

CHAPTER 2

INFORMATION TOOLS SUPPORTING BUSINESS MANAGEMENT AND SUPPLY CHAIN

Paweł Fajfer¹

¹ Poznan School of Logistics, Estkowskiego 6, 61-755 Poznan, Poland
pawel.fajfer@wsl.com.pl

Abstract

Supply chain management enables the physical transfer of goods and information. During the transfer of information, among business partners, in the logistics supply chain that information is often modified by them. Therefore, information systems of business partners must ensure the integration of the different elements of the logistics supply chain. A well-functioning IT system within the company is the basis for data collection and processing, which at various levels are used in the enterprise and beyond - with contractors. In this article the question why should companies implement IT systems is answered, and benefits of e-commerce in SCM, and benefits of using GS1 standards are described.

Keywords: ERP, SCM, GS1, EDI, information

2.1. Introduction

Effective management of the flow of goods includes both the physical transport of goods and the flow of information concerning a given transport. As the goods go through various stages of the supply chain, the information undergoes numerous changes. For this reason, the IT systems used by all business partners to control the flow of goods and information within the supply chain must guarantee the integrity of information at every stage. This article will discuss how to ensure the

information integrity and how Polish medium and large enterprises use IT systems in supply chain management.

Purchase and implementation of an IT system not only enhances the company's image in the eyes of its customers, but also improves the effectiveness of the processes which take place within the company (Fajfer, Kolinski, Krajewski, 2014, p. 74-85; Ehie, Madsen, 2005, pp. 545-557). Such an implementation allows the managers to solve a number of issues and problems with which they constantly had to cope before. Since the system takes care of the internal processes, it is possible to focus on other areas of the company's operation, which used to be neglected. The managers understand that efficient cooperation with suppliers and consumers within the supply chain provides the company with a greater competitive advantage. They realize how important each piece of information about the market, the competitors and the customers is, and they recognize the necessity to store and further process this information (e.g. within the marketing or sales department). The collaboration and level of together trust is depends on nationality of enterprise. It is a result of mentality of top management who decides of cooperation's area. It determine an amount and quality of shown information to partners in supply chain.

Apart from the internal process supervision, the management concentrates on establishing and strengthening relations with suppliers and consumers. Cooperation with external companies is no longer concentrated solely on finding the lowest prices possible. The customers' expectations grow increasingly higher, and providing them with a complex service translates into economic success. The price of the goods manufactured, discounts, quality, distribution, warranty service and the ability to adapt for evolving market demands are only some of the factors that determine the competitiveness of modern companies. The more creative and flexible the company, the more popular it grows. Companies would be unable to meet growing expectations if they operated on their own. This is why they should expand their scope of operation, focusing on both suppliers and consumers, and find their place as a link within the whole supply chain. Such an approach allows for more opportunities, as each link works towards the same economic goal: to stay on the market while enhancing the relations with the customers and business partners (Koliński, Fajfer, 2011).

In order to enhance these relationships companies take advantage of advanced IT systems. Depending on its role within the supply chain, the company will choose such a system as will prove most suitable for its specific purposes and provide desired functions related to the customer service, supply tracking and many other areas. Such a system becomes a basic means by which the company exercises control over the internal information flow.

Diversity of IT systems enables improvement of processes in whole departments in company. Often, there are some different IT systems in which data is collected. Gathered data base is used to create an information, which could create a decision or activity. There is not importance which IT system (one or more) is used in that process. If enterprise use one IT system is easier to find some potential error, which was made when entering data into the IT system. If the company uses several different IT systems, the risk of error is larger (higher number of data input into the database). The probability of error quickly capture the parallel operation of several IT systems is more difficult than in the case of a single system. The author's intention is not to indicate a better solution. This depends on the management of the company and the general policies related to the flow of information, as well as the economic possibilities of the company regarding the purchase and implementation of solutions supporting data collection and processing.

The use of IT systems run faster, helping to draw the right conclusions and decisions that affect the quality of work, products or services, customer satisfaction, suppliers and employees within the company. Satisfaction is the result of the liquidity related to the execution of orders (movement of goods, but also the flow of information and funds).

The way to eliminate the risk of error when entering data into the system are integrated systems. They are technologically advanced systems that process data in one common database (not yet have a database extracted in each of the systems). Such an integrated system is Enterprise Resource Planning.

The ERP system enables the company to automate and integrate the majority of business processes, share common data and practices across the enterprise, as well as generate and share information in real time.

The advantage of this class of systems is modularity. The company, which implements the system selects only those modules that are required for the effective management of the company. The module can be compared with the scope of work of the chapter in the company, for example, production's planning module corresponds to the functionality department of production, which in addition to the production process there will be processes related to planning, costing production, its clearing and characteristics of the product (Bill of Materials and route technology).

2.2. The results of a survey among employees of medium and large Polish companies

The author conducted a survey on the use of IT systems on a group of 195 employees. The study was conducted in the period 12.14.2015 to 01.11.2015. For the analysis of the results were taken into account those working in medium and large enterprises. Medium-sized enterprise employing 50 to 250 employees, while large company employing them above 250. The study involved 53 employees working in medium-sized enterprise and 63 employees working in a large-sized enterprise. Asked respondents to identify the products that they use in their daily work.

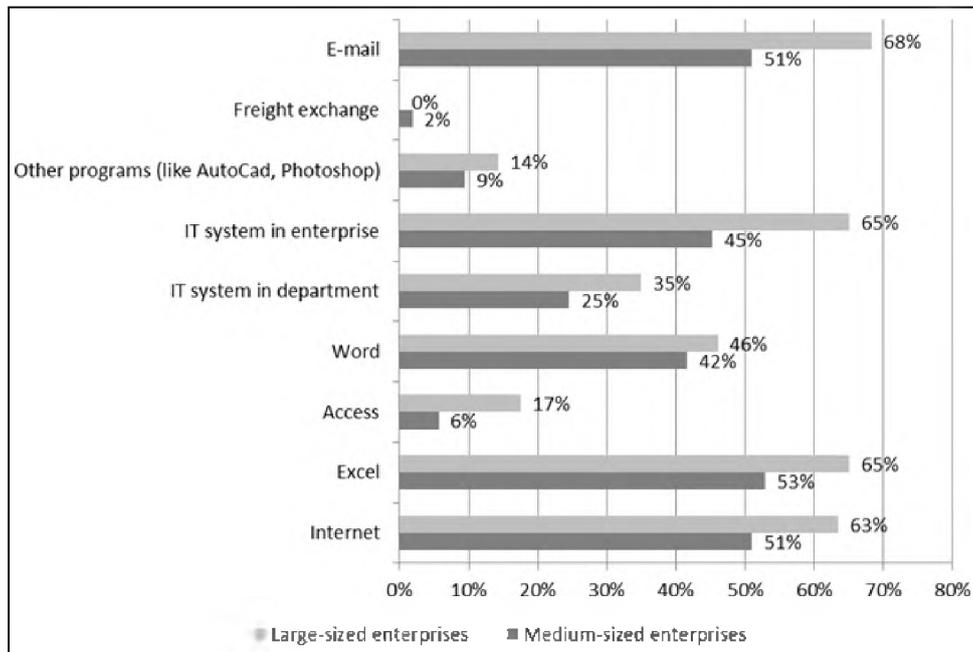


Fig. 2.1. The IT products used in everyday work

Source: results of own studies

Among the most frequently mentioned tools were simple tools related to obtaining information (web browsers), and communication (programs for e-mail). The most commonly used program proved to be Excel (53% and 65% of responses), which demonstrates the effectiveness of this tool. What may be surprising is the fact that the percentage of people using the IT system that supports the entire enterprise is almost identical (45% and 65%). Despite the universality of the ERP system, respondents indicated the use of Excel, which proves the popularity of this

Information tools supporting business management and supply chain

product and its wide range of applications. Among the least used products are, among other things Freight Exchange and Access. The first products will be used in transport and shipping companies. Usage of Access in Polish company is low (6% and 17%). This stems mainly from “the fashion” IT systems (especially ERP). Another factor that may affect it a little knowledge of the program (education, attention is focused on Word and Excel). The figure 2.1. shows the collected results of respondents broken down into medium and large enterprises.

In the next part of the survey asked respondents to indicate the usefulness of the tool in the context of their work. Analyzing the usefulness of tools (Excel and system IT) it can be observed that in the medium-sized companies the most attractive is Excel. This may result from the ratio of price to the functionality of the tool. The usefulness of the system IT is also highly rated by participants in completing the questionnaire. In large enterprises are more popular IT systems. The reason for this fact is that most of them have foreign capital. Concerns a rule imposing solution that will be used by employees of the company. It was observed that in parallel to the IT systems used Excel. Once again it proves versatility of this tool. Both the medium and large companies a very popular web browsers and programs for e-mail.

The survey respondents also was asked about the difficulty in handling the various IT products. Comparing the responses of employees of medium and large enterprises can be seen that in a similar manner rated individual products. Among the easiest to use and the program lists the internet for e-mail.

Tab. 2.1 Usefulness of IT tools used in everyday work

IT product	Medium-sized enterprises				Large-sized enterprises			
	Very useful	Useful	Useless	Very useless	Very useful	Useful	Useless	Very useless
Internet	23	7	5	0	32	14	4	2
Excel	20	7	3	1	33	17	1	1
Access	8	11	3	1	21	13	6	2
Word	10	12	8	0	13	24	6	1
IT system in department	12	8	2	3	24	14	3	1
IT system in enterprise	16	9	1	1	39	9	2	2
Other programs (like Auto Cad, Photoshop)	2	4	8	5	5	7	11	16
Freight exchange	2	2	10	5	4	7	8	17
E-mail	21	7	4	0	43	8	1	1

Source: results of own studies

The percentage of people who judge a difficult operation of the IT system is relatively low comparing it to the assessors it as easy or very easy. Similar results apply to Excel, Word and Access. The results obtained for this question is shown in table 2.2.

Tab. 2.2 Difficulty of IT tools used in everyday work

IT product	Medium-sized enterprises				Large-sized enterprises			
	Very easy in use	Easy in use	Difficult in use	Very difficult in use	Very easy in use	Easy in use	Difficult in use	Very difficult in use
Internet	29	5	1	0	41	9	0	0
Excel	7	20	5	0	11	33	6	0
Access	4	12	4	1	4	21	10	0
Word	16	13	0	0	22	18	2	0
IT system in department	8	9	3	0	12	21	6	0
IT system in enterprise	6	17	3	0	11	27	9	1
Other programs (like Auto Cad, Photoshop)	2	9	1	3	4	12	9	4
Freight exchange	1	6	5	3	3	10	6	4
E-mail	23	7	0	0	43	8	0	0

Source: results of own studies

The survey asked respondents how they gained the ability to use the product IT. The most advanced (IT system) require special training, which usually contracted by the employer. Quite a high percentage of answers indicates the acquisition of skills through the help of a colleague from work. Members also learn by trial and error (on your own). Among office programs (Word, Excel, Access) can be observed that the acquisition of skills is usually on their own. If Access is a certain percentage trained by the employer or with the help of colleagues. In the case of Word and Excel is a percentage of people who have gained skills while learning. Internet and software to handle e-mail respondents have learned to yourself. Compare with table 2.3.

From conducted by the author's research it shows that despite the popularity of IT systems, in everyday work is also used other tools (such as Excel, Access). This demonstrates the high versatility - especially in the case of Excel. Among other tools, you can replace Word, Internet browsers and programs for e-mail. Depending on the branch represented by the respondent uses other computer programs necessary to everyday work (e.g. Auto CAD, Photoshop, Freight

Exchange). From the study it can be concluded that the work of the systems required to work in a company (other than Excel, Word, Access) the employer puts emphasis on employee training. However, training the employee is often aided support colleagues. Usefulness of used tools is assessed as high, which testifies to the proper selection of tools necessary to monitor, collect and process data.

Tab. 2.3 The method of learning to use IT product

IT product	Medium-sized enterprises						Large-sized enterprises					
	Training by employer	Help of colleague	Experience from previous work	Self-study (by trial and error)	Training on your own (course)	While learning (college or school)	Training by employer	Help of colleague	Experience from previous work	Self-study (by trial and error)	Training on your own (course)	While learning (college or school)
Internet	3	2	2	19	1	6	0	4	10	30	0	2
Excel	4	3	6	7	1	7	3	4	10	16	3	10
Access	3	5	2	3	0	1	6	7	3	12	0	2
Word	3	1	3	12	1	6	0	3	9	19	3	8
IT system in department	8	5	0	5	0	0	21	13	2	4	0	0
IT system in enterprise	12	8	0	4	0	0	26	15	1	5	0	0
Other programs (like Auto Cad, Photoshop)	2	2	0	6	1	0	1	5	2	10	3	2
Freight exchange	1	2	1	5	1	1	2	6	0	6	3	2
E-mail	5	3	1	16	1	1	2	5	10	26	3	3

Source: results of own studies

2.3. Information flows in the supply chain

The chief task of SCM systems is to facilitate data exchange between the links of the logistic supply chain. The system controls the flow of information, goods and services, thus integrating the whole chain. The basic negative aspect of this solution from a short-time perspective is that its project and implementation in the

logistic supply chain entails significant costs. For this reason, SCM in itself cannot be treated as a means to generate savings in the short run. From a long-time perspective, however, it proves to be an efficient measure to cut costs by improving quality and reducing problems related to storage management within the supply chain. Another advantage offered by SCM is that it simplifies and streamlines complex processes taking place within the chain, improves the quality of customer service and increases work time efficiency. It must be also mentioned that a well-configured SCM system will not allow a situation to emerge where the customer places an order for a product which is no longer manufactured or which is undergoing a design change (Coyle, Bardi, Langley, 2003, p. 31). SCM systems are technologically advanced and provide tools to manage the whole supply chain, from design and finding material supply sources, through demand forecasting and distribution, to providing the customer with a finished product.

Even that SCM is the most effective tool in planning among partners in supply chain, the price of implementation that instrument is too high. Planning is possible when information flows in direct time and direct place. There are some tools which are used in supply chain to support and increase efficiency of data flow, which is necessary to create information used to planning.

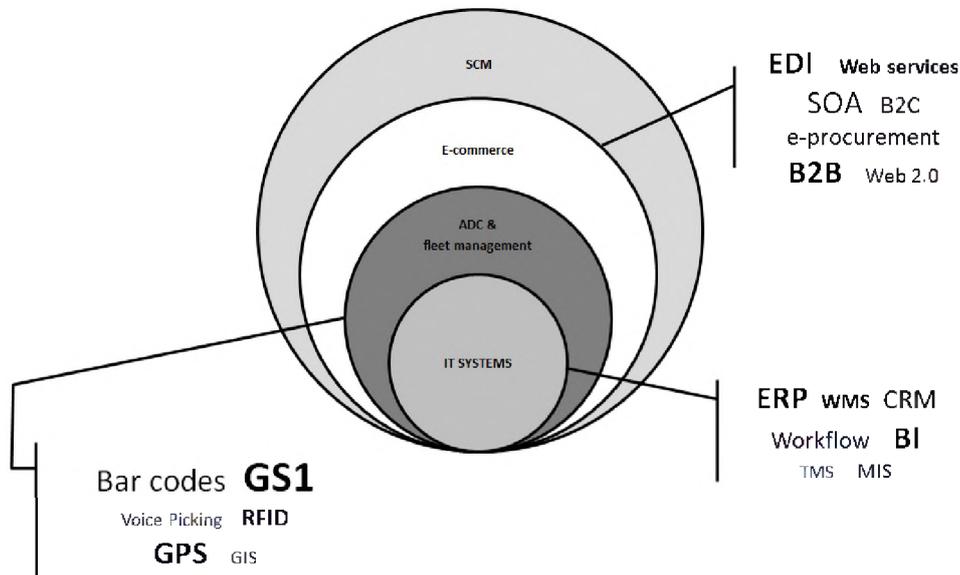


Fig. 2.2. Solutions supporting the exchange of information in the supply chain
Source: own study

If companies in the supply chain do not want to use expensive solutions (this is due to economic calculation), can use other, equally effective, as described below (Kisperska-Moroń, Krzyżaniak, 2009, p. 332-333) compare with figure 2.2:

1. Information solutions that support business cooperation:
 - Electronic Data Interchange (EDI) – exchange of standard data forms prepared electronically, which shortens the time associated with the transmission of documents and data entry therein to the computer system (elimination of errors),
 - electronic platforms, which allow to place orders and make purchases electronically (e-procurement),
 - Service-Oriented Architecture (SOA) – a collection of independent services and components, performing a variety of business functions,
 - Web Services – a special case of realization of SOA, these are software components that represent business functions that are available to other applications via the public network and using publicly available common data exchange protocols,
 - Workflow – systems, automated in whole or in the part the business process during which information and tasks are passed between participants in the process to implement activities in a manner consistent with the defined rules,
 - Web 2.0 – websites, including user-generated content (wikis, blogs, RSS feeds, etc.).
2. IT Solutions that support the business:
 - Enterprise Resource Planning (ERP) – systems which support resource planning in the enterprise; integration of all enterprise resource into planning processes (this system is very popular in European medium and large enterprises),
 - Transport Management System (TMS) – tools for the management transport and forwarding; Information service of the physical movement of goods between distant warehouses, occurring in certain packaging logistics,
 - Customer Relationship Management (CRM) – systems which support collaboration with customers; Information service knowledge base about the relationship, what they are the recipients of a company,
 - Warehouse Management System (WMS) – a system which is used to manage warehousing; IT support of physical movement of goods inside the warehouse, occurring in certain packaging logistics,
 - Business Intelligence (BI) – Information transform large amounts of data into information and computing transformation of information into knowledge; often used for planning and research the profitability of products, services, customers,

- Management Information System (MIS) – systems that collect and analyze data from different areas, and then deliver them to management units in an ordered form and current information,
- Automatic Data Capture (ADC) – Information and hardware techniques for automating the process of identifying data through the use of various methods of diagnosis, e.g. barcodes, RFID, and voice technologies,
- 3. IT solutions that support the monitoring of shipments:
 - EPCglobal – the international standard for data storage in the form of an Electronic Product Code (EPC) and the use of Radio Frequency Identification (RFID),
 - GPS (Global Positioning System) – a system that allows positioning of objects moving through satellite navigation,
 - GIS (Geographical Information System) - geographic information systems allowing for visualization of individual objects on maps and plans of cities and satellite images
 - fleet management – systems for collecting and supervising the information transmitted by radio from the on-board computers installed in vehicles.

2.4. Conclusions

Given the challenges inherent in SCM, it is imperative that firms carefully analyze their specific competitive positions to verify that the integration journey is worth taking. Without commitment and an understanding of the associated challenges and requirements, they may be better off focusing their efforts and resources elsewhere. They must also seriously consider their potential to learn and change (Fawcett, Magnan, 2004, pp. 67-74).

In figure 2.3. shows the relationship of the supply chain with the eight mutually complementary business processes. These are (Ciesielski, 2009, p. 316-317):

- Customer Relationship Management: it allows you to create an optimal model to assist building, developing and maintaining contact with the customer. It identifies the particular market segments, allows you to generate criteria for categorizing clients and determine their profitability,
- Service Management: the client is able to keep a check product availability, terms, and the current status of deliveries. Access to current information provides an interface linked directly to the production plans and logistics manufacturer,

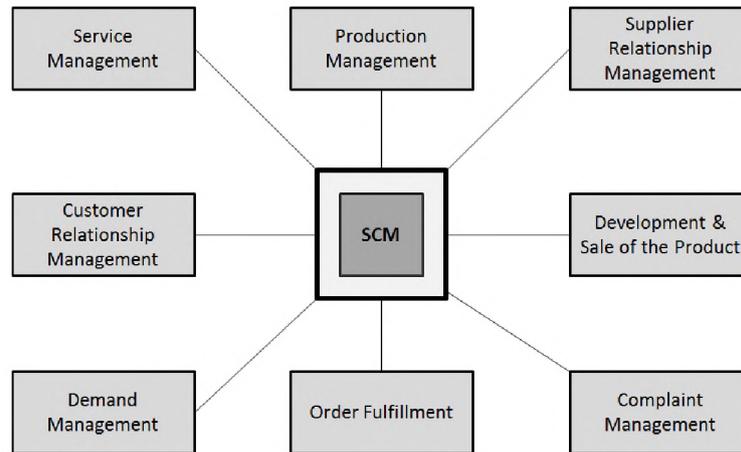


Fig. 2.3. Relationship of the supply chain with the eight mutually complementary business processes
Source: own study

- Demand Management: maintain an optimal balance between customer expectations and the manufacturer's production capacity. Demand management has advanced forecasting techniques with the simultaneous synchronization of their results with the production, purchasing and distribution,
- Order Fulfillment: it requires the integration of production plans, logistics and marketing on the side of the manufacturer. The manufacturer should strive to maintain positive relations with suppliers in the chain in order to deliver added value to customers and reduce the cost of delivering products to the market,
- Production Management: this process is directly related to the production of flexible products, quality control, analysis of the causes of deviations and continuous control of inventory,
- Supplier Relationship Management: the role of the SRM is to identify and build a close business relation with the so-called. key suppliers (suppliers make categorization by the determination of their profitability, growth opportunities and how maintenance of goods sold),
- Development & Sale of the Product: key importance attributed to speed delivery of new or improved products on the market,
- Complaint Management: can contribute to achieving the company a competitive advantage.

These processes occur in every link of the supply chain and are supervised by the IT systems and other tools. The more data are processed in the company, the better you can use them in the flow of information between supply chain partners. Reciprocal links involve not only the systems, but also of e-economy and standardization of information (GS1) or tools enabling fleet management. By establishing relationships with suppliers and consumers, creating logistic chains of supply and swiftly reacting to changing demand, business partners can attract and keep more customers. Cooperation with the chain partners would be impossible without complex IT systems and e-economy tools (such as EDI). The advancing standardisation allows companies to go beyond the local market and expand into global market horizons. Investments into the creation of complete supply chains and IT tools ensure a protection against market fluctuations and additional costs resulting from frozen capital and planning errors. This development tendency is unavoidable, and once more it provides businesses with new opportunities for achieving a strong position on the market.

References

1. Ciesielski M. (ed.), (2009), Instrumenty zarządzania łańcuchami dostaw [Instruments of supply chain management], Polskie Wydawnictwo Ekonomiczne, Warszawa
2. Coyle J.J., Bardi E.J., Langley Jr. C.J., (2003), The management of business logistics: a supply chain perspective. South-Western
3. Ehie I.C., Madsen M., (2005), Identifying critical issues in enterprise resource planning (ERP) implementation, Computers in Industry, Vol. 56, Issue 6, pp. 545-557
4. Fajfer P., Kolinski A., Krajewski S. R., (2014), Business Systems Virtual Platform - MBA in Logistics & Supply Chain Management, Poznan School of Logistics Press, Poznan
5. Kolinski A., Fajfer P. (2011), ERP integration as a support for logistics controlling in supply chain, in: Golinska P., Fertsch M. and Marx-Gomez J. (eds.), Information Technologies in Environmental Engineering - new trends and challenges, ESE. Springer, Berlin Heidelberg, pp. 617-626
6. Fawcett S.E., Magnan G.M., (2004), Ten guiding principles for high-impact SCM, Business Horizons, Vol. 47, Issue 5, pp. 67-74
7. Kisperska-Moroń D., Krzyżaniak S. (ed.), (2009), Logistyka [Logistics], Instytut Logistyki i Magazynowania, Poznań