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**THE ROLE OF RETAIL COMPANIES' INFORMATION MANAGEMENT
IN THE EFFICIENCY OF SUPPLY CHAINS – AN OVERVIEW**

*ROLA ZARZĄDZANIA INFORMACJĄ W SKLEPACH DETALICZNYCH
A EFEKTYWNOŚĆ ŁAŃCUCHÓW DOSTAW – PRZEGLĄD*

Key words: ICT management, information sharing, supply chain management, retail

Słowa kluczowe: zarządzanie ICT, wymiana informacji, zarządzanie łańcuchami dostaw, sprzedaż detaliczna

Abstract. This paper aims to present a systemic approach of some important information sharing ways from the point of view from the efficiency of supply chains, and provides a short review of Hungarian retail sectors related, actual status. The success of supply chains can be based on the partnership among the member sites and especially on the quality and quantity of the shared information. The aim of profit maximization in a supply chain can be mostly achieved through the minimization of transportation costs and at the same time with the maximization of the quantity of sold products. However the utilization of the high quantity of required data necessitates an appropriate preparedness by each member of the supply chain. Retail has a determinative role in the adequacy of related efficiency requirements, since in the next to last point of the chain it gets primary information related to the end-customers preferences.

Introduction

The sharing of information with suppliers and partners is of strategic importance, because through this the decision optimizing of previous links of the chain, and simultaneously the reduction or elimination of stocking anomalies (e.g. partial/total over- or understocking and bullwhip-effect) is possible. At the same time the using of ICT solutions that help and improve the collaboration (e.g. Electronic Data Interchange and its elements, such as retail information systems and retail-specific applications) improves the retailers functional efficiency and after all serves the high level of customer satisfaction through many phenomenon.

Retail's place, role and relevant functions in the supply chain

As the supply chains' next to last element retail has a specific transformational function. The "specific" attribute denotes that the retail does not alter the materials, semi-finished or finished products in their physical, chemical or other features, but according to the delegated tasks supports and allows of the purchasing in conformity with the customers' demands in the right time, place and way.

In virtue of the definition the retail is a mediation between the production and consumption, which provides the distribution of goods from producers to customers. After Töröcsik [1998] and Lehota [2001], the tasks of retail can be summarized by the followings:

- distribution,
- surmounting of spatial differences and temporal discrepancies,
- harmonizing of production and consumption structure,
- repairing and maintenance service,
- protection of consumers and products,
- exercising influence on consumption through marketing actions,
- financing and crediting,
- handling of goods,
- transformation.

The above specialized retail functions requiring many coordinated activities. The system of activities in turn are forming the store technologies and procedures. The improvement and optimization of procedures and the realization of quality-focused approach are resulting in significant, quantifiable advantages. The improvement or rather the optimization of procedures can be done manually, however in conformity with the 21st century's requirements, the much of enterprises are using ICT devices for these purposes.

The starting point of chain members' activities: surveying of customers' needs

In the course of the comparison with the competitors, an elemental finding is, that getting and retaining of customers is only possible in that case if a retailer can offer some plus in those factors, that are important from the point of view of customers.

This is in turn only possible if the retailer is acquainted with the customers' all-time demands. The claim that enterprises would like to exploit at least their own information that are arising in the course of their functioning stimulates them to use up-to-date technologies. However there is a question that the modern devices are only used for covering the elementary and in-house retail functions or is there an effort to use them to realize the higher standard of information management. Retailing's fundamental aim is to necessarily maximize the sales and income, ideally with the attainment of customer satisfaction. The concept of the so-called *logistic target function* is in harmony with the foregoing observations. It expresses that an optimal logistic system can be established, if the expected customer service level is realized at acceptable customer costs. This means that the too low service level at low costs can cause bankruptcy, but at the same time the higher, but too expensive customer service level is also impractical. So thus, the logistic performance depends on the customer service level and the rate of logistic costs; that is expressible and optimizable by a function [Szegegi-Prezenszki 2008]:

$$L_p = f(C_L; C_R)$$

where:

L_p – the logistic performance,

C_L – the level of customer service,

C_R – the total rate of logistics costs.

The retail information systems are supporting both the aspects of service quality and logistic efficiency. The primary information provided by these systems are squarely numerical, in most of the cases measurable and expressible in a sort of units (such as currency, piece, time, etc.) and so these data are also appropriate for quality control or logistic optimizing purposes.

From the point of view of this essay the utilization and sharing of stock-movement data among the members of the supply chain are the relevant elements. The cooperation within the supply chain can be realized by "business phylosophy" introduced in the next point.

The ECR approach

According to the ECR Europe Board the ECR's (Efficient Consumer Response) definition the ECR is the *cooperation between supplier and retailer in the interest of the better, faster gratification of customers' demands with the lowest costs so far* [www.ecr-all.org]. The ECR at the same time necessitates the stateful planning, the materialization of developed technological requirements, the supplier's and retailer's collective thinking and its main goal is the partners' processes paralelly with the providing of plus values for customers. So thus on the whole all the members of the supply chain can gain significant benefits by its adaptation. The opportunity of the ECR's existence comes from the fact that – in reference to an analogous conception, the category management – the retail structures have been radically altered for the sake of the changes of customers' habits. Nowadays – as a result of the alteration – the sites of the value chain more and more caring about the end customers, and in contrast of the previous approaches the chain members are collaborating towards to the improvement of their services. However the fact that – according to the ECR's essence – the manufacturers (suppliers) and retailers should cooperate in behalf of the customers (and of course of themselves) – needs an important change of mind from their point of view. Hence the success of the ECR efforts depending on the relationships and trust within the supply chain, as the cooperation is basically realized through the information and data sharing. The advantages of information sharing arises from the synthesis of information from different parts of the market, which allows of the better understanding of customers' verdicts. The combina-

Table 1. The levels of information-sharing among retailers and manufacturers, and its advantages in stocking
 Tabela 1. Poziom wymiany informacji pomiędzy detalistami i producentami i jego znaczenie dla magazynowania

Information sharing levels/ Poziom wymiany informacji	Average order-up-to level/ Średnie uzupełnianie zapasów		Average inventory level/ Średni poziom zapasów		Expected inventory cost/ Oczekiwany poziom zapasów	
	retailer/ detalista	manufacturer supplier/ producent, dostawca	retailer/ detalista	manufacturer supplier/ producent, dostawca	retailer/ detalista	manufacturer supplier/ producent, dostawca
Level 1 (decentralized)/ Poziom 1 (zdecentralizowany)	–	–	–	–	–	–
Level 2 (coordinated)/ Poziom 2 (koordynowany)	–	↓	–	↓	–	↓
Level 3 (centralized)/ Poziom 3 (scentralizowany)	↓	↓↓	↓	↓↓		↓↓

Legend: – the value equals that of level 1, ↓– the value is less than "–", ↓↓– the value is less than "↓"
 Legenda: – wartość równa 1, ↓– wartość mniejsza niż "–", ↓↓– wartość mniejsza niż "↓"
 Source/Źródło: Yu et. al. [2001]

tion of the knowledge also results in the descending costs of the supply chain (e.g. through the possible elimination of bullwhip-effect), so the profitability gets better by each of the members, and so the product-related costs are also decreasing [Li et al. 2011]. The ECR conception – beyond the necessary information sharing – requires the execution of various functions from the individual participants.

Yu et al. [2001] had assigned three integration levels from the aspects of the strength of vertical supply chain cooperations:

1. Decentralized control: The inventories at each different sites of the supply chain are evolving independently. In this case there is neither information sharing nor stock-coordination among the retailer and manufacturer. Both the retailer and manufacturer make their own decisions and actions based on their own forecasting. The retailer uses the customers' demand information, while the manufacture takes the retailer's ordering information as basis.
2. Coordinated control: The neighboring inventories are coordinated and evolved through the sharing of the customers' ordering information. In this case the manufacturer (supplier) can exploit the data about the customers' demands parallelly with the retailer's ordering data, thus its inventory decisions can be based on combined information.
3. Centralized control: If so, by means of the mutual electronic data interchange both the manufacturer (supplier) and the retailer gets the appropriate, synchronized demand information. With this the manufacturer is able to permanently supply, and the retailer's stock-levels' automatic and optimal replenishment is also possible.

The authors had correlated the above demonstrated cooperation forms with *Pareto improvement*. Pareto improvement implies that after any alteration in an economic system, the members of the system are at least as well off and some members are better off.

The advantages of information sharing – which of course matches the Pareto improvement's idea – such as the decreasing stock levels and by the way of that cost savings are arising distinctly by the different sites of the supply chain and differently by the above mentioned integration levels. Namely it is obvious that the manufacturer can achieve proportional advantages at any level of information sharing, at the same time the higher level partnership (the 3rd level) can improve each sites' and the supply chain's total performance to a greater extent.

Current supportive tools: EDI and data synchronization

It is often said that adaptation of Electronic Data Interchange is not a simple IT, but rather an overall rationalizing¹ project, which affects several of the connecting companies' functional areas (e.g. reception of goods, purchasing, administration, invoicing, accounting, etc.). The retail companies and suppliers fast, effective transactions can be spread in the immediate future, if – especially – retailers will widely recognize the significance of EDI's simplifying role in B2B communication, and that the suppor-

¹ Business Process Reengineering

Explanations/Objaśnienia:

1 – Enterprises using automated data exchange with other ICT systems outside the own enterprise/*Firmy wykorzystujące automatyczną wymianę danych z innymi systemami IT poza przedsiębiorstwem*

2 – Enterprises using automated data exchange for sending or receiving product information/*Firmy wykorzystujące automatyczną wymianę danych do pozyskiwania i przekazywania informacji o produkcie*

3 – Enterprises sending and/or receiving e-invoices/*Firmy wysyłające lub otrzymujące e-faktury*

4 – Enterprises who share electronically information with suppliers and customers on inventory levels, production plans, demand forecasts or progress of deliveries/*Firmy, które dokonują wymiany informacji z dostawcami i klientami nt. poziomu zapasów, planów produkcyjnych, prognoz popytu czy dostaw*

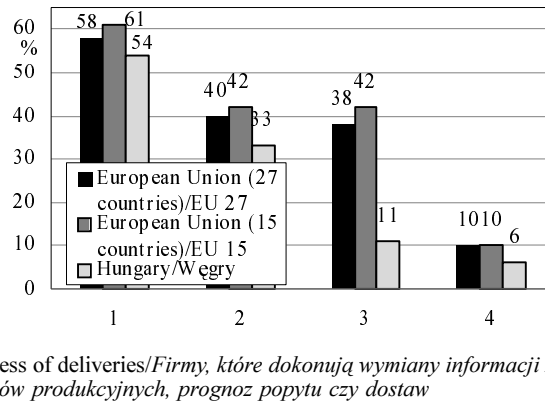


Figure 1. Comparison of SCM related IT readiness indicators by wholesale and retail enterprises in Hungary and the EU (data in percentage of enterprises and for year 2010)

Rysunek 1. Porównanie wskaźników gotowości IT związanych z SCM w odniesieniu do przedsiębiorstw sprzedaży hurtowej i detalicznej na Węgrzech (dane w procentach udziału przedsiębiorstw za rok 2010)

Source/Zródło: Benchmarking Digital...2009

tive automated processes, are potentially taking out the often circumstantial, less efficient and wasteful activities. (for instance through global standards, electronic invoicing, e-commerce, etc.). According to the next figure (Fig. 1) providing four parameters of benchmarking of the related digital readiness, Hungarian wholesale and retail sector has a remarkable leeway in the adaptation and usage of interoperability technologies.

The Global Data Synchronization Network based on GS1 standards as a global initiative has the aim to ensure that the changes of relevant and verified data issued and stored in a company's ERP system are automatically being enforced in the accompanying corporations' ERP systems as well. It is evident that the requirements of its application are improving and speeding up the data interchange and administration, and with this the movement of goods within a supply chain through ensuring the continuous consistency among suppliers and wholesalers/retailers product databases.

After the 2. and 3. Figures it is noticeable, that through the recognition of the advantages, the usage of GDSN is now representing a large scale growth rate, and already actively used in more than 80 countries by actors of business life.

The number of system users – until April 2011 – exceeds 21 thousands, and the number of registered products in turn is above 6 million 700 thousands. In Hungary, merely three big (food) retail chains (METRO, Tesco, COOP) are using GDSN under the framework of pilot projects, or in initial period.

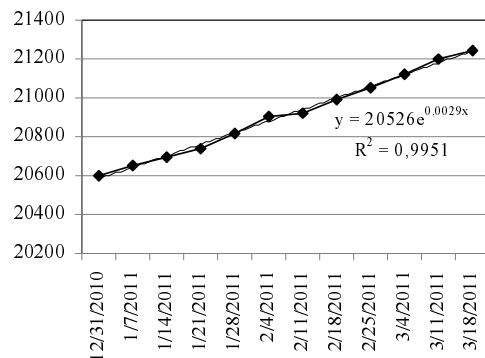


Figure 2. Registered GLNs (Global Location Numbers) in Global Data Synchronization Network
Rysunek 2. Zarejestrowane GLNs w Globalnej Sieci Synchronizacji Danych

Source/Zródło: GS1... 2011

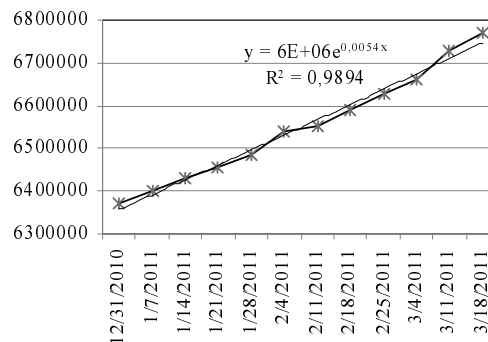


Figure 3. Registered GTINs (Global Trade Item Numbers) in Global Data Synchronization Network
Rysunek 3. Zarejestrowane GTINs w Globalnej Sieci Synchronizacji Danych

Source/Zródło: GS1... 2011

Conclusions

The European Commission's Digital Agenda strongly emphasizes the lack of interoperability: "Europe does not yet reap the maximum benefit from interoperability. Weaknesses in standard-setting, public procurement and coordination between public authorities prevent digital services and devices used by Europeans from working together as well as they should. The Digital Agenda can only take off if its different parts and applications are interoperable and based on standards and open platforms" [A Digital Agenda... 2010].

The infrastructural conditions related to efficient cooperation within supply chains are necessitating the quick development especially in Hungary, but also in several other technological aspects [Dutta, Mia 2011], Hungary has to catch up with developed European countries. In this regard, the role of retail information management can hardly be exaggerated, while as the supply chain's next to last element, with the appropriate technological readiness and developed information management it gets numerical, primary information about the customers' preferences and demand. However the other members of the chain are also requiring these information for the optimization of functioning. Both the EDI and GDSN, as key technologies of collaboration are allowing of the assortment and production optimization, the appropriate inventory planning and optimization, shelf optimization. Also the reduction of transportation costs – through the available, shared data and electronic and automatic synchronizing processes, the prevention of data inconsistency and its several kickbacks are possible. Thus this narrow, but important field of technology applications, are essentially adapted for the activation of the entire supply chain and for improving customers' satisfaction, and of course it parallelly serves the environmentally sustainable business.

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Streszczenie

Artykuł podejmuje tematykę zarządzania łańcuchami dostaw. Jego celem było zaprezentowanie ujęcia systemowego w kontekście wymiany informacji oraz roli jaką ona pełni w generowaniu efektywności łańcuchów dostaw. Dodatkowo zaprezentowano charakterystykę węgierskiego rynku sprzedaży detalicznej.

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