REGIONAL CITY LOGISTICS AND SUPPLY CHAINS IN MACHINERY

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In this paper the scope of goods exchange of Kraljevo region with foreign countries is analyzed. The aim of analysis is estimation of scope of goods flow as one of the starting parameters for introducing the innovations in industrial warehouse and for development of city logistics concept based on concentration of goods and information flows.

Key words*: industry, development, region, city logistics, supply chain*

1. INTRODUCTION

Rapid development of industry and information technologies have caused introducing the innovations in industrial warehouses and goods transport. These innovations are influenced not only by industry development and product increase but by the level of realized goods flows i.e. by export and import as well.

2. PRESENT CONDITION OF PRODUCTION SYSTEMS AND GOODS EXCHANGE IN KRALJEVO REGION

Development of city logistics is the feature of big cities but also of the regions where towns are closely connected in goods transport.

There are three municipalities in Kraljevo region with more than 300.000 inhabitants and distance among them being not longer than 100km. Total goods exchange between this region and foreign countries is more than 300.000 dollars. The exchange scope (as well as exchange in the region that is not included by this estimation) enables the problem of development of new industrial warehouses and city logistics to be taken into consideration.

Data on export and import in Kraljevo region for period from 2001-2004 (fig.1) also prove the abovementioned. The numbers in fig.1 present the millions of dollars.

In 2002 35.77% of total goods exchange in Kraljevo region was realized as an import and 64.23% as an export. In 2004 the export was increased on 37.9% but the import increased for 514 million dollars. Data on the region corresponds to the trend of goods exchange of Serbia and they are even a bit favourable.
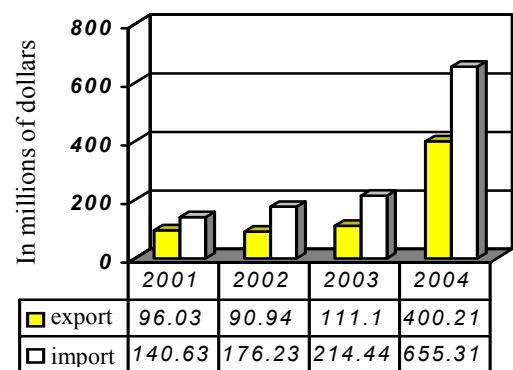

	2001	2002	2003	2004
export	96.03	90.94	111.1	400.21
import	140.63	176.23	214.44	655.31

Fig.1

Some significant and the most important partners are shown in figures 2 and 3, respectively.

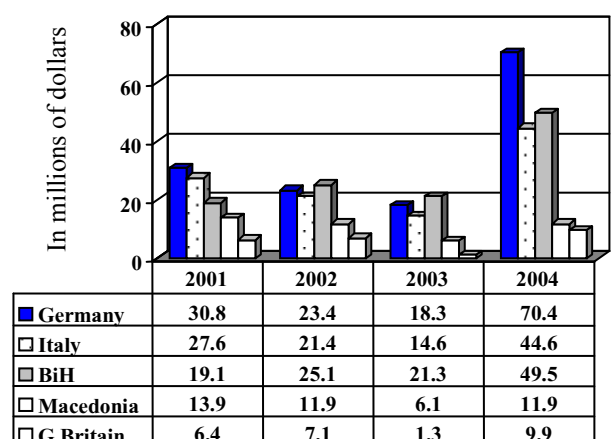|	2001	2002	2003	2004
Germany	30.8	23.4	18.3	70.4
Italy	27.6	21.4	14.6	44.6
BiH	19.1	25.1	21.3	49.5
Macedonia	13.9	11.9	6.1	11.9
G.Britain	6.4	7.1	1.3	9.9

Fig.2

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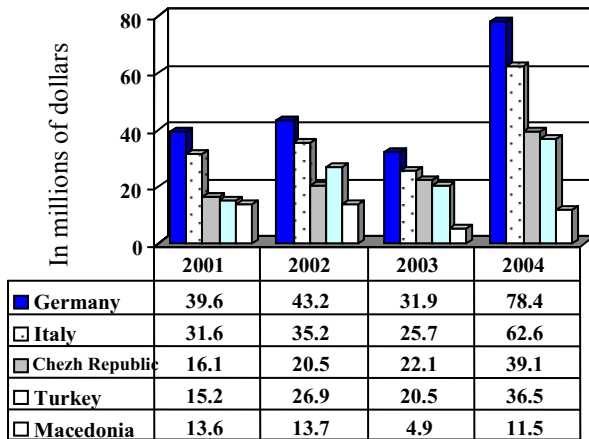|	2001	2002	2003	2004
■ Germany	39.6	43.2	31.9	78.4
□ Italy	31.6	35.2	25.7	62.6
▨ Chezh Republic	16.1	20.5	22.1	39.1
□ Turkey	15.2	26.9	20.5	36.5
□ Macedonia	13.6	13.7	4.9	11.5

Fig.3

Figures 4 and 5 show the exchange of goods and products in some industry branches. Figures 4 and 5 show the scope of export and import from 2002-2004, respectively.
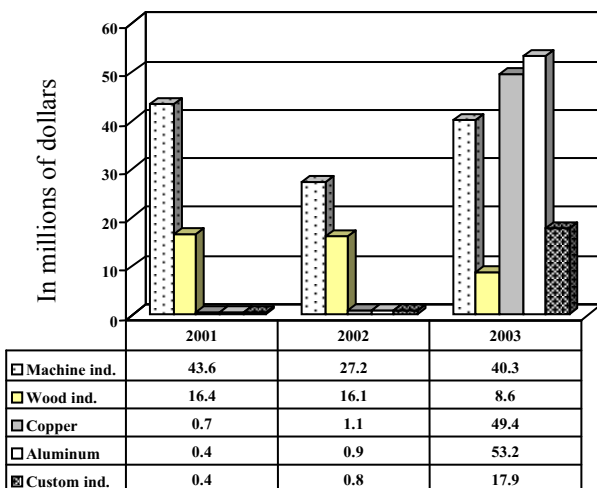

	2001	2002	2003
□ Machine ind.	43.6	27.2	40.3
□ Wood ind.	16.4	16.1	8.6
▨ Copper	0.7	1.1	49.4
□ Aluminum	0.4	0.9	53.2
▨ Custom ind.	0.4	0.8	17.9

Fig.4

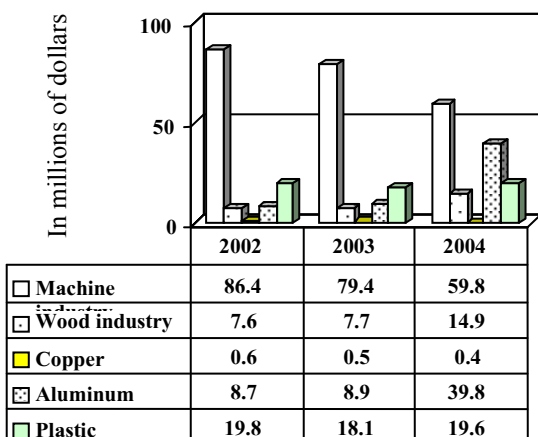|	2002	2003	2004
□ Machine industry	86.4	79.4	59.8
□ Wood industry	7.6	7.7	14.9
□ Copper	0.6	0.5	0.4
▨ Aluminum	8.7	8.9	39.8
□ Plastic production	19.8	18.1	19.6

Fig.5

3. CENTRAL INDUSTRIAL WAREHOUSE IN REGIONAL LOGISTIC CENTRES AND CITY LOGISTICS

Strategic up-to-date orientation of our economy forecasting development of small and medium enterprises points out the need for a new approach to improvement of regional prosperity. It must be started from basic requirements: decrease of both production and goods price and increase of the service quality level.

Very useful solution for improvement of business management in the regions is forming and development of regional logistic centres with a centralized industrial warehouse. In logistic centres all activities on total flow and retaining of the goods[2] in the region would be concentrated [1].

The experiences of developed European countries show that basic activities of logistic centres (goods and transport centres, distributive centres) and their supply are:

- Supply, keeping and retaining of goods (especially for the needs of the region),
- Reloading of goods (in these kinds of transport),
- Incoming and outgoing remote, regional and local transport of goods,
- Collective and distributive transport,
- Additional and service activities (informational control systems, load exchange etc.)[1].

The stated activities clearly point out the basic aims and tasks of the logistic centres and supply chains in the sectors of industrial (production) economy, traffic economy, living conditions etc. These aims and tasks are the following:

- Improvement of economy structure,
- Enabling the faster and wider development of small and medium enterprises (production and service ones),
- Making conditions for general improvement of regional development,
- Improvement of service quality,
- Decrease of transport costs and goods stocking,
- Improvement of functioning efficiency of the whole distributive system, especially the town and production enterprises supply,
- Improvement of traffic structure,
- Improvement of space plan,
- Large energy savings,
- Improvement and protection of the environment.

[2] Term goods means the most various products: material, half-finished material, finished material,…

Basic manner for decrease of both production and service costs is the adoption of new strategy supplying the consumer with materials/goods "just in time" i.e. when they are needed in production or when the service is being done.

The mentioned requirement implies that small and medium enterprises should have a central warehouse/distribution centre, from which the needed goods, materials, half-finished materials, components, etc. would be supplied just in time for immediate installation/production. It is irrational that the enterprise structure covers those quantities and assortments in the warehouses. So, the solution is forming the collaborative industrial warehouse either as part of the logistic centre or as the beginning of development of the regional logistic centre.

The central regional industrial warehouse can be structured in two ways:

- Centralized for whole region in one location, or
- Decentralized in more sub-regional locations in the city centers which are mutually integrated by information technologies.

When choosing the warehouse type one should bare in mind that application of information technologies enables the decentralized warehouse to be treated as centralized and both of them as part of the regional logistic centre.

By right choice of location of industrial warehouse and logistic centre the city logistics is basically improved as well as city and regional transport, which influences both the application and maintenance of travelling network.

4. THE NEED FOR CITY LOGISTICS DEVELOPMENT IN KRALJEVO REGION

For most European countries the problem of goods transport in cities is becoming current at the moment when the number of inhabitants exceeds 100.000 and when transport is being done on a distance up to 50km. According to geographic location of the towns in the region (fig.6) Kraljevo region has a line characteristic in the city logistics sense with exception of Gornji Milanovac. The analyses show that about 80% of transport is realized at the distance shorter than 50km. The important thing is that about 50% of road transport costs are realized in city transport and delivery.

Except financial parameters it is also important to mention that lorries make noise which is 10 times louder than the noise made by cars and that more than 50% of exhaust gases are made in traffic. [2].
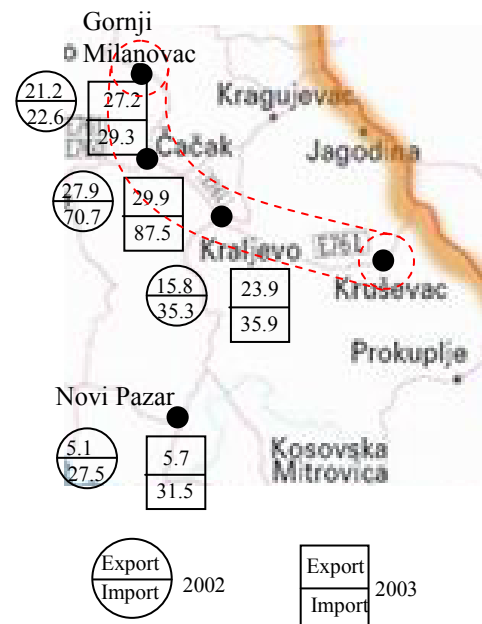
In millions of dollars
Fig. 6

Having in mind these data as well as the geographic location of this region (Kraljevo is about 50km far from Čačak and Kruševac but in opposite directions) and the increase of total goods exchange of the region, planned industrial development (after privatization, re-engineering of equipment and technologies) it can be stated that the conditions for starting then project of city logistics development in this region as well as new concept of centralized industrial warehouse and supply chains are made.

Each town, in this case the region as a whole, requires its own concept of city logistics which must be constantly followed and developed. In order to realize a project like this one must estimate and analyze a number of parameters related to this problem, firs of all the strategic concept of city logistics and forming the knowledge base [5].

Development of city logistics conception in the region is based on the concentration of goods, transport and information flows. In order to develop this concept adequate logistic centres must be formed and supply chains connecting incoming and outgoing goods flows must be provided (fig.7).
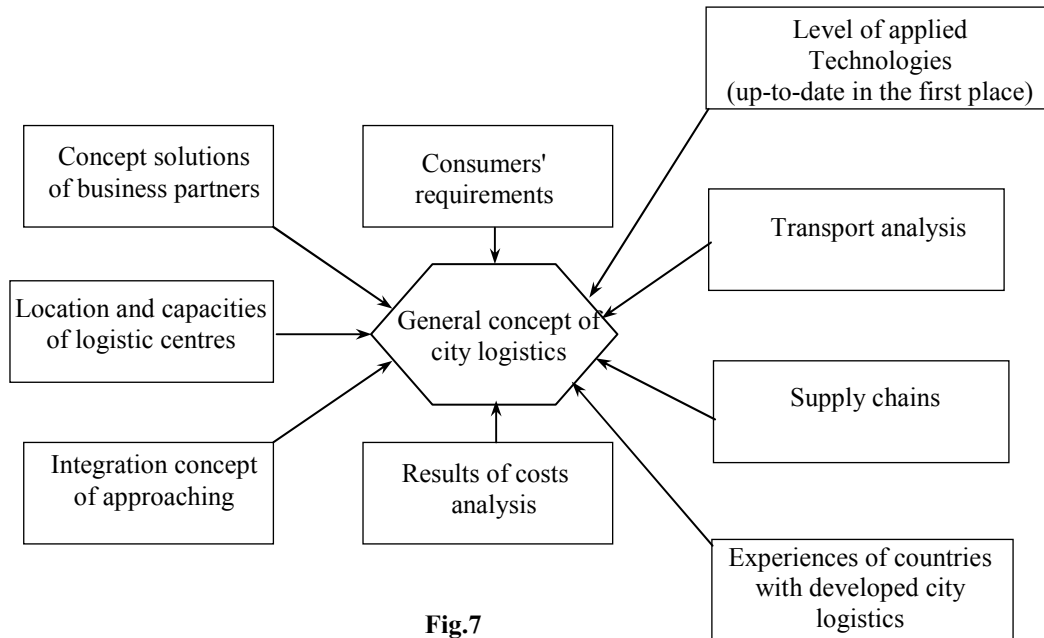
Fig.7

Fig.7

5. SUPPLY CHAINS AND THEIR MANAGEMENT

A supply chain is a network of means and distributive options supplying material, transform it into half-finished material and distribute it to the consumers. There are supply chains both in production and service business organizations.

In a word, the supply chain is a part of the process where the products are made and delivered to the consumers. The supply chain is a complex network of relations and it is managed by companies in order to acquire raw material and half-finished material, to make new products, sell them and finally to deliver them to buyers. The management of the supply chain is coordination of material, information and finance flows among all the companies participating in business transactions:

- Material flows include transfer of physical products from the supplier to the consumers through the chain, as well as reverse material flows such as reclamation of sold and delivered products, maintenance, recycling etc.;
- Information flows include prediction of demand, order transfers and reports on the status of single deliveries;
- Financial flows include information about the credit cards, credit conditions, payment terms etc.

Information and Communication Technologies (ICT) have enabled costs and effective spreading of information among various subjects in the supply chain. New strategies for the supply chain, such as Vendor Managed Inventory (VMI), Collaborative Planning, Forecasting and Replenishment (CPFR) and Efficient Consumer Response (ECR) have started to exploit these new communication channels at the end of retail supply chain. The influence of electronic management on supply chain of producers and on suppliers of material/components is less understood and exploited.

Some of basic strategies for supply chain (fig. 8) are:

- Decreased strategy- with one participant less in a supply chain,
- Electronic shopping-with distributive network being overcome and information and material flow is directly done between the consumer and the producer,
- EPOS- with information beimg transferred from the market to all companies in the supply chain,
- VMI simulated by development of the protocol between two participants in a supply chain giving necessary information about the stock and sale, authority and responsibility toward the supplier so that he could manage the consumers' stock.
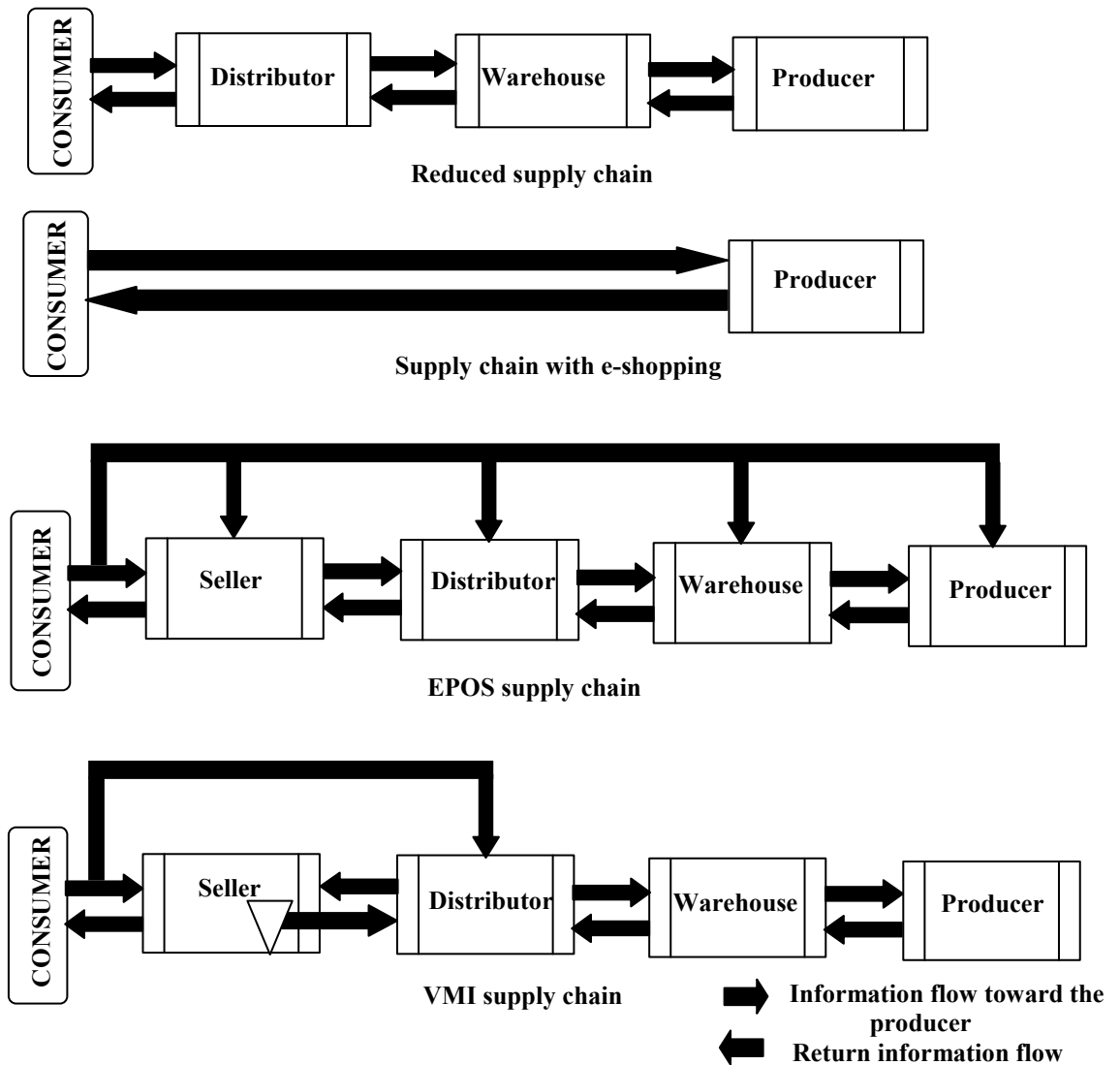
Fig. 8

In the screenplay where EPOS is approved the sale to final consumers is obvious to all members of the supply chain. The situation is the same as in numerous shops supply chains where data are available by the Internet or directly from the retailer or through the third groups and can be used by members of supply chains so that forecasts would be generated. In this strategy data on sale can be used by any participant, but each participant still should deliver the ordered (if it is possible). Particular VMI screenplay that is under consideration is the following: distributor in two member VMI relation manages the retailer's stock. Distributor is given the information on the sales and retailer's stock. The retailer in this screenplay does not place the orders to the distributor but believes he will set appropriate stock quantities in order to have enough (but not too much) stock at the retailer's.

The other participant in this screenplay (warehouse and factory/producer) functions in traditional mode.

Transport is one of the most important element in logistics costs for most of the companies. In practice, each supply chain management begins with transfer of raw materials or half-finished materials, than it includes internal flows and ends up with outgoing flow of finished products. Because of that transport management is of key importance for supply chain improvement.

Transport management includes:
- Transport planning,
- Determination of directions and distribution of vehicles in dynamic schemes,
- Selection of transport type (road, railway, air transport)
- Warehouse management, and
- Providing the functioning of return roads and continual transports.

Along with improvements in transport system product prices at big geographic (national) markets can be quite lower and favorable for most of the consumers.

5. CONCLUSION

The analysis of presented results of goods exchange shows that goods exchange is on the increase and that it might have sudden increase. In the region Kraljevo has the position of a central unit, its number of inhabitants is considered to be current for development of the regional city logistics. Transport requirements in supply chains, ecologic requirement and the need for living quality in stated towns in the regions particularly point out the significance of location selection of logistic centres as well as the manner and time for their supply.

6. REFERENCES

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