Mihaela STET
Western University "Vasile Goldis" of Arad

BENEFITS AND DRAWBACKS OF TECHNOLOGY IN SUPPLY CHAIN MANAGEMENT

Theoretical article

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Abstract

The study analyzes the impact of introduction of new technology framework in supply chain management in order to accomplish business process transformation, based on previous work directed on the effects of introduction and development of information and communication technology in optimization distribution processes. There have been revealed the main problems which represent the origins for different results obtained by companies in implementing same systems, starting from defining objectives, failures in leading people through change, software incompatibility problems. The paper presents a series of causes for failures in implementation and deployment of information technology in supply chain management, explaining why the anticipated performance improvements and financial benefits from technology investments are not reached.

1. Introduction

Expansion of the globalization and the developments in communication strategies have significantly changed the design of logistics channels. Besides the modification of the structures and their physical configuration, it is required a redesign of the information flows.

Information, the circulation and the control of it, plays an essential role, providing added value to the entire logistical channel when it is properly managed, but also in case of failures, that can lead to significant losses.

A proper management of information flows leads to a better coordination of material flows with positive impact on sales revenues and major influences in reducing total logistics costs.

2. Benefits of technology in supply chain management

Maintaining product quality on the whole supply chain is one of the main objectives of the actors involved in developing material flows.

If in the case of the different types of general products, this poses no particular problems, for example, in the case perishable foods it is necessary to monitor the environmental conditions, like temperature and humidity, during the transport and storage periods. The introduction of automatic monitoring of these features allows obtaining information in real time, any deviation from normal values can be fixed in a short time.

Use of Electronic Data Interchange enabled file exchange between participants, but does not allow control and does not provide visibility on all activities in the logistics channel.

Customer Relationship Management (CRM) offer the possibility to identify the most profitable customers and monitoring their behavior. The current trend is to adopt collaborative CRM systems in order to involve all business partners in collaborative customer services.

Warehouse management systems automatically or semi-automatically manage the allocation of storage spaces, creating picking lists, assortment of ordered goods and handling products in warehouses. Handling is done through automated guided vehicles (AGVs), automated storage and retrieval systems (AS / RS), sorting systems, conveyors and other devices.

A warehouse management system is required also to provide warnings on products with expired warranty period. In current conditions, managing inventory manually is inefficient and generates errors.

A number of mathematical models can be associated and used in the simulation of configuration of warehouses.

The newest and most frequently adopted technologies in warehousing are:

- warehouse management systems;
- voice picking;
- warehouse automation systems;
- mobile devices;
- computerized devices;
- handheld devices;
- RFID.

The most important advantages of the use of mobile solutions are:

- invoice the customer immediately;
- real-time proof of delivery;
- monitor the temperature of refrigerated goods.

Using bar-coding allows identification and traceability of products, allowing simplification of processes in logistics channel. For example, in combination with a warehouse management system it enables the fluidization of picking activities in order to compose the expeditions. At the sales points it provides information on the quantities of different types of inventories of products and on the level of value of sales.

But, barcodes do not offer the possibility of identification the time and place of good production or about moment of product expiration. These shortcomings are removed allowing RFID technology via radio frequency signals to read information about the product during the way from manufacturing to final sale.

Using RFID tags enable automatic obtaining information about the goods stored or transported without physical contact, even in conditions when there are objects between the reader and tags.

Also, RFID readers allow simultaneous reading of multiple tags even during movement. RFID systems use large capacity data storage and high-speed operation. RFID tags also allow reprogramming and updated information storage.

In addition to tracking goods, RFID tags can be used to prevent counterfeit, as well as:

- Fast identification of products;
- Handling products only once in order to form expeditions;
- Elimination of selecting products for shipping orders;
- Reducing the duration of identifying the stored inventories;
- Optimization movements in warehouses;

An integrated system as the Enterprise Resource Planning ERP system offers the advantage of an overview of the entire logistic channel, the existence of a common database collected across the supply chain.

ERP systems, by their ability to integrate the functions of production, logistics, sales, human resources, accounting and finance, offers premises for a performance management across the organization. For example, in the logistics field, ERP streamlines procurement, order management, planning of logistics activities.

Facilitating the real time access to the data from the

entire channel allows the fluidization of logistics processes and optimization of distribution networks. The condition is, however, that such a system to be properly implemented, given the demands of enterprise and employees.

There are on the market numerous software packages specific for supply chain, but it is necessary that they can be integrated with already existing programs.

Transport management systems allow real-time communication and getting monitoring of order at any time, based on GPS/telematics and cellular devices. In the event of any disruptive event it can accomplish the rerouting delivery vehicles.

Use of mobile devices is favored by lowering their cost of acquisition. Equipment for fluidization of freight transport used in recent years are equipments for:

- location and event reporting;
- route progress tracking;
- fleet telematics solutions: in-cab displays, on-board computers, and satellite communications.
- dispatching;
- information capture and retrieval.

Decision Support Systems (DSS), interactive software-based systems assist in decision making can be used in logistics activities.

E-commerce, integrating functions of data and funds transfer allow the remove of geographical barriers between suppliers and customers. Expansion the use of the Internet has provided opportunities for electronic trading.

Numerous studies show that increases IT efficiency using Supply Chain Management SCM [Power and Sohal, 2002; Supply Chain Council, 2002; Min & Galle, 2001; McAfee, 2002].

Use of IT in SCM offers a number of benefits:

- Reduce inventory levels;
- Faster and with high accuracy order processing;
- Lower transaction costs streamlining logistics flows;
- Improving customer service;
- Reduce costs due to human error;
- Improving data accuracy;
- Increasing visibility of assets

Increasingly more applications use the cloud technology. It can be integrated with existing systems in order to increase efficiency.

Cloud technology allows data to be updated and shared across the supply chain through a collaborative platform. Use of cloud computing offers a number of advantages, such as lower costs for commoditization of resources, possibility to externalize of maintenance, payment only what it is uses and removal the infrastructure costs. It offers also the advantage that it can be implemented very quickly, requires no investment from the participants and costs for maintenance and update,

being limited to the costs of a monthly subscription to access these services.

More, widespread use of the Internet brings many benefits in logistics channel:

- reduce costs and increase efficiency by automating processes;
- expansion of sales areas;
- providing new possibilities for communication.

3. Drawbacks and failures in the implementation of new technologies in logistics channels

There are studies that contest the positive effects of a CRM, because it did not produce the expected effects, in some cases even causing damage of long-term customer relationships. Failure of implementing of such a system may be caused by insufficient knowledge of it.

On the other hand, costs and risks of system implementation and integration with existing programs in an economic entity are high.

Encountered problems in the functionality of SCM systems are:

- Inaccurate data from other enterprise systems;
- Lack of good collaboration between company departments;
- Malfunction collaboration with suppliers, customers or distributors;
- Difficult to implement software tools;
- Oldfashioned business judgement.

An example of failure is Hershey Foods, which in 1999 has encountered problems in implementing a new order management, supply chain planning, and CRM system, which led to the loss of higher orders worth $ 150 million [SupplyChainDiggest, 2006].

Also, WebVan, an online grocer, in 2001 made significant investments in automated warehouses, but these have proved not to be justified by demand for products.

In a study conducted in 2001 (Robbins-Gioia Survey) reveals that 51% of companies that have implemented an ERP solution have not achieved the desired result [www.it-cortex.com].

Implementing an Enterprise Resource Planning ERP system can take several years and require constant updates and maintenance. Moreover, costs can raise to tens of millions of dollars [Mabert, 2000], which excludes for many companies the possibility of accessing such integrated systems.

The rate of successful implementation of such a system is still quite low, namely only about 33% [Zhang, 2003].

Failures could be determined by multiple causes:

- Differences between existing systems and new systems;
- Insufficient staff training or lack of motivation or understanding of the new systems;
- Particularities of channel and logistic requirements of different participants in the logistic channel;

- Dimensions and specifics of each company;
- An insufficient understanding of the processes and the operation of each component of logistics channel and its assembly by the software processes;
- Unjustified investment compared with the existing and potential demand;
- Underestimation of the complexity of planning, training and development for the implementation of such a system;
- Lack of involvement of employees who will use the system in planning, systems development and change;

Once the system is implemented, it can be accompanied by a number of drawbacks:

- Decrease in income;
- Reduction in market share;
- Loss of orders;
- Incorrect registration of inventories;
- Failure of operation of information systems

A not to be neglected problem is that the staff resistance to change, especially in situations where old systems work for a long time or when the new system is perceived by employees a risk of losing jobs.

Certainly, their concerns are justified, because such a system reduces human intervention throughout the supply chain.

One of the largest wholesale drug distributors in the US, Foxmeyer, in 1986, in an attempt to implement a new ERP system and automate a distribution center, has encountered many problems with both the order processing system, and with warehouse management.

But losses were incurred also by the anticipated contraction of orders based on estimates of cost reduction for the company given that the estimated high efficiency [SupplyChainDiggest, 2002].

Ten years later, Tri-Valley Growers has invested millions in a new ERP and supply chain planning system that did not work and required replacement with another [Gilmore, 2009].

Using RFID systems experiencing also some difficulties:

- RF signals are affected by interference and reflection metal and electrical systems;
- absorption of radio frequency signals in fluids;
- low rates of tag receptivity [Wu et al., 2006];
- existing barcode systems implemented recently and with relatively high cost which have not yet been amortized;
- high investment costs to implement RFID: equipment costs, expenses for integration with pre-existing systems and staff training in order to use this kind of systems;
- problems of compatibility with existing applications;
- data overload and data noise;
- existence of a large number of RFID hardware and software vendors and the lack of standardization of these components;
- lack of qualified personnel in the management and use of RFID systems.

Implementing software in supply chain, developed by a service provider, requires also the need to clarify the legal issues related to the security of confidential data.

There are also a few drawbacks, such as pricing and loss of control over data. Developing software is risky, being opportunities to use open source software and multiple options for application development.

The existence of different not interconnected systems for managing departments or sets of activities may cause errors, redundant data, which can lead to additional costs.

4. Conclusions

In XXI century, under the current circumstances, given that the important flows of freight, there are required information and communication technologies to be able to operate on the entire logistics network, encompassing all the participants.

However, at organization level, there may be some obstacles in adopting new technologies, even using the Internet. Barriers can raise both the employees reluctant to change, and the management at different levels. To be successful it is necessary to select the appropriate channel technology and logistic software packages. It is important that before the selection of a new system or new technologies to assess them to identify whether they can be adapted to the processes of the organization.

For flexibility and easy accessibility, one of the conditions is the standardization of technologies. Otherwise, updating or changing systems becomes difficult.

The largest share of expenses is not represented by the software and hardware costs, but the design and reconfiguration processes, retrieving and processing data from legacy systems, as well as training of staff in order to use the new systems.

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