A STUDY REGARDING THE USE OF THE INFORMATION TECHNOLOGY AND COMMUNICATIONS IN THE LOGISTIC ACTIVITY OF SMALL AND MEDIUM ENTERPRISES

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ABSTRACT: *This paper presents the results of a study regarding the necessary means for small and medium enterprises to effectively interact and cooperate in terms of obtaining a maximum profit from transport infrastructures and communications using available and predictable information technology and communications means. The diversity of structures among enterprises has led to the development of new software products, which are more competitive and efficient and are covering a wider domain of application. As the majority of logistics activities are focused on planning, realizing and tracking cargo, managing vehicles and afferent activities, specific software products were designed and developed, generically called TMS. An analysis of current situation shows that small and medium enterprises are using just a small part of available software. They are treat customers individually and does not enable collaboration between customers to reduce transportation costs or sharing the transport resources.*

1. INTRODUCTION

This paper presents the results of a study regarding the necessary means for small and medium enterprises to effectively interact and cooperate in terms of

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obtaining a maximum profit from transport infrastructures and communications using available and predictable information technology and communications means.

The studies will underpin the following:

- Elaboration of organizational models and software applications capable of ensuring access and coordinate the use of logistics infrastructures of small and medium enterprises that are structured in corresponding clusters
- Application of new logistic concepts
- Use of the new technologic infrastructures (GPS, GIS) in logistics strategies of small and medium enterprises

The structure of small and medium enterprises that are situated along the Romanian section of the European road was analyzed. A large variety of logistics strategies were reported to be adopted by the enterprises in order to optimize the activity related to goods and materials supplying, transport and delivery to customers.

Fiercely competition imposes the small and medium enterprises to use more and more complex and efficient computerized resources. The diversity of structures among enterprises has led to the development of new software products, which are more competitive and efficient and are covering a wider domain of application like transportation grants, communications programs, vehicle tracking devices.

An analysis of current situation shows that small and medium enterprises are using just a small part of available software.

The conclusions that have been reached are following:

- For the majority of products, the enterprises are using their own set of transportation, which usually have small capacity.
- Bulky products are delivered using leased vehicles.
- For short terms delivery they are using the services of courier companies.
- In terms of software products, they use their own applications in managing databases, for billing, to track own stocks in storages and documents of transport. Also, spreadsheet software programs such as Microsoft Excel are used to obtain reports.
- Mobile telephony, fax, instant messaging and e-mails are used as means of communications.
- Transportation grants, planning of logistics activities, route planning, and optimization in loading the vehicles or vehicle tracking devices are rarely, or at all, used by the companies.

The total cost of the product, that includes the production costs along with the ones for storage, transportation and manipulation, is the most used indicator in showing logistic activity efficiency. For a correct evaluation there must be held into account the satisfaction index of the client.

As the majority of logistics activities are focused on planning, realizing and tracking cargo, managing vehicles and afferent activities, in the last years specific software products were designed and developed, generically called TMS (Transportation Management Systems).

2. TRANSPORTATION MANAGEMENT SYSTEMS

Transportation Management Systems are software products that integrate means of logistic management and offer support for activities like: organizing the transport of goods, raw materials and finished products; transport activity planning, loading and unloading, storage and retrieval of data in databases, database maintenance, generation of documents and reports. In most of the cases the use of the Internet is needed.

Transportation Management Systems generally offers solutions for planning multi-modal expedition, in management and execution of transport, including renting and tracking of the goods and report preparation. There are program developers that offer ready-made programs through ASP (Application Service Provider). Also, there is a rather large market for IT&L systems (International Trade and Logistics) that are focused on transport and import/export operations.

The main benefits of Transportation Management Systems consist in low costs of transport obtained through: optimizing the method of transport, route and planning, use changes in the method of transportation on predefined routes, tracking and controlling throughout the transport of the cargo.

By utilizing Transportation Management Systems the savings with transport can reach up to 15% in the case of companies which transport large volumes.

Although the majority of Transportation Management Systems are accessible only on-line there are sistems that can be configured in accordance with the requirements of the user.

Within TMS:
- Once with GPS development there have been realized applications that can track the merchandise on the route in the benefit of the client or that can track a truck by the dispatcher of the Conveyor Company.
- Mobile telephony and satellite transmission is used for detecting (with lesser precision) the location of the transport.
- The information provided can be seen on electronic maps or on the Internet with the help of specialized software.

In terms of Information Technology and Communications, for realizing TMS, are used (figure 1):
- Systems that provide access to databases.
- Communication through Internet on account of exchanging data and messages.
- Means of drawing an visualizing digital maps
- Electronic devices that ensure the mobility of the user
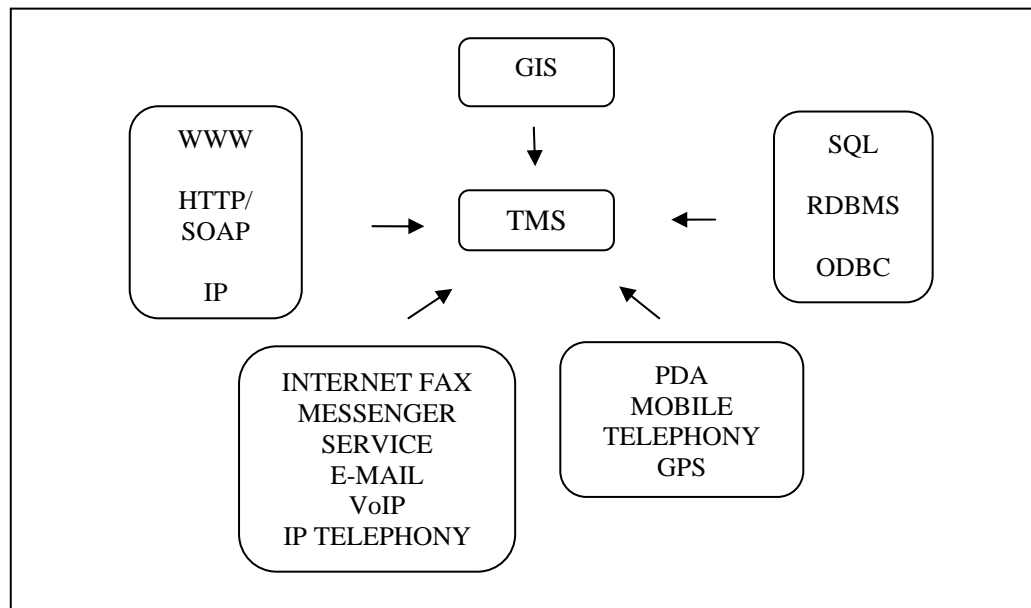
Figure 1. Information technologies and communications utilized by TMS

What do the small and middle enterprises expect from a computerized logistics system? After realizing the survey the requirements that a computerized logistics system must fulfill have outlined. Different small and middle enterprises have different opinions on what logistics systems should accomplish. In generally, the requirements are spread throughout the complexity beach of logistics systems, from the simplest to the most complex depending on the profile and the logistics strategy adopted by the small and medium enterprise. In the majority of cases the expectations against a computerized logistics system are that this should provide a set of basic services, and rarely additional services. In the order of their importance, the basic services are:

-   transportation management offerings
-   transportation management requests
-   billing and payment process management

TMS offers a series of extended services:

-   Transport planning (planning cargo loading process by synchronizing cargo preparatory actions, team preparation and loading facilities, optimize the loading of vehicles by minimizing unused volume and load balancing; route optimization of the transport by establishing the optimal path in space and time; optimization of unloading by synchronizing the time of arrival at the targeted destination).
-   Tracking the transport (monitoring planned route and route already made by the vehicles via electronic maps).
-   Communication through messages.

- Contract management (registering system users; managing access to system services; building and transmitting transport contracts; managing sent and received contracts).

To have a better image regarding information technology products used in domestic and international logistics, a series of such products were studied, analyzing the facilities they offer.

3. CONCLUSIONS

The facilities offered by TMS were summarized in a general functional scheme (figure 2). In various TMS listed may be missing some of the options presented in the scheme or may occur as separate modules.

Logistics planning may include, in addition to transport activities, storage and loading optimizations related to goods or products: stacking, optimizing product placement in relation to the storage.

In case in which products are delivered with a single means of transport, load optimization is performed, which refers to optimizing the use of space transportation and to ensure a balance of goods distributed in such a way as not to endanger the safety of transport.

If transport is done using several transportation methods, the optimization is more complex and the number of available options can be larger (intermodal transport optimization)

Software applications used for optimization are written in an object-related language which runs under operating systems like Windows or UNIX, after it has been previously installed.

The next phase of the optimization activity, whether it is about optimizing the cargo, whether it is about optimizing the intermodal transport, consist in setting the type (types) of the transportation method; it is achieved, firstly, depending on the volume, weight or the type of the cargo.

In route optimization, the most common used criteria are those of minimum route and minimum time, which in turn generate several alternatives with indexes that are close as value. Navigation programs on digital maps (such as GPI or other) can be useful, and can be embedded in optimization programs or as stand-alone.

Optimizing transport costs can be realized considering all the prior versions. They have a global characteristic, sometimes including the costs of storage – loading – unloading that can differ depending on the chosen alternative.

The selection of the type of transport means and carrier is realized through procedures that give access to the database of the provider or carrier. For an efficient determination, the databases must be updated and have to offer filtering data functions. Databases are in general the type of RDBMS, while the programs are written in SQL language. If, from the point of view of the consumer, an acceptable solution is reached, the procedures of issuing the orders or signing the contract with the carrier can begin.
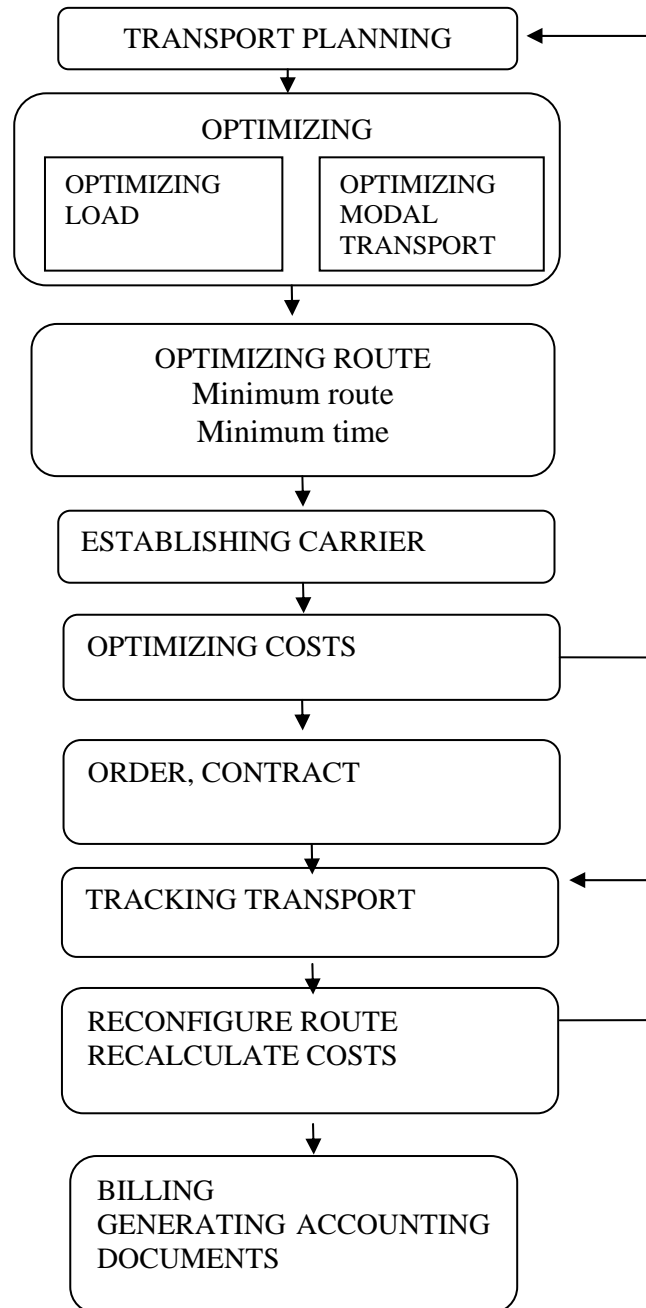
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Figure 2. General functional scheme for TMS

Editing, completion, document generation, accounting records activities use SQL languages, with communication network facilities

There are TMS`s that offer possibilities such as tracking of the cargo and route reconfiguration, depending on the situations encountered on the way. This can avoid foreclosure or unforeseen delays. Modern methods (Java mobile phone features GPS, PDA messaging) can be used to continuously update the position of the cargo. Also views on electronic maps can be used (GIS).

An important feature of organizing information structures used in TMS is how different software modules are distributed between provider and customer. From this point of view, distributed or local information structures may be used.

Distributed structures contain both modules running on client computers and those of the provider. Client modules are downloaded from the provider's website and are activated upon registration and payment, which usually consists of a regular subscription to certain facilities.

With modules downloaded clients can access databases or can launch various programs running resident provider's computer. If there is a possibility of tracking the transport or exchange of documents (order, bill), the programs facilitate the communication with the provider`s administrator and also with the dispatch operator.

Local structures are generally destined to companies that own vehicles or wish to use just the logistical planning of TMS. These programs are usually delivered against a price set accordingly to the conditions of the soft license.

In conclusion, analyzed TMS treat customers individually and does not enable collaboration between customers to reduce transportation costs or sharing the transport resources. Also, these systems do not take into account customer location and does not use of the advantages of their geographical groupings. Therefore, it would be useful to undertake a TMS system that will treat customers in a collaborative computer network, to a more efficient use of the means of transport.

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