到上述原因，本文提供了一種分析和企業的業務流程的有效性水平的評估，從集成平台基於 B2B 模式，並採用電子數據交換類型來選擇信通技術創建的應用程序產生的。

關鍵詞： B2B，業務流程管理，信息和通信技術，電子數據交換 (EDI)，Web 技術。