

E-Commerce and DataBase Technology in Small-Medium Wood Enterprises in Greece

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Abstract. Recently, the internet has become a major means in electronic commerce (e-commerce), as it offers various advantages and benefits. E-commerce is not only the internet and websites. It is about a new business concept that incorporates all previous business management and economic concepts. This modern information technology tool is based on databases. A Database Management System (DBMS) is the collection of data, which contains information about the entire enterprise in various levels and allows data to be effectively stored, retrieved and manipulated. DBMSs have more recently emerged as a fairly standard part of any company back office. Sales and marketing would be impossible without good database systems. In this paper, a such type of application, ECDBWood, is developed using Microsoft Access and it is implemented in a small medium size enterprise (SME) in wood sector in Greece. The findings of this study reveal the utility of ECDBWood and how it simplifies the processes in all the sectors of the company.

Keywords: ECDBWood, database, e-commerce, SME, wood.

1 Introduction

The internet is an exceptionally dynamic environment which continually evolves. (Andreopoulou et al., 2009). Traditional manufacturing and service environments have been transformed into more physically distributed enterprise environments, which include supply chains, electronic commerce (e-commerce) and virtual enterprises (Gunasekaran & Ngai, 2007). Thus, the internet has become a major

resource in modern business and many businesses are creating a web presence (Calitz & Scheepers, 2002). E-commerce represents a “highly pervasive innovation that is leading to significant changes in the traditional ways of doing business” (Prananto *et al.*, 2003). During the last two years there is a rapid increase of e-Commerce Applications in Small and Medium Size Enterprises (SMEs) worldwide but also in Greece (Kanellopoulos & Moore, 2011). E-commerce adoption seems to be a very prospective alternative to the way they do business. These portals can extend their reach to potential customers worldwide (Chan & Chung, 2002) through the use of the internet as a marketing tool. Enterprises and individuals have lately become familiar to do business transactions the way and time they prefer, thus, long-established enterprises in all areas of interest are continually searching to enable the provision through internet for their products and services (Krueger & Swatman, 2004).

E-commerce initially consists of the distribution, purchase, sale, marketing and servicing of products or services over electronic systems such as the internet and other computer networks. The Information Technology (IT) suppliers see it as an electronic business application that is aimed at commercial transactions (Andreopoulou *et al.*, 2009) and provide a large number of integrated solutions, in this market segment (Kanellopoulos & Moore, 2011). E-commerce is not solely the Internet, websites or dot com companies. It is about a new business concept that incorporates all previous business management and economic concepts. As such, e-commerce impact on many areas of business and disciplines of business management studies. More specifically (St. Xavier’s College, 2010):

- *Marketing*. Issues of on-line advertising, marketing strategies and consumer behavior and cultures such as e-marketing. E-marketing is the practice of utilizing all the versatility the Internet offers (Ciarlone, 2007). It is a subset of e-business that utilizes electronic medium to perform marketing activities and achieve desired marketing objectives for a company. It is set on a strategic level in addition to traditional marketing and business strategy (Petrovic, 2010). As the specialists of CISCO company have demonstrated, e-marketing is a generic term utilized for a wide range of activities-advertising, customer communications, branding, fidelity programs, etc. - using the internet. More than the simple development of a website, e-marketing focuses on online communications, direct dialogue with consumers who thus participate to the creation of new products, finding efficient methods to win customers’ fidelity and ease their business-making process. E-marketing is the sum of activities a company makes with the purpose of finding, attracting, winning and retaining customers (Otlacan, 2005).
- *Computer Sciences*. Development of different network and computing technologies and languages to support e-commerce (ex. Linking front and back office legacy systems with the ‘web-based’ technology).
- *Finance and Accounting*. On-line banking; issues of transaction costs; accounting and auditing implications.
- *Economics*. The impact of e-commerce on local and global economies; understanding the concepts of a digital and knowledge-based economy and how this fits into economic theory.
- *Productions and Operations Management*. The impact of on-line processing has led to reduced cycle times. It makes seconds to deliver digitized products and services electronically; similarly the time for processing orders can be reduced by

more than 90% from days to minutes. Production systems are integrated with finance marketing and other functional systems as well as with business partners and customers.

- *Production and Operations Management (Manufacturing)*. Moving from mass production to demand-driven, mass customization customer pull rather than the manufacturer push of the past. Web-based Enterprise Resource Planning (ERP) can also be used to forward orders directly to designers and production floor within seconds, thus cutting production cycle times by up to 50%, especially when manufacturing plants, engineers and designers are located in different regions.
- *Management Information Systems (MIS)*. Analysis, design and implementation of e-business systems within an organization; issues of integration of front-end and back-end systems. The main purpose of MIS is to provide the right information to the right people at the right time (Management Hub, 2011). MIS are one of a number of different types of information systems that can serve the needs of different levels in an organization. For example, information systems might be developed to support upper management in planning the company's strategic direction or to help manufacturing in controlling a plant's operations. Some of the other types of information systems include: transaction processing systems, which simply record the routine transactions needed to conduct business, like payroll, shipping, or sales orders; and office automation systems, which are intended to increase the productivity of office workers and include such systems as word processing, electronic mail, and digital filing. Ideally, the various types of information systems in an organization are interconnected to allow for information sharing (Encyclopedia of Business, 2011). Decentralization is one of the biggest advantages; it allows monitoring of operations at low levels and frees up resources for departmental managers to devote time to strategic activities. Coordination of specialized projects and activities is much better and decision makers in the organization are aware of issues and problems in all departments. Another advantage of MIS is that it minimizes information overload, which can be quite common with conventional businesses in the modern era (Dutta, 2011).
- *Human Resource Management*. Issues of on-line recruiting, home working and 'intrapreneurs' working on a project by project basis replacing permanent employees.
- *Business Law and Ethics*. Issues such as copyright laws, privacy of customer information, legality of electronic contracts, etc.

The benefits of e-commerce can be seen to affect three major stakeholders (St. Xavier's College, 2010): organizations, consumers and society. The benefits of e-commerce to the organizations deal with the international marketplace, the operational cost savings, the mass customization, the digitization of products/processes and the absence of 24-hour-time constraints. It also enables reduced inventories and lowers telecommunications cost. The benefits of e-commerce to the consumers refer to their ability to shop or conduct other transactions 24 hours a day, to the fact that there are more choices, to the ability for price comparisons and to the improved delivery processes. Finally, e-commerce enables more flexible working practices, connects people and facilitates delivery of public services.

But, there are limitations even to e-commerce. The limitations to the organizations deal with: lack of sufficient system security, reliability, standards and communication protocols, rapidly evolving and changing technology, under pressure to innovate and develop business models, facing increased competition, problems with compatibility of older and newer technology. The limitations of e-commerce to the consumers refer to:

- Required computing equipment
- Required technical knowledge
- Cost of access to the internet
- Cost of computing equipment
- Lack of security and privacy of personal data
- Electronic processes as replacement to physical contact
- Lack of trust

A typical corporation-sized e-commerce system is composed of many front-end servers and a back-end database server. The front-end servers include web/application servers, image servers, and dynamic cache servers. They interact with users through web interface and execute business logic. The back-end database server stores business information and processes queries (Fujian et al., 2004).

DBMS is the collection of data, which contains information about the enterprise in various levels (Andreopoulou et al., 2011). DBMS allows data to be effectively stored, retrieved and manipulated. The DBMS environment was designed in a specific way in order to follow some basic principles. These principles are: availability, reliability, scalability, manageability, security and flexible solutions. The total approach of data entry in a database has many advantages, such as independence structure from other applications, reduction in duplicate record creation and data accuracy because of automatic data update (Mc Fadden et al., 1999). Databases offer access and handling to a vast amount of data, collection of relevant data, independent data processing, common view of the database, increase in productivity and reduction in delay time (Elmasri & Navathe, 2004). They also help the user to a more effective data handling, thanks to an interface environment that is designed for database adjustment to the user's needs and requirements through browsing the appropriate buttons until showing the desired results (Pratt & Adamski, 1991; Post & Kagan, 2001; Elmasri & Navathe, 2004). The essential feature of database technology is that it provides an internal representation (model) of the external world of interest (Jeffery, 2008). DBMSs also offer multi-processor support, support for parallel queries and clustering. The data stored in a DBMS package can be accessed by multiple users and by multiple application programs like SQL Server, Oracle and Ms-Access.

DBMSs have more recently emerged as a fairly standard part of any company back office. Sales and marketing would be impossible without good database systems (Lloyd, 2007).

This paper discusses the use of this modern information technology tool, e-commerce application which is based on a database named as ECDBWood, and will be described how it simplifies the processes in all the sectors of a wood SME in Greece.

2 Methodology

ECDBWood was entirely developed with Microsoft Access 2007.

Data collection was made straight from the entrepreneur's books, the clientele and the employee's archives. The 11 tables that were created are the following:

- Customers. It includes all the personal data of each customer such as name, date of birth, address and phone. This table sets the customer ID.
- Statements. It involves details about the transactions such as the ID of the customer that made the order, the product ID, the order month, the number of the days of manufacture, the price of the product, the receipt type, the payment method (with visa card or deposit money in the bank), the bank account which may be used and the payment rates.
- Materials. In this table, can be found information about the materials that have been used, the type of wood and the country of its origin. This table defines the material ID.
- Payment-Delivery. This table indicates not only which orders have been paid but also which orders have been delivered.
- Products. Here, the product ID is set. The type of furniture and its material ID are also mentioned.
- E-mail Addresses. This table shows the customer ID and whether he has an email address or not. If he has, it is written.
- Providers. Which the provider of each material is, is displayed.
- Staff. This table contains personal details of all the employees, such as their names, their addresses, their phones. There are also information about the expertise of each one, his months of experience and his monthly salary, too.
- Photos. This table includes photos of almost all the handmade furniture which are accomplished by the customer ID that has made the order.
- Bank accounts. It indicates the bank accounts of the company and in which bank they belong. The bank account ID is also shown.
- Excise data. It shows to which tax office belongs each customer and his own excise number.

At our convenience, some items have been encoding. Each customer, each employee, each product and as well as each material, has its own serial number that is displayed as ID. Then, the relationships among the tables were defined. Establishing relationships within the relationship view in Microsoft Access is a necessary step for a well-rounded and finalized project in order to protect our data from orphaned records (Badurina, 2011). Tables are linked so that all information is consistent across the entire database. So, we can create queries to display information from several tables at once.

After the creation of the relationships, several queries were made, which meet the manager's needs and help strategic planning and decision support within company. A query is a useful tool while accessing data from an already built database, often called by means of a form (Andreopoulou and Kokkinakis, 2009). These queries have a great number of uses, such as searching for and obtaining data from one or more of the existing tables, performing certain actions inside the database or making certain calculations, depending on the user's needs. The user can also create a

temporary table where he can operate changes in data, but he cannot perform this action for more than one record at a time (Wilson, 2007). The experienced user can also have access to the main database window which can also serve as a data management interface; hence they can design even more complicated queries, reports or forms, to serve potential needs and to support decision making process (Andreopoulou and Kokkinakis, 2009). Printable reports from queries were further developed, aiming to support managerial tasks.

3 Results

Having added all the data in ECDBWood database collected from the SME, the 11 database tables are full.

Figure 1 displays indicatively the final table “Materials”.

Material ID	Material	Type of Wood	Country of Origin	Προσθήκη νέου πεδίου
M1	Wood	Cherry Tree Wood	Italy	
M2	Wood	Walnut Wood	Greece	
M3	Bakelite			
M4	Wood	Beech Wood	Greece	
M5	Wood	Oakwood	France	
M6	M.D.F.			
M7	Wood	Oakwood	Italy	
M8	Wood	Oakwood	Greece	
M9	Novopan			

Figure 1. Final Table “Materials”

Figure 2 indicates which tables are linked and which particular fields of them. The primary key of each table can be seen, too. For instance, a customer may have many orders. The customer's private information is held in a table separate from the order information. A relational database setup with referential integrity prohibits the deletion of a customer record without first deleting the associated orders. This creates data integrity by eliminating orphaned records.

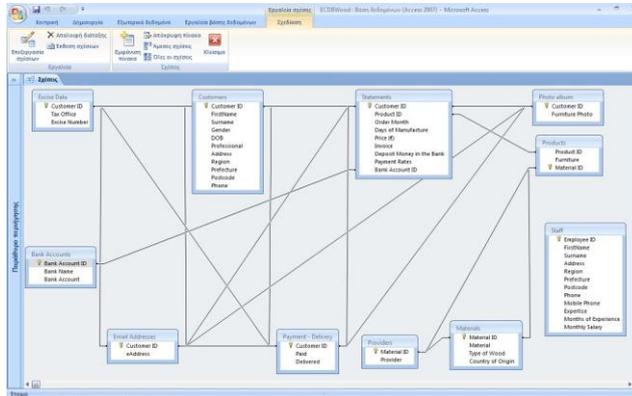


Figure 2. Relationships among 11 tables

Figure 3 introduces the final table with results of the query “How long does it take for furniture to manufacture?”

Furniture	Days of Manufacture
Dining Room Furniture	4
Double Bed	7
Kitchen Furniture	5
Living Room Furniture	12
Bathroom Furniture	4
Wardrobe	5
Dining Room Furniture	5
Double Bed	7
Library	2

Figure 3. Query “How long does it take for a piece of furniture to manufacture?”

Further queries have been created that cover the needs of the enterprise. The Table 1 presents all the e-commerce (queries) tools used in the ECDBWood and the functions they accomplish.

Table 1. E-commerce tools

	E-commerce tool	Function accomplished
1	Employees' salaries	Awareness of the company financial duties to its staff
2	Customers that have requested Greek wood	Decision for continuation or not of the collaboration with Greek providers after demand specification of Greek wood
3	Earnings 2010	Knowledge of the statement of the financial position
4	Orders that have been placed during summer months	Achievement of better staff management during summer months
5	Professionals that have not requested invoice	Knowledge of the immediate professionals' cash payments
6	Customers that do not live in Thessaloniki	Evaluation of the need for co-operation with a common carrier
7	Customers that have an email address	Easier and more effective type of communication
8	Orders that have been delivered	Better delivery scheduling
9	Statements that have been paid	Knowledge of the statement of financial position
10	Artificial materials that have been used	Acquaintance with the types of artificial materials that have been consumed
11	Materials that have been used	Acquaintance with the material types that have been consumed
12	Days of manufacture of the furniture	Providing the right information to the customers how many days of manufacture of the furniture
13	Payment method that is used more often	Knowledge of customers' preferences and familiarity with internet. As a consequence, he will be informed about the absence or not of the need for the update of his website and its services
14	Most commonly used bank account	Request of bank augmentation services
15	Customers that have chosen to pay on rates	Knowledge of the statement of financial position

Taking into account the queries in ECDMWood about the orders, which have been delivered, and the statements, which have been paid, the entrepreneur can become acquainted with the accomplished statements. In this way, knowing the abeyances of the company, he will create a better strategic plan.

Additionally, having created queries about the 2010 earnings, the statements that have been paid, the customers that have chosen to pay on rates and a table that contains detailed information about the staff (including monthly salary of each employee), the entrepreneur can evaluate accurately the financial situation of its entire company. Furthermore, decisions about better staff management respecting the summer vacations can be facilitated knowing the number of orders during the summer months through a query. Also, the entrepreneur is capable to be familiar with the consumption of each staple and as a result with the need of feedback, through the

suitable tables and queries. So, he will never again either order big quantity of the staple that is not used so often or order smaller quantity of this one that is used more.

As well, the entrepreneur can be informed immediately about its customers' personal information such as its address, the email address, and the furniture type that has ordered. In case there is an email address, the entrepreneur could inform the client about either special offers or simple advertisement emails. Using email newsletters, stronger relationships will be built with the existing customers.

ECDBWood also gives the entrepreneur the capacity of enhancing the competitiveness of its firm. This decision support system helps the company to deliver its products at the right time, to the right place and with the right price. So, it is more feasible for the enterprise to survive in the competitive marketplace (Ho et al., 2007). Knowing the preferred payment method, the entrepreneur is acquainted of the need or not for the update of his website and its services. Last but not least, if a bank account is more often used, the bank account owner can ask optimized bank services which will benefit himself.

Finally, it is worthwhile to note that we have added buttons, in the Access main window, that run the queries and the fact that a printable report is connected.

4 Conclusion

ECDBWood can be an effective tool while designing similar DB tools for a SME that aims to initially or further involve itself in the e-commerce activities in the wood sector. Therefore, it is pointed out that the SMEs in wood sector in Greece have to adjust to the new 'information era' and aim to become more effective and efficient while accomplishing e-commerce activities.

There is a deep understanding of the need of ECDBWood application from SMEs. So, the companies will experience a lower operation cost while at the same time increasing its profit. This solution will allow businesses to eliminate unnecessary paperwork. All paperwork and data can be transformed into an electronic format. Thus, it will eliminate valuable shelf space and data can be searched and accessed in matter of seconds. E-commerce will also automate the sales process. Customers can "point & click" on the products they wish to purchase, fill out the customer information, and the product will be shipped and received in a matter of few days. The administration department does not have to fill out any paperwork because the customer had done it already. Thus, the efficiency will be greatly improved. With an e-commerce solution, the business will be open 24 hours a day, 7 days a week. People from anywhere in the world with an Internet access will be able to visit the site at any time. They will not be restricted to the "normal" business operating hours. A "brick + mortar" business is normally limited to serving the customers in its local geographical location.

With an e-commerce solution, that business will not be limited a geographical restriction, rather it opens itself to the global on-line market. Essentially, the business' market exposure will be greatly increased (Cooper, 2005). Given the current economy trends, new technology tools can be vital for the viability of a SME.

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