BUSINESS INTELLIGENCE AS A SUPPORT OF E-COMMERCE SYSTEMS IN CONNECTION WITH DECISION MAKING AND CROSS-BORDER ONLINE SHOPPING

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Abstract:
Recent business development in connection with the present state of world economy evokes the managers to make alterations in their decision making. Companies’ managements can make right decisions only with the aid of current and precision information. In addition, managers have to get all information in time. Decision-making processes should be realized quickly and under the strong thumb of a competitive environment. Some years ago, for the support of top level of management, information systems development was oriented to decision support systems (DSS). On the present, decision support systems development is transformed to development of business intelligence (BI) systems. Business intelligence technologies provide historical, current, and predictive views of business operations. In business intelligence, described views are represented by reporting, ad-hoc reporting, OLAP analysis etc. With the aid of business intelligence systems development, managers have more possibilities to choose types and structures of information. This article deals with business intelligence systems development in connection with the e-commerce systems, cross-border online shopping and business companies’ management needs.

Keywords: e-commerce system, online shopping, customer requirements, management needs, business intelligence, reporting.

JEL Classification: C87, C88, F43, F47, L21, M15, M16, M21, O31, O33, Q55.

1. Introduction
Electronic Commerce or e-commerce is the trade of products and services by means of the Internet or other computer networks. E-commerce is expected to influence a wide range of supply chain systems and thus lead to unidentified environmental impacts. E-commerce provides customers with a platform to search product information through global markets with a wider range of choices, which makes comparison and evaluation easier and more efficient. Although number of Europeans and world shopping on-line grow up, there are a high percentage of unsuccessfully business transactions in foreign internet shops. Business environment and its development in connection with a present state of world economy urge managers to look for new methods and procedures lowering financial charges especially in the sphere of ancillary processes. Many companies have to redefine some internal and external processes and IS/IT architecture and in many cases companies have to use support of internal functions with help of external resources (outsourcing). Managers can make right decision only if they get precision information in a required form in right time. To this goal, recent development of information systems is oriented to business intelligence. Business intelligence is rapidly becoming a major source to achieve competitive advantage and often aims to support better business decision-making, among others, in the sphere of e-commerce (online shopping).

2. E-commerce statistics and the Supposed Development
There were and there are many forecasts concerning of e-commerce, especially online shopping. Jaap Favier in 2006 forecasted that in the coming five years, the number of Europeans online shopping will grow from 100 million to 174 million. Their average yearly net retail spending will grow from around €1,000 to €1,500, as UK Net consumers outspend even their US counterparts online. Overall, this will cause European e-commerce to surge to €263 billion in 2011, with travel, clothes, groceries, and consumer electronics all above the €10 billion per year mark. (Favier 2006) The other forecast says that in concordance to a recent report from eMarketer, e-commerce in Europe will reach 323 billion Euros ($407 billion) by 2011. That is an average 25% growth rate each year from 2007 to 2011. Italy, Spain and the Netherlands will growth to be a large force for European e-commerce hubs between 2007 and 2011. However Eastern European countries - Russia, Poland and the Czech
Republic - won't impact online shopping hubs until well into the 2010 decade according to eMarketer researchers. (Knight 2007)

All the forecasts are differentiated in terms of numbers, but the same in terms of e-commerce purchase’s continuous increasing. The statistics and expectations presented herein above can be documented by data presented by Czech Statistic Authority and other Statistic Offices in different countries recently.

Already 150 million consumers shop online, although only 30 million shop online cross-border. Cross-border e-commerce systems development depends on globalization of the world economy. The globalization of the world economy is characterized by a huge amplification of the interconnections collaborations and interdependencies between the national states generated from the tendency of the economical objectives and interests to exceed the national borders. (Radescu 2008) A big sense for the cross-border online shopping development has also sequential financial integration. (Mirdal 2008) Report on cross-border e-commerce show problems with the business transactions in foreign internet shops.

![Figure 1. Cross-border online shopping in EU member countries.](image)

**Source:** Czech statistical office, 2009 and EUROSTAT, 2009.

In terms of member states of European Union, almost 20% of the all online shoppers buy in foreign e-shops. 13% online shoppers (from member country of EU) buy goods in e-shops from countries out of EU. (Figure 1) Research results show that 60% of attempts to buy products in foreign internet shops are failure. Reason is that businessmen for various reasons do not offer the goods into the same countries and in many cases there are some problems with payments systems. The biggest problems with the cross-border online shopping in out of EU countries have people in Bulgaria, Rumania, Latvia, Malta and Belgium. The smallest problems in the sphere of cross-border online shopping have people in Austria and Spain. (EURACTIVE 2009)

One of the barriers to cross-border online trade is language proficiency. 33% of EU consumers say they are willing to purchase goods and services in another language, while 59% of retailers are prepared to carry out transactions in more than one language.

Although there are some problems at present, we can suppose changes which will lead to takeoff a cross-border online shopping development. This predication is supported by:
next development of information technologies,
foreing business markets opening off,
currency unification (the euro adpotting),
payment systems development,
co-ordination of business activities at the level of supranational bodies,
the improving of language proficiency.
Regarding to the current worldwide economic conditions, rapid development in the sphere of internet online shopping in Far East, above all in China and India, can be supposed. This presumption is supported, among others, by the economic development and development of world internet users. Towards the end of the year 2009, there are approximately 1 733 993 742 world internet users, from that 338 000 000 in China. (IMRWORLD 2009) Rightly China’s, India’s and other Asiatic countries’ markets will offer a big business potential in future. Contemporary software producers prepare for this fact and a great number of software contain Chinese and other Asiatic countries’ languages support.

3. E-commerce systems

E-commerce systems are fundamental aids of online shopping. Generally and simply, e-commerce system can be defined as web server linked by company’s information system. Detailed definition of e-commerce system appears from definition of information system. (Figure 2)

![Figure 2. Common components of information systems.](image)

E-commerce system is about combining of several parts (Figure 3):
- customers,
- suppliers (sellers, dealers, producers, businessmen),
• web server,
• information system (ERP, CRM, database system),
• payment system,
• dispatch system,
• legislature.

E-commerce systems are developed for support of business activities. Customers have requirements and managers have to find of such ways, methods and resources to satisfy customer requirements and needs. A great emphasis has to be aimed at all management systems. In the sphere of e-commerce there are CRM (Customer Relationship Management), SCM (Supply Chain Management), FRM (Financial Resource Management), HRM (Human Resource Management), MRP (Manufacturing Resource Planning) and CPM (Composite Product Mapping).

ERP is suitable for global operations as it encompasses all the domestic jargons, currency conversions, diverse accounting standards, and multilingual facilities. ERP software attempts to integrate business processes across departments onto a single enterprise-wide information system. The major benefits of ERP are improved coordination across functional departments and increased efficiencies of doing business. The goal of CRM is to collect information gained by doing business in a central repository, analyze it, and make it available to all departments. In many cases, CRM are integrated into ERP, but it is not the rule.

CRM and ERP benefits can be measured and quantified. With usage of ERP, company can gain following benefits:
• improve alignment of strategies and operations,
• improve productivity and insight,
• reduce costs through increased flexibility,
• support changing industry requirements,
• reduce risk,
• improve financial management and corporate governance,
• optimize IT spending,
• gain higher ROI (Return on Investment) faster,
• retain top performers,
• provide immediate access to enterprise information.

A major benefit of CRM can be the development of better relations with the existing and new customers, which can lead to:
• increased sales through better timing due to anticipating needs based on historic trends,
• identifying needs more effectively by understanding specific customer requirements,
• cross-selling of other products by highlighting and suggesting alternatives or enhancements,
• identifying which of your customers are profitable and which are not.

The condition of an entry to global markets is an adjustment of the information system to global information and business system management standards. Management standards are defined for three basic sectors which are customer relationship management, supply management and operating management. These sectors can be further refined into information system management, business processes management, management of logistics and production logistics, management of human resources, legal rules in relation to international law etc. (Vymětal and Suchánek 2009)

Payment systems are often ones of the problem area of e-commerce especially in context of cross-border online shopping. There are numerous different payments systems available for online merchants. These include the traditional credit, debit and charge card but also new technologies such as digital-wallets, e-cash, mobile payment, e-checks, cash on delivery. To support of the cross-border online shopping development, it is necessary to provide the customers safe payment environment and to give support to international bank clearing.

Dispatch is supported and controlled by SCM. SCM is the oversight of materials, information, and finances as they move in a process from supplier to manufacturer to wholesaler to retailer to consumer. Supply chain management involves coordinating and integrating these flows both within and among companies. Supply-chain management, at least in the largest multi-national corporations, is a global endeavor. (Murillo 2001)

Like every area of business these days, ecommerce is surrounded by a maze of red tape, rules and regulations. In fact, selling online tends to be worse because of the international dimension. On
the one hand, legislature can help to online shopping and cross-border online shopping, on the other hand can scant e-commerce development.

4. Customer Requirements and Management Needs

In terms of e-commerce, customer requirements can be separated up two groups. The first group of customer requirements result from exploitation of IS/IT as the main technological support of e-business and e-commerce environment. In 2003, ANEC Policy Statement on Design for All called upon the standard-makers to take the following generic consumer requirements into account when designing, selecting, commissioning, modifying and standardizing ICT systems. Requirements for IS/IT were summarized as accessibility/design for all, adaptability, child safety issues, comprehensible standards, consistent user interface, cost transparency, easily adaptable access and content control, ease of use, environmental issues, error tolerance and system stability, explorability, functionality of solution, health and safety issues, information supply for first-time user set-up procedure, interoperability and compatibility, multi-cultural and multi-lingual aspects, provision of system status information, privacy and security of information, quality of service, system reliability and durability, rating and grading systems, reliability of information, terminology. (ANEC 2005)

The second group of customer requirements is closely associated with business transactions. Customers want to find what they want easily and in short time, to get sufficient number of information, to place an order easily, payment system to be secured and failsafe, to get goods in quality of service and in short time, goods to be guaranteed by sellers (producers) and to get benefits in dependence on a number of purchases.

To be reliable in an uncertain and changing environment, firms must be able to quickly respond to changes. To obtain it, managements need actual information. The most important condition of customer satisfaction is feedback. Suppliers and producers have to monitor market environment and all have to be targeted the customers. All customer requirements have to be monitored for ever and company information system with the all company’ processes have to be formed to ensure quality and rapid processing of the all customer feedback information, needs and requirements. Feedback information can be getting by the communication channels which are usually integrated in CRM (Customer Relationship Management). Feedback is the most important condition of getting information. If managers want to satisfy all customer requirements, they should: get precision information, get information in time, get information in required form, get information in visual form, know information what do they want to,

Besides information managers need:

- to develop the ability to apply information technology in complex and sustained situations and to understand the consequences of doing so,
- to learn the foundations on which information technology and applications are built
- and current or contemporary skills.

5. Business Intelligence

Business Intelligence is a term that refers to the sum total, or effect, of gathering and processing data, building rich and relevant information, and feeding it back into daily operations so that managers can make timely, effective decisions and better plans for the future. Generally business intelligence brings to managers a quite number of advantages. The advantages enjoyed by market leaders and made possible by business intelligence include the high responsiveness of the company to the needs of its customers, recognition of customer needs, ability to act on market changes, optimization of operations, cost-effectiveness, quality analysis as the basis for future projections, the best possible utilization of resources etc.

Business intelligence is oriented to management needs and decision making support. Optimal setting of control processes is a prerequisite of the planned and expected aims. A business processes are the collections of activities designed to produce a specific output for a particular customer or market. It implies a strong emphasis on how the work is done within and organization, in contrast to a product's focus on what.

To do right decisions, managers need information. Data that is relevant to a business decision may come from anywhere. The most important sources of data include:
**Master data** - this is data that is collected (usually once and only) to define the entities in an e-business system (customer file, product file, account codes, pricing codes, etc...). Scores of the time we can meet with term of Master Data Management (MDM). MDM comprises a set of processes and tools that consistently defines and manages the non-transactional data entities of an organization (which may include reference data). (WIKIPEDIA 2009)

**Configuration data** - as the term implies this is data that defines the nature of the system itself. The system is configured to reflect the nature and needs of the business.

**Operations data (OLTP - Online transaction processing)** - also known as activity this data is generated by daily business activities such as sales orders, purchase orders, invoices, accounting entries, and so on. OLTP refers to a class of systems that facilitate and manage transaction-oriented applications, typically for data entry and retrieval transaction processing.

**Information systems (OLAP - Online analytical processing)** - these are sophisticated applications that collect information from various internal and external sources to analyze data and distill meaningful information. OLAP software allows for the real-time analysis of data stored in a database. The OLAP server is normally a separate component that contains specialized algorithms and indexing tools to efficiently process data mining tasks with minimal impact on database performance.

Almost all requisite data for the decision making support in e-commerce comes from CRM and ERP systems. Business intelligence is closely related to data warehousing. Data has to be processed (data selection, data analysis, data clearing etc.) and send in right time and in required form to the competent persons usually act in management system. (Figure 4) Obtained data are basis of decision making support at all levels and kinds of management.

![Figure 4. Business intelligence system.](image)

Data processing is support by ETL (Extraction, Transformation and Loading). The ETL process is also very often referred to as Data Integration process and ETL tool as a Data Integration platform. The terms closely related to and managed by ETL processes are: data migration, data management, data cleansing, data synchronization and data consolidation. (ETL-TOOLS.INFO 2009)

The purpose of the Data Warehouse in the overall Data Warehousing Architecture is to integrate corporate data. Data warehousing evolved through 1990s to environments that typically featured batch-oriented “stocking” and “restocking” of the data warehouse, primarily for purposes of after-the-fact reporting and analysis. (Simon and Shaffer 2001) The amount of data in the data warehouse is massive. Data is stored at a very granular level of detail. For example, every sale that has ever occurred in the organization is recorded and related to dimensions of interest. This allows data to be sliced and diced, summed and grouped in unimaginable ways. Recent technological advancements in
data warehousing have been contributing to the emergence of business intelligence useful for managerial decision making. (Taniar 2009)

Applications what can be for example SharePoint, MS Excel, BIRT Project, The Pentaho BI Project, Agata Report and many other (some of applications can be interconnected) are fundamental interface between system and managers. With the aid of shown application users can choose and manipulate a wide variety of visual representations, including map-based data displays to review business intelligence reporting results geographically, multidimensional scatter plots to view data statistically, and bar charts, pie charts, line graphs, profile charts and more.

At present, when the world economic conditions are not affable, companies look for all information which would help them to start economic growth. In this respect e-commerce companies have recently started to capture data on the social interaction between consumers in their websites, with the potential objective of understanding and leveraging social influence in customers' purchase decision making to improve customer relationship management and increase sales. (Young and Srivastava 2007)

Business intelligence systems are able to provide the managers quite a number of statistics dealing with customers and their environment. As important customer statistics can be considered, for example, matching sales revenues with site visitor activity, by week and month, in total and by product line, matching weekly and monthly sales with site visitor activity over time (trend analysis), in total and by product line, matching sales revenues with site visitor activity, by day and hour, in total and by product line (to measure the effectiveness of advertising campaigns), matching sales revenues with site visitor activity from main referrers, by week and month, in total and by product line. Where the referrer is a search engine, also matching the search query with sales revenues. (INTERNET MARKETING ENGINE 2008) These statistics respond the managers to questions:

- Who did buy?
- How much did they buy?
- When did they buy?
- What did they buy?
- From where customer arrived at the site?
- In which region customer are located?
- How they arrived at the site (e.g. by what search engine query)?
- From which page customer entered the site?
- Their path through the site?
- From which page customer left the site?
- On a weekly and monthly basis and the trends, over time.

Advantages and benefits of business intelligence in the sphere of e-commerce can be summarized as:

- Business intelligence gives any firm the specific view of corporate data that is required for progress (quickly access sales, product and organizational data in any database).
- In sales and marketing, business intelligence offers new tools for understanding customers’ needs and responding to market opportunities
- By providing financial planners with immediate access to real-time data, Business Intelligence builds new value into all financial operations including budgeting & forecasting.
- Business intelligence supports decision-making with automatic alerts and automatically refreshed data.
- Business intelligence provides performance monitoring for accelerated action and decision making.
- Business intelligence makes companies possible to receive and process data from cross-border business activities (above all from cross-border online shopping).
- Business intelligence can bring to companies competitive advantage.

Besides data from business intelligence systems, companies can use services of the consultation companies. There are many consultation companies providing information and doing analyses. Correct source information are necessary, but usually have to be paid for. There are many sources providing statistical data on the Internet, but these are usually not adequate. Managers can acquire correct information from the many sources. (Molnár 2009) Following sources supply the attested information usable for manager’s decision making in the global markets. Foreign stock market information can be

6. Conclusions

E-commerce is one of the most important facets of the Internet. E-commerce brings benefits to organizations that use this with their business partners, to customers and generally to society. Besides quite a number of benefits, e-commerce fumbles with some problems. One of them is a problem with cross-border online shopping. Reason is that businessmen for various reasons do not offer the goods into the some countries and in many cases there are some problems with payments systems. Although there are some problems at present, we can suppose changes which will lead to takeoff a cross-border online shopping development. Regarding to the current worldwide economic conditions, rapid development in the sphere of internet online shopping in Far East, above all in China and India, can be supposed. Rightly China’s, India’s and other Asiatic countries’ markets will offer a big business potential in future. Hence, it is necessary to understand the development of e-commerce and its future trends. Contemporary software producers prepare for this fact and a great number of software contain Chinese and other Asiatic countries language support. The present state of world economy requires searching for new methods and procedures in support of decision making. Suppliers and producers have to monitor market environment and all have to be targeted the customers. All customer requirements have to be monitored for ever and company information system with the all company’ processes have to be formed to ensure quality and rapid processing of the all customer feedback information, needs and requirements. In this respect, managers have to get right information in right time. Recent development in the sphere of data processing is oriented to business intelligence. Business intelligence systems are able to provide the managers quite a number of statistics dealing with customers and their environment. Generally, Business Intelligence solutions are necessary for any company to keep up with the competition brought on by changing, trends and technologies and the freely available information waiting to be used. Target information help managers in decision making. Besides information from business intelligence systems, there are many consultation companies providing information and doing analyses.

7. References:


