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THE PRODUCTION PROCESS MANAGEMENT IN INTEGRATED SUPPLY CHAINS OF SMALL AND MEDIUM SIZED ENTEPRISES

Before companies, and more and more before small and medium sized company, stay problem how to effective manage materials flows in the supply chains environment. Arise the question, how this trend may influence production process management in corporations which realize in this environment their production activities. The existence of plants, which would be doing outside of broad supply chains in the contemporary global market turbulent environment, is questionable. The article deals with analysis of changes in materials flow structure in supply chains and presents the analysis of the current situation in present APS/SCM offer on the Czech market based on own research. The paper was prepared and published based on the project IET201450508.

ZARZĄDZANIE ŁAŃCUCHEM DOSTAW W PROCESACH PRODUKCYJNYCH MAŁYCH I ŚREDNICH PRZEDSIĘBIORSTW

Przed przedsiębiorstwami w ogóle, a małymi i średnimi przedsiębiorstwami w szczególności leży problem efektywnego zarządzania przepływem materiałów w łańcuchach dostaw. Rodzące się pytanie wiąże się z kwestią wyboru strategii zabezpieczania dostaw realizowanych przez poszczególne korporacje, strategii gwarantujących osiągnięcie zakładanych celów. Ma to istotne znaczenie w warunkach zakłóceń powstających na globalizującym się rynku producenta. Praca przedstawi ocenę zmian zachodzących w strukturach przepływu materiału oraz analizuje możliwości systemów APS/SCM oferowanych obecnie w Republice Czech.

1. CHANGES IN MATERIALS FLOW STRUCTURE IN SUPPLY CHAINS

Supply chains are the reflection of the effort to exploit synergism connected with global systems optimization and digger from traditional logistical chains in these basic orientations:

In comparison with the classical logistical chain extend its structure in horizontal direction on and against the material flow. We may conceive that in the future we will be able to manage the material flow from raw materials mining cross semi products, parts, components producers, distributors to individual customers. What is contemporary situation? Very good experiences we have with integrated management two or three connecting steps. In CRP (Continuous Replenishment Program) we are successful in collaboration coordination between food producers and big distributors. The stock management by suppliers is in this form real. Corporate working teams are seeking about coordination of the demand forecasting and the supply planning. As successful case may be collaboration between Skoda WW Mlada Boleslav and parts, components producers. JIT system is implemented, several components producers are located directly in assembly plant, and their plans are coordinated.

The supply chain concept includes back effective linkage, especially remaking and recycling of waste materials. In this field few activities was done, about integrated waste material flows management or even about managed recycling of used products there is no discourse. There are problems with plastic packaging recycling, legislation isn't effective etc. In Europe are first cases about transition from supply chains to supply cycles. Flextronics comp. step by step realize ambitious program of 3R (Recycling, Remanufacturing, Reprocessing) their products with minimal impact on their products prices.

In supply chain environment come up the vertical structure integration, too. Specialized producers supply lot of different customers, they are members of many supply chains, logistical chains begin create wide interconnected nets which are necessary manage as one integrated system. In Czech Republic are producers of parts and components for European automobile industry, their integration to wide supply chains is the case of this trend. Materials flow in these factories approach to T type, which is from production process management very suitable.

Vertical structure integration is look on as mutual connection of logistic, marketing, production process management, management of research and quality control. Supply chain becomes a central concept of all parts of company management.

Suppose that all parts of the company management perfectly collaborate. But the supply chain environment will need integration of all parts of company management all partners in supply chain too. This trend may arises the affectivity of customer services offer. A first application of CPFMR (Collaborative Planning, Forecasting and Replenishment) is the case of this. The scheme of conception of integrated planning and pursue activities in supply chain is on Fig.1 (DRP Distribution Requirements Plan, MPS Master Production Plan) is very inviting. Corporate forecast of the final customers demand may exploit the broad basis of information and experiences all partners in the chain, automated scheduling cut planning process, elimination of classical order system increase response on customers demand changeover, backward planning in all

chain permit the time and physical plans interconnection, on line information about stock level cut reaction time on stochastic deviations.

Like in logistical chains is in supply chains emphasized principle of collaboration. Qualitative new is in supply chains implementation of openness principle, common information share about activities dealing with material flow management. This principle is necessary assumption for corporate planning and management. In the first place information about the stock level, about situation in fulfilling demands of the next part of the supply chain, about partners capacities, about problems in the material flow and in the last time about costs.

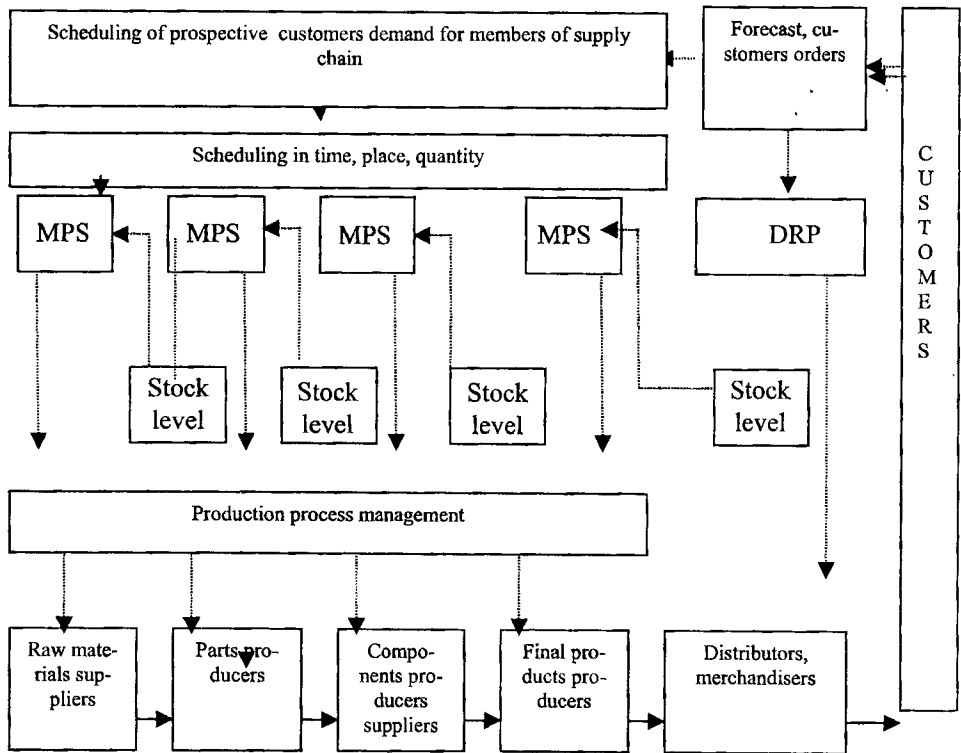


Fig.1 Integrated planning process in Supply Chains

The anticipated development in the materials flows management is conditioned by several factors. Needs very good working information flow in wide supply chains, which is conditioned by full information systems compatibility of partners in the chain, unified identification system of products and services, sufficient supply of 3PL partners in transport, stock and other services etc. The dominate factor for good supply chain operation is necessity of the same high level of management of collaborating partners. Therefore the exceptional observation is directed on the partners' selection.

For the continuous production process security purchase production plants more and more parts, components and services. Therefore the successful process management influences more and more effective purchasing strategy. In connection with the manufacturing process management extend in the selecting process such criterions, as

- Capability of JIT components supply
- Time losses cause to supplier
- Number of refused orders form qualitative reasons
- Number of refused customers orders of own products
- Flexibility of suppliers

First studies indicated, that from the importance view point of criterions used for suppliers selection ever more extend forefront such one, which directly influence manufacturing process run. In(1)are results of analysis executed in supply chain of air-conditioning machines producers. Immediately by criterion of purchasing costs were criterion of number of defective parts and criterion time losses. Because of more and more number of purchasing parts the significance of the parts selection differs from the importance of the purchased parts role in the production process. Crucial are especially suppliers of so-called critical parts. For their selection we may use for instance adapted portfolio analysis on fig. 2. High requirements in partners' selection need items C and D.

| | | Volume of purchase | |
|---|------|--------------------|------|
| | | Low | High |
| Importance of item final product for production | Low | A | B |
| | High | C | D |

Fig.2Importaqnce of item final product for production

In connection with APS (Advanced Production Scheduling) systems implementation isn't usage of volume of purchase criterion appropriate. More appropriate are criterions, which calculate the influence of purchasing parts on value added obtained of final product sale.

The integrated supply chain management must be supported with modern communication systems. EDI (Electornic Data Interchange), Internet, E-hubs are the only environment for information transfer in supply chains. In(2)is the case of the successful EDI implementation in supply chain materials flow management in Asian textile industry. The narrow

collaboration of raw materials, dry goods suppliers, manufacturers and distributors cause the penetrative growth of sales of American and European market.

Integration in supply chains needs perfect function of

- information flow between partners, information, which are necessary for production process management,
- orders management,
- stock level management,
- forecasting system and
- other services like products certification etc.

Successful supply chain management must be coordinated. Traditionally the role of coordinator had business organizations. In the last time often take over this active role manufacturers. Reasons are obvious:

- Manufacturers are able better demonstrate their effort to conclude partnership with their customers
- Manufacturers as initiator are able to conclude advantageous collaborative agreements with partners
- As initiator they have opportunity to obtain advantages and better position

When we are discussing about coordinating role, we haven't ignore its dynamics. It is connected with the fact that as in APS modern systems implementation is in organization the bottleneck the main decision and regulation point, must have the same role the bottleneck in whole supply chain.

2. ANALYSIS OF THE CURRENT SITUATION OF THE APS/SCM OFFER ON THE CZECH MARKET

We determined that one of the main assumptions of the integrated supply chain management and production process management is the compatibility of information systems of all partners in the supply chain. At the beginning of 2003 year was performed in the Czech Republic study about the actual market offer of APS and ERP (Enterprise Resource Planning) instruments. Results of the research include information about 52 products of this category, 20 forms abroad and 32 forms Czech Republic. Majority of them are able to support planning and management of the whole supply chain. In the environment of these products on the basis of accessible information managers are better able to decide with pay attention to constraints about ways how to carry out customers needs.

The research was concentrated on the next functions: demand planning, forecasting, transport planning, order management, bottle neck usage optimization, usage of different optimization criterions. Results are in table on Fig. 3.

| Name of product | Demand planning | Order planning | Transport planning | Available to Promise (ATP) | Allocated Available to Promise (AATP) | Capable to promise (CTP) | Constraint based optimization | Optional way of optimization |
|--|-----------------|----------------|--------------------|----------------------------|---------------------------------------|--------------------------|-------------------------------|------------------------------|
| iBaan | * | * | * | * | * | * | * | * |
| J.D.Edwards 5 ERP 8.0 | * | * | * | * | * | * | * | * |
| Oracle E-Business Suite | * | * | * | * | * | * | * | * |
| mySAP Business Suite | * | * | * | * | * | * | * | * |
| BPCS | * | * | * | * | * | * | * | * |
| BRAIN XPPS | * | * | | | | | | |
| eFORS Automotive | * | * | | * | | | | |
| EXACT Globe | * | * | 0 | * | * | * | 0 | * |
| i/2 | * | * | * | * | * | * | * | * |
| IFS Aplikace | * | * | 0 | * | * | * | * | * |
| iSCALA 2.1 | * | * | | * | * | | | |
| MAX | * | * | | * | | * | | |
| MFG/PRO | * | * | * | * | * | * | * | * |
| Microsoft Business Solution – Navision | * | * | | * | 0 | * | 0 | * |
| Microsoft Business Solution – Axapta | * | * | | * | 0 | * | 0 | 0 |
| Movex | * | * | 0 | * | * | * | * | * |
| PSIPENTA.COM | * | * | 0 | * | * | * | * | * |
| SunSystems | | | | | | | | |
| SYSTEM 21 | * | * | * | * | * | * | | * |
| VISUAL Enterprise | * | * | | * | | | * | |
| ABRA G3 | | 0 | | | | | | |
| ALTEC Aplikace | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Bílý Motýl | * | * | * | * | * | * | * | * |
| DIALOG 3000S | 0 | * | * | | * | | | * |
| DIAMAC, DIAMAC+ | 0 | 0 | 0 | | | | | |
| EIS APSO | | * | * | 0 | | | 0 | 0 |
| ENERGIS | | | | | | | | |
| EPASS | | * | 0 | | | | | |
| ESO 9 | * | * | * | | | | 0 | * |

| | | | | | | | | |
|------------------------------------|---|---|---|---|---|---|---|---|
| FACTORY ES | * | * | * | * | * | * | * | * |
| FEIS | * | | | | | | | |
| IDEA | | | | | | | | |
| INFORIS Magic | * | * | * | | | | | |
| INFOS | | | | | | | | |
| IS Compekon | | * | | | * | | | |
| KARAT | | | | | | | | |
| Kostka Pro SB | | o | o | | | | | |
| LCS Noris | * | * | * | | | | * | * |
| LCS Helios IQ | | * | * | | | | | |
| NOTIA Systém II | | * | | | | | | |
| OptimumAccess | | | | | | | | |
| ORGASOFT SYSKLASS RV, ASEPO IS) | | | | | | | | |
| Orsoft | | * | * | | | | | |
| OR-SYSTÉM | o | * | o | * | * | * | | |
| Vision32 | o | o | | o | | | | |
| QI | o | * | o | | | | | o |
| RIS2000 | | * | o | | | | | |
| SAFIR | | * | | | | | | |
| Twist Inspire | * | * | | | | | | |
| IS Verna | | | | | | | | |
| WAM S/3 | | * | * | * | * | * | | |
| WAK INTRA | | | | | | | | |

Note: * - full functionality, o - half of functionality

Fig3 Planning process support in IS application

The research confirms, that new applications use simultaneous planning, planning processes are pursued concurrently. Plan may be changed continuously for all members of the supply chain. New solutions reduce planning time, offer optimization methods. Main assets are in higher supply reliability, higher capacity usage and lower stock level.

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