INFORMATION LOGISTICS AS MEANS OF INFORMATION SERVICES FOR FREIGHT TRANSPORT NEEDS

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Abstract: European parking information center (EPIC) – it will provide unified and detailed information about European parking areas. The EPIC system will receive the data from local information centres. For Slovak republic there will be one provider for traffic data – a National traffic information center (NDIC). The EPIC system is available at http://truckinform.eu. Intelligent parking system (IPS) will be linked with NDIC. The aim of the IPS system is to provide information as follows: number of free parking places, services to be used in parking area and so one.

1   Introduction

To ensure effective functioning of the National traffic information system NSDI in Slovakia the following should be implemented in the future [1]:

• To engage all competent public authorities to the NSDI abreast of national, regional and local authorities,

• To build the NSDI as an open modular system integrating all available data from information systems of the operators who have built their own information systems (eg, communications managers - National Highway Company (NDS), the Slovak Road Administration (SSC), Police Force (Police Corps), Fire and Rescue Corps (HaZZ), the national center, regional centers, specialized centers of each individual service and information systems that will work on information and not control lines

• Providing of traffic data will be understood as a public service, i.e. traffic information will be available in basic form under appropriate conditions for free to anyone who will ensure their further spread, or use it for improving traffic and transport,

• To edit the Act No. 211/2000 Coll (Freedom of Information Act) for purposes of cooperation elements of the information system and information needs in terms of optimization of freight haulage.

2   Analysis of logistic chain in terms of information needs

When systemic processing of analysis from the perspective of logistics chain information needs, please be aware of the following characteristics:

• System consists of a limited number of elements,

• the logistics chain elements are in mutual correlation,

• elements of the logistics chain are in correlation with its environment.

For system analysis of logistics chain elements in term of information needs, the following is important:

• defining elements of the logistics chain,

• rigorous analysis of existing information flows,

• the exact formulation of the information relationship between suppliers, carriers and customers,

• analysis of the elements of the logistics chain in terms of information possibilities

2.1   Description of logistic chain

Currently there is increasing pressure for improving the effectiveness of all activities, not only in the transport sector. Restructuring, modification of obsolete thinking and old habits and activities of form is closely associated with the use of information technology, modern approaches and modern logistics methods to increase efficiency, rationalization and optimization of material, financial and information flows. Management and implementation of flexible global logistics networks with their high demands of communication and coordination creates the preconditions for continued strong growth.

A specific term of logistics is the logistics chain. It is a set of elements, arranged to create flow of information and materials needed in terms of a specific aim. Logistics chain is the flow of products from the raw materials to end user. A typical logistics chain is shown in Figure 1.

According to the transport the logistics chain can be characterized by transport chain as a sequence of interconnected technical and organizational operations,

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which were transporting people or goods from one source to the target. Transport chain may be a monomial or multi part. For multipart chain considering relationship manufacturer – consumer there is a change in transport means.
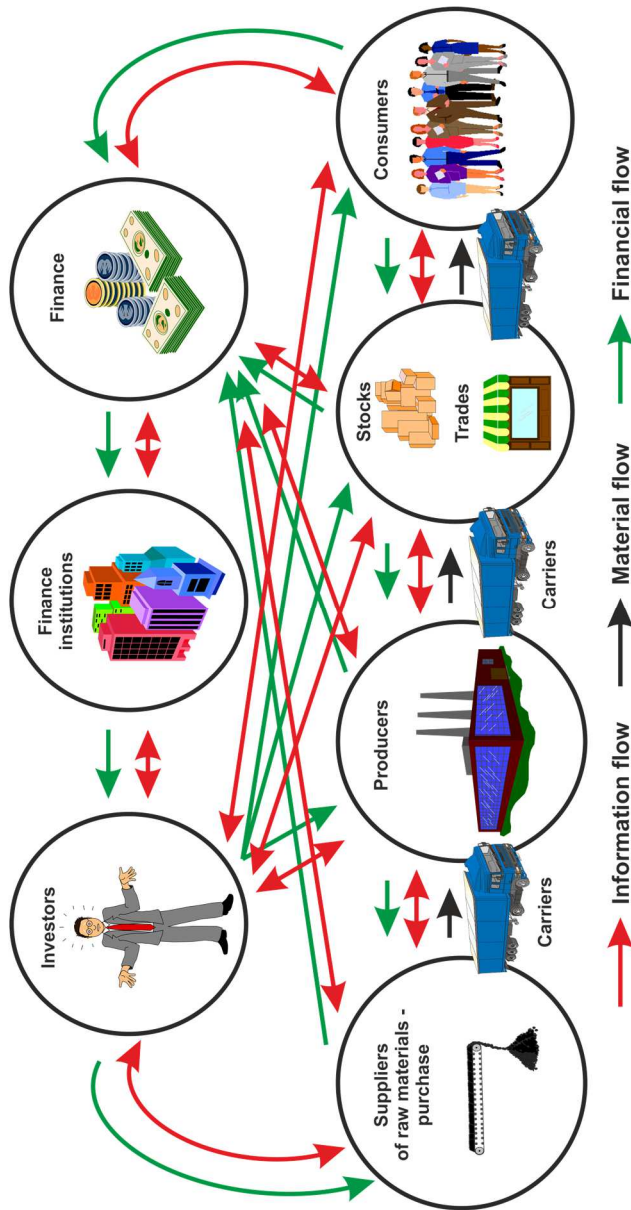

Figure 1 Logistic chains

Transport as shown in Figure 1, is one of the most important elements of the logistics chain. It participates as an intermediary between suppliers of raw materials and manufacturers and also between the manufacturers and warehouses, shops and consumers. The above picture shows the importance of transport national or international.

While organizing the technological process of transport, it is desirable to achieve the best indicators of the use of vehicles, in terms of performance, time and

capacity. Next the transport has a major impact on growth and decreasing of logistics costs. While organizing the technological process of transport, it is desirable to achieve the best indicators of the use of vehicles, in terms of performance, time and capacity and has a major impact on traffic growth and decrease logistics costs. The aim of freight transport is to overcome distances, to transfer the goods from point of manufacture to point of consumption. The role of transport from logistics point of view is [1]:

• Choosing the most suitable means of transport - Transport means is concrete transport device for transportation. The choice means of transport mainly affects the length of path that goods must overcome, type, kind of goods and space in which the goods will move by means of transport. In normal practice, for delivery of goods within the republic the road transport is used. Normally, most commonly used transport means are trucks up to 3 tons. Vehicles over 3 ton of capacity weight is mainly used for transport to greater distances or to combine multiple items.

• Choosing the most suitable transport process - the transport process is associated with the organization and management during transport.

2.2 Description of logistics chain elements

Figure 1 shows a typical logistics chain with highlighting of information, material and financial flows. Its elements are as follows:

• Suppliers of raw materials - there are mainly mining companies who provide transportation of raw materials within their own capacity or by external carriers. For case above the road freight transportation is used only for short distances, or for collection of goods to the nearest transfer station. Therefore it is not necessary for suppliers to think about parking [2].

• Carriers - are companies designed to transport goods and products between suppliers and producers and between producers and final consumers or distributors, warehouses and so on. As shown in Figure 1, the carriers in the logistics chain are represented many times. Developing a smart parking system is especially useful for transport companies that will be able to make better and more effective transportation routes. In addition, working conditions for truck drivers will be improved.

Manufacturers - many manufacturers will provide transportation of their products within its own fleet. For these manufacturers, it is very important to take the issue of planning and optimizing routes and tracking of goods being shipped.

The second group of manufacturers that manufacture only their products are seeking ways of reducing their costs for transport, handling and storage. Therefore, all activities related to the goods shipment moves to a specialist - the carrier, which assigns the following activities, including distribution to the final consumer. In this case, planning and optimizing routes are carried out directly by shipping company.

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Stores and shops - acts as an intermediary between producers and consumers. Like the producers the stores, shops and distributors often need to think about the issue of transport planning. In particular, distributors are an element of the logistics chain who are mostly under pressure in order to ensure quality of logistics services (supply timely, optimization of costs and traffic routes, security). Safety breaks of truck drivers should be also considered in step with the existing legislation of the SR and the EU.

Consumers - acts as end customers, who are not in the important from IPS data providing point of view.

When building intelligent parking system it should be considered with other elements in the logistics chain, such as:

Authorities - acts as responsible for legislation and implementation of laws. Define using of lands and roads.

Road Manager - The public authority responsible for the construction, operation and maintenance of road networks.

Road operator - is a private company having license for construction, operation and maintenance of road networks.

The provider of parking - builds, operates and maintains parking lots. The provider of parking can be public or private organization with a different range of activities.

Parking Operator is only provider of parking responsible for the operation of the parking lot. It can be public or private institution.

2.3 Analysis of logistic chain elements

The most important element in the logistics chain from the perspective of the needs and providing information is the carrier, so that next an analysis is focused primarily on quantity and quality of the information that the every element can provide or requires. Whenever, basic logistical chain begins with the client, which may be in the form of input raw materials supplier, manufacturer or distributor and ends at the end user, who may be in the form of stores, shops, manufacturers and consumers. It is obvious that some elements of the logistics chain can be both the provider and recipient of information [1].

The current situation is characterized by non-systemic providing of information about parking possibilities. The most common information provided on parking areas is as the following:

- the location, direction,
- telephone contact,
- capacity,
- parking facilities,
- the availability for the dangerous goods or special cargo.

A traffic data for truck drivers can be provided by following ways:

- brochures and maps,

- internet portals,
- mobile devices,
- public information resources,
- variable traffic signs,
- verbally between the truck drivers.

For shipping company the goods transportation is realized by two ending elements that are acively participating on transport process:
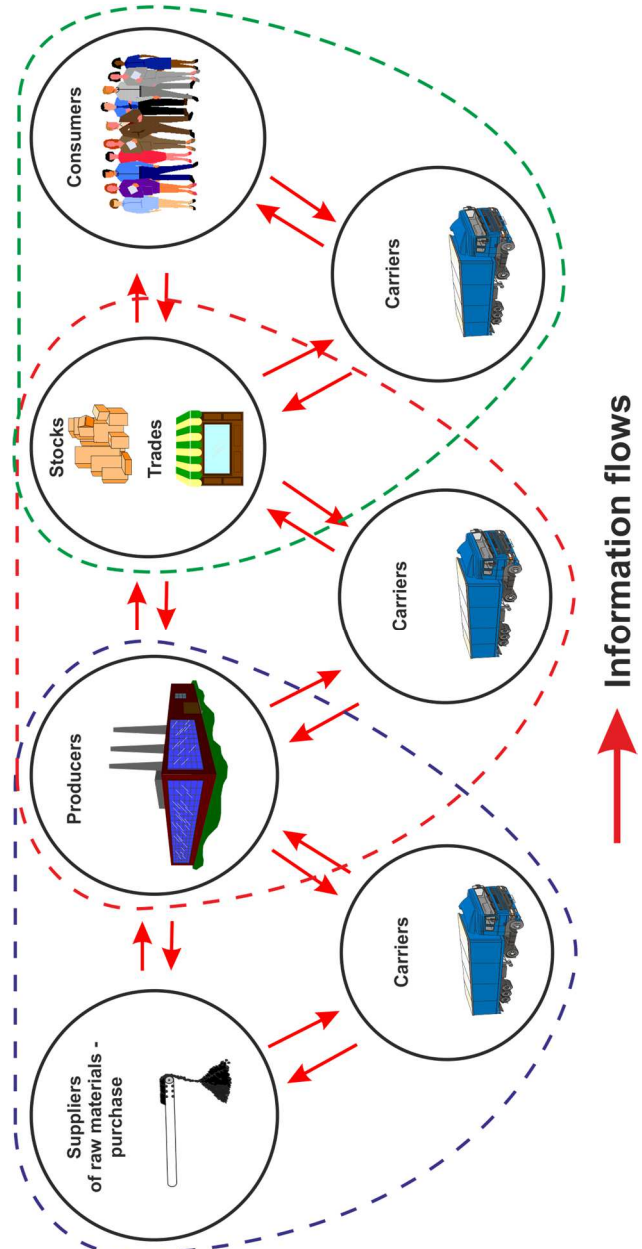
- truck driver,
- transport operator in transport company.

Figure 2 Information triads [2]

The scope for a systemic analysis of information needs for the elements of logistics chain is Figure 1. Figure 1 shows the flow of information between shipping companies on the one side or suppliers and buyers on the

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other. In this context it should be noted that some elements of logistics chain may also act as a recipient as well as suppliers. For example, the manufacturer acts as a recipient if buying from the supplier of raw materials or as a supplier if sending its products to warehouses, shops or distributors.

It is obvious that manufacturer's information needs will vary in nature, in terms of quality and type of data to be provided or received on input and output.

The level of analysis of information flows across the logistic chain is focused on solving a basic level of information flow that is level between manufacturers, carriers and consumers [1], [3]. This level in terms of information flow is characterized by a triangular relation - logistic triads. There are following groups of information relationships:

1.   Group A – consists from supplier of raw material – carrier – manufacturer.

2.   Group B – consists from manufacturer – carrier – warehouses / stores / distributors.

3.   Group C – consists from warehouses / stores / distributors - carrier - consumers.
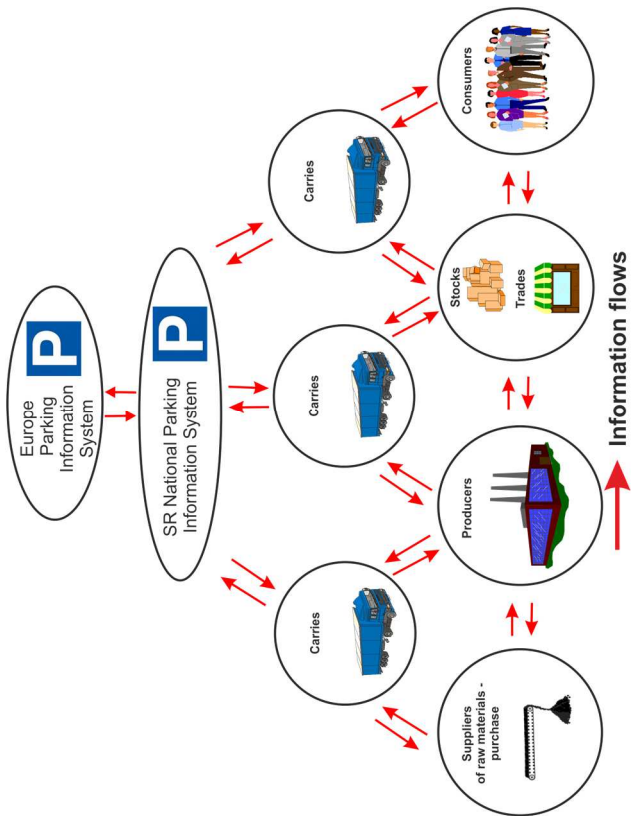

Figure 3 Logistic pyramides of information flows [1]

The relationships between any elements create 2 levels (Figure 2). The first one consist from suppliers of raw material, manufacturers, distributors, stores and consumers [1], [2], [4]. The next level consist from carriers. The above mentioned levels can be extended

about other 2 levels representing the National Intelligent Parking System (IPS) and the European Transport Parking System (EPIC) (see Figure 3).

With the introduction of intelligent parking it would be useful if parking areas were in accordance with system of Intelligent Transport Systems ITS. or specifically with NDIS system in our country. The IDS system is able to manage increasingly difficult traffic situation on the road [1], [5]. Interconnection of IDS information system with information system of Intelligent parking system (IPS) will be solved later.

Possible architecture of information flows between national IPS system and European transport parking system EPIC is shown in Figure 4.
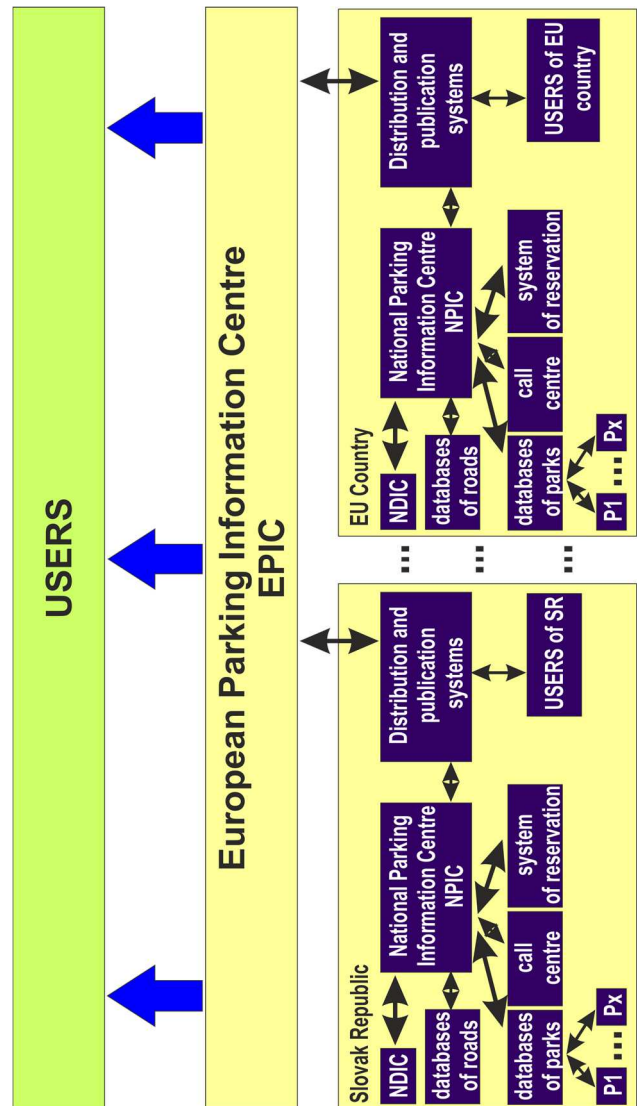

Figure 4 Possible architecture of information center NPIC and EPIC with its elements and its mutual cooperation [1]

European parking information center (EPIC) – it will provide unified and detailed information about European parking areas. The EPIC system will receive the data from

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local information centres. For Slovak republic there will be one provider for traffic data – a National traffic information center (NDIC). The EPIC system is available at http://truckinform.eu

The EPIC system will include an interactive map of the EU so that every user enters the desired area / state by clicking on the map. The user can access to multilingual information about the location, parking lots, services provided by different parking operators, etc. The basic language is recommended to English.

National Parking Information Center (NPIC) is going to be linked with road database and National Transport Information Center. The aim of the NPIC is to provide data about free parking lots, services in every parking area, etc. The part of NPIC system will be a database of parking areas, call centrer and reservation system.

The reservation system - used to reserve space on the parking area.

Call Center - provides information about individual parking areas, next solves problems of drivers, performs bookings by phone. It is recommended to communicate in Slovak and English language.

Distribution and publication channels – are used to distribute all the information to road users like truck drivers.

Data distribution interface can be divided into 2 groups:
• information that are provided before driving like internet, television,
• information that are provided during driving like radio broadcast, RDS-TMC, variable road signs

Database of parking places - store information about parking facitities and services as well as some contacts. Examples for parking services are as the follows:
• A petrol station,
• Roadworthiness tests of vehicles,
• Possibility of weighing of loads, restaurant,
• connection to the Internet,
• parking with security features,
• shower,
• toilets,
• possibility of parking for trucks with dangerous goods,
• possibility of parking for trucks with refrigerator,
• booking.

Parking areas wit its information system – the parking areas have information connection with parking database [1], [6]. A parking worker is responsible for updating a data about parking area.

2.4 Description of information triads

The first communication link (Group A) is between supplier of raw material, carrier and manufacturer. The supplier of raw material and manufacturer communicate each other about:

• number of deliveries (before you go) - tons, pieces, ...
• quality of delivery (before you go) - the quality of raw materials,
• date of dispatch (before you go) - the time when the product is ready for shipment,
• the kind of goods (before you go) - the specific characteristics of materials,
• the price of raw materials (before you go) - contracted price of raw material,
• place of delivery (before you go) - delivery address,
• information about the customer (before you go). - billing Information.

Next the supplier of raw material communicates with carrier about:
• number of deliveries (before you go) - tons, pieces, containers, pallets, ...
• quality of delivery (before you go) - transport conditions,
• date of delivery (before you go) – a date of delivery to recipient,
• the kind of goods (before you go) - the specific characteristics of materials to be transported,
• price of deliveries (before you go), - the price for transport,
• place of delivery (before you go and during delivering) - delivery address,
• information about the recipient (before you go), - company name, contact person, phone number to recipient,
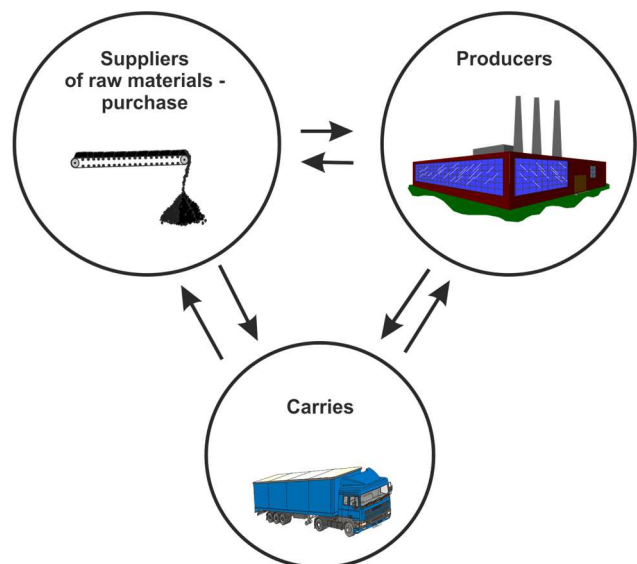• type of transport (before you go) – the choice of means of transport.

Figure 5 Information flows in Group A [1], [2]

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Next there is a communication between carrier and manufacturer:
• date and time of delivery (before you go and during delivering),
• occurencce of unforeseen situations (during delivering). – accidents, traffic congestions
• contact data to recipient,
• delivery conditions or its modification respectivelly

Besides the above-described data, the carrier requires some other information that cannot be obtained from a supplier or recipient (manufacturer in that case). These data is as follows: carriageability, the possibility of rest, auto-service, etc. [1], [7], [8].

The second communication link (Group B) is between manufacturer, distributors / warehouses / stores and carrier. Manufacturers and distributors / warehouses / stores can communicate each other about:
• number of deliveries (before you go) - tons, pieces, ...
• quality of delivery (before you go) - the quality of producsts,
• date of dispatch (before you go) - the time when the product is ready for shipment,
• the kind of goods (before you go) - the specific characteristics of materials,
• the price of product (before you go) - contracted price of products,
• place of delivery (before you go) - delivery address,
• information about the customer (before you go). - billing Information.

Next manufacturer communicate with carrier about:
• number of deliveries (before you go) - tons, pieces, containers, pallets, ...
• quality of delivery (before you go) - transport conditions,
• date of delivery (before you go) – a date of delivery to recipient,
• the kind of goods (before you go) - the specific characteristics of materials to be transported,
• price of deliveries (before you go), - the price for transport,
• place of delivery (before you go and during delivering) - delivery address,
• information about the recipient (before you go), - company name, contact person, phone number to recipient,
• type of transport (before you go) – the choice of means of transport.

Next, there is a communication between carrier and distributors/warehouses/stores about:

• date and time of delivery (before you go and during delivering),
• occurencce of unforeseen situations (during delivering). – accidents, traffic congestions
• contact data to recipient,
• delivery conditions or its modification respectivelly

Similar to group A, the carrier requires some other information that cannot be obtained from a supplier or recipient (distributors/warehouses/stores in that case). These data is as follows: carriageability, the possibility of rest, auto-service, etc.
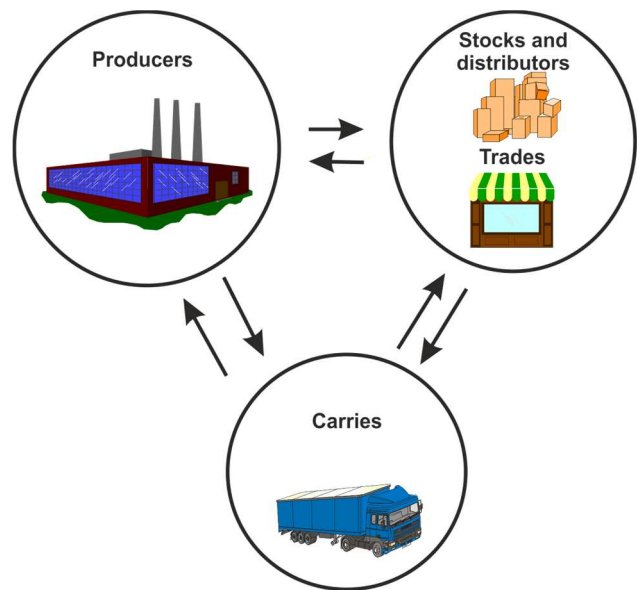

Figure 6 Information flows in Group B [1], [2]

The last group consist of distributors / warehouses / stores, carrier and consumers (Group C). There is a communication between distributors/warehouses/stores and customers about:
• number of deliveries (before you go) - tons, pieces, ...
• quality of delivery (before you go) - the quality of products,
• date of dispatch (before you go) - the time when the product is ready for shipment,
• the kind of goods (before you go) - the specific characteristics of products,
• the price of product (before you go) - contracted of fixed price for product,
• place of delivery (before you go) - delivery address,
• information about the customer (before you go). - billing Information.

Next the carrier communacate with distributors / warehouses / stores about:

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•   number of deliveries (before you go) - pieces, pallets, ...
•   quality of delivery (before you go) - transport conditions,
•   date of delivery (before you go) – a date of delivery to recipient,
•   the kind of goods (before you go) - the specific characteristics of materials to be transported,
•   price of deliveries (before you go), - the price for transport,
•   place of delivery (before you go and during delivering) - delivery address,
•   information about the recipient (before you go), - company name, contact person, phone number to recipient,
•   type of transport (before you go) – the choice of means of transport.

Next, there is a communication between carrier and consumers about:
•   date and time of delivery (before you go and during delivering),
•   occurencce of unforeseen situations (during delivering). – accidents, traffic congestions,
•   contact data to recipient,
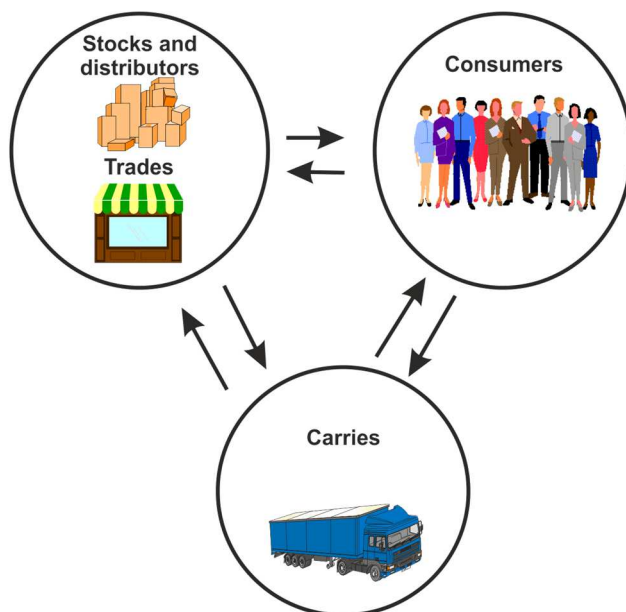•   delivery conditions or its modification respectivelly.

Figure 7 Information flows in Group C [1], [2]

Similar to group A and B, the carrier requires some other information that cannot be obtained from a supplier or recipient (customer in that case). These data is as follows: carriageability, the possibility of rest, auto-service, etc.

Conclusion

It is possible to classify the data according to the information needs as follows:
•   Information necesary for preparing a transport process.
•   Information necessary to make transport.

The above-described information flows are important for the preparation of the transport process. They are not suitable for transport realization. The driver, as a road user has the information about carriageability or traffic-carrying capacity of some roads. The information are applicable when optimizing transport routes.

From systemic analysis of logistic chain it should be stated that for a safe and secure goods transportation it is important for driver to get correct information before and during deliveries. These information are for example: parking possibilities, location of parking areas, phone contact to parking operator, free parking lots in any time, parking facilities and services. In case of dangerous goods the driver also needs information if parking area can accept that kind of goods.

Besides the above mentioned data, the driver needs some traffic information such as weather conditions, carriageability and occurencce of unexpected colisions, data about possibility to go around.

References

[1] Straka, M., Balog, M. and Bindzár, P.: Project EASYWAY, Information services for users of logistics chain of heavy roads transport, Žilina, Research institute of transport, p. 53, 2010. (original in Slovak).
[2] Balog, M. and Straka, M.: Logistics information systems, Bratislava, Ing. Miroslav Mracko, EPOS, p. 208, 2005. (original in Slovak).
[3] Rosová, A.: Logistics costs of the enterprise, Acta Montanistica Slovaca, 12 (2), p. 121-127, 2007.
[4] Besta, P., Samolejová, A., Janovská, K., Lampa, M., Lenort, R.: Evaluation of benefits resulting from innovation of input raw materials dosing process in sintering, Metalurgija, 51 (4), p. 457-460, 2012.
[5] Witkowski, K., Saniuk, S.: Aspect of logistics management of the city infrastructure, Logistyka 41 (2), p. 589-600, 2011.

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[6] Winkler, R.: Effectiveness - an attempt about conceptualization of the idea, Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie, No. 820, Cracow, p. 105-117, 2010.

[7] Trebuňa, P., Halčinová, J.: Mathematical Tools of Cluster Analysis, Applied Mathematics, 4 (5), p. 814-816, 2013.

[8] Cagáňová, D., Čambál, M., Weidlichová Luptáková, S.: Intercultural Management – Trend of Contemporary Globalized World, Electronics and Electrical Engineering, Technologija, Kaunas, 6 (102), p. 51-54, 2010.

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