

THE LOGISTICAL CONCEPT OF MATERIAL DECOUPLING POINT IN THE POLISH MINING SECTOR

Artur ŚWIERCZEK

Abstract: *The Material Decoupling Point (MDP) is one of the most popular concepts in logistics. It is currently perceived as one of the most fundamental logistical solutions, which allows a company to survive and gain a competitive position in the highly volatile environment. The MDP is a point in the material flow to which the customers’ order penetrates. In other words, it separates the order-driven activities in the product flow from the forecast-driven ones. There are many publications introducing theoretical background of the MDP concept, but only a few of them present its practical importance. The paper will depict an illustrative case study analyzing the position of MDP in an exemplary Polish coal mine.*

Key words: *information and material decoupling point, coal mine, material flow, information flow.*

1. INTRODUCTION

The Polish mining sector is still under reconstruction and demands the implementation of modern technology and innovative methods, as well as concepts and tools of management. One of such concepts is logistics, whose role and importance over the last decade has risen dramatically. The implementation and usage of logistical rules and methods positively influence the effectiveness of companies and enable them to gain competitive advantage in the permanently changing environment. One of the most popular logistical concepts is material decoupling point, which in the last few years has been a subject of intense research both in theoretical and practical fields.

The paper presents an illustrative case study on the external and internal material relations in a coal mine and an analysis of the position of material decoupling point in product flow of coal.

2. INFORMATION AND MATERIAL DECOUPLING POINT – LITERATURE REVIEW

From the logistical point of view there are at least two pipelines within each company – the information flow and the material flow. Both flows are significant and can be perceived as a strategic source of market competitive advantage for an organization.

When a demand for products is transmitted along a series of inventories using stock control orders then the demand variation will increase with each transfer. Market sales data are a catalyst for the whole supply chain, holding undistorted data describing the customer demand pattern. The point to which a marketplace order data penetrates without modification is called information decoupling point [1].

Information decoupling point is where market driven and forecast driven information flows meet [2]. It is a point at which information turns from the high value actual consumer demand data to the typical upstream distorted, magnified and delayed order data [8]. To

maximize the strategic potential of customer data within the supply chain information decoupling point should be moved as far upstream as possible ([2]) to embrace the maximum number of companies.

Sharing in-depth information sounds easy, but does not come naturally for most companies. In fact, the company policy has in the past frequently actively discouraged it [1].

The position of the information decoupling point is strictly concerned with the implementation of the adequate logistics information system in the supply chain – Fig. 1.

Fig. 1 illustrates two types of supply chains: one, traditional pipeline, where each supply chain player receives information from its immediate customer from which a decision on a required internal order rate to satisfy its stock targets is made [1].

In the second situation information is distributed online from one source to all supply chain players. The advantage of such solution is the ability to share many different data, without modification. It means that for example the information about customers’ demand, which

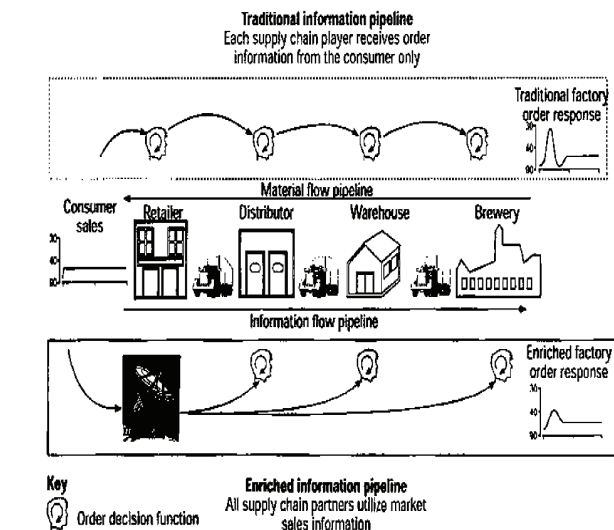


Fig. 1. Enriched information supply chain.

is transferred among supply chain's partners is real, updated and guarantee an appropriate basis for the decision making process.

The logistics information system in the supply chain should guarantee that the organisation will be enriched with information. It means that although through the implementation of IT many companies are flooded with information, very few have gained a competitive advantage via their improved data flow. The implementation of IT is not enough if it only transfers the previous data pool faster, but the information that is transferred leads to success. Successful information enriched supply chains must view their information as a strategic asset and ensure that it flows with minimum delay and minimum distortion [2].

Some managers may think that IT implementation is a solution, but it is only an enabler, which should be utilized properly. The main issue is to overcome the adversarial relationships between supply chain members where they regard each other as enemies [3].

Although the information decoupling point is a very vital issue to consider, it can be solved by changing the companies' attitude to cooperation and achieving common, interorganizational goals. It is much more difficult to do with a material decoupling point.

The material decoupling point has been on the logistical agenda for several years. Material decoupling point (MDP) is a point in the product axis to which the customers' order penetrates. It is where order driven and forecast driven activities meet [2]. MDP is a buffer between upstream and downstream players in the supply chain. This enables them to be protected from fluctuating consumer buying behaviour and therefore establishing smoother upstream dynamics, while downstream consumer demand is still met via a product pull from the buffer stock [2].

The strategic position of the material decoupling point depends very much on the product type, consumer demands and supply chain adopted [4].

Fig. 2 represents a typical position of material decoupling point in the product flow.

The first one is Ship to Stock (STS) – products are standardized and pre-positioned in the market; customers' expectations of immediate availability support the maintenance of speculative safety stock at all points of distribution. The second point is called 'Make to Stock'

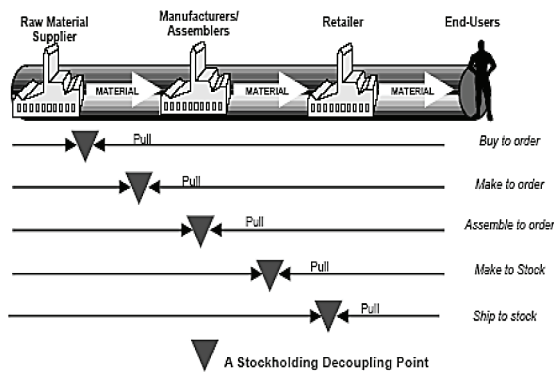


Fig. 2. Typical positions of the material decoupling point in a product flow.

(MTS) – products are standardized but not necessarily allocated to specific locations; the demand is anticipated to be stable or readily forecasted at an aggregate level.

The third possible position of MDP is 'Assemble to Order' (ATO) – products can be customized within a range of possibilities, usually based upon a standard platform. The fourth point is known as 'Make to Order' (MTO) – raw materials and components are common, but can be configured into a wide variety of products. The last position of the material decoupling point is 'Buy to Order' (BTO) point. Products demanded by customers can be unique right down to the raw material level, product variety is virtually limitless, though lead time is long as materials are procured, processed into finished goods, and delivered [5, 6].

Despite the fact that the material decoupling point can be positioned at different points of the supply chain, the governing principle is always to move the material decoupling point as close to the end customer as possible thereby ensuring the shortest lead-time for the customer. This approach also enables full capitalization of the benefits of divorcing the customer variability from the demands placed on the majority of players in the supply chain [2].

3. THE EXTERNAL AND INTERNAL RELATIONS OF A COAL MINE

One of the most important links in the supply chain of coal is the coal mine. It initiates the whole flow of product and affects its efficiency and productivity.

The place of a coal mine in the exemplary material and information flow is presented on Fig. 3.

The analysis of material decoupling point in a supply chain of coal was conducted in the aspect of functioning of coal mines in Poland. The author made the assumption that a coal mine is a crucial tie in a supply chain. On the contrary to theory in a coal mine as the first player in a supply chain is positioned material decoupling point, which can not be moved downstream because of the technological limitations of coal production.

There are many, very complex and different material flows in a coal mine. The widest spectrum of logistical relations is concerned with the basic aspects of functioning of the company – production and distribution of coal. The flow of coal can be subdivided into two main phases: production and distribution of product.

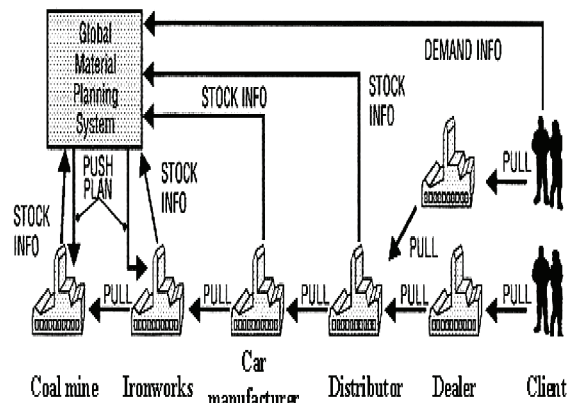


Fig. 3. Coal mine in a logistics flow.

The production phase includes a sequence of two stages: mining and processing of coal.

Mining here means the amount of coal delivered within a unit of time from underground to the ground surface for processing or means of out-of-mine transport. The extraction of coal includes completion of the following duties:

- technical and organizational preparatory activities allowing on mining coal,
- extraction of underground coal,
- vertical and horizontal transport of coal.

The coal extracted to the surface is directed to mechanical processing stage. It is a very important stage in the process of coal production, as the quality parameters of extracted coal differs from those required by the receivers. Because of this, it becomes necessary to process the extracted coal so that it fulfils the customers' demands.

The essential goals of coal processing are commercial products meeting required quality (usage) parameters, with minimized cost price and loss of coal in waste. Due to the technology usage of concentrate in coking plants and fine coal in power plants, the quality of extracted coal is defined by its average value.

The phase of coal distribution in Polish mines includes activities concerned with the selling of a particular type of coal. The receivers can be qualified into two groups: the companies and individual customers. The group of companies comprises: power plants, heat and power generating plants, heating plants, trader intermediaries, etc. This group receives mainly fine coal in high level of order quantities.

The group of individual customers includes: physical persons and companies which use coal according to their private needs. They pay for the received coal in cash-desk of the company and have short period of payment. Individual clients purchase the product in small quantities, mainly coal of higher quality.

4. THE ANALYSIS OF THE POSITION OF MDP IN A PRODUCT FLOW OF COAL MINE

The general discussion on external and internal relations in a coal mine allows to conclude that material decoupling point is allocated relatively close to market. It separates forecast driven activities in a initial process of coal production, especially from mining coal to screening and order – driven activities in a coal processing and product distribution. Fig. 4 illustrates a number of activities which are initiated by plans and forecasts. Therefore, presented activities are fulfilled by push strategy.

The activities initiated by plans and forecasts are: coal mining underground, horizontal transport of coal, coal haulage to the surface, coal screening, etc. As a result there are three types of products: commercial grades (mostly untreated fine coal purchased by companies, not by individual customers), plus mesh (oversize) product (mostly washed and purchased by individual receivers) and minus mesh (undersized) fraction (mostly washed and purchased by companies). These types of products and activities are initiated and fulfilled according to push strategy.

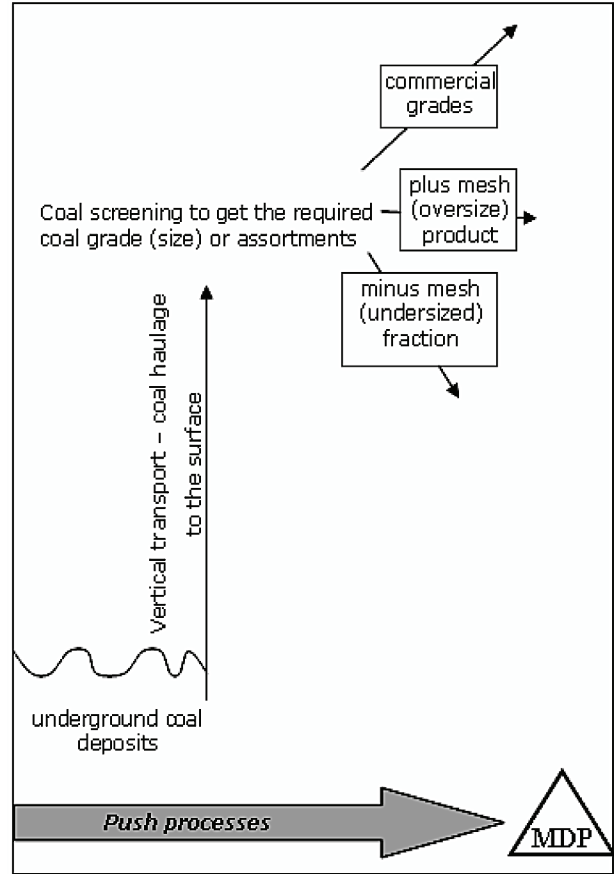


Fig. 4. Activities in a material flow of coal mine initiated by plans and forecast.

On the other hand there is a large amount of activities initiated or potentially originated by customers and their needs. Fig. 5 illustrates activities initiated by market needs of customers.

Three types of products are then directed to loading/storage (especially untreated fine coal), washing (especially minus mesh fraction and plus mesh product), crushing in order to reduce coal size. As a result of coal processing there are different types of products:

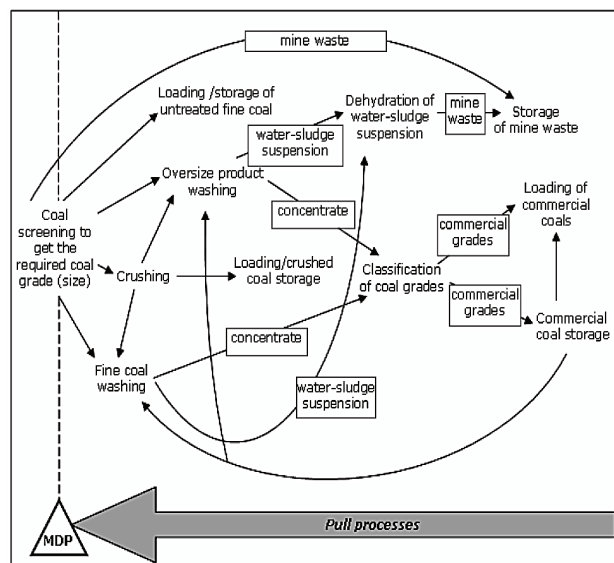


Fig. 5. Activities in a material flow of coal mine initiated by market demand.

- concentrate, its classification and finally commercial grades, which are immediately loaded on the means of transport or set to storage,
- water-sludge suspension, its dehydration and mine waste, which is finally stored,
- crushed coal, which can be immediately loaded on the means of transport, stored or mixed with fine coal of worse quality in order to obtain coal blend with better quality parameters.

Fig. 6 presents a complex analysis of the material decoupling point in a coal mine. There are forecast driven activities on the left side of MDP. All activities here are initiated by push strategy, according to plans and forecasts. There are order driven activities on the right side of material decoupling point. Therefore all activities are originated by pull strategy, according to customers' market demand.

The analysis presented above allows to conclude that the position of material decoupling point in a coal mine is optimal. Such allegation is justified according to following reasons:

- washing untreated coal is followed by the recognition of qualitative and quantitative parameters of receivers' demand,
- coal extracted and not sold in a particular period of time is passed to storage. It is put to direct sale or can be set to coal processing stage in order to obtain quality parameters according to customers' demand,
- size reduction of plus mesh product in order to obtain crushed fine coal, which is then mixed in the coal processing stage. There is coal blend in a result with a desired quality parameters.

The factors above are the evidence that a position of material point in the product flow of a coal mine allows or can allow for effective management of the whole material flow in a supply chain of coal.

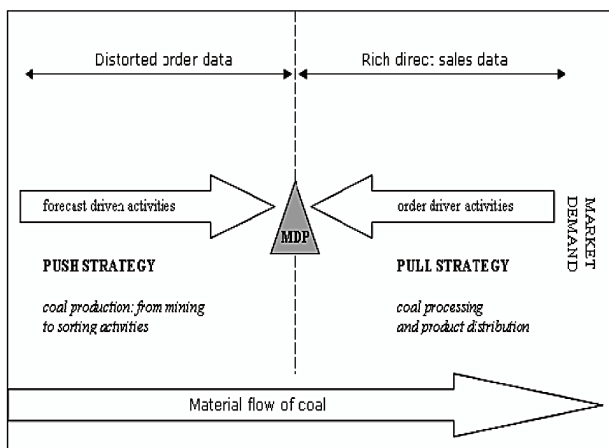


Fig. 6. The position of material decoupling point in a product flow of coal mine.

It is much more complicated in the situation of individual clients, who report their needs (on quantity and quality) on the day of purchasing product. This explains the frequent queues of trucks awaiting for purchasing a particular type of coal. The way of solving that problem could be constructing and implementing an electronic portal which informs receivers on-line about outlets of particular types of coal and in result allows for the reduction of waiting time of individual customers.

5. CONCLUDING REMARKS

Both external and internal material relations of a coal mine and the analysis of the material decoupling point in the Polish mining industry introduced above allow to conclude that the position of material decoupling point in material flow is appropriate, corresponding to the logistics theory. It is important to remark that in parallel with the analysis of material decoupling point, the information decoupling point should also be examined. The joint analysis of material and information decoupling point will provide full benefit for the coal mine and will entirely allow to exploit its potential and efficiency.

REFERENCES

- [1] Mason-Jones, R., Towill, D. R. (1997). *Information enrichment: designing the supply chain for competitive advantage*, Supply Chain Management, vol. 2, no. 4, pp. 137–148.
- [2] Mason-Jones, R., Towill, D.R. (1999). *Using the Information Decoupling Point to Improve Supply Chain Performance*, The International Journal of Logistics Management, vol. 10, no. 2, pp. 13–26.
- [3] MacBeth, D. K., Ferguson, N. (1994). *Partnership Sourcing: An Integrated Supply Chain Approach*, Financial Times, London, Pittman Publishing.
- [4] Kisperska-Moron, D. (1999). *Wpływ tendencji integracyjnych na rozwój zarządzania logistycznego*, AE Katowice.
- [5] Naylor, J. B., Naim, M. M., Berry, D. (1999). *Leagility: Integrating the Lean and Agile Manufacturing Paradigms in the Total Supply Chain*, International Journal of Production Economics, vol. 62, pp. 107–118.
- [6] Goldsby, T. J., Garcia-Dastugue, S. (2003). *The Manufacturing Flow Management Process*, International Journal of Logistics Management, vol. 14, no. 2, pp. 33–52.
- [7] Mason-Jones, R., Towill, D. R. (1998). *Time compression in the supply chain: information management is the vital ingredient*, Logistics Information Management, vol. 11, no. 2, pp. 93–104.
- [8] Hoekstra, S., Romme, J. (1992). *Integrated logistics structures: Developing Customer Oriented Goods Flow*, McGraw-Hill, London.

Authors:

M.Sc. Artur ŚWIERCZEK, Assistant Professor, Higher School of Labour Safety Management in Katowice, Department of Management and Psychology in Business,
E-mail: artuross@poczta.fm