LogForum
> Scientific Journal of Logistics <
2012, 8 (4), 297-310
http://www.logforum.net p-ISSN 1895-2038 e-ISSN 1734-459X

EFFICIENCY ANALYSIS SYSTEM OF MATERIAL MANAGEMENT

Bogusław Śliwczyński, Adam Koliński

Poznan School of Logistics, Poznan, Poland

ABSTRACT. Background: Significant scope of enterprise's efficiency management is improving of material management process both the strategic and operational level. The complexity of material flow processes can lead to a threat such as distraction and disintegration of analysis focusing on many different factors influenced on effective sourcing and procurement management, transport and warehousing processes, inventory management, working capital and cash flow management.
Material and methods: The presented article focuses on multidimensional and multi-criteria analysis of material management efficiency that is considered as decision support system. Authors have presented results of the research regarding ineffective material management confirm insufficient analytical supporting in various decisions of procurement operations.
Results and conclusions: Based on research results authors presented in the article model of efficiency analysis system of material management.

Key words: efficiency, controlling, material management, sourcing & procurement.

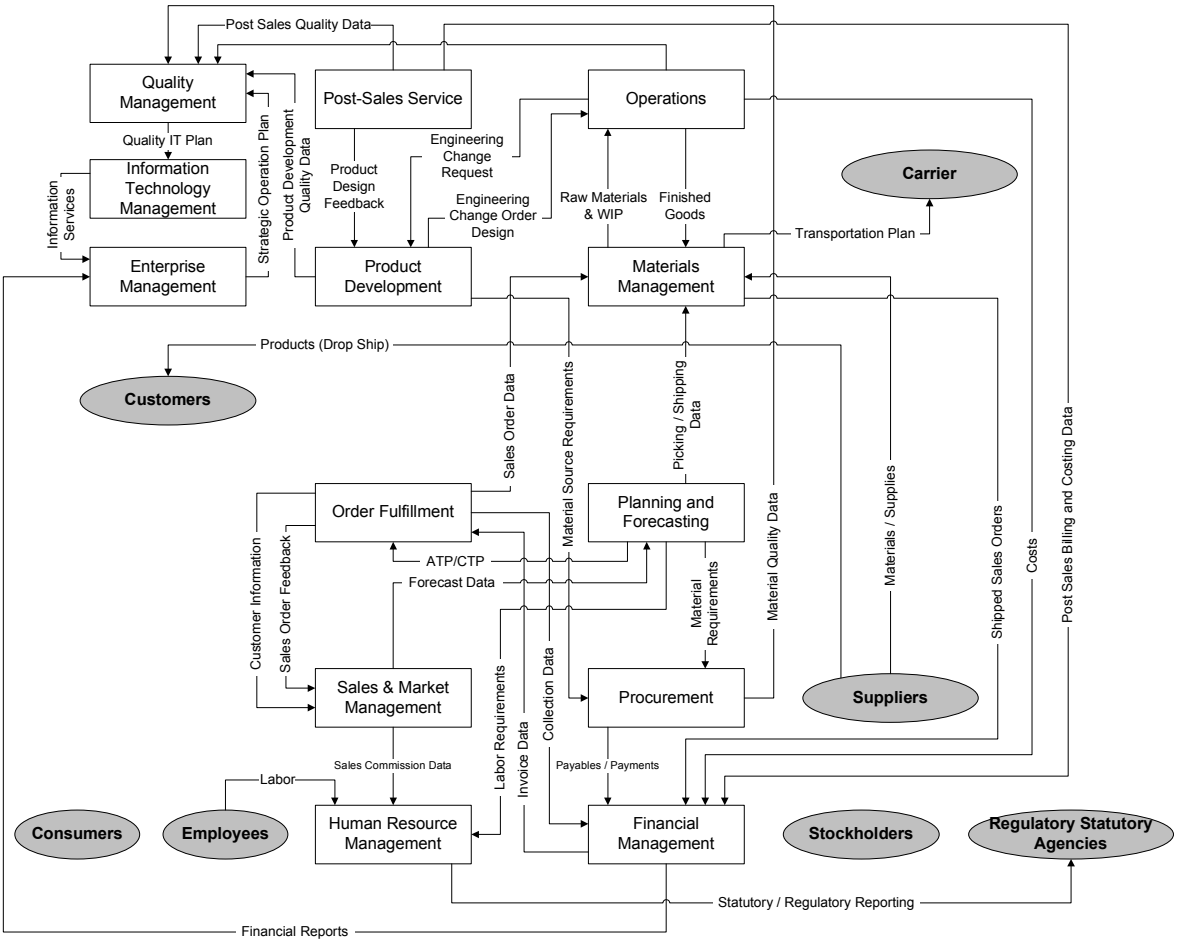
INTRODUCTION

The complete cycle of material management support beginning from sourcing and purchase decision by internal control of production materials, planning and control of work-in-process, the warehousing and shipping, to distribution of finished products [Johnson, Malucci 1999]. Combining the activities of material management does not merely represent a linear chain of one-on-one business relationships, but a web of multiple business networks and relationships [Min, Zhou 2002]. In complex analysis of material management relationships authors have used assumptions of net thinking methodology elaborated by P. Gomez, G. Probst and H. Ulrich [Probst, Gomez 1989; Ulrich, Probst 1990].

The efficiency management of enterprise's processes requires coordination between multidimensional measurement process (with using financial and operational indicators) and in feed-back planning and organizing of operations that ensures effective business adjustment to achieve the planned objectives [Śliwczyński 2010]. The complexity of material flow processes can lead to a threat such as distraction and disintegration of analysis focusing on many different factors influenced on effective sourcing and procurement management, transport and warehousing processes, inventory management, working capital and cash flow management.

The model of material management decision support system requires detailed analysis of all relationships in general model of enterprise and supply chain process management. Depending on the characteristics of the product, two distinct material flow in supply chain configurations offer competitive advantage: one based on efficiency and a second based on market responsiveness [Parmigiani, Klassen, Russo 2011]. General model of enterprise's process management, that was assumed by authors as basis for analysis various relationships, is shown in figure 1.

Citation: Śliwczyński B., Koliński A., 2012, Efficiency analysis system of material management. LogForum 8 (4), 297-310
URL: http://www.logforum.net/vol8/issue4/no3
Accepted: 06.09.2012, on-line: 5.10.2012.



Source: own study

Fig. 1. General model of enterprise's process management
Rys. 1. Ogólny model procesu zarządzania przedsiębiorstwem

The objectives for material management derived from general business relationships analysis (shown in Fig 1) were categorized by authors to two groups - primary objectives:

- efficient materials planning (e.g. S&OP and MRP level),
- sourcing and purchasing,
- good supplier relationship,
- procurement and transport,
- storing and inventory control,
- financial management and controlling (e.g. costs, cash flow and working capital),
- quality assurance.

and secondary objectives of materials management:

- efficient activity and assets using scheduling,
- standardization of materials and procedures,
- assisting in product design and development
- forecasting material requirements,
- quality control of materials purchased,

- material handling and warehousing,
- use of value analysis and value engineering,
- smooth flow of materials in and out of the organization

Taking into account the practical aspect of material flow in enterprises, there often occur the lacks of analytical and planning tools for effective execution of material management and adjusting of material flow processes (e.g. purchasing, transport, inventory management and warehousing) to the assumed strategy. Results of the research regarding ineffective material management (shown in table 1), carried out by the authors of this paper, confirm insufficient analytical supporting in various decisions of procurement operations.

Table 1. Research results of insufficient analytical supporting in various procurement operations decisions
Tabela 1. Wyniki badań niewystarczającego wsparcia analitycznego w różnego typu decyzjach w obszarze zakupów

Results of insufficient analytical supporting in material management decisions	Percentage share of studied enterprises
Non-benefit conditions of purchasing contract in relation to procurement requirements	21,0%
Non- adequate level, allocation and structure of material inventories	28,7%
Non- adequate scale and frequency of purchases and supplies	25,6%
Non-optimal transport planning and conditions of transport outsourcing	18,4%
Non- adequate capacity and efficiency of transport and warehousing infrastructure	34,6%
Non-optimal execution of material flow processes – delay, waiting and queue, bottleneck in transport, handling and warehousing processes	31,3%

Source: Own study; It was conducted in the years 2011-2012 via audits in 92 enterprises and by means of an interview and opinion poll among managers of 176 enterprises. The study was conducted in 4 sectors - automotive, building, apparel and household devices - in production sector, with an even quantitative distribution in the group of small, medium and big enterprises.

In this same group of enterprises were carried out research of knowledge about efficiency factors of material management at managers. Results of the research are shown in table 2.

Table 2. Research results of knowledge about efficiency factors of material management at managers
Tabela 2. Wyniki badań dotyczących wiedzy o czynnikach wpływających na efektywność zarządzania materiałowego posiadanej przez zarządzających

Efficiency factors of material management at managers	Percentage share of managers
Inventory costs (replenishment, warehousing, capital)	18,0%
Material value along supply chain	13,7%
Standard costs and operation norms in material process flow	24,2%
Benchmark of outsourcing rates	63,5%
Various methodologies of analysis and calculation algorithms (e.g. value, costs, ABC/XYZ, material safety, EOQ, supply chain scenarios)	32,6%
Normative range of material management indicators	43,7%

Source: Own study; It was conducted in the years 2011-2012 via audits in 92 enterprises and by means of an interview and opinion poll among managers of 176 enterprises. The study was conducted in 4 sectors - automotive, building, apparel and household devices - in production sector, with an even quantitative distribution in the group of small, medium and big enterprises.

The results of the studies conducted in Polish enterprises show that analytical supporting and efficiency factors knowledge are insufficient from the point of view of effective material management. On that basis, authors elaborated and presented in the article model of efficiency analysis system of material management.

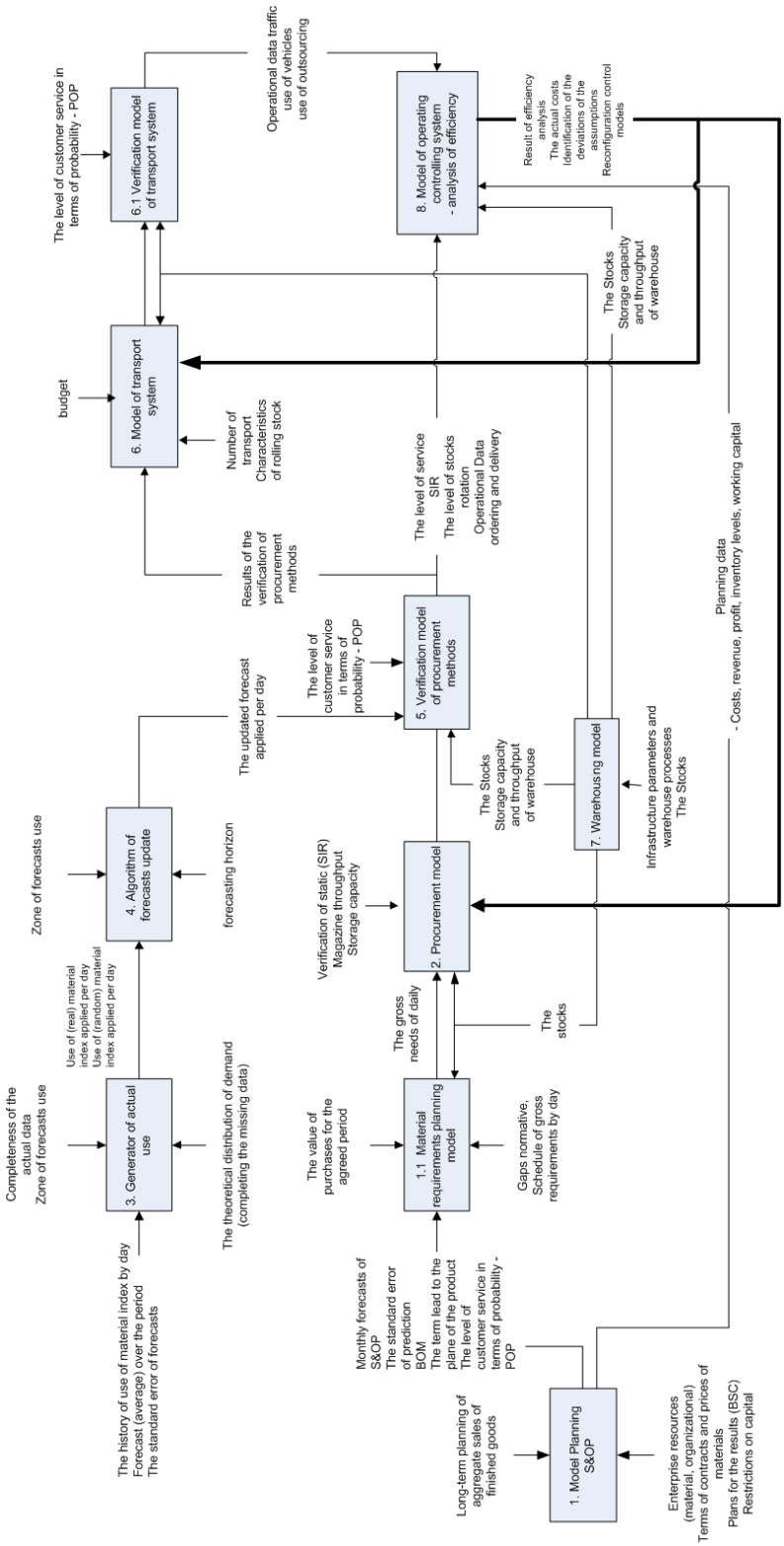
THE MODEL OF EFFICIENCY ANALYSIS SYSTEM OF MATERIAL MANAGEMENT

Carrying out a detailed analysis of the suggested controlling system one needs to look at the process of material management using the reference methodology of the SCOR process approach and take into consideration component models (SCOR - Supply-Chain Operations Reference Model - Model Overview Version 9.0. - a referential model of supply chain operations integrating five basic processes- planning, supplies, realisation, distribution and service of the turning streams, developed by managers and academics associated in a global organisation Supply-Chain Council. The model consists of representative methods of describing supply chain processes, a set of standards for the assessment of processes and their results as well as the best practical actions of managing processes in a supply chain):

- S&OP planning model- makes it possible to plan operations in a supply chain including transposing the needs of sales into the level of planning the stream of goods from production process,
- the model of planning material needs- including material structure of a product, which is necessary for material count, technologies and production itineraries, necessary for scheduling material needs, and store states; simulation is carried out with the net values of material needs,
- the model of commission- making it possible to simulate individual variants according to estimated net material needs,
- the generator of real consumption and the algorithm of updating prognoses, which should be treated as auxiliary simulation models of real consumption for examined material indices; they are necessary for simulating the real environment of material supplies realisation, transport processes and supplies availability at the stage of verifying the commission models,
- the model of verifying the commission methods- facilitating a multi-criteria analysis and choice of satisfactory models according to set criteria values,
- the model of a transport system and the model of verifying that system including the model solution for a multi-criteria load and routes planning as well as means straining and transit scheduling,
- the model of storing, which is also an auxiliary model necessary for defining the capability of receiving and servicing transport processes and maintaining supplies.

Presented models are components from which the system of material management analysis takes input data for efficiency analysis. The logical schema of efficiency analysis system of material management process is presented in Fig. 2.

Criteria and measures for analysis of anomalies of the real state of things from the one that has been planned, on an operational level, are not only long-term but also very general when it comes to the obtained data, e.g. market share. However, it needs to be remembered that it is already on an operational level where it is necessary to monitor gradually the aims realisation and alternatively correct current actions so as to increase the probability of gaining the result that has been planned [Koliński 2012].



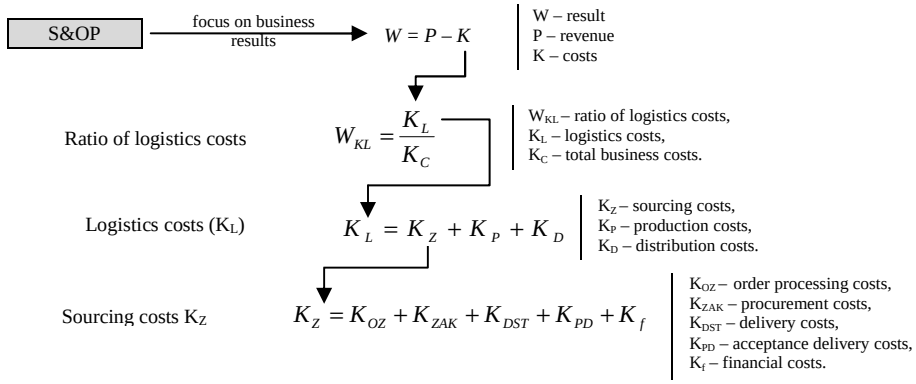
Source: own study, base on [Research project "Simulation of managing..."]

Fig. 2. Logical schema of efficiency analysis system with the information from the material management process
Rys. 2. Schemat logiczny systemu analizy efektywności na podstawie informacji z procesu zarządzania materiałowego

Transposing a strategic aim in an expenses aspect is possible due to a detailed analysis of a S&OP plan which includes programming the choice and the size of sales on individual markets and operations securing the sales in a complete supply chain. The S&OP plan is a decisional process thanks to which all tactical plans are coordinated with each other. However, an effective analysis should be supported by input data that is not financial. This data should be received from earlier stages of material management process. The data crucial for carrying out an effective S&OP plan is the following:

- data concerning suppliers' location and formulated offer inquiries,
- criteria for initial offers and tenders selection,
- data and criteria for qualifying suppliers,
- criteria for ranking and rating suppliers,
- data concerning permanent conditions of realising the supplies set by the recipient.

It is just a multi-criteria analysis of the S&OP plan that can be a reliable basis for transposing company's aims to the operational level of the sourcing process. That is why the developed system of operational controlling requires a detailed analysis of the role that sourcing expenses play in a logistic process. Accepting the basic dependence of logistic expenses and transposing them to sourcing expenses, other expenses should be treated as permanent, or known, to the decision maker of the controlling system. Transposing company's result to sourcing expenses is shown in Fig. 3.



Source: own study

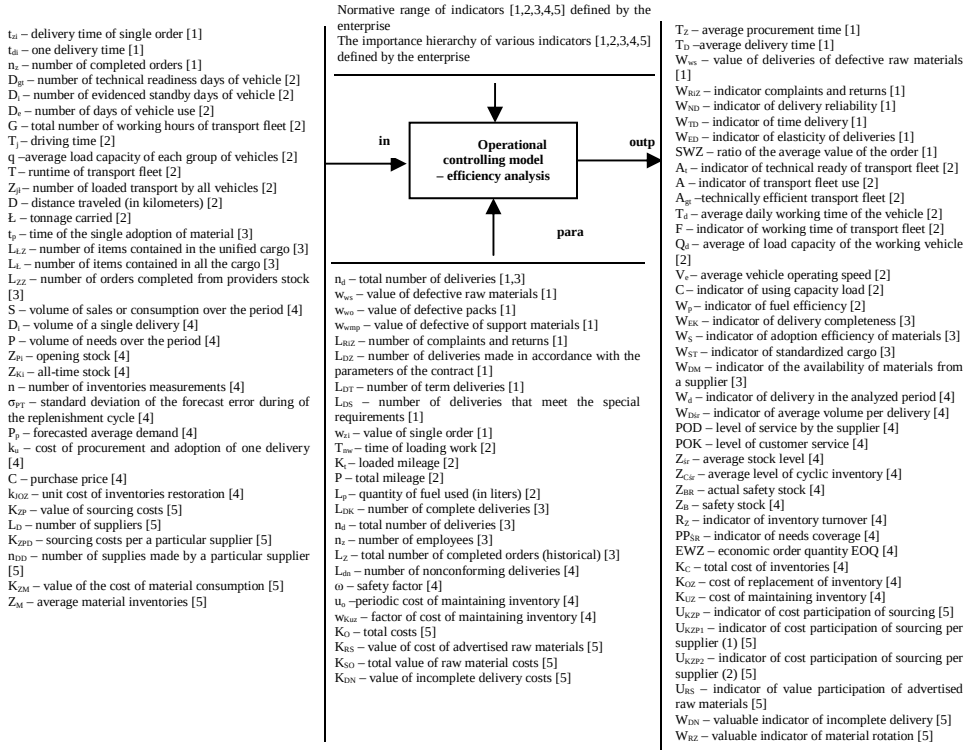
Fig. 3. Transposing company's result to sourcing expenses
Rys. 3. Transpozycja wyniku przedsiębiorstwa do wydatków

The idea shown in Fig. 3 is based on the assumption of expenses optimisation as a more efficient tool of improving company's result. Expenses optimisation is about rationalising factors which can be steered by a company and for this reason it has a tremendous effect on the possibility to generate higher profits. However, it needs to be remembered that optimum concentration on the analysis of sourcing expenses is advisable only in a situation when the value of logistic expenses rate, meaning the share of logistic expenses in company's total expenses, is significant.

The following components of efficiency analysis system aim at supplementing and specifying analytical data. The result data of the following models: S&OP, commission, transport and stock is, at the final stage of simulation, analysed in a model of final verification using the model of operational controlling. Algorithmisation of many functions for estimating the results of, among others, expenses and efficiency, reliability, productivity, stock level and rotation as well as operational capital involved in a sourcing process is the basis of the final assessment of material flow management [Hadaś, Cyplik, Domański, Fertsch 2009]. Identifying anomalies from the values set in S&OP module in the confines of adopted tolerance is the basis for handing over, in feedback, expenses and operational data to operational modules for the needs of new configuration of the parameters and models regulation.

The basic input data for the model are defined already on the level of the S&OP plan. One also needs to remember about the assumptions directly proceeding efficient sales and operations planning which are connected with, among others, classifying the suppliers and contracting them. Aims and indicators used in an efficiency analysis should result from a company's vision and strategy. An efficiency analysis can be named complete when it does not only refer to indicators which apply to past results but also when it allows to monitor what affects future results. Taking into account multi-criteria aspect, the problem of efficiency assessment can be based on the assumptions of Balanced Scorecard developed by R. Kaplan and D. Norton. The authors proposed the analysis of efficiency from four perspectives: financial, customer, internal business process, and learning and growth.

Many companies already have performance measurement systems that incorporate financial and nonfinancial measures. What is new about a call for a "balanced" set of measures? While virtually all organizations do indeed have financial and nonfinancial measures, many use their nonfinancial measures for local improvements, at their front-line and customer facing operations. Aggregate financial measures are used by senior managers as if these measures could summarize adequately the results of operations performed by their lower and mid-level employees. These organizations are using their financial and nonfinancial performance measures only for tactical feedback and control of production process in short-term [Kaplan, Norton 1996].



Source: own study based on [Twaróg 2005]

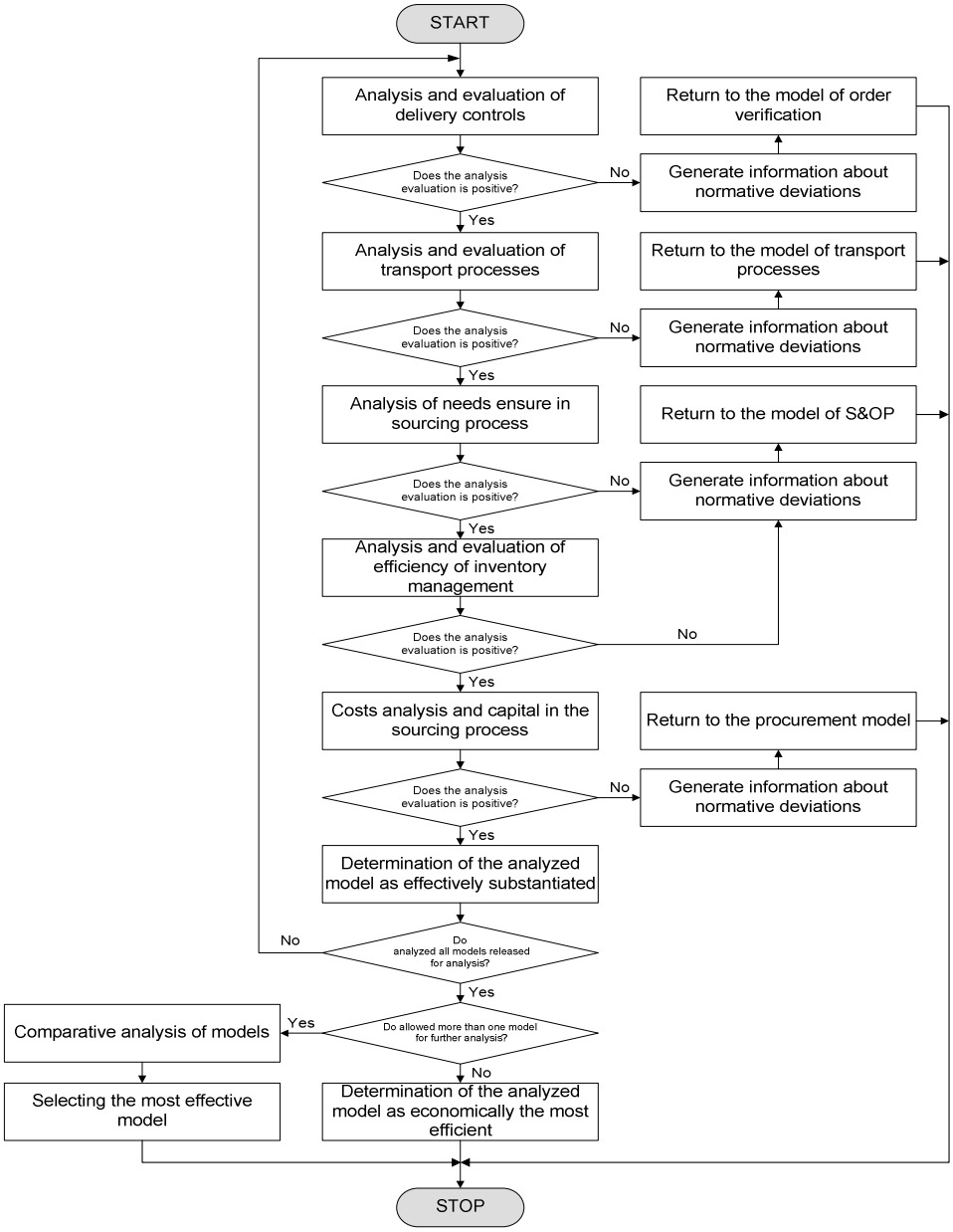
Legend:
[1] Data, parameters or indicators necessary for the analysis and evaluation of delivery controls
[2] Data, parameters or indicators necessary for the analysis and evaluation of transport processes
[3] Data, parameters or indicators necessary for the analysis of needs ensure
[4] Data, parameters or indicators necessary for the analysis and evaluation of efficiency of inventory management
[5] Data, parameters or indicators necessary for the costs analysis and capital in the sourcing process

Fig. 4. Defining input and output data as well as parameters necessary for an effective analysis of the efficiency of material management processes
Rys. 4. Definiowanie danych wejściowych i wyjściowych jako parametrów niezbędnych do efektywnej analizy efektywności procesów zarządzania materiałowego

A set of standards [Watson, Blackstone, Gardiner 2007; Śliwczyński 2011; Twaróg 2005] used for building an operational controlling system have been developed thanks to an analysis of the efficiency of material management processes in the four discussed perspectives.

Multi-criteria parametric analysis

A complex assessment of the efficiency of managing the material flow in an analytical system has been based on the systems of standards as well as generated basic data necessary for defining these standards (compare Fig. 4). Further detailed analyses of the model for assessing the efficiency of managing the commissions and materials supplies have been based on algorithmic assumptions presented in Fig. 4.



Source: own study, base on [Research project "Simulation of managing..."]

Fig. 5. A general algorithm for assessing the efficiency of material flow management
Rys. 5. Ogólny algorytm oceny efektywności zarządzania przepływem materiałowym

An algorithm, presented in Fig. 5, for assessing efficiency has been purposefully divided into individual elements because of the existing feedback in the process of managing the material flow and because of containing the perspectives of the Strategic Scorecard.

In its detailed analysis of efficiency of material flow management (Fig. 5) is as follows the input data and measures, which are necessary for multivariate assessment. The following list was compiled with the division into analyse elements in accordance with the stages of the algorithm.

Input data and measures for analysis and evaluation of delivery controls is shown in Tab. 3.

Table 3. Input data and measures for analysis and evaluation of delivery controls
Tabela 3. Dane wejściowe i współczynniki dla analizy i oceny kontroli dostaw

Analysis area	**Input data and measures**
Delivery control	number of purchased parts, materials or raw materials
	weight of incoming cargo
	number of orders in a given period of time
	place of delivery
	time of each delivery
	lead times of each procurement
	number of completed orders during the period
	number of realized deliveries during the period
	value of the defective raw materials, defective packaging and defective support materials
	unit cost of raw materials delivery, packaging delivery and used support materials
	unit cost of possible loss of continuity of production due to the delivery of defective raw materials
	unit cost of possible loss of continuity of production due to the delivery of defective packaging
	unit cost of possible loss of continuity of production due to the lack of sufficient of support materials
	unit cost of additional delivery of support materials
	number of complaints and returns during the period
	qualitative normative
	the number of deliveries of inconsistent assortments parameters of the orders
	the number of deliveries of inconsistent quantitative parameters of the orders
	the number of deliveries of inconsistent qualitative parameters of the orders
	assortment and quantitative order parameters
	complaint handling time
	number of deliveries made in accordance with the parameters of the order
	number of deliveries made in accordance with the deadline during the period
	number of delayed deliveries of raw materials, packaging and support materials
	number of deliveries that meet the special requirements
	deliveries list
	delivery time normative
	normatives of economic order quantity
	packaging normatives of delivery
	list of available modes of transport
	value of single order

Source: own study based on [Twaróg 2005].

Input data and measures for analysis and evaluation of transport processes is shown in Tab. 4.

Table 4. Input data and measures for analysis and evaluation of transport processes
Tabela 4. Dane wejściowe i współczynniki dla analizy i oceny procesów transportowych

Analysis area	Input data and measures
Transport process control	weight of incoming cargo
	amount of kilometers driven during the period
	number of days of technical readiness
	number of days of registration standby
	number of working days
	number of transport working hours
	running time of the rolling stock
	cargo handling time
	average capacity of particular groups of vehicles
	course loaded (in vehicle-kilometers)
	total course (in vehicle-kilometers)
	number of rides made by all the loaded vehicle or group of vehicles
	ridden road (in kilometers)
	tonnage carried
	quantity of fuel used (in liters)

Source: own study based on [Twaróg 2005].

Input data and measures for analysis of needs ensure in sourcing process is shown in Tab. 5.

Table 5. Input data and measures for analysis of needs ensure in sourcing process
Tabela 5. Dane wejściowe i współczynniki dla analizy i oceny procesu zakupu

Analysis area	Input data and measures
Operational needs ensure in sourcing process	time of the single material adoption
	number of employees
	number of items contained in the cargo unified
	number of items contained in all cargo
	normatives of cargo
	number of orders made from supplier stock

Source: own study based on [Twaróg 2005].

Input data and measures for analysis and evaluation of efficiency of inventory management is shown in Tab. 6.

Table 6. Input data and measures for analysis and evaluation of efficiency of inventory management
Tabela 6. Dane wejściowe i współczynniki dla analizy i oceny zarządzania zapasem

Analysis area	Input data and measures
Inventory management	size of single delivery
	size requirements (e.g. demand) during the period
	volume of sales or consumption during the period
	number of nonconforming delivery
	initial stock during the period
	final stock during the period
	number of measurements
	safety indicator
	standard deviation of forecast error
	standard deviation of the cycle time of replenishing
	expected life cycle inventory complete
	forecasted average demand
	cost associated with the order and the adoption of a single delivery
	purchase price
	cost indicator of periodic maintaining stocks
	unit cost of replacement stock
	ratio of maintenance of stocks

Source: own study based on [Twaróg 2005].

Input data and measures for costs analysis and capital in the sourcing process is shown in Tab. 7.

Table 7. Input data and measures for costs analysis and capital in the sourcing process
Tabela 7. Dane wejściowe i współczynniki dla analizy kosztów i kapitału w procesie zakupu

Analysis area	Input data and measures
Costs and capital in the sourcing process	number of incoming goods for the period
	number of employees in the execution of orders
	number of employees in the goods adoption
	procurement costs
	total cost of goods adoption
	costs of wrong deliveries
	costs of returns
	costs of delayed delivery
	value of procurement costs generated during the period
	value of total costs generated during the period
	value of procurement costs attributable to a particular supplier
	amount of deliveries made by a particular supplier
	value of advertised raw materials cost
	total value of raw material costs
	value of incomplete delivery costs
	value of total delivery costs
	value of material consumption cost
	average material inventories

Source: own study based on [Twaróg 2005].

The data and metrics for evaluating of the material flow efficiency, may of course occur in different parts of the analysis simultaneously. In this statement the individual data included only once - at the point of first use.

Detailed algorithmic processes refer to input data and the parameters presented in Fig. 5, with the division according to the key, as well as to appropriate calculation formulas included in the literature of the subject matter. From the point of view of material management controlling system in an analytical scheme a special attention should be paid to processes connected with:

- comparative analysis of commission models,
- an analysis of economic benefits of the commission model.

CONCLUSIONS

The system of efficiency analysis of material management, if developed in detail, can facilitate rationalisation of the scenarios of sourcing and managing the materials involving the criterion of the highest, or satisfactory, efficiency of a company. The present article has defined the relation of company's processes efficiency to the processes of material flow and sourcing which together create a complex decisional system in accordance with the fundamental aim of the article. Sourcing processes, which should be treated as basic economic processes [Porter 1998], define a set of rules as well as input data necessary for the efficiency of the operational controlling system. It leads us to the conclusion that the optimum of functions necessary for efficient management of material flow in a so defined system can imply, in accordance with the methodology of a systemic approach, elimination of sub-optimisation and concentrating the efficiency on sourcing processes. A very important issue is also an analysis of the sensitivity of efficiency function for a defined system of a complex material flow including also factors of the efficiency of supplies and stock management, total procurement cost and organisation of supplies system.

Creating an efficiency model it needs to be borne in mind that an in-crease in one department's efficiency does not have to result in an increase in whole company's efficiency. Only an increase in key processes efficiency will result in an increasing the indicators of efficiency of a company's business activity. A very important aspect is also coordination of operational and strategic aims. If operational aims do not reflect accurately strategic aims, then a result can be generating contradictory indicators which have a negative influence on material management efficiency.

The presented suggestion for building an efficiency analysis system includes an analysis of economic processes in the aspect of the following systems: a system of transposing an aim, a control system and an analytical system. The presented idea, however, should be made more specific by carrying out further analyses in a decisional and control systems, which requires further literature research and confrontation in simulation studies. Literature research and observations of economic practice reveal that the management of companies incessantly search for the tools which would support making decisions concerning the choice of sourcing variants in order to achieve the most efficient decisions at the stage of planning process, which only confirms the importance of research in this area.

REFERENCES

Hadaś Ł., Cyplik P., Domański R., Fertsch M. 2009, Comparative analysis of selected concepts of managing material flows in distribution logistics. LogForum, 5 (4), 1-6.

Johnson G. A., Malucci L. 1999, Shift to supply chain reflects more strategic approach. APICS - The Performance Advantage, October, 28-31.

Kaplan R. S., Norton D. 1996, The balanced scorecard: translating strategy into action. Harvard Business Press.

Koliński A. 2012, The efficiency of the production - the analyse of problems based on the literature research. LogForum, 8 (2), 137-150.

Min H., Zhou G. 2002, Supply chain modeling: past, present and future. Computers & Industrial Engineering, 43 (1-2), 231-249.

Parmigiani A., Klassen R. D., Russo M. V. 2011, Efficiency meets accountability: Performance implications of supply chain configuration, control, and capabilities. Journal of Operations Management, 29 (3), 212-223.

Porter M. 1998, Competitive Advantage: Creating and Sustaining Superior Performance. NY The Free Press, New York.

Probst G., Gomez P., 1989, Vernetztes Denken. Unternehmen ganzheitlichen führen. Wiesbaden.

Śliwczynski B. 2011, Operational controlling - a tool of translating strategy into action. LogForum, 7 (1), 45-59.

Śliwczyński B. 2010, The Reference Model of Supply Chain Operational Controlling in Value Management. LogForum, 6 (1), 21-36.

Twaróg J. 2005, Mierniki i wskaźniki logistyczne. Instytut Logistyki i Magazynowania, Poznań.

Ulrich H., Probst G. 1990, Anleitung zum ganzheitlichen Denken und Handeln. Ein Brevier für Führungskräfte. Bern-Stuttgart.

Watson K. J., Blackstone J. H., Gardiner S. C. 2007, The evolution of a management philosophy: The theory of constraints. Journal of Operations Management, 25 (2), 387-402.

SYSTEM ANALIZY EFEKTYWNOŚCI ZARZĄDZANIA MATERIAŁOWEGO

STRESZCZENIE. **Wstęp:** Istotną częścią zarządzania efektywnością przedsiębiorstwa jest udoskonalanie i poprawa procesu zarządzania materiałowego, zarówno na poziomie strategicznych jak i operacyjnym. Kompleksowość procesów przepływów materiałowych stwarza takie zagrożenia jak rozproszenie analizy skoncentrowanej na wielu różnych czynnikach wpływających na efektywne zarządzanie procesem zakupu, transportu, magazynowania, poziomem zapasu, kapitału pracujacego i przepływem środków pieniężnych.
Materiały i metody: w prezentowanej pracy główny nacisk położono na wielowymiarową i wielokryterialną analizę efektywności zarządzania materiałowego, która wspomaga system podejmowania decyzji. Autorzy zaprezentowali wyniki badań dotyczące nieefektywnego zarządzania materiałowego i potwierdzające niewystarczające wsparcie analityczne decyzji w obszarze operacji zakupu i zaopatrzenia.
Wyniki i wnioski: w oparciu o wyniki badań autorzy zaprezentowali model analizy efektywności przepływu materiałowego.

Słowa kluczowe: efektywność, controlling, zarządzanie materialowe, zakupy i zaopatrzenie.

SYSTEM DER EFFIZIENZ-ANALYSE IM MATERIAL-MANAGEMENT

ZUSAMMENFASSUNG. Einleitung: Ein wesentlicher Teil des Effizienz-Managements im Unternehmen besteht in der Vervollkommnung und Verbesserung der Prozesse innerhalb des Material-Managements, sowohl auf dem strategischen als auch operativen Niveau. Die Komplexität von Materialfluß-Prozessen verursacht jedoch Gefährdung des effektiven Managements wegen einer potenziellen Zerstreuung der betreffenden Analyse, die auf viele unterschiedliche Faktoren konzentriert ist. Solch eine Effizienz-Analyse vermag jedoch effektives Management von Einkaufs- , Transport- und Lagerprozessen und des Vorratsniveaus, ferner des rotierenden Kapitals sowie des Finanzmittel-Flusses positiv zu beeinflussen.

Material und Methoden: Die Entscheidungssystem unterstützende Mehrdimension- und Mehrkriterien-Analyse der Effizienz des Material-Managements ist in der vorliegenden Arbeit zum Schwerpunkt der betreffenden Forschung geworden. Die Autoren haben die uneffektive Material-Managementsysteme anbetreffenden Forschungsergebnisse präsentiert und die mangelnde Unterstützung seitens analytischer Entscheidungen im Bereich von Einkaufs-und Beschaffungsprozessen bestätigt.
Ergebnisse und Fazit: Angesichts der Forschungsergebnisse haben die Autoren ein Modell für die Analyse der Effizienz des Materialflusses dargestellt.

Codewörter: Effizienz, Controlling, Material-Management, Einkauf und Beschaffung.

The paper was prepared as a part of a research project "Simulation of managing the flow of company's material as an instrument of multivariant analysis of transport processes efficiency" no N N509 549940 is carried out from the financial funds for education granted by the Ministry of Study and Higher Education thanks to the decision No 5499/B/T02/2011/40. Research project "Simulation of managing the flow of company's material as an instrument of multivariant analysis of transport processes efficiency" no N N509 549940 is carried out from the financial funds for education granted by the Ministry of Study and Higher Education thanks to the decision No 5499/B/T02/2011/40.

Bogusław Śliwczyński
Poznan School of Logistics
ul. Estkowskiego 6
61-755 Poznań, Poland
e-mail: boguslaw.sliwczynski@wsl.com.pl
Adam Koliński
Poznan School of Logistics
ul. Estkowskiego 6
61-755 Poznań, Poland
e-mail: adam.kolinski@wsl.com.pl