

Iveta Kubasakova - Juraj Jagelcak \*

## LOGISTICS SYSTEM JUST-IN-TIME AND ITS IMPLEMENTATION WITHIN THE COMPANY

*Just-In-Time (JIT) is a logistics system with its own technology for supply, production, distribution and management within the company. This article describes the technology of how to apply the JIT system in the company, about legal aspects of JIT and its positive and negative impact on the company's profits.*

**Keywords:** Logistics system, implementation, legal aspect, positive, negative.

### 1. Introduction

According to Mr. Gregor and Kosturiak, JIT production is a philosophy of eliminating all forms of waste within the production process, from purchase of the materials and components to distribution of the final product. Production using the principles of JIT aims to produce high quality products in large quantities, which customers need within a certain time. This means that JIT manufacturing should be for specific customer orders only and goods are delivered once they are needed. JIT approach requires production of high quality products in order to reduce and eliminate storage of parts and thus lowering the overall cost of production [1 and 2].

### 2. JIT characteristics

The basis and philosophy of the JIT system means production of the goods, which are needed so that the storage of stock would not add value to the production process. A philosophy of JIT production is to supply only a specific product in order to eliminate wasted material and time" (Sliva, 2004).

Based on the opinion of Lambert, Stock and Ellram, JIT is a lean production of the high quality components. JIT production supplies the products needed after the customer had placed an order and therefore eliminates all wasteful processes at all stages of production. It means producing and delivering components and goods 'just in time'. JIT philosophy shows how to increase competitiveness of the company in the market, and contains all the areas in and out of the company [3 and 4].

It is about fulfilling customers' demands for the particular material in production or final product in the distribution chain. Also it includes meeting agreed strict deadlines of inventories "in the right time according to the customer's needs."

JIT is a production philosophy of management inventories in the company. Its aim is to provide reduction of wasted stock. The key of JIT is the idea to eliminate any losses. This philosophy is in conflict with the traditional philosophy "just in case (JIC)", according to which a company stores big inventories in case they are needed. The traditional producers in manufacturing "push through" the final product. This is not permitted in JIT manufacturing. According to JIT, it is considered to have a negative impact on society. On the contrary, JIT philosophy promotes the principle of 'pulled through' production and finished goods, 'just in time' to be sold.

### 3. JIT system

JIT system is the most widespread logistics technology in the field of supply, production and distribution. It satisfies the requirements of delivery of the particular materials, parts and components in the production or distribution of finished products (goods) by delivering them "just in time". It means that these goods are delivered accurately and by the deadlines according to the specific need of the customer. This system approach requires very frequent supplies of partly finished components 'just in time' to the customer. Therefore, the customer is a dominating article of the supply chain. The suppliers have to adapt in such a way that they create parts that will smoothly pass through all points of the handling operations at the production line.

\* Iveta Kubasakova, Juraj Jagelcak

Department of Road and Urban Transport, Faculty of Operation and Economics of Transport and Communications, University of Zilina, Slovakia  
E-mail: iveta.kubasakova@fpedas.uniza.sk

The aim of JIT strategy is to create a product as fast as possible by simplifying and rationalization of internal and external data flow in logistics and thus cutting the costs of the production process. It is important that the high quality supply chain is synchronized with production and thus delivers required materials. JIT goal is to reduce the amount of warehouses. This concept focuses on sophisticated planning, quality detection, designing efficient warehouses and stock supply, in particular:

- selection of means of transport,
- decision about location selection,
- collaboration with the suppliers.

The JIT method is used as a tool to reduce the storage of parts and early supply of the plant. The plants, using this method, concentrate particularly on the reduction of wasted time. The objective is to be closer to the customer and to react faster according to the changes and needs. The main

advantage of JIT manufacturing is the shortening of the entire production (consumer) cycle. Time, during the whole cycle, causes acceleration of capital turnover, increases performance and flexibility and satisfies the consumer. Suppliers located closer to the production plant (place of consumption) do not bring any benefits to the supply chain because the transfer of the costs spent on stocks goes back to the distribution channel. If the rapid reduction of stocks is not simultaneously accompanied by the saving of time in the production process, it may cause a serious threat to the plant. To adapt to the needs of customers, the suppliers currently use synchronized strategies within JIT system, when there is only minimal safety stock for the case, e.g. of unexpected delay of transport or emancipation strategies, when the plant produces several supplies to the store, from where they are dispatched according to customer needs in JIT mode [5 and 6].

The advantage of this system is the propinquity of the supplier and the customer. On the contrary, this strategy may be limited in case of a short transfer distance, border controls and freight forwarding equipage, in case of not complex composite assortment, in-adaptable structures of suppliers production or unsolved problem of connection in the material flow (not aligning of the means of transports, unsuitable way of unloading, ineffective quantitative and qualitative control upon receiving of goods, long follow-up of inter-operational handling) or in information flows (if not a smooth transmission of information). The first four above mentioned factors may be eliminated by accepting of emancipation strategy in the form of inserted common warehouse operated by a contractual freight forwarding agency. In this case, it also ensures the receiving of supplies sent by the supplier to the warehouse on the basis of appeal to the customer (e.g. storage operations and their evidence, supplies from the warehouse for consumption according to direct appeals in JIT mode). Moreover, this warehouse also provides information services and handles formalities connected with supply transport [7, 8 and 9].

If several suppliers are involved in the subsystem of transit storage supplies, the freight forwarder also performs completion or compilation of items within the supply from the warehouse, according to the order required by the customer. The importance of a freight forwarders' involvement in storage systems increases in the current trend of distribution channels influenced by global logistics. (Table 1) In general, it is possible to say that JIT system operates in 4 basic fields:

- improvement of stocks turnover,
- better customer service,
- reduction of storage area,
- improvement of response time.

Implementation of JIT to the logistics chain Table 1

<b>Choose</b>	Corresponding methods of production management Define the lines of management of the sector Define production with JIT manage Define goals Create steering group
<b>Shorter the interim times</b>	Consolidate jobs in the lines or in groups Customize management parameters Reduce waiting times Eliminate downtime
<b>Reduce setting times</b>	Increase flexibility Reduce amount of production Waste reduction Reduce variable costs
<b>Maintain balance of the activities</b>	Increase consumption Collaboration between plants Adapt to demands
<b>High quality products</b>	Reduce faulty products Increase production Increase productivity Increase reliability of the products
<b>Maintain efficiency of the manufacturing park</b>	Increase production Increase effectiveness and reliability of the tools and machinery Reduce faults resulting in production shutdown
<b>Create, Design</b>	Adapt to work changes Motivate

Source: authors

Impact of the introduction goes into business [4] Table 2

Activity	Improvement
Increased productivity	about 20 - 50 %
Reduce purchase prices	up about 10 %
Reduction in manufacturing inventories	about 50 - 100 %
Reduction in finished inventories	up about 95 %
Waste reduction	up about 30 %
Reduce time required for the handling and transportation	about 50- 90 %
Reduction of service processes	about 35 - 80 %
Saving production and storage areas	about 40 - 80 %
Improving quality	up about 55 %

Source: [4]

The implementation of a JIT (Table 2) system may also cause the decrease of distribution costs, decrease of costs on transport, improvement of products quality from the suppliers and reduction of number of carrier haulers and suppliers. Within the JIT system, the importance of transport as a segment of logistics increases and high requirements are put on it:

- shorter and more reliable time of transport,
- more sophisticated communication,
- smaller number of carrier haulers with long-term relations,
- effectively proposed means of transport and equipment for manipulation with material,
- high-quality decision models about use of transport vehicles (own, public, contractual).

However, JIT has also some possible negatives. An emphasis on creating the best conditions for smooth production with minimal stocks may mean deterioration in conditions for the customer and limitations of the sub-suppliers. On the other hand, the companies with several suppliers may become too dependent. Similarly, a JIT system makes high demand on the organization of transport process (correct timing of supply, reliability of means of transport, etc.) [5].

#### 4. Legal aspects of contracts with the suppliers (JIT approaches)

A contract with the supplier about the delivery/deliveries of materials is a final stage of the management processes of purchase strategy of the plant. In the case of determining quantity and value volumes of the material, the plant enters into *long-term contracts* with the suppliers. These contracts are intended to ensure supply of the plant, also during the periods of insufficient offer on the markets and so to protect the plant against unplanned events.

Another advantage of long-term contracts is quantity rebates (price discount on supplied amounts). For the supplier, they are a subject of demonstration of withdrawal stability of products produced by it [10 and 11].

The following aspects are subjects of the contracts:

- 1 **Specification of materials and their qualitative parameters.** Material to be delivered has to be precisely specified, while drawings are often part of the contract. It also specified the necessary quality tests of both contractual parties, way of substitute supplies and substitutions of non-quality supplies.
- 2 **Specification of initial raw materials and materials and possibly their suppliers.** In order to ensure quality of materials, in terms of stability, the input parameters of initial materials are defined.
- 3 **Manipulation with tools, devices and forms.** If the customer is an owner or co-owner of the tools used by the supplier, their utilization has to be contractually agreed. Moreover, if the design of the material comes from the customer, it is their intellectual property. Then, the supplier cannot produce for anybody else without the express permission of the customer.
- 4 **Plan of formation of stock reserves and plan of supplies**
- 5 **Duration of contract validity and notice periods** The long-term contracts are usually concluded for 3 or more years; notice periods are usually at least 6 months.
- 6 **Prices.** Contractual prices are usually fixed for the period of 1 year. The contract usually includes a price calculation.
- 7 **Contractual penalties** for not meeting of contractual terms and conditions [12].

If the customer concludes a contract with the supplier about the JIT form of supply (supply synchronous with production), then the contractual relations are legally modified to three planning levels:

- 1 *strategic (long-term) level:* We talk about a frame contract, e.g. for the period of 3 years with frame annual division of volumes.
- 2 *medium-term level:* We speak about a one year contract with the specification of tasks of the supplier per quarter. Here, the supplier gets the necessary understanding of the needs of a customer in order to ensure the input of raw materials.
- 3 *short-term (operative and realization) level:* It represents monthly plans for the supplier with weekly or daily specifications that are also instructions for supply containing information about quantity, with possible modifications and places of delivery.

The transmission of information is especially difficult in the last level. It is necessary to use phones, faxes and e-mail [6].

## 5. Conclusion

It is very difficult to implement a JIT system, because it requires significant costs to ensure effective operation of the entire system. The most important benefits of the system occur only after a certain time of its operation. The process of material system includes a sub-system of material availability, material

appeal, storage, material preparation, visual management and information system [13 and 14].

## Acknowledgements

This paper presents results of work supported by the Slovak Scientific Grant Agency of the Slovak Republic under the project No. VEGA 1/0331/14.

## References:

- [1] GREGOR, M., KOSTURIAK, J.: *Just in Time. Product Philosophy for Good Management* (in Slovak), 1<sup>st</sup> ed., Bratislava: ELITA, 1994, 299 p. ISBN 80-85323-64-8.
- [2] SLIVA, A.: *The Elements of Logistics* (in Czech), 1<sup>st</sup> ed., Ostrava : ES VSB-TU, 2004, 102 p., ISBN 80-248-0678-9.
- [3] STOPKA, O., BARTUSKA, L., KAMPF, R.: *Passengers' Evaluation of the Integrated Transport Systems*, (in Croatia), *Nase more = Our sea: znanstveno-strucni casopis za more i pomorstvo*, vol. 62, No. 3, 2015, pp. 153-157.
- [4] LAMBERT, D., STOCK, J. R., ELLRAM, L.: *Logistics* (in Czech), 2<sup>nd</sup> ed., Brno : CP Books, 2005, 590 p., ISBN 80-251-0504-0, KE03001, p. 196.
- [5] KUBASAKOVA, I., SULGAN, M.: *Logistics for Freight Forwarding and Road Transport I*, 1<sup>st</sup> ed., Bytca : Druska Books as university textbook, 2014. CD-ROM, 107 p., [AH 7.02], ISBN 978-80-89646-86-9.
- [6] STOPKA, O., SIMKOVA, I., KONECNY, V.: The Quality of Service in the Public Transport and Shipping Industry, (in Croatia), *Nase more = Our sea: znanstveno-strucni casopis za more i pomorstvo*, vol. 62, No. 3, 2015, pp. 126-130.
- [7] KALASOVA, A., KRCHOVA, Z.: *Analysis of Road Traffic Accident Rate in the Slovak Republic and Possibilities of its Reduction through Telematics Applications*, Transport Systems Telematics: 10<sup>th</sup> conference, TST 2010, Katowice - Ustron, 2010: selected papers, Berlin : Springer-Verlag, 2010, ISBN 978-3-642-16471-2, pp. 463-468. (Communications in Computer and Information Science, 104, ISSN 1865-0929).
- [8] PERNICA, P.: *Logistics of 21<sup>st</sup> Century* (in Czech), part 1-3, 1<sup>st</sup> ed., Praha : Radix, 2005. 198 p, ISBN 80-86031-59-4, p. 959.
- [9] SIXTA, J., MACAT, V.: *Logistics Theory and Practice* (in Czech), 1<sup>st</sup> ed., Brno : Computer Press, 2005, 320 p., ISBN 80-251-0573-3, p. 245.
- [10] JAGELCAK, J., ZAMECNIK, J.: Evaluation of Wagon Impact Tests, *Various Measuring Equipment and Influence of Impacts on Cargo Stability*, vol. 17, No. 4, 2015, pp. 21-27, University of Zilina, ISSN 13354205.
- [11] SULGAN, M., SOSEDOVA, J.: Procurement of Materials and Components for Manufacturing Activity, *Communications - Scientific Letters of the University of Zilina*, No. 2, 2014, pp. 58-62, ISSN 1335- 4205.
- [12] GASPARIK, J., SIROKY, J., PECENY, L., HALAS, M.: Methodology for Assessing the Quality of Rail Connections on the Network, *Communications - Scientific Letters of the University of Zilina*, vol. 16, No. 2, 2014, pp. 25-30.
- [13] NEDELIAKOVA, E., DOLINAYOVA, A., GASPARIK, J.: Methodology of Transport Regulation in the Slovak Republic, *Periodica Polytechnica Transportation Engineering*, vol. 38, No. 1, 2010, pp. 37-43.
- [14] JAGELCAK, J., KUBASAKOVA I.: Load Distribution in General Purpose Maritime Container and the Analysis of Load Distribution on Extendable Semitrailer Container Chassis Carrying Different Types of Containers (in Croatia), *Nase more = Our sea: znanstveno-strucni casopis za more i pomorstvo*, vol. 61, No. 5-6, 2014, pp. 106-116.