



Role of Fleet Controlling in Logistics

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ABSTRACT

The paper deals with the role of fleet controlling in logistics. Main benefits of its application for transport companies (dispatcher, fleet manager etc.), drivers, customers and logistics are described here. Other parts of the article solve the application of fleet controlling in the road transport of high-value cargo and in the field of intermodal transport.

KEYWORDS: Fleet Controlling, road cargo transport, valuables cargo transport, intermodal transport

1. Introduction

Fleet controlling (FC) belongs to the overall concept of "Fleet Management System" (FMS). The FMS is a total concept for ITS (Intelligent Transport System) applications in the field of vehicle-fleet management. The FC is now the last development stage of FMS. That is why terms FC and FMS are equivalent today.

1.1. The development of fleet management/controlling

In 1980-ies the search for stolen vehicles, using "tracking" method, begun in the United States of America. In 1995 the American Department of Defense allowed public using of Global Positioning System (GPS). This facilitated general cost-free use. Mainly after the year 2000, when the wilful inaccuracy of position detection was removed, the boom of satellite navigation started.

The main presumptions of FMS realisation were the development of GPS technology, mobile communication GSM, data transfer technology GPRS and also systems of data reading from various sensors in vehicles.

Four development stages of FMS are distinguished: Tracking, Monitoring, Fleet Management and Fleet Controlling. "Tracking" enabled only simple vehicle tracking; "Monitoring"

made possible data reading from the vehicle bus. The stage "Fleet Management" already enabled on-line communication between a dispatcher and driver and the current stage "Fleet Controlling" enables complete vehicle-fleet administration and management and fully uses the GPS technology. The total economic agenda of each vehicle is enabled too.

Two FC types exist. The first is called "internal FC" – when the fleet management is fully controlled by a company which owns the fleet. And the second type is "external FC" – when the fleet management is outsourced to another company.

Well-known companies, which offer FC technologies, include e.g.: Berg Insight, Frost and Sullivan, YMS Czech Republic. [1] [3] [4]

1.2. The application of fleet controlling

The FC can be applied to any vehicle-fleet. The main areas of FC use are fleets of:

- trucks,
- buses,
- taxi-cars,
- police-cars, ambulances, fire-trucks,
- army vehicles,
- company cars (authorities, offices),
- construction machines (crane trucks, excavators).

This article is focused on the FC of truck-fleet mainly.

1.3. Principles of fleet controlling

The FC is based on on-line (real time) communication between a driver and certain employee of the road hauler in the office (dispatcher, vehicle manager, etc.). The communication is based on principle of writing and sending messages. The communication is similar for example to “ICQ” communication program.

Other important principles of FC are: vehicle tracking/tracing (using GPS) and the transfer of information on driver’s work (driving, safety breaks, etc.), vehicle technical data (speed, consumption, etc.) and cargo data. [1] [4] [5]

2. Communication and control areas

There are three main areas of communication and control here. These are: the driver, vehicle and cargo.

2.1. Driver

At first, the FC provides information on driver’s work – driving times, rest times, times of loading/unloading, etc. The driver’s work in the European Union is (among others) regulated by Regulation 561/2006/EC. This regulation gives all time-limits of driver’s work. The FC-system cooperates with a digital tachograph in a vehicle, so the dispatcher has the current information on driver’s working mode.

The second function of FC is the transfer of data related to driver’s driving style. For example the data concerning: current/maximal speed, gear-changing accuracy, safety and support systems’ activation – e.g. ABS, ESP, and driver’s vigilance control system. [4] [5]

The third area of control is pursuing procedures of loading and unloading and on-line communication with the driver on traffic and transport matters.

2.2. Vehicle

Some areas of communication and control from the “vehicle area” are mentioned in part 2.1. Pieces of information which are transferred from the vehicle to the dispatcher or the fleet-manager include: actual engine revs, engaged gear, fuel status, instantaneous and average fuel consumption, engine temperature, vehicle load (per axle, total), tyre pressures, etc. [4]

It is of course necessary that the vehicles are equipped with systems, which allow certain data transmission. For example: to provide a dispatcher with the information concerning axle-loads, the vehicle has to be equipped with the ECAS system (Electronically Controlled Air Suspension). In a similar way the TPM system (Tyre Pressure

Monitoring) is essential to the transfer of information on tyre-pressures.

2.3. Cargo

The FC allows observing the beginnings, processes and ends of cargo loading/unloading procedures.

If the vehicle is equipped with ECAS, the dispatcher has the information on real cargo weight. This can be used as a basis for transport invoicing. If a vehicle carries some perishable cargo (according to the ATP agreement) the temperature in the loading space can be observed.

After unloading at the consignee’s place the immediate invoicing can be done. The FC also supports the use of electronic documents – EDI (Electronic Data Interchange). [5]

3. Main requests related to truck-fleet controlling

The main request related to the FC used for truck-fleet is the satellite navigation with up-to-date maps including “truck attributes”. These attributes are mainly: bridge bearings, underpass (tunnel) heights, allowed vehicle widths, car parks/rest areas suitable for trucks, traffic prohibitions into certain areas. Another request (as mentioned hereinbefore) is the on-line communication between the driver and dispatcher (vehicle manager).

4. Benefits of fleet controlling application

The FC offers benefits for all parties concerned. The first party comprises transport companies and their “office employees” – top-managers, dispatchers and vehicle



Fig. 1. On-board communication device

Source: [5]

managers. The second party is formed of drivers. The third party consists of customers (cargo consignors and consignees) and the logistics itself. And the fourth party comprises the society. [2] [4] [5]

Main benefits for transport companies:

- actual positions and activities of vehicles;
- easy service planning;
- driver's work and vehicle operation optimization;
- labour productivity increase;
- sufficient usage of the fleet;
- monitoring of drivers' work (driving times, rest-times, drivers' "behaviour");
- evidence of taking holidays;
- lower operating costs (fuel, tyres, maintenance, repairs, etc.) – e.g. company Volvo declares 5-15 % decrease of fuel consumption of a vehicle fleet, if using its DynaFleet system;
- lower phone costs;
- easier wage planning;
- better ergonomics of the office work (less phone calls, quieter environment);
- quick reactions to customers' requests;
- immediate invoicing after the cargo delivery.

Main benefits for drivers:

- access to digital maps in sat-nav with truck attributes;
- up-to-date information on the traffic situation on certain route (congestions, detours);
- information on traffic prohibitions (e.g. low-emission zones in certain cities);
- the FC system complies with driving/resting rules (as mentioned hereinbefore in 2.1);
- information on weather;
- information on driving bans in European states;
- less phone calls with dispatchers, less notes.

Main benefits for customers and logistics:

- increased effectiveness of cargo transport;
- real-time information on the consignment (cargo) position;
- information on the consignment status – e.g. "loaded", "on-route", "unloaded";
- for a perishable consignment (ATP agreement): on-line control of given temperature during loading/unloading, transport, warehousing;
- quick and safe transport.

Main benefits for the society:

- increase in the road transport safety;
- higher fluency of road traffic;
- lower environmental impact of the road transport (lower fuel consumption – lower emissions);

- social profitability in the field of sustainable transport and development.

5. Fleet controlling in the field of valuable cargo transport

Valuable cargos comprise mainly tobacco, cigarettes, alcohol, electronics, computers and pharmaceuticals. Besides requirements mentioned hereinbefore, there is a high demand for transport safety in the field of valuable cargo transport.

Semi-trailer combinations are mainly used for valuable cargo transport. Semi-trailers are specially constructed. They have a box loading space with strengthened walls and rear door. They are also equipped with motion and light sensors in the loading space.

The whole process of transport, loading operations and warehousing of valuable cargo in Europe is regulated by standards of TAPA-EMEA (Transport Asset Protection Association – Europe, Middle East and Africa). [2]

5.1. Loading operations

The rear door of a semi-trailer can be opened (e.g. at the place of loading or unloading) after multiple unlocking. At first, the driver has to make a phone-call to the dispatcher and ask him to perform remote unlocking of the door. This unlocking operation takes approximately two minutes. Then, the driver has to use his personal chip and enter his personal code on the keyboard. The keyboard is situated in a locked case on a semi-trailer. After entering the code, the driver has 50 seconds for opening the semi-trailer door. After this time the door is automatically locked and the whole procedure of unlocking has to be done again.

If a driver (or any other person) would have tried to open the door without unlocking by the dispatcher (or without using the chip or entering the code), the alarm would have been set off. The alarm means an immediate warning report on dispatcher's computer and in the "safety-centre" (see below). The driver has no access to loading and unloading procedures. This principle increases safety of these procedures.

5.2. Transport

The driver has a route previously defined by the dispatcher. The dispatcher sends the driver certain part of the route to driver's GPS navigation. The dispatcher does not send the whole route from a loading place to unloading place. He

sends only a certain route stage – e.g. from the loading place to a place where the driver will spend his rest time.

The satellite vehicle tracking is something obvious, of course. One of the most important things in the field of valuable cargo transport is that “safe truck-parks” are defined. These truck-parks comply with requests of TAPA. In extraordinary cases (when the dispatcher allows so) the driver can stop on a “not safe” truck-park. In this case the vehicle (semi-trailer combination) has to be secured using geo-fencing technology. However this service is very expensive.

Main reasons to alarm set off are:

- diversions from the defined route;
- decoupling of semi-trailer;
- the use of “safety button” in the driver’s cab;
- forced entry into a semi-trailer.

For example enterprise LOG-IN is equipping their drivers with a special mobile phone “Benefon”. There is a safety button on this mobile phone. The driver has two safety buttons available to use.

Drivers are trained how to act during a case of emergency, such as:

- assault on the vehicle (while driving, during rest-times);
- unexpected change of defined route e.g. by a reason of assault, detour or road check (weighing etc.).

In the case of assault on a vehicle, the driver presses the safety button in the truck-cab or on his mobile phone. Thanks to this, the dispatcher and the safety-centre (in the case of LOG-IN they outsource this duty to the company CSM) are immediately informed about this situation. The safety-centre guarantees the transport company that its employees (or policemen) will be at a vehicle in 15 minutes.

In the case of a road check, the driver has to inform the dispatcher about this situation, so that there will be no alarm. [2]



Fig. 2. Transhipment of a semi-trailer in an ITR-terminal
Source: [7]

Main benefits of the FC in the field of valuable cargo transport are:

- separate position control of prime-mover and semi-trailer;
- on-line driver to dispatcher communication;
- GPS and GSM antennas are built both in the prime-mover and in semi-trailer;
- safety buttons in the driver’s cab and on the mobile phone;
- motion- and light-sensors in a semi-trailer;
- sensors on rear door of a semi-trailer;
- sensors of coupling on the fifth-wheel of a prime-mover.

6. Fleet controlling in intermodal transport

From the view of consignment’s position monitoring the intermodal transport (ITR) is significantly more complicated in comparison to a direct road transport. In the case of direct road transport it is sufficient to monitor certain truck.

In the ITR it is necessary to monitor the consignment (loaded in certain transport unit – e.g. ISO container, semi-trailer, swap-body) during:

- transport by road;
- transshipment and warehousing in ITR terminals;
- transport by other transport-modes – rail and water transport mainly. [3]

The position monitoring of certain transport unit has to be possible without repeated phone calls. For example the company ZOCA Container Security offers a tracing service for ISO containers during the whole transport process from a consignor to consignee. [6]

Significant requirements of the FC system applicable to ITR are: up-to-date information concerning consignment’s position and complex, reliable and correct information



Fig. 3. GPS device mounted on an ISO container
Source: [6]

from all parts of transport (road transport, transshipment, warehousing of transport unit, rail transport etc.). Also all actors participating in the ITR have to be willing to share all important data among each other – so that the system of FC in the field of ITR would be able to operate.

7. Conclusion

The main purpose of the FC system is to offer on-line (real time) information concerning a vehicle fleet. Main areas of information transfer are:

- driver's work and his driving style;
- vehicle's position;
- operating and technical data about a vehicle;
- cargo (consignment) data and position.

The FC is based on on-line communication between the driver and dispatcher, fleet manager, or administration employees.

The main goal of the FC is to secure effective, economical, ecological and safe operation of vehicle fleet. The FC enables cost-reduction in the field of vehicle fleet administration.

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