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## **Business intelligence as the support of decision-making processes in e-commerce systems environment**

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# Business Intelligence as the Support of Decision-Making processes in E-commerce Systems Environment

Petr Suchánek, Kateřina Slaninová, Robert Bucki

**Abstract:** The present state of world economy urges managers to look for new methods, which can help to start the economic growth. To achieve this goal, managers use standard as well as new procedures. The fundamental prerequisite of the efficient decision-making processes are actual and right information. Managers need to monitor past information and current actual information to generate trends of future development based on it. Managers always should define strictly what do they want to know, how do they want to see it and for what purpose do they want to use it. Only in this case they can get right information applicable to efficient decision-making. Generally, managers' decisions should lead to make the customers' decision-making process easier. More frequently than ever, companies use e-commerce systems for the support of their business activities. In connection with the present state and future development, cross-border online shopping growth can be expected. To support this, companies will need much better systems providing the managers adequate and sufficient information. This type of information, which is usually multidimensional, can be provided by the Business Intelligence (BI) technologies. Besides special BI systems, some of BI technologies are obtained in quite a few of ERP (Enterprise Resource Planning) systems. One of the crucial questions is whether should companies and firms buy or develop special BI software, or whether they can use BI tools contained in some ERP systems. In respect of this, there is a question if the modern ERP systems can provide the managers sufficient possibilities relating to ad-hoc reporting, static and dynamic reports and OLAP analyses. A one of the main goals of this article is to show and verify Business Intelligence tools of Microsoft Dynamics NAV for the support of decision-making in terms of the cross-border online purchasing. Pursuant to above-mentioned, in this article authors deal with problems relating to managers' decision-making, customers' decision-making and a support of its using the BI tools contained in ERP system Microsoft Dynamics NAV. A great deal of this article is aimed at area of multidimensional data which are the source data of e-commerce systems.

**Keywords:** Business Intelligence, decision-making, e-commerce system, cross-border online purchasing, multi-dimensional data, reporting, data visualization.

## 1 Introduction

E-commerce systems allow web-based companies to be established and provide an opportunity for existing companies to automate their sales process as well as use their online presence to achieve higher sales volumes and to reach global markets. The e-commerce market in Europe is flourishing with the number of shops that offer online options, but also the number of people shopping online has arisen during a few past years. However, cross-border transactions in the same time have stagnated and only around six to seven percent of EU consumers bought something online from another country, as opposed to the overall 33 percent who made online purchases. (Parfeni, 2009) Although 150 million consumers shop online, only 30 million shop online cross-border. Report about cross-border e-commerce shows problems with the business transactions in foreign internet shops. Research results show that 60 % of attempts to buy products in foreign internet shops are failure. The reason is that businessmen usually do not offer the goods into the more countries and in many cases there are some problems with payment systems. For convenience and support of successful decision-making processes, managers can use Business Intelligence (BI) technologies. BI technologies offer the managers to control the processes more easily and make them possible to extend their business activities. In context of the present state of world economy, cross-border business activities (especially cross-border online selling and shopping) development can be expected. More and more, BI tools shall be used as a support of the cross-border selling, because of possibilities to provide the multidimensional reports. There are many software products containing BI tools in Czech and foreign markets. More often, BI tools are often integrated into ERP (Enterprise Resource Planning) systems as the special modules. As

an example, we can mention a Microsoft Dynamics NAV (MD NAV), that contains direct support of e-commerce and multidimensional reporting. Authors of this article try to answer such questions as what is necessary for the decision-making processes in area of the e-commerce systems, what are the main BI solutions and tools for the support of efficient decision-making and what are the source multidimensional data in e-commerce systems. The next question is whether modern ERP systems can provide such BI tools like special BI systems. Case study is done with the Microsoft Dynamics NAV. Models and approaches used in this article are one of the starting elements of the research in terms of project OP VK č. CZ.1.07/2.3.00/09.0197.

## 2 E-commerce systems

Electronic commerce or in short e-commerce, refers to business activities like selling and purchasing of products and services carried out over electronic systems like the Internet and computer networks. (Bora, 2009) The Internet changed the way how customers, suppliers, and companies interact to conduct business, communication, and collaboration. The Internet is creating huge opportunities to expand existing businesses, and enabling the creation of completely new businesses unthinkable without the business and technology advances fostered by the onset of the Internet age. (Brown, 1999) E-commerce brings benefits to organizations using this with their business partners, benefits to consumers and benefits to society. (Richardson, 2009) 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. E-commerce systems, when designed and implemented correctly, can generate drastic reductions in administrative, sales and marketing overheads. E-commerce systems can be modeled in a number of ways. Primary model describes an e-commerce system as a web server linked by company information system. Theoretical conclusions and especially practical experiences show that each component of an e-commerce system can be influenced by quite a number of disturbances affecting its functionality, efficiency and stability. Generally, e-commerce is different and requires a high degree of business innovation and responsiveness. (Rossi, 2004) Main basic components of e-commerce systems are:

- Customers,
- Internet,
- Web server,
- CRM (Customer Relationship Management),
- ERP (Enterprise Resource Planning),
- Payment system,
- Supply,
- After-delivery (after-sales) services.

Shown basic components of e-commerce system are supported and controlled by the management (SCM - Supply Chain Management, FRM - Financial Resource Management, HRM - Human Resource Management, MRP - Manufacturing Resource Planning, CPM - Composite Product Mapping, etc.), hardware, software, people, co-operative suppliers, legislation, internet services and all e-commerce system is a part of business environment.

If we want e-commerce system to be efficient and to offer the customer full-value service, it is possible to implement into e-commerce system many services, especially related to modern electronic domain. As an example, the various components or subsystems making up the e-commerce super system include: (Murthy, 2001)

- Digital payment systems,

- Payment server,
- Payment gateway,
- Wallet,
- Security systems like firewall and intrusion detection.

Every e-commerce system component and components' interfaces can be influenced by different types of disturbances. Disturbances are usually causes of negative effects to e-commerce system characteristics:

- Usability,
- Stability,
- Performance,
- Security,
- Availability,
- Functionality,
- Operability.

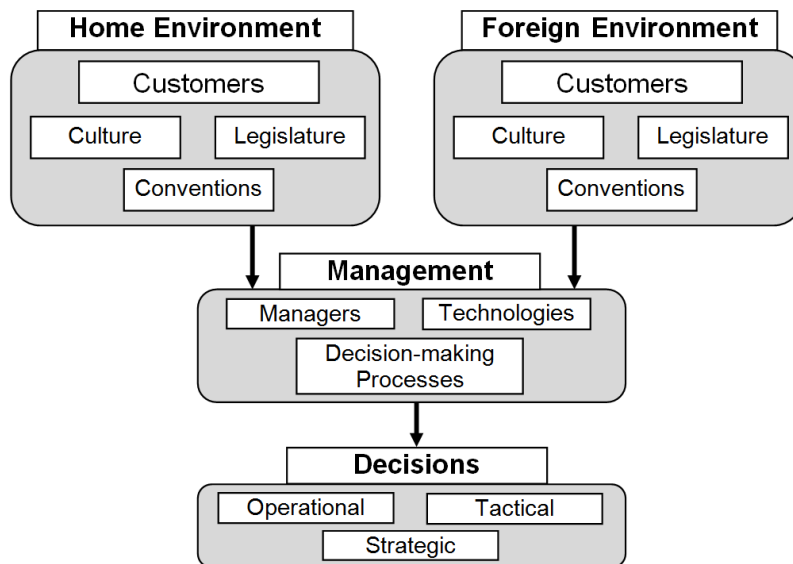
Problem with one or more of shown e-commerce system characteristics can have an adverse effect to companies' business activities and can be the cause of a financial loss. E-commerce system is an information system. The biggest emphasis should be putting on the functionality of the information system from the point of view of its performance. This kind of approach can also be implemented in similar solutions to interactive systems. (Bucki, 2007)

### **3 Decision-making processes in e-commerce system environment**

Decision making processes need combination of skills, creativity, recognition of the problems, and lucidity of judgment, determination, and effective implementation in operational plans. Generally, decision making process has five stages: (Harrison, 1998)

- Problem determination (definition of objectives),
- Collection of information (identification of alternatives),
- Choosing of optimal decision,
- Implementation of a decision,
- Evaluation of decision.

To adopt a right decision, managers have to get correct information in right time. In connection with e-commerce and especially cross-border online selling, source system of data set is extended. With a view to minimization of failure during the domestic and especially cross-border online selling, it is necessary to allow for many factors. Besides typically economic indicators, source information of management systems have to be for example legislature, culture, conventions etc. (Figure 1)



**Figure 1** E-commerce Management System and its Source Information Areas.

Decision making processes are also proceed on the side of customers. The customers' decision-making process is the process they go through when they decide to purchase something. (Olsen, 2003) Research suggests that customers go through a five-stage decision-making process in any purchase:

- Need recognition and problem awareness,
- Information search,
- Evaluation of alternatives,
- Purchase decision,
- Post-Purchase evaluation.

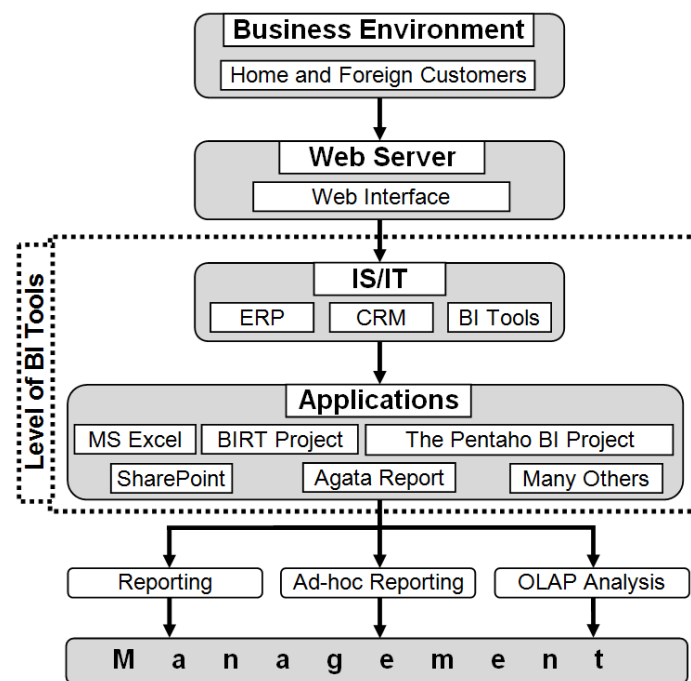
Managers' decisions should lead to make the customers' decision-making process easier. All decision making processes have to be targeted to the customers and their needs and requirements. Customers' needs and requirements are usually different in a number of countries. This fact is always a cause of unsuccessfully cross-border online selling transactions. Only the way leading to reduce the number of unsuccessfully cross-border online selling transactions is an optimal management system making use of all necessary source information. To obtain an efficient decision-making, there are used mathematical models of allocation processes (Bucki, 2008). This article does not deal with it. Supranational character of e-commerce systems evokes the need to process an extensive set of information and urges the managers to look for the new methods that lead to maintenance and improvement of position in domestic and especially foreign markets. This is possible only with the aid of modern information technologies. Current trend is oriented to development and usage of systems with BI tools.

#### **4 Business intelligence solution**

An effective, integrated business intelligence solution can improve business performance by driving better decision-making across organization. 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 and the best possible utilization of resources. (SRC, 2009) In the market, there are many BI solutions with rapid ongoing development. Current BI solutions usually provide real

time monitoring of metrics, viewing of graphical representation of data, predicting of performance results, drilling down to performance at different levels, responsive decision making and improved program execution.

BI solutions and its tools have a cardinal importance for the data acquisition and processing. In terms of e-commerce systems, a main communication interface between customers and company information system (IS) is a web server. Data are processed in company IS containing hardware base and software applications and components with BI tools. (Figure 2)



**Figure 2** Process of Data Acquisition via Common Model of BI Solution.

Output data provide the managers information support of decision-making processes. The first type of the reporting is ad-hoc reporting. It is used to indicate something that is done at the time without planning ahead of time. An Ad Hoc report is one that is created when someone asks for it, not at a specific point. (Wikianswers, 2009) Ad hoc reports can be generated at any time to quickly gather data from information system. An ad hoc report is created by sending a request or query for specific information. The query results show the most current information in the format specified by manager. The next type of reporting is a standard reporting which can be static or dynamic. Static reports are run immediately upon request, and then stored with the data in the Completed Reports module. Static SQL reports are run asynchronously, allowing you to continue using Commerce Server Business Desk to perform other tasks while static reports are running. Dynamic reports are created at runtime. Each time a dynamic report is run, it gathers the most recent data in the Data Warehouse. Only the report definition, which remains the same over time, is stored. (MSDN, 2009) The third main output from IS with BI tools can be OLAP (Online analytical processing). OLAP is an approach to quickly answer multi-dimensional analytical queries. OLAP is a part of the broader category of business intelligence, which also encompasses relational reporting and data mining. (Pareek, 2007) In the term of data access and presentation, OLAP has two basic variants. The first is so-called MOLAP (Multidimensional Online Analytical Processing). With the aid of MOLAP a cube is aggregated from the relational data source (data warehouse). The next variant of OLAP is ROLAP (Relational Online Analytical Processing). ROLAP provides OLAP functionality by using relational databases and stores the cube structure in a multidimensional database.

(Larson, 2008) Most commercial OLAP tools now use a so-called Hybrid OLAP (HOLAP) approach, which allows the model designer to decide which portion of the data will be stored in MOLAP and which portion in ROLAP. (Wikipedia, 2009) The multidimensional data model is composed of logical cubes, measures, dimensions, hierarchies, levels, and attributes. (Oracle Database, 2004) (Paredes, 2009)

- Cube
  - Measures - In a cube, a measure is a set of values that are based on a column in the cube's fact table and are usually numeric. Some common measures are sales, cost, expenditures, and production count.
  - Dimensions - A dimension can define multiple dimension elements for different levels of summation. For example accounts dimension elements can be region, territory, account, sales dimension elements can be time, customer, product, and channel, etc.
    - Dimension attributes - An attribute provides additional information about the data. A dimension attribute is a column in a dimension table. Each attribute describes a level of summary within a dimension hierarchy. Attributes for the time dimension table can be time code, order date, month code, month, quarter code, quarter, year etc, for the product dimension color, flavor, size, etc.
    - Levels - At least one level is required for each dimension. Levels are used to indicate a position within a hierarchy. For example, in a Time dimension, you could have levels for Year, Quarter, Month, and Week. Each level represents a position in the hierarchy.
    - Hierarchies - A hierarchy is the set of members in a dimension and their positions relative to one another. For a dimension created from a data mining model, the hierarchy represents the node structure of the mining model. For example, in a Geography dimension defined with the levels Continent, Country, and City, in that order, the member Europe appears in the top level of the hierarchy, the member France appears in the middle level, and the member Paris appears in the bottom level. France is more specific than Europe, and Paris is more specific than France. (MSDN, 2009)

BI solutions become a standard part of companies' information systems and remain in advanced development. Research results show that by 2010, 20 % of organizations will have an industry-specific analytic application delivered via software as a service as a standard component of their business intelligence portfolio. By 2012, business units will control at least 40 % of the total budget for business intelligence and one-third of analytic applications applied to business processes will be delivered through coarse-grained application mashups. (Gartner, 2009)

## **5 Multidimensional data in cross-border e-commerce systems**

E-commerce systems became a standard business tool for every type of organizations. In connection with the current state of world economy, online shopping growth can be expected in coming months and years. It results from basic characters of e-commerce. E-commerce provides the sellers and customers a great number of possibilities and advantages. The most important advantages are reduced costs and easy enter on the home and foreign markets. Especially enter on the foreign markets can expressively extend customer base as well as financial gain. 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 some countries, do not know foreign market (customer needs and requirements, business environment, conventions, etc.) and there are some problems related to payments systems. In many cases, problems with the cross-border online shopping are caused by the using of unfit or wrong adapted e-commerce system. For the support of the cross-border online selling are required systems which can make possible the processing of a higher volume of data and to

define requirements to output data. In terms of e-commerce systems, efficient decision-making processes are supported by the usage of multidimensional data. Multidimensional data allows managers to design, create, and manage multidimensional structures that contain detailed and aggregated data from multiple data sources, such as relational databases, in a single unified logical model supported by built-in calculations. (MSDN, 2010) As in all kinds of business, on-line selling can be characterized by quite a few of indicators. Major indicator is a sales analysis. The sales analysis is a determination of the extent to which a sales force has met its sales objectives within the specified timeframe. (Businessdictionary, 2010) Sales analysis provide the managers information about the most profitable customers, which products are purchased, the profit generated by each product, which divisions of business are selling, which sales people are performing, market trends and geographic buying patterns, sales forecasting, and so on. With the aid of Business Intelligence tools, managers can get many types of analysis depending on actual needs. Significant effects bring analysis by dimensions. Dimensions can be related to customers, dealers, goods etc. Managers usually need sales analysis, purchase analysis, price analysis and so on. All shown analysis should be developed as an analysis by dimensions. Dimensions may be, for example, time (period), location, region (customer region), customer type (small, middle, large company), dealer, etc. In analyses, quantitative indicators are the number of sold products, profit, average margin, return of investments and so on. In every case, managers have to know the type of information which they require to obtain.

Various levels of analysis, from summary reporting to statistical trending, are required by executives, store managers, product managers, marketing analysts, as well as external suppliers who provide materials or finished goods.

## **6 Case study of business intelligence tools in Microsoft Dynamics NAV**

BI tools are contained not only in many special software products, but also in many ERP systems. As an example we can mention ERP and CRM business software Microsoft Dynamics NAV (MDNAV). MDNAV consists on business intelligence tools, financial management and human resources management modules, supports project management, sales and marketing and service management, supplies chain management etc. Part of MDNAV is commerce portal which is a solution for an Internet business designed for creating electronic products catalogues and automatic processing of orders submission via Internet. Business Analytics in MDNAV helps to transform company data from almost any source into intelligent dashboards, revealing analysis and insightful reports. (El-Assal, 2008) MDNAV makes possible work in an intuitive environment to build targeted analyses using predefined or customized OLAP cubes. For this purpose, users (managers) can set up dimensions such as, for example, product line, geographic sales region, and time period and value hierarchies that reflect reporting and accounting needs.

BI module provides tools optimized for tactical or strategic decision making. Tactical decision making, oriented to personal and team BI is allowed by role-tailored access to real-time, integrated data and analysis with visibility to relevant business activities. This module has tight integration with widely used user application – Microsoft Excel - for further analysis and manipulation as well as supports export to PDF format for outcome distribution. Strategic decision making is supported by built-in organizational intelligence tools for creating views of business performance, graphical displays and reports, multidimensional analysis etc. MDNAV works with other microsoft applications like SQL Server Reporting Services and SQL Server Analysis Services to provide advanced reporting based on OLAP analysis and sophisticated data mining.



For detailed analysis conformed to analyst needs MDNAV supports application of user-defined dimensions. As a two-dimensional analysis, we can mention, for example sales per region. However, MDNAV provide creating of more than two dimensions for multidimensional, more complex analysis. The dimension can consist of unlimited series of dimension values. Using dimensions, analyst can reveal new trends and compare various characteristics across a wide range of entries.

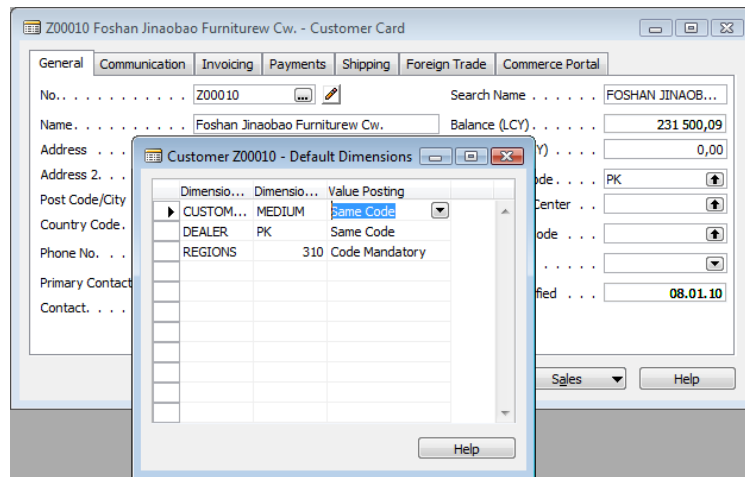
Code	Name	Dimension...	Totaling
200	America	Standard	
<b>300</b>	<b>Asia</b>	Begin-Total	
310	China	Standard	
320	Japan	Standard	
<b>390</b>	<b>Asia, total</b>	End-Total	300..390
<b>400</b>	<b>Europe</b>	Begin-Total	
<b>410</b>	<b>North Europe</b>	Begin-Total	
411	Sweden	Standard	
412	Norway	Standard	
<b>419</b>	<b>North Europe, total</b>	End-Total	410..419
420	Central Europe	Standard	
<b>440</b>	<b>South Europe</b>	Begin-Total	
441	Netherlands	Standard	
442	Belgium	Standard	
<b>450</b>	<b>South Europe, total</b>	End-Total	440..450
<b>490</b>	<b>Europe, total</b>	End-Total	400..490

**Figure 3** Example of Dimension Definition – Regions.

On Figure 3 we can see an example of value definition for dimension named Regions. This dimension is used for customer aggregation concerning to geographic information. Each dimension can have hierarchical relationship between dimension values. Defined values then can be considered as subsets of another dimension value, as we can see on region Europe.

For the case study purposes there were created three dimensions called Regions, CustomerType based on company type (values: Small Company, Medium Company, Large Corporation, Non-profit Organization) and Dealer based on dealer who performed the business transaction (values: concrete dealer names).

For the presentation of BI tools in MDNAV using customized OLAP cube and Analysis and Reporting with multiple dimensions was created fictive transnational company which business scope is furniture purchase and sale with appropriate budget definition. Than five fictive customers were created from various countries like China, Netherlands, Belgium, Sweden and Norway. Each company has defined detailed parameters related to invoicing, payments (payment terms, payment method), shipping (stock location, shipment method), foreign trade (currency, language) etc. As we can see on Figure 4, each customer has assigned these dimensions: Regions, CustomerType and Dealer.



**Figure 4** Customer Definition - Dimension Set up.

For the case study purposes was performed sale of four types of furniture (office chairs) to defined customers during the period from Nov 2009 to Feb 2010. For each item were defined parameters in relation to invoicing (costing method, costs, VAT), replenishment, planning etc. with appropriate connection to general ledger. Fictive company has defined data warehouse with inventory divided into location (stocks) for each item, see Figure 5. This information is suitable for further sale analysis as an additional dimension.

No.	Description	Red Stock	Blue Stock	Silver Stock	Green Stock
1908-S	Office Chair LONDON, blue	4	223	0	57
1968-S	Office Chair MEXICO, black	15	226	0	14
1972-S	Office Chair MUNICH, yellow	-14	37	0	-1
1980-S	Office Chair MOSKVA, red	6	63	0	14

**Figure 5** Warehouse - Items by Location.

On the basis of performed sales orders to predefined customers was generated Sale Analysis Report for solded furniture, see Figure 6.

Row Ref. No.	Description	Sale - Delivered, no...	Sale, Invoiced	Sale, Total	Sale Quantity	Unit Price	Sale, Last Year	Sale, Last Year, Quantity
R1	Office Chair SYDNEY, green		231 500,09	231 500,09	50,00	4 630,00	231 499,96	50,00
R2	Office Chair LONDON, blue	46 299,98	46 300,01	92 599,99		4 630,00		
R3	Office Chair MEXICO, black					4 630,00	46 299,99	
R4	Office Chair MUNICH, yellow		46 299,99	46 299,99	10,00	4 630,00		10,00

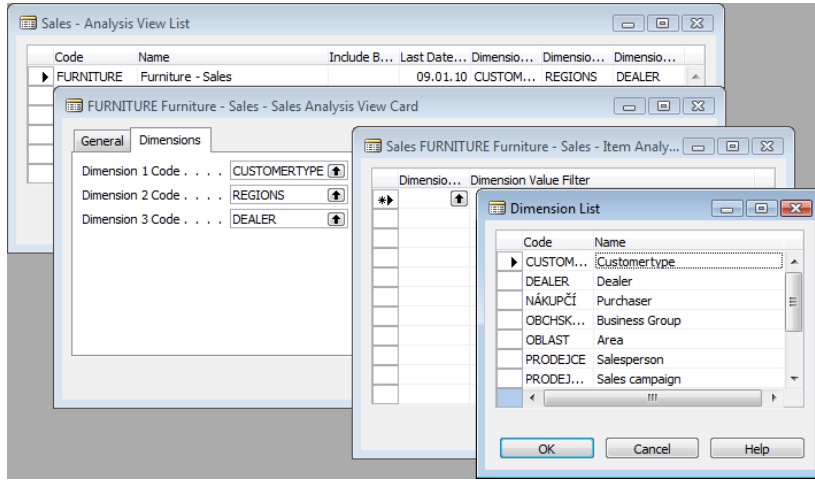
**Figure 6** Sales Analysis Report - Price Analysis.

Report contains price analysis of selected products for the year 2010. The MDNAV supports unlimited user-definition of lines and columns for report to meet analyst needs. Using templates makes report creation easier. This type of report allows further analysis and real-time data filtering using defined dimensions. Figure 7 shows application of customer filter to Sales Analysis Report.

Row Ref. No.	Description	Sale - Delivered, not Invoiced	Sale, Invoiced	Sale, Total	Sale Quantity	Unit Price	Sale, Last Year	Sale, Last Year, Quantity
R1	Office Chair SYDNEY, green		138 899,96	138 899,96	30,00	4 630,00		
R2	Office Chair LONDON, blue					4 630,00		
R3	Office Chair MEXICO, black		46 299,99	46 299,99	10,00	4 630,00		
R4	Office Chair MUNICH, yellow					4 630,00		
R5	Office Chair MOSKVA, red					4 630,00		

**Figure 7** Sales Analysis Report - Filter Application.

As the analysis view is particularly effective for the multidimensional purpose, MDNAV allows usage of filters, account schedules and reports to create informative dimension analyses. Analysts can define several analysis view; for each view can be specified up to three dimensions, as well as criteria for items, dates and locations. On the item analysis view card can also be defined filters on dimensions not included in the analysis view. Figure 8 shows view analysis definition including dimension setup and further filtering.



**Figure 8** View Analysis Definition with Dimension Setup.

Final Analysis by Dimensions depends on analysts' definition of dimensions for each axis in the matrix (lines and columns) using dimensions available in the analysis and including Item number, Location and Period selection. Figure 9 shows Sales Analysis By Dimensions Regions and Customer type for the years 2009 and 2010.

The image shows a screenshot of the SAP Sales Analysis by Dimensions Detailed View. The window title is 'FURNITURE - Sales Analysis by Dimensions'. It has tabs for 'General', 'Filters', and 'Options'. Under 'General', the 'Analysis View Code' is 'FURNITURE', 'Show Value As' is 'Sales Amount', 'Show as Lines' is 'REGIONS', and 'Show as Columns' is 'CUSTOMERTYPE'. The main area contains a table with the following data:

Code	Name	Total Qua...	Total Sales A...	Large Cor...	Medium Co...	Non-profit ...	Small Com...
200	America						
<b>300</b>	<b>Asia</b>						
310	China	-55	254 650,10		254 650,10		
320	Japan						
<b>390</b>	<b>Asia, total</b>	<b>-55</b>	<b>254 650,10</b>		<b>254 650,10</b>		
<b>400</b>	<b>Europe</b>						
<b>410</b>	<b>North Europe</b>						
411	Sweden	-15	69 450,00	69 450,00			
412	Norway	-20	92 600,02		92 600,02		
<b>419</b>	<b>North Europe, total</b>	<b>-35</b>	<b>162 050,02</b>	<b>69 450,00</b>	<b>92 600,02</b>		
420	Central Europe						
<b>440</b>	<b>South Europe</b>						
441	Netherlands	-50	231 499,94				231 499,94
442	Belgium	-20	92 599,97	92 599,97			
<b>450</b>	<b>South Europe, total</b>	<b>-70</b>	<b>324 099,91</b>	<b>92 599,97</b>			<b>231 499,94</b>
<b>490</b>	<b>Europe, total</b>	<b>-105</b>	<b>486 149,93</b>	<b>162 049,97</b>	<b>92 600,02</b>		<b>231 499,94</b>

**Figure 9** Sales Analysis by Dimensions CustomerType and Dealer, Detailed View.

For the detailed information of appropriate items in the matrix, we can see Item Analysis View which represents unique combination of posting date, item number and dimension values defined in Analysis By Dimensions. On the Figure 10 we can see Sales Analysis by Dimensions CustomerType and Dealer with detailed view to appropriate items for Customer Type Small Company.

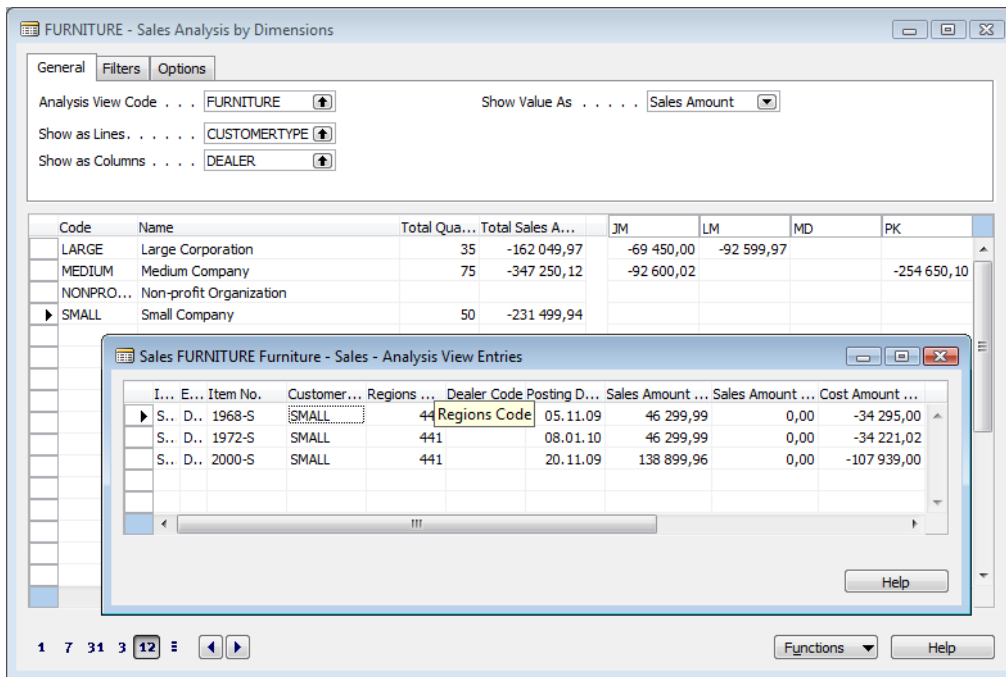


Figure 10 Sales Analysis By Dimensions Regions and CustomerType.

Data generated by analysis by dimensions can be than filtered using other dimensions, posting date, item number and location. Figure 11 shows Sales Analysis by Dimensions Regions and Location, filtered by CustomerType Dimension.

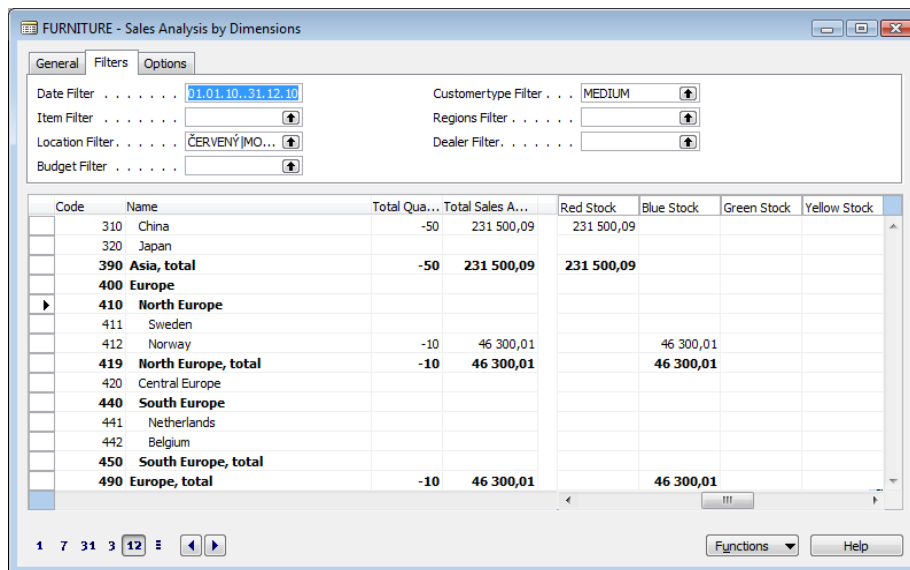


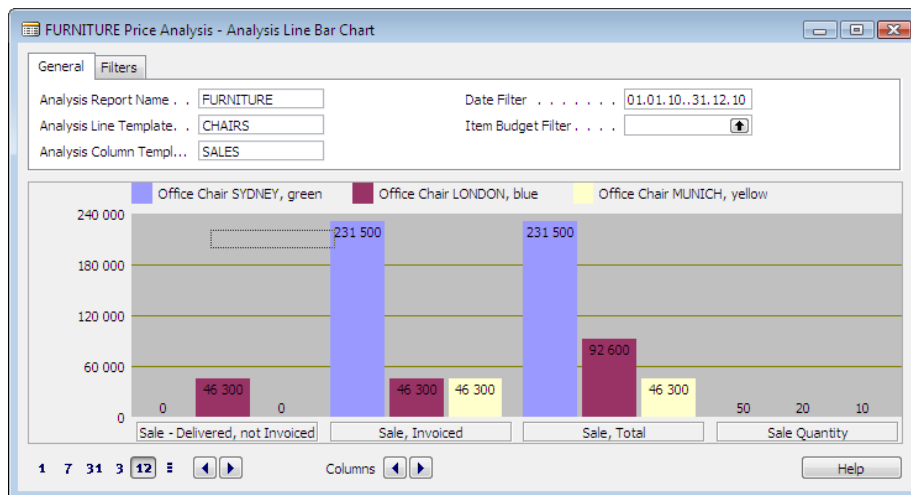
Figure 11 Sales Analysis by Dimensions Regions and Location, Application of Filter.

MDNAV supports export of created reports to Microsoft Excel for further analysis and manipulation as well as export to PDF format for outcome distribution. Export of reports created by analysis by dimensions is provided in the format of pivot table.

## 7 Data visualisation

Tables provide a good summary of quantitative values, but managers usually want to see data in graphical representation. In the new millennium, data visualization has become active area of research, teaching and development. (Post; Nielson; Bonneau, 2002)

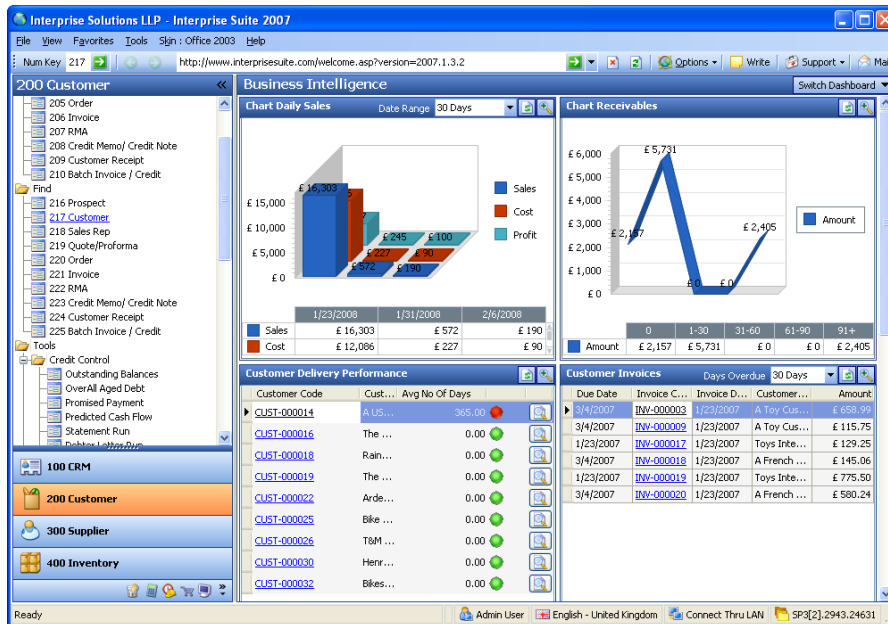
MSDNAV offers graphic representation of analysis reports using interactive bar charts. Analysis line bar charts enable to view one or to compare two or three selected lines from analysis reports. Bars, differentiated by colors, represent the amount on the line for each column. Analysis line charts are interactive. The filters are copied from the analysis report window as a default state. However, analysts can change the filter values to view required data in compliance with their needs.



**Figure 12** Analysis Line Bar Chart – Price Analysis.

Figure 12 shows Analysis Line Bar Chart generated from Sales Analysis Report built to view price analysis of furniture. For detailed view of the report, see Figure 6. Analysis Line Bar Chart was created for selected goods (three types of chairs), which are represented by different colors; in the Sale Analysis Report were goods represented as rows. As we can see, amounts for each column from the Analysis Report were transformed to each bar with appropriate color. Selected filters from Analysis Report were set as default values of filters in Analysis Line Bar Chart, but can be changed to immediately describe required type of data.

However, MDNAV offers other graphical tools for data visualization. For example, similar type of presented chart can be generated for defined account schedule (Account Schedule Line Bar Chart) or we can use Gantt charts for resource or capacity planning.



**Figure 13** Display of Graphic Representation of Reports in Interprise Solution.  
**Source:** Interprise Solutions, 2008

Data visualization tools and graphic representation of generated reports are included in every present ERP or BI systems. Figure 13 shows display of graphic representation of reports in Interprise Solution. Interprise solution is a leading business software application in UK for small to medium businesses. It includes CRM, ERP and Accounting Softwares all rolled into an integrated solution. (Interprise Solutions, 2008)

Software market includes great numbers of ERP and special BI software products. BI tools are more often contained in ERP systems. It is always necessary to analyze all needs and goals which should be achieved. A big attention has to be oriented to return on investments. BI systems and ERP systems with BI tools are necessary at the present time and in case of cross-border e-commerce systems they are able to provide the managers a very good foundation for their decision-making.

## 8 Conclusions

Regarding the current state of Word economy, e-commerce provides relatively easy possibilities to enter on the home and especially foreign markets. The e-commerce market in Europe is flourishing with the number of shops that offer online options but also the number of people shopping online registered a rapid growth. Many companies have to re-evaluate the purchase and decision-making processes with a view to reaction to customer feedback. In connection with e-commerce and especially cross-border online selling, source system of data set is extended. With a view to minimization of failure during the domestic and especially cross-border online selling, it is necessary to allow for many factors. Besides typically economic indicators, source information of management systems have to be for example legislature, culture, conventions etc. Decision making processes are also proceed on the side of customers. Managers' decisions should lead to make the customers' decision-making process easier. An extended data set in terms of cross-border e-commerce systems evokes needs to use information systems containing requisite and appropriate tools. By these systems are Business Intelligence systems at the present time. Business intelligence systems contain BI tools like reporting tools, OLAP tools and data mining tools. Managers can choose from many software products. BI tools are contained not only in many special software products,

but also in many ERP systems. As an example we can mention ERP and CRM business software Microsoft Dynamics NAV. A one of the main goals of this article was to show and verify Business Intelligence tools of Microsoft Dynamics NAV for the support of decision-making in terms of the cross-border online purchasing. In this article is presented Analysis By Dimensions development. Advantage of Business Intelligence systems or ERP systems contained Business Intelligence tools is not only fast and easy development of reports, but also offers different possibilities of reports presentation. All depend on the managers and their needs. It is always necessary to analyze all needs and goals which should be achieved. A big attention has to be oriented to return on investments. Managers always should to define strictly what do they want to know, how do they want to see it and for what purpose do they want to use it. Only in this case they can get right information applicable to efficient decision-making. In this respect, managers of business companies should buy or develop such modules or integrated information systems that can provide requisite tools (above BI tools) covering an area of all companies' activities. Business Intelligence tools are, and will be, an important support of e-commerce systems on a world-wide scale and contribute to cross-border business transactions failure restriction.

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