District E-supply Chain Collaboration: Two Successful Case Studies

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Summary

Internet possesses much interesting potentialities and undoubtedly a correct use of web-based solutions offered, it is more and more important to maintain one's competitive level. The goal of this paper is to develop a framework to classify several web-based Information and Communication Technology (ICT) solutions that considers two variables: the form of ICT services (e-promotion, e-auction, e-catalogue and e-supply chain collaboration) and supply conditions (in house development, application service provider and outsourcing). The focus of the work has been Italian district e-solutions and in this reference, two cases have been studied, that are representative of the use of web-based solutions carried out to support the exchange of data among partners of supply chain.

Keywords: e-business, e-Supply Chain Collaboration, Web-EDI, Italian Districts

Introduction

The technological evolution in Information and Communication Technology, that has characterized the few last years, has allowed an availability of network equipment, personal computers, servers, etc., more and more powerful and with decreasing costs. The technological availability of equipments has produced favorable conditions to realize new business opportunities.

As a matter of fact the Internet became a more and more strong tool used by enterprises due his features: an extremely widespread ramification, higher and higher rates, standardization of protocols, more and more powerful and custom-made tools, etc.
Companies that concentrated more than others on technology innovation immediately tried to utilize these new opportunities and due to the increasing enthusiasm, many others followed the trend. Nevertheless many enterprises, having embarked too early and without the appropriate analyses on this new way, chose in such a way that they did not gained an actual competitive advantage. On the contrary in many cases they lost even the advantage they already had.

Internet possesses indeed much interesting potentialities and undoubtedly a correct use of web-based solutions offered, it is more and more important to maintain one's competitive level. Nevertheless the implication that the implementation of new technologies alone is enough to assure a certain success is false. Internet is an excellent complement to improve one's own market position because it offers new opportunities. In spite of first impressions, the application of Internet requires a good knowledge of the traditional economy approaches, being strategic choices more and more important.

In this reference outline, two cases have been studied, that are representative of the use of web-based solutions carried out to support the exchange of data among partners of supply chain. These solutions, also called e-Supply Chain Collaboration platforms, concern

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applications of information technologies based on the use of network that could modify even deeply the structure of the company and the way of acting inside the organizations. The integration among the partners of supply chain is useful to exchange information of various kinds about company areas such as production programming and planning, new products development, business function, etc. The question is to transform the customer/supplier relationship in a process characterized by clearness, timeliness, and efficiency in exchanging detailed information. The most advanced systems enable a complete integration with the company software in use, supporting the control of each critical variable.

Research Design

In recent years, the use of the Internet in companies has become more and more in use in different ways and in very different context.

In the past, the data processing solution oriented to integrate and support the exchange of information along supply chain, has been mainly EDI (Electronic Data Interchange), that allowed the exchange of standard-sized documents. The disadvantage linked with this technology is the high cost of implementation, as it requires a private network and specific hardware equipment. The new trend, aiming to replace EDI systems, are Web-EDI solutions that, in comparison to a quite low investment, enable all the main functionalities of dedicated EDI systems. In fact personal computers connected to Internet are sufficient to use Web-EDI tools. Moreover with a very low expense it is possible to create an interface directly connected to the information system of the company.

This work is based on a framework that considers two variables: the forms of ICT services and the supply conditions of the ICT services.

The forms of ICT services are services – or e-services – provided by the Internet solution and they can be distinguished in e-promotion, e-auction, e-catalogue and e-supply chain collaboration.

An e-promotion service usually contains general information about the company or the business industry, provides services for the information exchange (e.g. forum, mailing list, chat,...). Connections among companies are often managed offline.
We can identify 2 mains functions:

- External Communication when the e-promotion service has the task to show general information about the firm, products, etc.
- Internal Communication is the function that allows to spread information and documents within the organization.

An e-promotion solution could be referred to a single enterprise, an association of enterprise, a local district and so on.

An e-auction is a system that allows a dynamic definition of price through auctions. One of the most important target is the price reduction. Therefore it's normally used for no critical articles. There are two main classes of auctions: direct auctions and reverse auction. The former class takes place when there is one seller and many buyers; the second class occur when there only one buyer and many sellers. Prices goes up in the first class of auction while they goes down in the second class.

The simplest tool to conduct a transaction is a catalogue that can be implemented with new technologies and published on the Internet. As well as traditional catalogues, that support the publication, an e-catalogues can also provide services to manage and upgrade the catalogue, support the transaction and the information needed after the transaction.

An e-marketplaces, defined in accordance with Grieger (2003),

> (...) *brings multiple buyers and sellers together (in a "virtual" sense) in one central market space. If it also enables them to buy and sell from each other at a dynamic price*

which is determined in accordance with the rules of the exchange, called an electronic exchange; otherwise it is called a portal. The important point, which differentiates an exchange from other B2B e-commerce companies, is that an exchange involves multiple buyers and sellers and it centralises and matches buy and sell orders and provides post-trade information. (...)

could provide all the electronic services described above.

Finally an e-supply chain collaboration service is an information and communication solution that can used when buyer-supplier relation is critical and when it present a long period end.

It allows to exchange among the partners several information as production information, commercial information, and so on.

As argued by Vakharia (2002) Supply Chain Management is

the art and science of creating and accentuating synergistic relationships among trading partners in supply chain and distribution channels with the common shared objective of delivering products and services to the "right customer", in the "right quantity", and at the "right time" (quotation marks has reported as in the original)

The perspective from a supply chain point of view of the value proposition of SCM is (Burke and Vakharia, 2002)

Total performance of the entire chain is enhanced when we simultaneously optimize all links in the chain as compared to the resulting total performance when each individual link is separately.

With this perspective we can define a supply chain collaboration as an integrated and collaborative management of all the process within an organization and with its main partners of the supply chain, with the task to improve performance by planning and managing operations as an extended enterprise.

E-supply chain collaboration solutions provide to firms an Internet platform to facilitate the integration and collaboration between partners in a supply chain. This task is reached by the definition of a "common language for interaction" between Information Systems of different partners. In other words, these services define a protocol to code how different Information Systems can exchange information on the Internet about order, invoicing, and so on.

These features are necessary to support an automatic exchange of information about buyer and seller processes over the Internet.

These services, as mentioned above, refers to processes of collaboration, coordination and integration between firms. Table 1 shows different Process Steps where could be used an e-Supply Chain Collaboration solution. The process steps identified are:

- Order-delivery-invoicing cycle: the aim is to automate those processes that are interfaces between business partners.
- Monitoring and control of the supply chain (knowledge and event sharing)
- Collaborative process (production planning sharing, collaborative new product development, and quality management)

All processes identified base their integration on the definition of a common language throw a data exchange or master data alignment protocol.

In other words, e-supply chain collaboration services contribute to support:

- Data exchange between supply chain partners throw translation systems that allow information Systems to "talk" each other.
- Data alignment between diverse Information Systems

Internet protocols has allowed to develop new solutions called web-EDI (Electronic Data Interchange) that are replacing the old EDI solutions. The use of such protocols, that are very widespread in every firm, allows more organization to used these technology.

Table 1 - E-Supply Chain Collaboration: Process Steps

PROCESS STEPS	ORDER-DELIVERY-INVOICING CYCLE	MONITORING AND CONTROL OF THE SUPPLY CHAIN	COLLABORATIVE PROCESSES
COLLABORATION	- INTEGRATED ORDER MANAGEMENT - INTEGRATED INVOICING - INTEGRATE LOGISTIC AND WAREHOUSE MANAGEMENT	- KNOWLEDGE SHARING - EVENT MANAGEMENT	- OPERATIONAL PLANNING - NEW PRODUCT DEVELOPMENT - QUALITY MANAGEMENT
INTEGRATION	DATA EXCHANGE MASTER DATA ALIGNMENT		

Source: AA.VV., 2003 *"Le fasi del processo ed i relativi servizi di eSupply Chain Collaboration" Fig. 5.1.*

We can distinguish three mains supply conditions of the ICT services (AA.VV., 2003):

- In house development
  This is the traditional form to develop an e-business solution. Hardware and software equipment are bought by the user enterprise (or by a consortium of firms). Generally, the achievement of the project can be obtained by an external software house or by internal resources.
- Application service provider
  The client firm (the one that will use the e-business solution) can hire hardware and software from a supplier. It provides a standard e-business solution developed for different potential clients. The client firm can use the e-business application as a remote access client. The value proposition of this providers is to supply a advanced environment, a continuously upgraded service, with high performance level and at a relative low cost.
- Outsourcing
  The environment analyses, the development and implementation of the e-business solution is given to an e-business third party. It will also manage all the activities involved in the e-business project and it will provide the maintenance, upgrading and security of the system.

Figure 1 shows how forms of ICT services and supply conditions of ICT services can match.

An e-promotion service are usually developed in house or by an application service provider. It's unusual it's made in outsourcing. E-action and e-catalogue services can be developed and managed by all the three supply conditions identified. Finally, an e-supply chain collaboration service is rarely made in fully outsourcing due

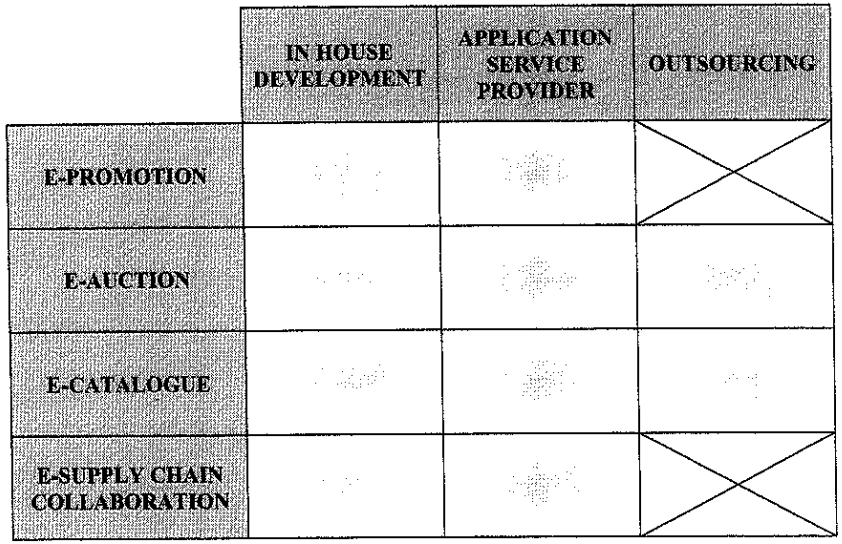
This work has employed a case method for several reasons. First of all, due novelty of these topics and continuous changes in the availability of new technological solutions, a case studies approach has been chosen.

In fact, as suggested by Yin (Robert, 1994) a case study is an empirical approach to:

- contextual conditions are pertinent to the phenomenon of study
- analyze a contemporary phenomena in its real context, when
- boundaries between the phenomena and its context aren't clearly outlined, and when

- empirical evidence from multiple sources are employed
- when the research question embodies an explanatory

Figure 1 - Forms of ICT services and supply conditions



Particularly, explorative case study research is needed to develop research ideas and questions (Voss, 2002).

Methodology

Sample selection

According with the aims of this work and the methodological approach, two companies operating in two Italian districts have been selected:

- OPTO IDX: an e-supply chain collaboration service for electronic data exchange based on a protected virtual network for the eye-wear district of Belluno;
- KMS (DETA): a Kanban Management System, developed by DETA Spa, an enterprise of the chair district in Manzano (UD). DETA has planned and developed his KMS system in house as an information exchange system for production planning and control.

Data collection

Data have been collected by multiple source and, according with (Voss, 2002) :

Typically the prime source of data in case research is structured interviews, often backed up by unstructured interviews and interactions. Other sources of data can include personal observation, informal conversations, attendance at meetings and events, surveys administered within the organisation, collection of objective data and review of archival sources.

In fact our data source have been:

- Direct structured and unstructured interviews to
  - managers
  - professionals involved in the development of ICT solutions
  - Informal conversations with developers and users of studied solutions.
- Study of:
  - Project records
  - Enterprise web site
  - Internal working procedures of the ICT system
- Direct use of the ICT solution like a user

Data analysis

Opto-idx

Opto-idx (acronym of Internet Data Exchange in the eye-wear district) is a service for data exchange through Internet in the eye-wear Belluno district. The Belluno eye-wear producing district is located in the province of Belluno, and covers a total of 2,082 km² containing 42 municipalities with 67,074 inhabitants.

Opto-idx enables partner enterprises to integrate themselves in a simple way exploiting Internet spreading and availability. It uses standard electronic layouts that define conditions of order exchange, order confirm, packing list, invoice, price list, and other types of documents that may be useful.

Opto-idx has been planned and developed in the eye-wear Belluno district, that is, the site of the most important production of glasses.

Enterprises created this service through an integration process, overcoming their typical strong competition logics. Even though the organizational and managerial autonomy of the supporters has been maintained, the achievement of this project enables to integrate in a quick and effective way the company processes. Opto-idx is a service that can be used in several ways to answer the requirements of enterprises. If one owns already a quite advanced managerial software or ERP programs (Enterprise Resource Planning), it is possible to integrate Opto-idx with these software, so that all the ingoing and outgoing documents (orders, bills, invoices, lists, confirmations) are automatically generated by the program. In this case Opto-idx supplies a certain communication channel and manages in a self way the whole process of shipment to the receiver and of incoming delivery of documents, assuring the origin and the reaching of destination. It is possible to enter the service using the web interface if one does not want to integrate the ingoing and outgoing messages from the company with the information systems or if one does not posses advanced managerial systems. As a consequence it is possible, with a simple browser, to control constantly the situation of the orders – both ingoing and outgoing – to draw bills and invoices in accordance with the received orders, and at the same time to eliminate the risks of mistake originated by data reinstatement in documents.

Opto-idx allows to exchanged information e documents about:

- Open orders
- Close orders
- Order confirms

- Transport Document
- Dispatching notice
- Price lists
- Cancelled orders

Finally, security is a basic aspect of the service. For this reason the standards used are among the highest ones, from the private virtual network to the asymmetrical key coding. The Opto-idx data exchange through Internet takes place in a cipher way, accessible exclusively to the sender and the receiver.

KMS (DETA)

DE-TA is one of the most important firms in the Manzano chair district. It produces chairs for offices through a complex network of sub-suppliers.

DE-TA manages a very complex network, made up of some firms of the group and a lot of suppliers, who perform some important stages of the production cycle, supply a large part of components and assemble some finished goods; the network consists also of a large number of suppliers who supply both DE-TA and his sub-suppliers with some components.

In the last decade some problems have emerged in holding the competitive position of the firm, due to difficulties in supply chain management: the network managed by DE-TA wasn't efficient. In fact some clients, like Ikea (35% of sales), required a higher level of service and a reduction of order cycle times. For these reasons DE-TA started a reorganizing project of the supply chain.

In this context has emerged the need to manage the network to increase the productivity and the efficiency of the whole supply chain. The reorganization project of the network consists in two steps:

Reorganization of supply chain

Implementation of the Kanban Management System (KMS), a software that uses the Kanban system and helps to improve the transparency of the material flow through partners.

As shown in figure 2a, the traditional system, is composed by 3 steps:

- Second tier suppliers sends components to third party suppliers and fill in DDT (transport document) forms
- Third party suppliers receive components sent by second tier suppliers, convert them into semifinished or finished products, sends them to DETA head office and fill in a second DDT form
- DETA head office receives semifinished or finished products and DDT forms by third party suppliers and inserts data in the firm Information System.

With the Kanban Management System the procedure has changed in these steps:

- Second tier suppliers sends components to third party suppliers and fill in on-line DDT (transport document) forms
- Third party suppliers receive components sent by second tier suppliers, convert them into semifinished or finished products, sends them to DETA head office but don't fill in any second DDT form
- DETA head office receives semifinished or finished products and on-line DDT forms by third party suppliers but doesn't inserts any data in the firm Information System. In fact second tier suppliers have already inserted all data needed.

In other words, Kanban Management System allow to reduce unvalued operations of data entry.

Figure 2 - Third party supplier receiving system (before and after the KMS)

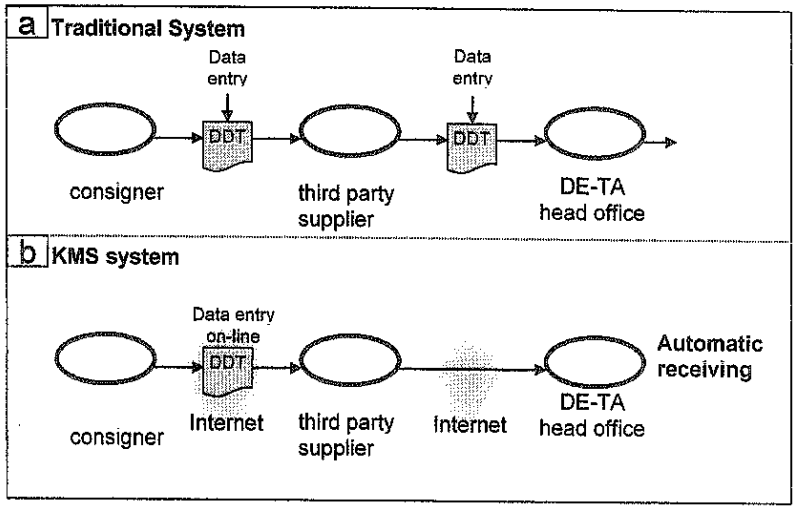
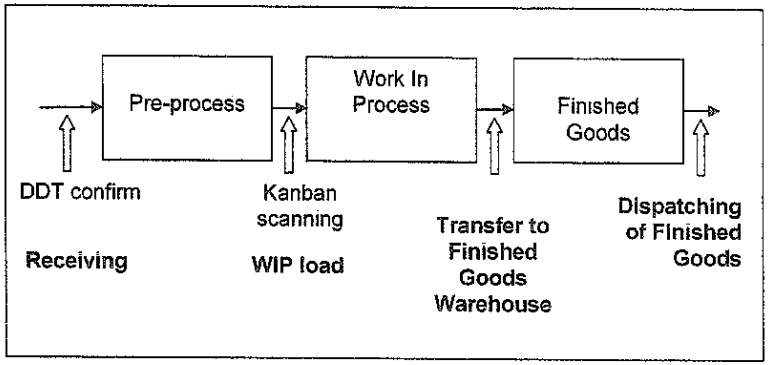


Figure 3 shows KMS procedures for a third party supplier, that consists in 3 steps:

- Pre-process: On receipt of goods, third party supplier confirms DDT's.
- Work in process: the production process starts and DDT's are used to charge components on work in progress
- Finished goods: when semifinished or finished goods are made, third party supplier dispatches and declares them to DETA.

Figure 3 - Procedures of KMS



Conclusions

This paper has presented the results of an empirical research on two e-supply chain collaboration solutions in two Italian districts. Its objectives have been:

- the analysis of e-Business successful applications
- the supply forms used
- the difficulties in achieving the systems
- the district applicability of e-business solutions

Both analyzed cases have resulted useful to increase the efficiency in data exchange between partners of the supply chain. In particular, these software have increased the degree of transparency of interactions and provided more accuracy and timely information to every partner.

The main difference emerged between the two cases concerns the promoter of the software solution. In fact Opto-idx has been made by the district association while KMS by a firm.

In addition to the different promoter, another difference between the two systems concerns the criteria used to plan and develop the conceptual frameworks that represent the functioning of systems. In fact, Opto-idx and KMS have been created to answer to the same needs, but due to different criteria used, the systems utilize different technologies and offer different services.

In both cases hardware requirements for suppliers (third party supplier or second tier suppliers) can consist in a Personal Computer connected with the Internet.

With reference to what observed, a possible future development of KMS software may be a district portal that will include some services for every firm in the district. These services may be:

Enterprise private web site with e-commerce and data exchange services included
Management of technical data (bill of materials, labels, draws)
Reduced on-line ERP for small enterprises
Management of price lists and invoices

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