

SUPPLY REORGANISATION CONDUCTED WITH THE APPLICATION OF E-BUSINESS PRACTICE: THE CASE OF POWER INDUSTRY IN POLAND

Maria Nowicka-Skowron
Professor
Technical University of Czestochowa

Iwona Otola
M.Sc.
Technical University of Czestochowa
izygmunt@poczta.onet.pl

Abstract

The main aim of the research was to elaborate directions for supply reorganisation in The Southern Power Concern (SPC). In 2001, The Southern Power Concern was formed of seven independent power plants. Now the power plants are members of the SPC, but they still have their own supply policies. Although in most of the Concern entities the delivery departments function properly, there is no co – ordination of delivery activities in the whole Concern. The research focuses on the description of e-business initiatives in the power industry.

Keywords

power plant, supply centre, e-business

INTRODUCTION

Modern logistics systems are based on information systems known as integrated management systems and relate mainly to storing – transportation chains (Abt 1998). The possibility of a direct contact between sellers and buyers appeared along with the birth of the Internet. Internet as an easy and cheap medium improves contacts between companies. (Wiśniewska & Karasek, 2002).

Recently, the concept of supply chain management has frequently appeared in the literature. Its aim is to develop optimum Internet solutions in the area of logistics systems, especially in the field of supply chains. Supply chain management is planning, managing and controlling, that include all stages – from the place of winning raw materials, through the production processes, all the way to a consumer. It aims at offering right products at the right time and place, at the right quantity and quality with the application of modern technology (Blaik 1999). New technologies related to information and communication have emerged to support supply chain management. E - business in general, refers to doing business electronically, via the Internet. The core of e – business from a supply chain management perspective is the intensive and efficient information transfer between companies within a value chain that

improves reaction to changes in customer demand (Vorst VAN DER *et al.*, 2002). The opportunities provided by e-business and the potential for change because of the differences between Internet-based interactive, allows for spontaneous relationships or transactions to occur, has many potential users and can create both delivery mechanism and a market-place (Thompson *et al.*, 2000). E-business is also defined as the technology that provides effective and efficient ways in which corporate buyers can gather information on available products and services, evaluate and negotiate with their suppliers, process orders and access post-sales services (Archer & Yuan, 2000). In an enterprise implementing e-business there are numerous opportunities in the area of decreasing costs and increasing revenues. It is possible to reduce costs by decreasing delivery costs and time, decreasing inventory costs through centralisation, as well as improving supply chain co-ordination through information sharing. As far as revenues are concerned, it is possible to increase them by implementing flexible prices, providing 24-hour access from any location and offering direct sales to consumers. Internet is used by suppliers, consumers and distributors for business communication and transactions.

SUPPLY SYSTEM IN SPC

The supply system in SPC was the first stage of the research. An analysis of the present condition was conducted. The analysis concerned the following issues: the demand of SPC in the field of materials, semi-finished products, services supply, ordering system, organizational structure and circulation of documents in supply departments, identification and estimation of the level of inventory costs as well as warehouse infrastructure analysis.

Corporate logistics processes, particularly relating to the supply issues, arise certain logistic costs. Cost accounts play a special role in a logistics system. The principle here is evaluation and estimation of past costs. (M. Nowicka – Skowron, 2000). Basing on the data obtained from the SPC entities certain logistics costs were estimated. Delivery and purchase processes are crucial for proper operation of a power plant (in particular for the proper course of production processes), as any disadvantageous actions have an impact on the costs borne by the enterprise in relation to production stoppages. At the same time, excessive inventories worsen the financial liquidity and cause the formation of frozen capital. The crucial action is to find and determine the optimum solutions, which would ensure the continuity of electric and heat energy production on the one hand and on the other minimize the costs of maintaining inventories in the concern logistics chain. The right level of inventories is essential for ensuring the continuity of work. Maintaining inventories above the indispensable level is inadvisable as it is the cause of freezing the financial resources and as it increases the costs of a business unit operation. However, a low level of inventories may cause stoppages that result in losses. Raw material and goods should be thus delivered to the enterprise in such quantity and time, which will not cause disruptions in production. The level of inventories in particular power plants of the SPC differs significantly. It is caused by the differences in their size and activity. All material demands in the SPC were systematized according to the Systematic Product Register. This is a classification of material according to production branches and it is used to identify the materials needed to satisfy customs and taxes demands. Figure 1 presents the value of materials in individual branches of SPC.

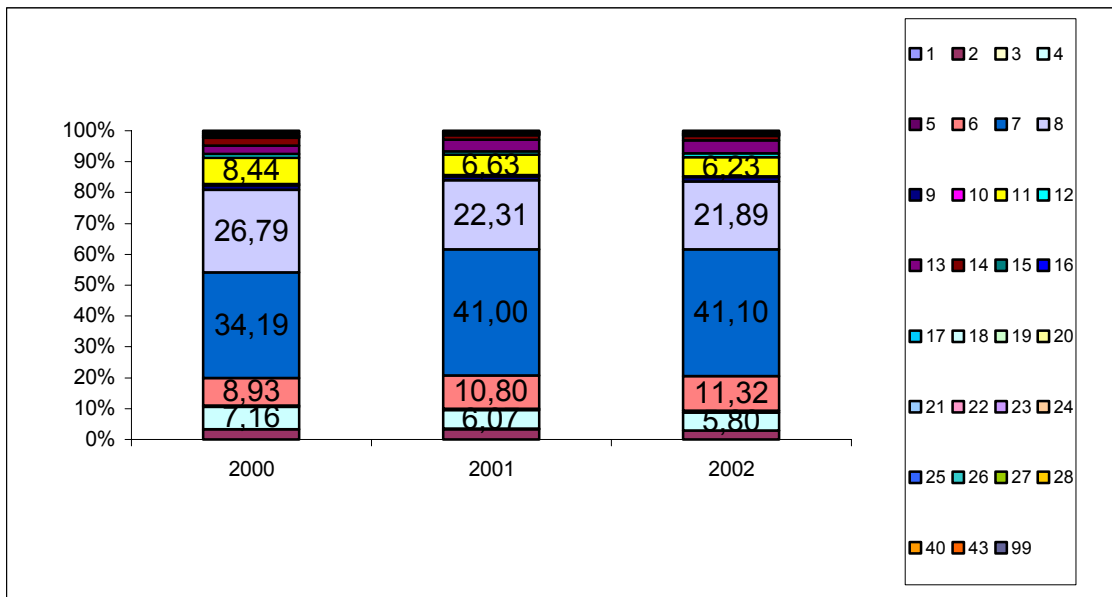
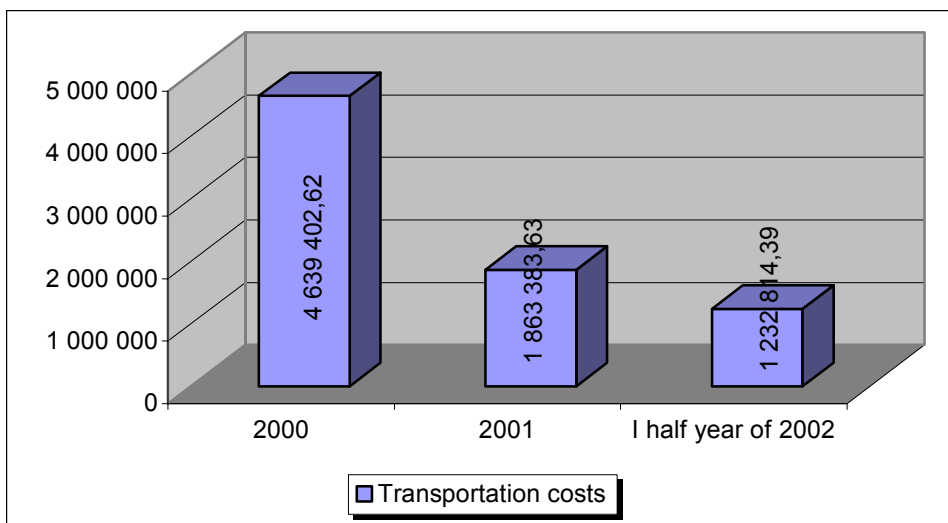


Figure 1. The value of materials in individual branches of SPC

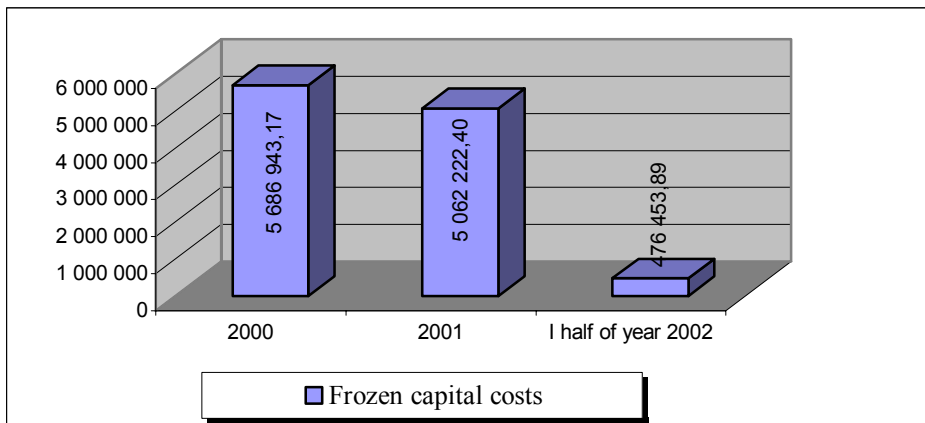
The materials from the following five branches had the highest value: 4 (iron/steel industry goods), 6 (metallurgical industry goods), 7, 8 (equipment and machines), 11 (electronic and electro – technical industry goods). In the years 2000 – 2002 the percentage share of the materials from these five branches amounted to about 85 – 86 % of all the materials value.



Source: own analysis.

Figure 2. Transportation costs in the SPC

The data on transportation costs shows a decreasing tendency. It is consistent with the power plants policy to choose suppliers ensuring free transport. Market changes have caused great competition and only the entities that ensure a high level of services may survive.



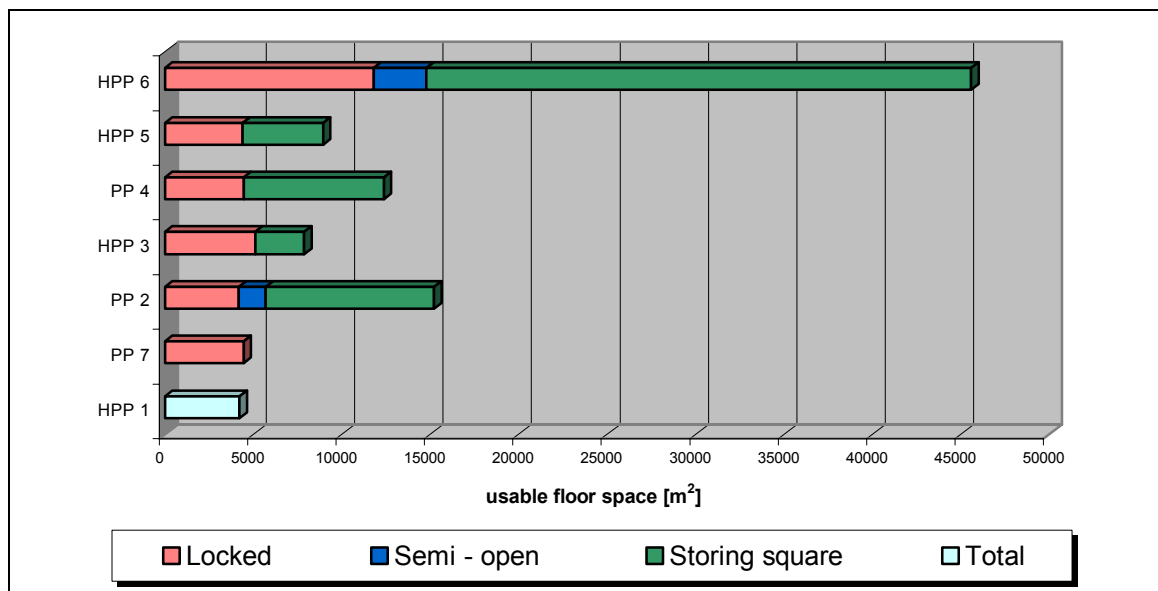
Source: own analysis.

Figure 3. Frozen capital costs in the SPC.

In order to estimate the level of frozen capital costs at inventories it is necessary to take into consideration the average interest of bank deposits. The liabilities costs were not taken into consideration as all payments for supplies were realized from the plant financial resources. The average interest of deposits in the particular period was the following: in the year 2000 - 13,52% , 2001 - 11,50% and January, February 2002 - 7,80%. The research indicates that the decrease in the level of frozen capital costs was caused by the decrease of deposit interests rather than real fall of the inventories size.

The power plants use three kinds of warehouses:

- ✓ Locked
- ✓ Semi – open,
- ✓ Open.



HPP – Heat and Power Plant

PP – Power Plant

Source: own analysis

Figure 4. Utilisation of the storing area infrastructure in particular entities of the SPC

Utilisation of the storing infrastructure of SPC is very diverse. The average utilization amounts to 60%. However, in some power plants there are completely unused warehouses and a part of the warehouses is used to the maximum extent. As a number of the inventories may be closed down, one should assume that the unused floor space would increase. Due to the fact that the existing infrastructure is not utilised optimally there is a possibility of rationalization actions which may bring cost reduction.

Taking into consideration the possibility of transferring materials between particular power plants of the SPC, transportation distances between these entities were evaluated. This data could be helpful in the future logistics decisions in the field of storing and transport. The distance matrix and the geographical location may be applied for determining a Supply Centre localisation. The Supply Centre is the optimum place of storage, ensuring minimization of storing and transportation costs.

HPP 1	HPP 1							
PP 2	20	PP 2						
HPP 3	65	51	HPP 3					
PP 4	15	36	70	PP 4				
HPP 5	60	58	102	72	HPP 5			
HPP 6	17	38	77	31	59	HPP 6		
PP 7	44	59	103	56	66	27	PP 7	
PP 8	35	24	69	51	45	44	70	PP 8

HPP – Heat and Power Plant
 PP – Power Plant

Source: own analysis.

Figure 5. Estimated distances between the present storage infrastructure of the SPC.

Order processing takes place on the basis of the following documents:

- annual demand plan,
- temporary and emergency demands.

Annual demand plan is a compilation of the demands of individual organizational units of particular power plants. A temporary or an emergency demand may be written out only for the materials that are not taken into consideration in the annual plan and whose value does not exceed 10% of the aforementioned plan.

The deliveries to the SPC are realized on the basis of one of two ordering methods: inviting tenders or purchasing without tenders. One does not invite tenders when the net value of an order does not exceed 5000 Euro or in emergency situations, in which the net value may amount to 300 000 Euro. Tenders are invited in case of orders whose net value amounts from 5000 to 300 000 Euro.

The ordering systems in particular power plants and heat and power plants of the SPC present the following irregularities:

- ✓ Too complex system of document circulation. Very frequently order documents are duplicated.
- ✓ Informal information exchange - some employees create their private registers.
- ✓ Incorrect application of procedures concerning purchases in individual power plants.

- ✓ The necessity of enclosing detailed and precise description of parts and materials ordered results in difficulties in the information flow.
- ✓ The index system implemented is not a complete data base. Discrepancies in the index names are caused by the lack of co-operation between the power plants.
- ✓ Lack of compatibility between the information management system (of the Department of Material Management) and the new accounting system (of the Department of Accountancy).
- ✓ Independent processing of orders by individual power plants limits the possibility of taking advantage of the following benefits: free transport, discounts or negotiating prices and terms of payment.

The analysis of the supply and logistics system has shown that:

- ✓ The entities of the SPC have their own supply procedures;
- ✓ There are different suppliers in each one of the entities. This situation results in the fact that there are various prices for the same product, various supply and payment conditions;
- ✓ Some of the plants have no procedures of a supplier choice;
- ✓ While purchasing separately, the plants have to bear high transportation costs per unit;
- ✓ The plants have larger inventories than demands. It is especially visible in case of the spare parts inventory. Some spare parts have been stored for many years, as the remains of the previous centralised economy where enormous quantities of spare parts were stored in case of damage. Now they constitute a large share of the total inventory value with a little hope for usage in the nearest future.

The present situation hinders the implementation of the optimum supply policy, that is the policy of standardizing the procedures, introducing uniformity in the material indices, centralizing supply and distribution decisions, creating a database of the Concern inventories.

SUPPLY CENTRE

There is no perfect organizational structure as each organization has specific needs and requirements. Nevertheless, two types of solutions may be distinguished: centralization and decentralization. The important question is whether purchase management should be provided by one central unit or whether it would be better to decentralize it. Before taking the decision it is necessary to distinguish the advantages and disadvantages of both solutions.

The advantages of centralized purchasing are the following:

- ✓ Stronger negotiation position being the result of the turnover size and larger amounts of products purchased;
- ✓ Decrease in purchasing unit costs;
- ✓ Material and payment flows monitoring;
- ✓ Preventing corruption through the application of the Law on Public Orders;

Obviously, there are some disadvantages of centralized purchasing:

- ✓ The central unit may have trouble with effective application of the information on local demands;
- ✓ Transmission of information may be delayed by the communication system between particular power plants and the central unit;
- ✓ Mistakes of the central unit are experienced by the subordinated plants;

The advantages of decentralized purchasing include:

- ✓ More flexible reactions to own needs;
- ✓ Opportunity of finding favourable purchase conditions in the local area;
- ✓ The size of the purchase corresponds to the size of the demand;

The points against decentralized purchasing are the following:

- ✓ One may not rely on favourable price conditions;
- ✓ Probability of buying the same materials by different suppliers;
- ✓ Some orders do not receive the right priority;

It seems that nowadays, when there are information systems that may operate in complex organizational structures, one may search for management solutions employing both forms. This chance is offered by a complex approach to the process of purchasing - from ordering to storing. Some processes should not be decentralized, whereas some others should be implemented by particular plants.

The distances between particular power plants exclude the possibility of direct supply management, and thus an e-business solution should be applied.

E-business means executing business transactions over the Internet. The companies implementing the e-business practice may perform some or all of the following transactions over the Internet:

- ✓ Providing information;
- ✓ Negotiating prices and contracts with customers and suppliers;
- ✓ Allowing customers to place orders;
- ✓ Allowing customers to track orders;
- ✓ Filling and delivering orders to customers;
- ✓ Receiving payment from customers;

Some of these transactions are crucial in the case in question. Information on the presently stored materials and spare parts allows for proper inventory movement and inventory level decrease to take place in all power plants of the SPC.

Nowadays, there is no common system in the SPC entities which would enable the introduction of modern logistics solutions aiming at improving the supply departments work. The analysis shows that one possible solution is to create a common Supply Centre. The Supply Centre would process the orders that are common for all power plants as well as the orders placed by particular plants. Centralization of these activities would allow for the implementation of the procedure of choosing a qualified supplier. Purchasing goods for all the SPC plants allows for negotiating prices, receiving discounts, free transport and negotiating the payment terms.

It is necessary to ensure communication between the Supply Centre and particular entities of the SPC. It would be helpful to introduce a computer mode in all power plants that would become a database for the Supply Centre. It is necessary to consolidate the material and spare part indices between particular power plants, as well as the documents used in the supply procedures.

An efficient network between particular entities of the SPC and the Supply Centre would result in a more effective and faster procedure of order placement as well as in detailed identification of inventories in individual power plants.

Another advantage for the SPC managers is the possibility of easy monitoring of the Supply Centre activity and the inventories costs.

The following issues would be dealt with by the Supply Centre:

- ✓ Processing and recording orders;
- ✓ Choosing a qualified supplier and negotiating;
- ✓ Transportation to particular power plants;
- ✓ Storing the ordered products;
- ✓ Implementing the purchasing procedures in accordance with the Law on Public Orders;

CONCLUSION

The analysis conducted in the concern has proven that the optimum solution would be the implementation of an Internet-based system. The new system would enable centralising the purchasing processes of the Concern which would in turn result in greater price negotiation possibilities. The system centralisation would also improve the inventory level control. Its introduction would imply standardisation and simplification of purchasing processes. This situation would effect in decreasing the number of employees.

Unified purchasing systems as well as qualified suppliers lists would result in better quality control of the goods purchased.

All the changes would be possible to implement after having introduced certain modifications in the organizational structure of particular purchase departments. The actions discussed would contribute to the decrease in the Concern logistics costs.

REFERENCES

- Abt, S. 1998. Logistics Management in the Enterprise. Warsaw: PWE.
- Archer, N. & Yuan, Y. 2000. Managing B2B Relationship Throughout the E –commerce Procurement Life Cycle. *Internet Research: Electronic Networking Applications and Policy*. Vol. 10, No. 5, 385 – 395.
- Blaik, P. 1999. Logistics. The Conception of Integrated Management of the Enterprise. Warsaw: PWE.
- Nowicka – Skowron, M. 2000. The Effectiveness of Logistics Systems. Warsaw: PWE.
- Thompson, S.J. & Hayenga, M. & Hayes, D. 2000. E-agribusiness. Proceedings of the IAMA Conference, Chicago, 23-28 June.
- Vorst, J. van der & Dongen, S. van & Nougier, S. & Hilhorst, R. 2002. E –business Initiatives in Food Supply Chain; Definition and Typology of Electronic Business Models. *International Journal of Logistics: Research and Applications*. Vol. 5, No. 2., 119 – 137.
- Wisniewska, E. & Karasek, J. 2002. The Analysis of Introducing E-procurement Solution. In: Grabara, J. K. & Nowak, J.S. (ed.) 2002. *Computer Systems Application and Initiative 2002*. Warsaw – Szczyrk.