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## **ROLE OF INTEGRATOR IN SUPPLY CHAIN**

The organization of material deliveries depends in large measure on the relations within the supply chain. Therefore it is important to organize the deliveries to meet the requirements placed by enterprises taking part in the supply chain.

In the traditional model functioning in economy the customer is joined with suppliers directly. There are no agents in the process of material flow. The system of deliveries depends on direct contact with suppliers. The classical organization of the material flow creates the necessity of storing material at customer. Large number of information channels is also a problem that has to be supervised by customer. It influence the expanses connected with supervision of informative flows.

The development of production as well as enlargement the material assortment form new challenges for the company – changes to improve the new organization of material deliveries. The solutions taken into consideration are:

- Introduction of JIT method in the organization of material deliveries;
- Change of structure of material flow.

The introduction of JIT method without changes in the supply chain will make it possible to mineralise the stock. However, it results in growth of control of material deliveries. Information flow will remain intensive. This leads to increasing costs of work. It also may mean the necessity of raising the level of employment.

The possibility to modify the supply chain should be analysed. The target is to create new arrangement of supply chain in order to ensure the timing of deliveries as well as their synchronisation.

The first step of proposed changes is to divide all suppliers into groups. Each group delivers components are putting together during assemble. It results from the grouping the materials the time necessary for preparing materials, the target place in the production line, possibility to assemble.

In every group one supplier is chosen as „leader” for the group – the so-called integrator. In additional to its basic tasks implied by production of components. The

chosen enterprise got the opportunity of integrating the remaining supplier's deliveries. Therefore it became the integrator of deliveries for the new supply chain. The new arrangement of supply chain is shown in figure 1.

The new tasks of the integrator include:

- The flow of information between customer and remaining suppliers;
- The organization of deliveries of components to customer;
- The purchase of materials from suppliers;
- The produce its own materials.

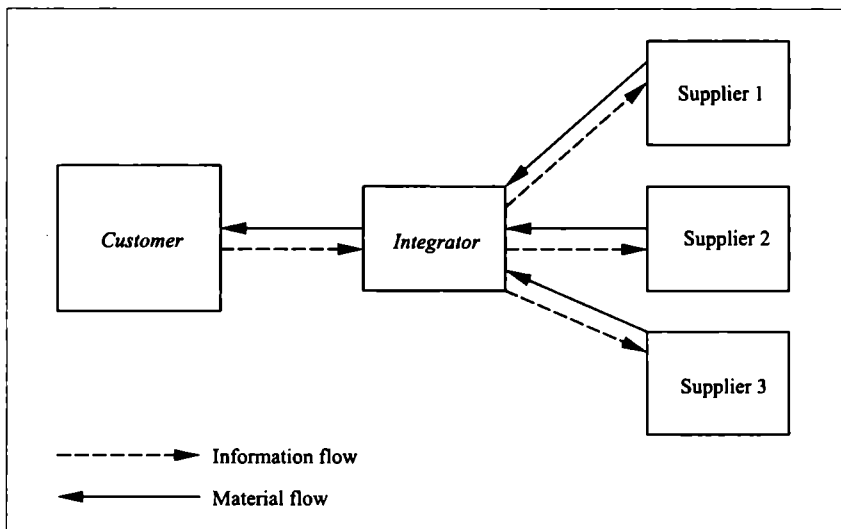


Fig. 1. Material and information flow using integrator

Source: own study.

The integrator takes over the communication between customer and suppliers. It is his part to communicate with customer to accept orders, after propriety processing, to pass on order to suppliers.

On the basis of received orders the integrator purchases the materials from the suppliers. It is his task to look after the terms of realization of orders, to exact the customer's requirements, and to exact the up lateness of deliveries.

Delivery of materials gathered from whole group of suppliers is the next task of integrator. The modification is that in frame of the whole group the customer has only one supplier, which will deliver the whole range of products.

In frame of the new system of deliveries the costs connected with service of purchased materials, the integrator covers storing materials as well as their delivery to the customer. The costs of transportation to the integrator are cover in full by the suppliers.

The costs of the altered chain are presented in the following table. Customer's daily demands are 80 units. The kind of packing is the settlement basis.

Table 1. Suppliers' transport costs

	Supplier		
	1	2	3
Quantity in box [pcs]	8	6	30
Daily demands [box]	10	14	3
Max quantity in one delivery [box]	120	40	20
Stock in days	12,00	2,86	6,67
Frequency of deliveries [quantity/month]	2	12	4
Full truck transport cost [EUR]	1 500	1 800	2 500
Monthly transport cost [EUR]	3 000	21 600	10 000
Summary transport cost [EUR/month]	34 600		

Source: own study.

Table 1 presents the suppliers' costs generated by the necessary deliveries to the integrator. In all the cases the parameters of packaging are the main limitations. The above presented table shows that the required delivery frequency fluctuates between 2 and 15 days. Assuming fixed monthly figures the costs of supplier – integrator delivery is estimated at about € 35000. Suppliers cover these costs. In the calculations the integrator costs should be considered too (table 2). Costs of storing one pallet unit and logistics service cost are one of the calculation factors.

Table 2. Integrator's cost

	Supplier		
	1	2	3
Unit cost of storing and logistics service. [EUR/pallet unit]	5,25		
Number of pallet for supplier [pcs/month]	240	480	80
Monthly cost service [EUR]	1 260	2 520	420
Logistics service costs	4 200,00		

Source: own study.

Further are the costs of all material delivery to the customer. Due to different packaging sizes and problems with loading trucks it is necessary to use 4 transports daily. The cost of each delivery is € 200. The cost of delivery from the integrator to the customer would have to be on the level of € 16000 monthly.

The total integrator's delivery costs would be on the level of about € 20 000 monthly. Recapitulation of all costs is presented in table 3.

Table 3. Supply chain total costs using integrator

Cost	Value
Transport costs to the integrator [EUR]	34 600
Cost of storing and logistics service cover by integrator [EUR]	4 400
Transport cost between integrator and customer [EUR]	16 000
Total costs [EUR]	55 000

Source: own study.

The cost covered by the integrator is not connected with the production, and only with the material turn. Therefore a different solution should be found allowing keeping a good level of service and simultaneously reducing the cost resulting from the palettes.

The proposition is to move the actual storing place. Such a move will permit to transfer the costs of storing from integrator to external warehouse. The proposed solution pattern is represented in figure 2. The presented solution allows to reduce the integrator's own costs. With deliveries constructed that way the integrator gets rid of all costs connected with storage. In return the coverage of the external warehouse

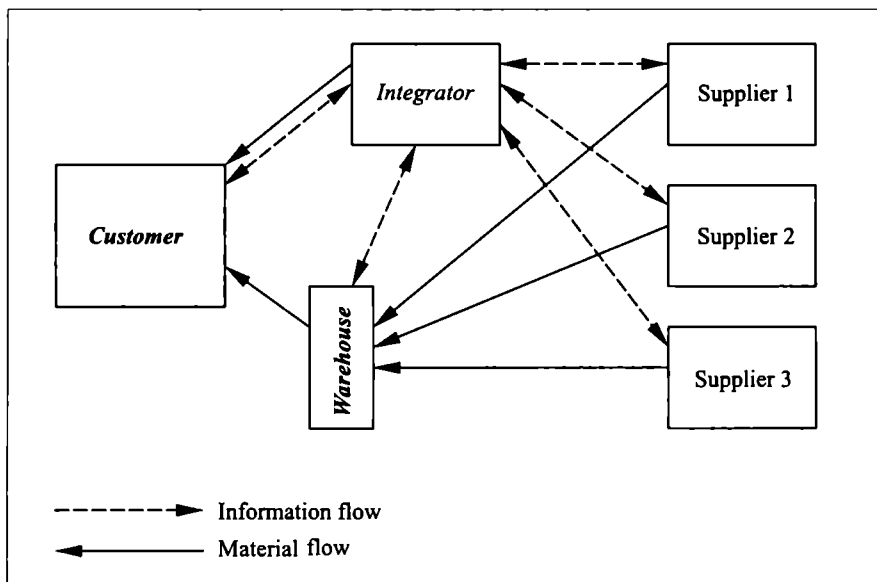


Fig. 2. Modified material and information flow using integrator

Source: own study.

costs is necessary because of specialisation of services. The costs are lower than the costs covered by the integrator. The transfer of transportation cost from the integrator to the external warehouse turns out to create considerable savings.

By giving up the other suppliers' materials, the integrator gives three transports to external warehouse daily. It has only one direct delivery of his products to the customer. The transportation cost stays on the level €4000 monthly, which is four-times reduction of delivery costs.

The markets offers of warehouse contain not only services of storing but also target transportation. For definite size of production the costs of the whole process should be on the level of €4000 monthly. The composition of costs is presented in table 4.

Table 4. Integrator costs using the external warehouse

Cost	Warehouse	Integrator
Cost of storing and logistics service [EUR]	4000	200
Delivery cost between customer and integrator [EUR]	0	4000
Total costs [EUR]	4000	4200
Customer service total cost [EUR]	8200	

Source: own study.

A defect of this solution is a lack of control over warehouse states as well as limitation of reaction in critical situation and lack of flexibility actions. All of disadvantages are caused by lack of direct information flow between the warehouse and the customer.

Recapitulation of total costs of the customer's service using the external warehouse is presented in table 5.

Table 5. Customer service costs using the external warehouse

Costs	Value
Transport costs between suppliers and integrator [EUR]	34 600
Cost of storing and logistics service [EUR]	200
Delivery cost between integrator and customer [EUR]	4 000
External warehouse costs [EUR]	4 000
Total costs [EUR]	42 800

Source: own study.

Table 6. Advantage and disadvantage proposed supply chain organization

Variant	Disadvantage	Advantage
1. Integrator	Rebuilding infrastructure; Increasing costs of storing and external transport To save up a place for storing materials Increasing shipments to customer	Development company Control on the material flow (incoming and out coming) Organizational changes, to adjust to new customer demands Having stock
2. External warehouse	Covering costs of renting external warehouse; Lack of control on stocks and deliveries' quantity control Limited influence on the speed of reaction, regularity deliveries etc. Difficulty in documents flow	Warehouse is very close the customer Short delivery time Possibility to transport full trucks

Source: own study.

The presented suggestions to modify the supply chain, it is visible that storing materials in external warehouse is more profitable situation. Yet while making decisions about using the external warehouse and create the material flow.

## References

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## WYKORZYSTANIE INTEGRATORA PRZY ORGANIZACJI DOSTAW

### Streszczenie

Artykuł traktuje o organizacji łańcucha dostaw, która zapewnia wymaganą synchronizację dostaw u odbiorcy. Zaprezentowano dwa warianty wykorzystania integratora dostaw. W obu wariantach integrator jest jednostką odpowiadającą za synchronizację dostaw materiałowych oraz odpowiednie dostawy w systemie Just In Time do ostatecznego klienta biznesowego. W analizie i porównaniu wariantów za główny czynnik przyjęte zostały koszty związane z logistyczną obsługą przepływów materiałowych. Zwrócono jednak uwagę na pozakosztowe aspekty organizacji dostaw.