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Tehnology and Management of Traffic
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NEW PRODUCTION TECHNOLOGIES AND TRAFFIC

SUMMARY

Today the modern production includes the following principles: JIT (Just-in-Time), FMS (Flexible Manufacturing System), EOS (Economies of Scope), R&D (Research and Development), and increasingly present Lean Production.

This article analyses how the mentioned principles, characteristic for the production sphere, get integrated in the field of traffic.

1. INTRODUCTION

Modern production today is enabled by the scientific and technological development. The technical and technological structure presents the material basis for the development of economic relationships.

What is often being neglected is the crucial role of traffic (transport, logistics) which has to be highly adaptable in support of the production. Absence of logistic strategies is evident today (according to Dr. Ihde, logistic is a wider term and contains among other things traffic as a narrower term, and this contains transport as the narrowest term). Today, we need such traffic (transport, logistic) which can follow / provide strategies of a company.

The role of traffic (transport, logistic) is especially important in the international relationships. Without the adequate support in this field the economic development and the presence of countries (and companies) on the international market would lack equality (competitiveness).

2. NEW PRODUCTION TECHNOLOGIES

The market, i.e. the customers today want versatility of products. Only production which can satisfy the constant changes, which covers the expenses and brings profit to the company can survive.

Therefore, new production systems have to include the following principles (Andersson and Stromquist, 1988):

- JIT - Just in Time
- FMS - Flexible Manufacturing System
- EOS - Economies of Scope
- R&D - Research and Development

Successful introduction of the mentioned principles enables adjustment to the market requirements and thus greater competitiveness on the world market. The principles do not exclude but rather supplement one another.

3. JUST IN TIME (French: Le Juste a Temps)

JIT is the principle of industrial organisation which has been known as early as the beginning of the 80s. For the JIT principle of operation it might be said that it is only a partial example of the new organisation (network organisation). It refers to the process of optimal co-ordination that could not be achieved without the basis of the network organisation.

JIT - principle, concept, philosophy, or successful organisational innovation, means an exactly determined throughput of goods regarding time. It deals with the needs of production for raw, auxiliary and installation materials (synchronous delivery).

The rule is: purchase or produce only what is needed and when it is needed. The delivery to the production line requires 100% quality (both in manufacturing and in transporting activity). Total quality has developed primarily because of the impulse given by the Japanese culture of quality.

JIT presents a field of logistic for which numerous companies have shown active interest. Modern logistic concept in industry with repeatable production is based on the consistent integration of the JIT philosophy (where this is possible).

Successful application of the JIT principle brings drastic reduction in capital bound by the stored goods. We can differentiate the proper (authentic) JIT systems and those that are not. Improper systems still use storehouses in the vicinity of the manufacturer (buffer storehouses), whereas proper JIT systems have no storehouses along their logistic chain. Today there is a proverb that information replace stock.

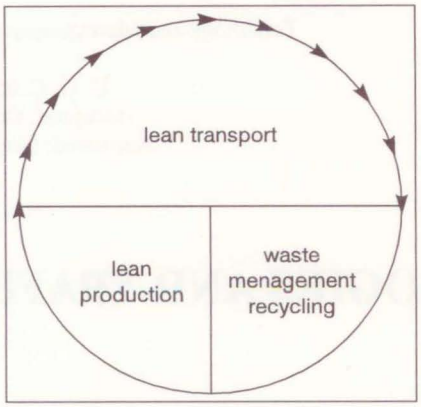


Figure 1 - Production and participation of automobiles

The implementation of JIT system is not adequate for all the companies and fields of material flows. First of all, the synchronous delivery of goods is adequate for the goods of higher and high value, and with regular deliveries. These are the reasons why the introduction of JIT system has gone furthest in industry. It is true especially of the car manufacturers.

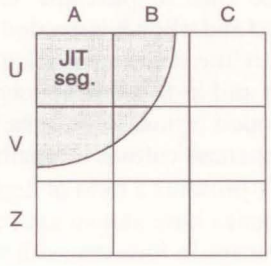
This principle is spreading to other company activities as well, and especially interesting is "Just in Time Development". It spreads more and more into the electrical, chemical, food industry and into the trading activities as well.

JIT has to be accompanied by rationalisation in the company, and change in the mentality of the employees.

JIT segment can be presented by the following scheme:

A: high consumption value of goods
B: medium consumption value of goods
C: low consumption value of goods

U: regular deliveries
V: oscillating deliveries
Z: irregular deliveries



3.1. "Just in Time " and Traffic

JIT concept in the traffic sense means:

- closer relationships among the suppliers, manufacturers and transport companies,
- more frequent deliveries of smaller quantities,
- more intensive information flows between manufacturers and transport companies and suppliers,
- consequent implementation of JIT means those quantities that are really needed by the production (what the parties want and when they want it),
- that it refers to good parts or material with guaranteed quality, which has to be taken care of by the quality control at the supplier's (it is about smaller amounts in both directions - no claimed parts)
- since it is the modular sourcing i.e. sequential deliveries to the production line of single parts, assemblies or subassemblies, the suppliers usually move to the vicinity of the customers, which shortens the transport (tkm),
- the orientation to a smaller number of suppliers (single sourcing) means greater amounts and better utilisation of the transport area (certain trains, railcars, greater utilisation of heavy trucks, reduced utilisation of overhead transport),
- because of better information and communication connections, there is a greater possibility of consolidating JIT deliveries by the forwarding agent.

4. FMS - Flexible Manufacturing System

The market today requires that the industrial structure of large-scale production, organised hierarchically, be directed towards the flexible manufacturing processes, which are organised in networks. Companies, regardless of their size, have to be able to produce not only big batches but also, if necessary, economically manufacture also the very small batches (small amounts of products, a few pieces).

This is not an easy task considering that the flexibility and productivity are opposite in tendencies. This is the reason for the proverb "flexibility has its price".

New production forms (flexible specialisation), which enable this, include multi-purpose production machines, automation, and full integration of complete production tasks, logistic, management and control.

4.1. Flexibility and Traffic

Changes in the production structure towards greater flexibility by creating flexible manufacturing capacities, will have to follow / already follow the transport sector as well. As the industrial companies increasingly persist on greater flexibility, the transport companies will adequately have to analyse more decisively the structure of their fix expenses, in order to be as flexible as possible themselves. This refers primarily to replacing their own capacities by the contractual ones. Big transport operators have already been using this technique, in order to extend their capacities (the market of specialised vehicles is a relatively narrow

one, so that hiring them is more expensive, and hiring non-specialised vehicles is more economical).

It is also necessary to consider the experiments of institutional dividing of infrastructure from the transport operations, in light of greater flexibility of railway and improvement of the position of railway as the service supplier in the goods transport.

The decision-makers are aware that preference of one transport carrier in place of the other transport carrier is in fact failure to respect the transportation science and the role of the market. The guidelines of the EC Ministry Council dated July 29, 1991, state that railway has to be adapted to the European market. Therefore, the tendency is to provide all the transport carriers with the same conditions of business operations. This means first of all the division of path - infrastructure and transport operations. We differentiate numerical, organisational and actual or institutional division. To what extent will the others be discriminated until access to the railway line depends on the integration of the mentioned solutions.

5. EOS - Economies of Scope

The advantages of this principle are, among others, based on the fact that it is cheaper to produce two different products within one company than in two separate and mutually competitive companies. It involves utilising single objects (infrastructure facilities, buildings, optional factors, communication and transport systems) for group purposes.

EOS is an answer to market changes and requires fast and flexible adjustment. The principle provides the company with a greater possibility of reacting and complying to the changes in the market profile.

This is the primary reason for establishing big companies with taking over, merging or founding of a network of dependent subcontractors.

6. R&D - Research and Development

New achievements in the field of science are often the initial factor for technological discontinuities in the field of production and also of infrastructure development. Investing in R&D has a decisive role in the strategic planning.

Today, knowledge has to be applied daily in product design, production process, and in the development of new production methods.

R&D and its integration into the production process change the industrial production. The result of the high-tech production systems are the products with the greater added value (more sophisticated). Innovation is today the key factor of the modern development, "spiritus movens", which changes the economic structure. Constant innovations are, as it seems, the only strategy, which can lead to greater success.

Within the European Union, R&D programmes in the fields of computer sciences and communication are among the most important ones. Since it is said that information and communication technologies act "horizontally", the "spin-off" of these R&D programmes is extensive, and they have found fertile ground in many fields.

Among these, the transport plays an important role. Many applications have already been implemented and many more are being developed. Knowledge, which provides strategic utilisation of information and communication technologies is today an important factor.

In road transport there is the well-known programme DRIVE - acronym for Dedicated Road Infrastructure for Vehicle Safety in Europe. Among the DRIVE programmes, EUROFRET and FLEET are important.

Among other programmes, in the field of road transport there are RACE ESPRIT, IMPACT, and within EUREKA - PROMETHEUS (Programme for a European Traffic with Highest Efficiency and Unprecedented Safety).

7. LEAN PRODUCTION

"Lean production / lean organisation" joins several strategies of modern management philosophy. This is a new concept, which tries to produce (products and services) at the lowest possible price, requiring careful and rational utilisation of all the resources.

Therefore, "Total Quality Management" is the precondition for the "Lean Production". The concept of "Lean Production" can be realised only with complete information support and constant control of all the business activities within a company and its environment.

7.1. Lean Transport

Minimisation of utilisation of resources as the origin of high-quality improvement, can be felt in the automotive industry as well. The objective of the technical efforts of the manufacturers is not directed any more only towards reduction in fuel consumption, but rather takes as an equal objective the utilisation of natural resources.

The automotive industry pays increasing attention to the reduction of burdens (internalisation of external expenses) which result from the traffic. This includes the reduction in exhaust gases emission, increase in driving safety, passive safety, reduction of noise, etc.

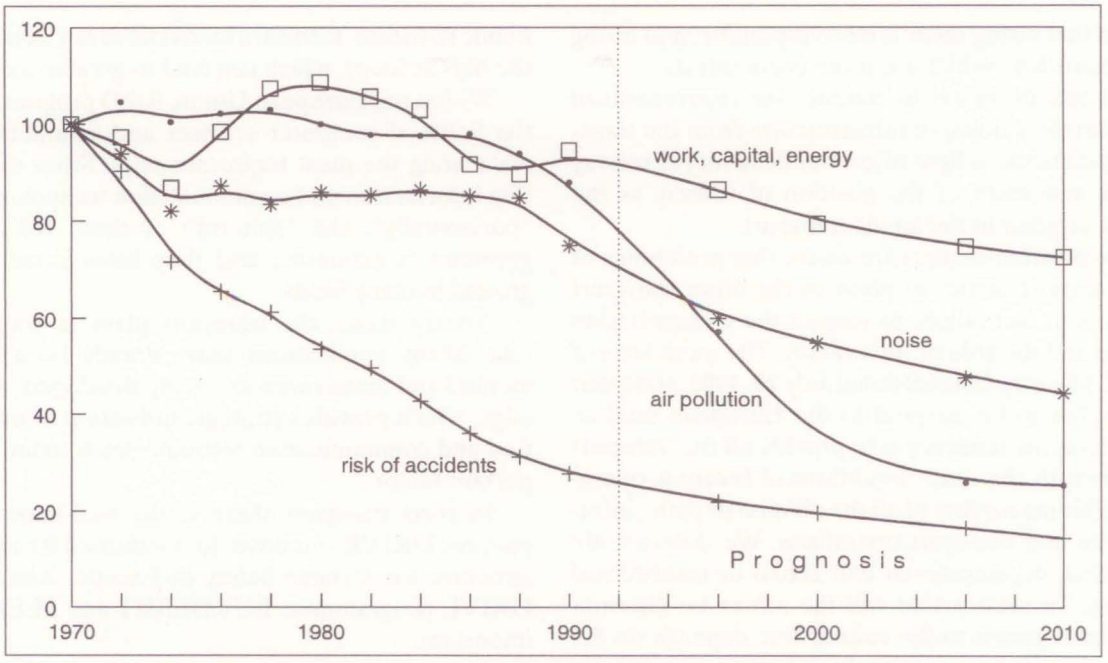


Figure 2 - Consumption of resources per km in road traffic

If we consider all the factors: work, capital, energy, noise, air pollution, risks of accidents, driving per unit (km) has become cheaper and according to the prognosis made by Planco-consulting, the expenses will drop even further until the year 2010.

8. CONCLUSION

New technologies present today strong support to the development and at the same time a great danger.

Technology is, according to Levitt, an accepted master, engine which is pulling behind everything else and is determining where the future lies. On the other hand there is nothing that would so much spend the resources as utilisation of the possibilities offered by new technologies in an increasing volume, for inappropriate, banal, and unfeasible purposes.

The traffic (logistic) today is required to be adaptive in support of production. Traffic (logistic) companies that have realised this, and behave accordingly, are at an advantage today.

On the other hand, both sides (the manufacturers and those who offer traffic/logistic services - logistic companies) are required to adapt their operations (activities) already today, and primarily in the near future, to the environment.

Better conservation of resources is already today for both sides a very important criterion of successful economic operation (Lean production, Lean transport, etc.). Therefore, new economic models have to be compatible with the limitations of our planet and the real needs of the people.

IZVLEČEK

NOVE PROIZVODNE TEHNOLOGIJE IN PROMET

Danes sodobna proizvodnja vključuje naslednje principe: JIT (Just in Time), FMS (flexible manufacturing system), EOS (economies of scope), R&D (research and development), vse bolj se prisotna vitka proizvodnja (lean production).

V tem članku se analizira, kako se omenjeni principi, ki so značilni za proizvodno sfero, vključujejo na prometnem področju.

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