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USE OF TELEMATICS IN ROAD TRANSPORT COMPANY MANAGEMENT

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Purpose: For many years, the most common way of moving freight has been road transport. In order to ensure optimum quality of transport services in Poland, modern telematics solutions have begun to play a key role. The answer to the needs of the dynamically changing transport market is the use of telematics. Customers are expecting increasingly personalised services from road transport companies that provide continuous monitoring of how their orders are being carried out. Thanks to the variety of telematics devices, companies are able to choose from a wide range of solutions tailored to their needs. The aim of this article is to present the impact of the environment and the use of telematics on road transport safety. When analysing the use of telematics systems in road transport companies, particular attention should be paid to the technical condition of the vehicle, the condition of the road infrastructure, surrounding environment and accessibility of the road, as well as the behaviour of road users.
Design/methodology/approach: In order to address the question stated in the purpose of the article, a survey was conducted among the employees of the transport companies under study. The results of the analyses look into the effectiveness of the implementation of telematics solutions in transport companies.
Findings: Based on the data collected, the analysis will enable the results to be presented in terms of the effectiveness of the implementation of telematics solutions in the selected transport companies.
Practical implications: The results of the research provide pragmatic guidance for managers, on the basis of which guidelines and indications can be drawn up for changing or extending the use of telematics systems.
Value: It is an original research that can be used on its own or simultaneously with other research methods to solve a specific problem. It can be very interesting to confront the results of a specific research problem, obtained by using several research methods.
Keywords: telematics, transport company, road transport, transport services.
Category of the paper: Research paper**.**

1. Introduction

The desire of companies to maximise profits and minimise costs and losses has led them to seek both technological and organisational solutions that would enable them to achieve their goals efficiently. The problems faced by transport companies have stimulated ICT and automation specialists to develop comprehensive transport management systems. Telematics systems have become a widely used tool for monitoring, coordinating and optimising the operation of motor vehicles, with a particular emphasis on the operation of trucks and vans (Sałek, Kliś, 2012, p. 69).

Telematics systems are used in companies, among others:

- in logistics - vehicle fleet monitoring and shipment tracking,
- in resource management - managing machinery and equipment,
- in sales and marketing - data analysis and adaptation of the offer to the customers' needs,
- in production - quality control and optimisation of production processes,
- in fleet management - vehicle tracking and route optimisation (Tomaszewska, 2022, p. 344).

The intense growth of the IT industry, which deals with telematics and information systems used in transport, has resulted in a diversity in the range of solutions available using, among other things, satellite systems. Deciding how to meet transport needs is one of the key logistical choices made by a company. It is a strategic decision every time, due to the significant share of costs involved. The main factors according to which the appropriate mode of transport is chosen are the economic viability of the cargo, its technical parameters and operational aspects (e.g. delivery time). Despite the great popularity that road transport enjoys, it is still not always the right choice.

Telematics is an interdisciplinary field encompassing telecommunications, automotive technology (road transport, traffic safety, etc.), electrical engineering (sensors, instrumentation, wireless communications, etc.) and computer science (multimedia, internet, etc.). Telematics may include any of the following:

- The technology of sending, receiving and storing information using telecommunications equipment to control distant objects.
- Integrated use of telecommunications and computing for in-vehicle applications and for controlling vehicles in motion.
- Global satellite navigation system technology integrated with computers and mobile communication technology in in-vehicle navigation systems.
- The use of such systems in road vehicles (also known as vehicle telematics) (Neumann, 2017, p. 45).

The application of telematics in transport brings with it a number of benefits. Among the most important of these we can include:

- increased transport efficiency,
- better use of available resources,
- reduction in the negative impact of transport on the environment,
- improved economic and financial performance of the company,
- increasing traffic safety and reducing traffic congestion (Dyczkowska, 2014, p. 70).

The basis of their operation is above all an efficient flow of information within the system, which should be designed in such a way that, in the event of disruptions to its operation, it is possible for external operators supervising its correct functioning to take appropriate action. The operation of the system is based on processes responsible for collecting, analysing and processing the information necessary to interpret the situation on a given section of a road. The next point in the process is to decide on appropriate control and improvement measures. Characteristics of intelligent transport systems include:

- efficiency as a common benefit,
- flexibility and high adaptability,
- the ability of the system to make autonomous decisions in changeable situations,
- integration of technology, ensuring efficient flow of information (Pałys, 2008, p. 225).

Thanks to the above-mentioned features of the ITS and its design, in the event of unforeseen situations such as congestion or traffic collisions, it is possible for the operators to react immediately, give appropriate priority to their actions and thus, for example, allow privileged services to pass without collision. In addition to proper management of the information acquired for the ITS, variety in the data acquired is extremely important. Depending on the situation for which a particular transport system is responsible, well-defined data are collected:

1. basic road transport information:
    - traffic at junctions, capacity of road sections, congestion areas, average traffic volume (by day, hour, weather conditions, season), public transport timetable,
    - possible traffic modifications due to unforeseeable events,
2. traffic management:
    - accidents,
    - weather forecast,
    - traffic volume on local sections of roads,
    - streets, car parks, traffic jams, locations of cycle paths and pedestrian precincts,
3. information for travellers:
    - delays on specific sections, average speeds of public transport,
    - accident information, weather information,
    - public transport accessibility data, and information for drivers:
    - visibility, road pavement condition, weather conditions,

- location of the driving destination,
- location and speed of neighbouring traffic directly affected,

4. toll implementation:
   - vehicle registration number,
   - emission class,
   - vehicle type,
   - bank account number of the vehicle owner,
5. road accident management:
   - types of accidents,
   - place and time of the incident,
   - type of assistance needed,
   - possible detours and access routes for emergency services,
6. analysis of environmental conditions:
   - weather factors,
   - air quality
   - road pavement condition,
7. activities of transport companies:
   - type of cargo transported,
   - route,
   - distribution of fleet (Pałys, 2008, p. 226).

The collection of the above data is made possible by ICT technologies used in urban logistics. The most common technologies of this type include: Internet, mobile networks, satellite navigation systems, smart cards, radio communication systems, traffic monitoring devices and weather stations.

In conclusion, it can be said that the use of telematic transport systems, in many aspects, has positive effects. From improving road safety, increasing capacity of urban roads by reducing carbon dioxide emissions into the environment, to increasing detection of traffic offences (Taniguchi, Thompson, Yamada, 2001).

Intelligent Transport Systems work together with information and control technologies, which form the basis of the ITS function (Kalasova, Krchova, 2011, pp. 25-27). Some of these technologies, are well known to transport professionals. However, there are many lesser-known technologies and system concepts that are key to the functioning of the ITS. The technical core of the ITS is information and control technologies, but the human factor is also extremely important and therefore very complex potentially (Jarašūniene, 2007, pp. 61-67).

2. An overview of the literature

Telematics systems in transport contribute to the efficiency of TSL companies, also enabling rapid information flow and monitoring of routes on which cargo is transported (Masłowski et al., 2020, pp. 41-47). Thanks to the country's convenient location and the availability of the occupation of a goods vehicle driver or bus or coach driver, transport is one of the fastest growing branches of the economy. Thanks to the appropriately qualified staff of transport companies, it is possible for the economy to function properly, develop, and remain financially and economically stable. A great opportunity for domestic companies to remain on the international market is to introduce modern transport solutions into their daily operation.

The use of intelligent transport systems makes it possible to:

- register basic vehicle operating parameters (speed, route, fuel consumption, axle load, engine revolutions),
- plan optimal routes using digital maps and regular update of the systems,
- analysis and control of routes while minimising their length and transport costs,
- control of the driver, on-board systems, temperature,
- precise determination of delivery times,
- increasing the safety of the driver, the transported load and other road users,
- reducing the possibility of terrorist risks, by making it possible to inspect the cargo space without breaking customs seals (Łacny, 2008, p. 265).

All the above-mentioned benefits speak for the use of telematics in the operations of transport companies, and it is also a key factor in the reduction of operating costs.

Telematics solutions help fleets to operate more profitably and have long been of great benefit to the haulage and transport sectors. Telematics systems (when integrated with fleet management solutions) enable fleet operators and dispatchers to streamline workflows and procedures and make the most of their resources by providing key data and insights.

A telematics system allows real-time data to be transmitted, processed and analysed, enabling effective and ongoing fleet management and optimisation of logistics processes (Tomaszewska, 2022, p. 344).

The development of ICT applications has led to the creation of various telematics systems. Appropriate application of technical resources does not only increase traffic flow and route capacity, but above all increases safety and economic benefits. Telematics systems make it possible to optimise journey times, i.e. to save money, and also enable automatic control of travel speed. Through variable message signs, they make it possible to regulate traffic in response to changing weather and road conditions. In addition, they make it possible to measure the weight of trucks in motion and, using relevant on-board devices, to perform automatic toll collection. Telematics systems also include automatic vehicle identification (possibility of searching for stolen vehicles), navigation and communication, environmental protection

solutions, geographic road data, accident prevention systems and many others (Neumann, 2017, pp. 1-4).

The most important benefits of implementing telematics solutions in transport companies are presented in the table below.

Table 1.
Benefits of implementing telematics solutions

Recipient of the benefit	Scope of benefits
transport companies	a) reduction of costs involved in the operation of the vehicle fleet, b) reducing administrative costs, c) minimising the number of unprofitable transports, d) simplification of the collection and archiving of documents, e) ncrease in the level of quality of services provided.
forwarders	a) uninterrupted access to cargo and vehicle information, b) time saving, c) increased efficiency in communication with other drivers, d) increased flexibility in the execution of orders.
customers	a) control of every stage of transport, b) increased confidence in the contractual partner, c) possibility of continuous monitoring of data on the conditions of transport.
drivers	a) increasing the level of transport safety, b) possibility to provide information and documentation in a direct way, c) possibility to correct bad driving habits, d) possibility to fully concentrate on driving.

Source: Pasierbski, 2020, p. 205.

Vehicle telematics can contribute to improving the efficiency of an organisation. On-board telematics also includes trailer and asset monitoring, which is used to protect cargo in terms of transit conditions, condition and location or storage. Drivers can tag the GPS location when disconnecting a trailer. The coordinates are then passed on, allowing direct navigation of the selected trailer. Optimising routes and tasks is also supported by telematics systems. By combining the experience of the transport company's logisticians and telematics systems, drivers can take the fastest routes avoiding traffic jams and obstacles. Control and efficient transport management do not require anyone to actually be present in an office. The entire command centre can be on a company laptop or smartphone (Badzińska, Cichorek, 2015). Another functionality of telematics is to address road and vehicle safety. One example is checking the driving time of the vehicle so that, based on the GPS reading, an immediate response can be made if the driver exceeds the maximum limit of driving hours. In this way, regulations are complied with and the risk of driver fatigue and accidents resulting from tiredness is reduced. With the help of cooperating control devices, we can obtain data such as driving with punctured tyres, approaching other vehicles, reaching the upper limits of engine speed, sudden deceleration and acceleration, dangerous cornering, etc. (Neumann, 2017, p. 45). Telematics also assists in checking the technical condition of the vehicle. The assessment of the technical condition of the vehicle is supported by the analysed data on faults and failures. An increase in the frequency of faults and failures is a signal to replace the relevant parts or to carry out a comprehensive maintenance (Badzińska, Cichorek, 2015, p. 415).

One indication of vehicle malfunction is an unreasonable increase in fuel consumption (Janani et al., 2020, pp. 1-14). Telematics systems provide information on vehicle performance and remind and record mandatory periodic maintenance. Telematics allows for a fair, legal and motivating driver billing system. Telematics data, combined with the experience of the company's logisticians, enables a TSL company to determine the average performance of its fleet. By setting a certain range of kilometres and freight, it is possible to determine the driver's base pay. It is also possible to add bonuses for meeting selected criteria or achieving high performance compared to other drivers. Refuelling control is also one of the telematics solutions. Telematics can identify a particular location of refuelling and automatically integrate it with an invoice. Refuelling can be verified against the value of the corresponding invoice. In addition, effective fuel measurement from a fuel probe, an algorithm and also analytics are used. This guarantees that there are no refuelling discrepancies and a small discount on fuel when refuelling. Fuel filler protection also serves to protect against fuel fraud on the part of the driver (Silva, Henriques, 2020, p. 138; Zaremba, Żmich, 2018, p. 33).

One of the benefits of telematics is the reduction in fuel costs. The fuel consumption on a given route depends on several factors. The most important parameters affecting fuel consumption are mainly the length and number of stops, fuel consumption while driving and the choice of route. The driving style of a driver also influences fuel consumption. Telematics systems can detect uneconomical driving and effectively eliminate it (Masłowski et al., 2020, p. 44; Garg, Kasai, 2019). Telematics solutions make it possible to effectively reduce vehicle overuse by continuously monitoring all parameters important to the fleet manager. By implementing telematics, maintenance and repair costs can be reduced as the driver is aware that his/her behaviour is being recorded and therefore drives more carefully. As a result, the risk of a collision or accident is reduced, as well as wear and tear on the vehicle. In addition, telematics systems send diagnostic information to the selected vehicle and signal, for example, an upcoming maintenance appointment (Borowiak et al., 2018, p. 1023). This allows the fleet manager to schedule vehicle shutdowns. Telematics enables effective time management for drivers. This is crucial when planning the delivery of loads to their destination. It is now possible to predict vehicle arrival times in a precise and reliable manner. This significantly reduces delays in deliveries. The use of telematics makes it possible to speed up deliveries. Very often, information about existing traffic obstructions reaches the driver too late to change the route. The data provided by telematics systems make it possible both to plan optimal routes and to adapt the current route to the situation. The implementation of telematics reduces administrative costs, as it is possible to reduce the amount of work involved in, for example, tachographs or billing driver time. The automation of such processes by using telematics systems not only reduces the time required to carry them out, but also influences their flawless and timely execution (Tomanek, 2011, p. 741).

3. Research methods

Using a simplified model of the hypothetico-deductive method, information on individual processes should be collected and the research problem formulated. Then a hypothesis should be formulated and, in the last phase, it should be confirmed fully or partially (Lisiński, 2016).

The following limitations were adopted in the research process (Wood et al., 2008, pp. 270-295): the research area is limited to Polish data, due to the availability of the necessary statistical data.

To achieve the objective of solving the research problem, a number of research tasks were carried out, which included:

- a review of the specialist literature on telematics and its growing capabilities;
- analysis of a survey questionnaire;
- an assessment of the solutions and opportunities in the companies surveyed;
- conclusions and recommendations for further development.

The compilation and study of the collected data will make it possible to analyse the results in terms of the effectiveness of the implementation of telematics solutions in selected transport companies.

It will also answer the following hypotheses accepted for proof:

1. It is possible to improve the efficiency and effectiveness of operations of transport companies through telematics.
2. Telematics facilitates the work of transport company managers.
3. Telematics promotes enterprise competitiveness.

The research tool was an anonymous questionnaire conducted among employees of transport companies.

The questionnaire consisted of 13 questions. The questions in the questionnaire were designed to verify the hypotheses stated at the beginning of the survey. Some of the respondents spontaneously shared their opinions on the topics raised in the survey, which were taken into account in the interpretation of the results.

3.1. Results of the research

The companies considered for the study are located in Poland.

They are companies transporting goods from the food industry.

In order to optimise their logistics network, they use advanced route planning and transport monitoring software. With these, they are able to ensure fast and efficient distribution of goods, minimising costs and delivery times. The programmes take into account both road conditions, the volume of goods and customer preferences, allowing them to deliver logistics services at the highest level.

A total of 60 employees of three transport companies took part in the survey, including 25 women (42% of the total respondents) and 35 men (58% of the total respondents). Of the respondents, 27% were planners, followed by 21% of those employed as freight forwarders. 19% of respondents were coordinators and 11% were salespeople. The remaining 23% were decision-makers (owners, directors and managers).

The respondents were asked which telematics systems they use in their work to monitor and manage their fleet. It was possible to select more than one answer, as it was necessary to indicate all the systems used by the company, therefore the sum of the answers exceeds 100%.

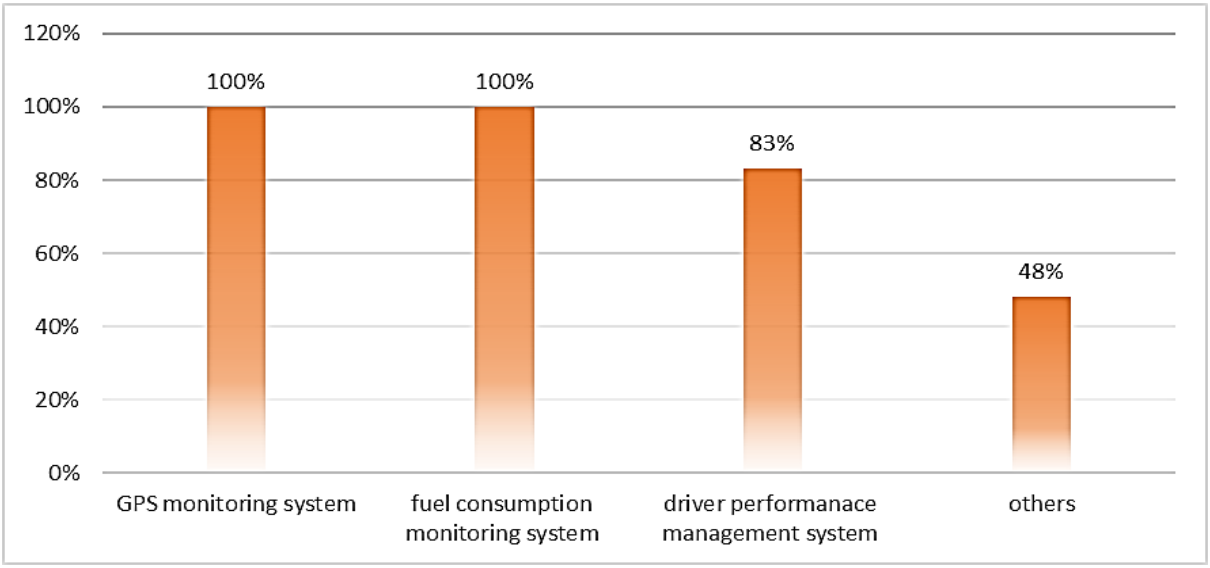

Figure 1. Question what are the types of telematics systems used in the companies surveyed.
Source: authors' own elaboration based on the questionnaire of the survey.

All the companies surveyed use GPS technology and a fuel consumption monitoring system to monitor and manage their fleets. 83% of respondents ensured that their places of employment also use telematics driver time monitoring systems. 18% of respondents reported that their company also uses systems that enable digital documentation, 15% of respondents said they use telematics solutions to optimise drivers' routes. It turned out that 15% of the companies are also using systems that support fleet maintenance scheduling.

In the next question, the respondents were asked what benefits they believe are associated with the use of modern telematics solutions. The results are presented in Figure 2. More than one answer was allowed in the question.

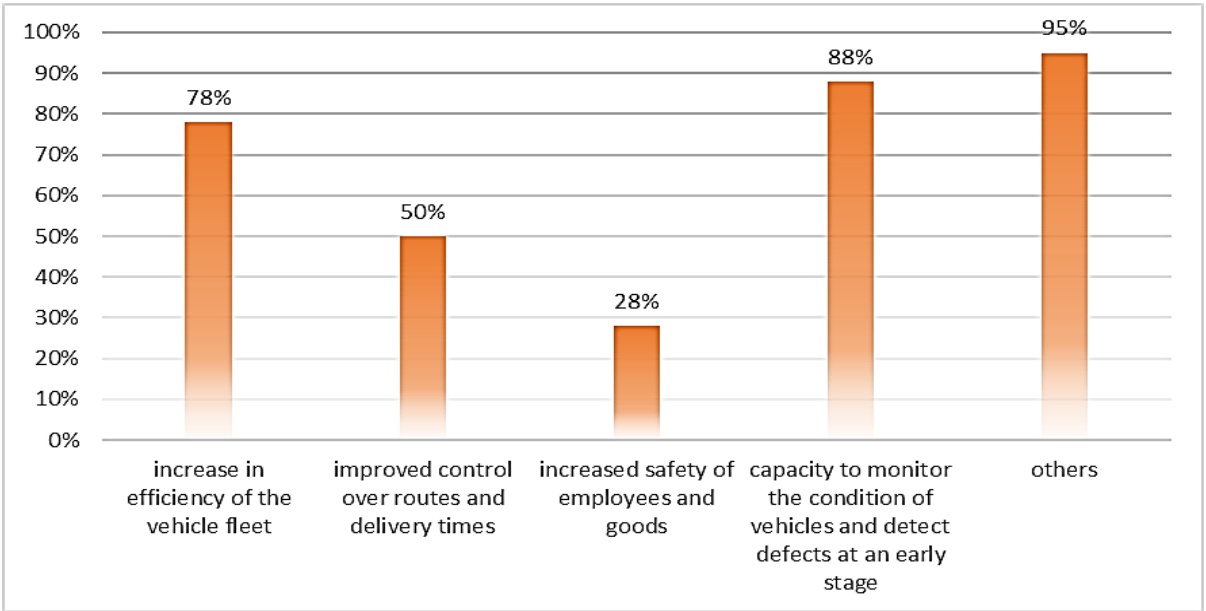

Figure 2. Question about the benefits of using modern telematics systems.

Source: authors' own elaboration based on the questionnaire of the survey.

The majority of the respondents (88%) view positively the ability to monitor the condition of the vehicles, which translates into the ability to quickly detect faults well in advance. The second most frequently perceived benefit was an increase in the level of efficiency of the vehicle fleet (78%). Half of the respondents confirm that telematics has helped to improve control over routes, while 28% of respondents agreed that it has improved employee safety and the carriage of goods. The respondents were given an option to provide additional answers of their own, indicating that telematics has helped to increase fleet efficiency, for example by eliminating empty runs (65% of respondents), while 30% of respondents also highlighted financial savings.

In the next question, the respondents were asked to address whether telematics systems in their companies had influenced route optimisation and delivery planning. 88% provided an affirmative answer, while 4% gave a negative answer, and 5% of respondents had no opinion on the subject. The results are shown in Figure 3.

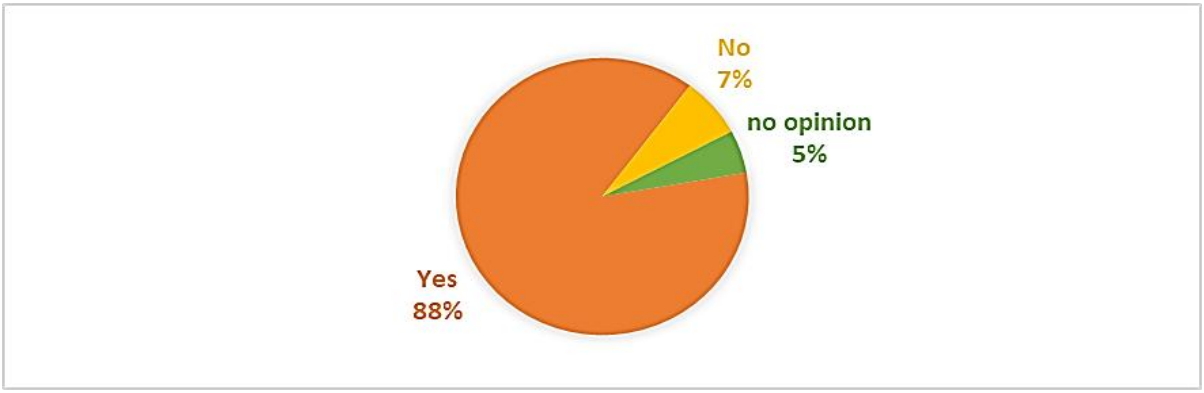

Figure 3. Question whether telematics systems help to optimise routes and plan deliveries.

Source: authors' own elaboration based on the questionnaire of the survey.

In the next question, the respondents were asked to indicate whether, in their opinion, the implementation of telematics systems in companies has contributed to operational efficiency. The results are shown in Figure 4.

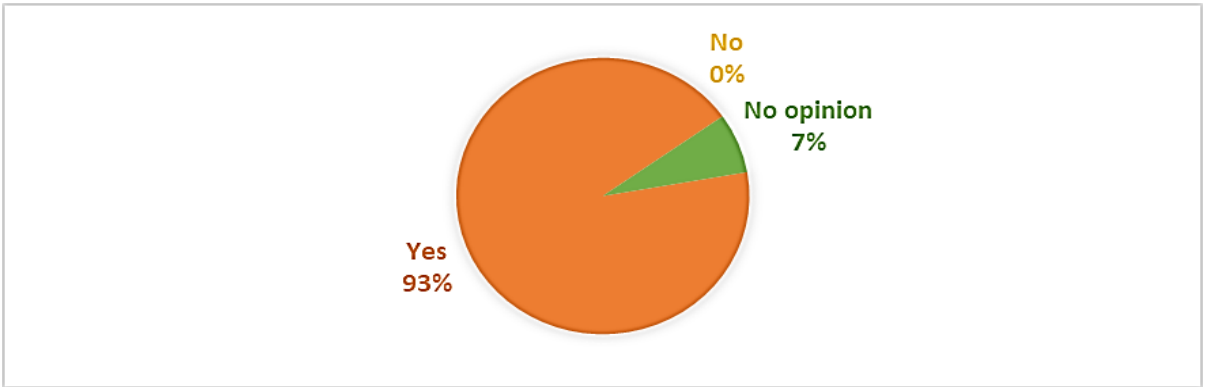

Figure 4. Question whether the implementation of telematics systems has contributed to the efficiency of operations.

Source: authors' own elaboration based on the questionnaire of the survey.

For 93% of the respondents, the implementation of telematics in the company has contributed to operational efficiency. None of the respondents expressed a negative opinion on telematics systems, however, 7% of the respondents had no opinion on the subject.

In the next question, the respondents were asked to assess whether, in their opinion, investing in modern telematics systems in the TSL industry is a good option from the point of view of the company where they were employed at the time of taking part in the survey. All respondents unanimously answered this question in the affirmative.

The survey participants were then next asked whether their companies were planning to expand their current telematics solutions in the future. The results are presented in Figure 5.

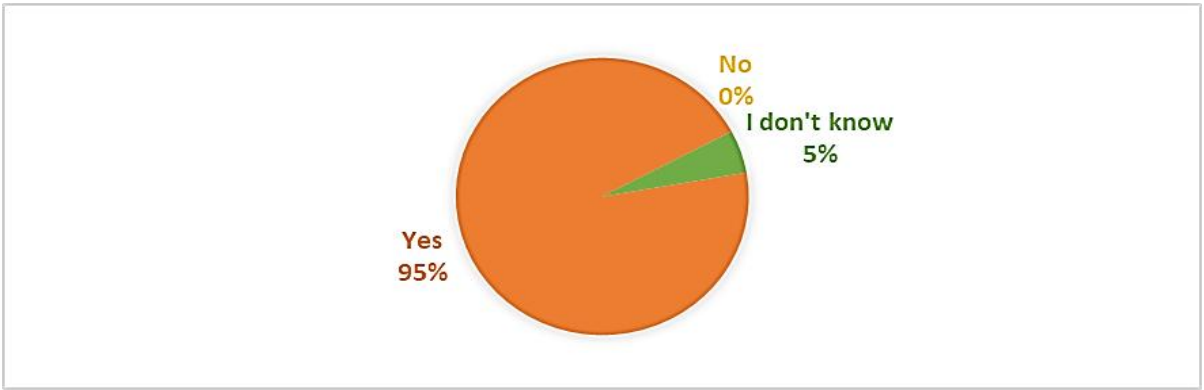

Figure 5. Question on whether companies plan to expand telematics systems in the future.

Source: authors' own elaboration based on the questionnaire of the survey.

95% of the respondents admitted that their employers are planning to expand the telematics systems currently in use, while 5% of the respondents had no knowledge of whether companies have such plans.

In the next question, the respondents were asked to indicate which areas were most important in terms of telematics development from their company's point of view. The results are summarised in Figure 6 (multiple responses possible).

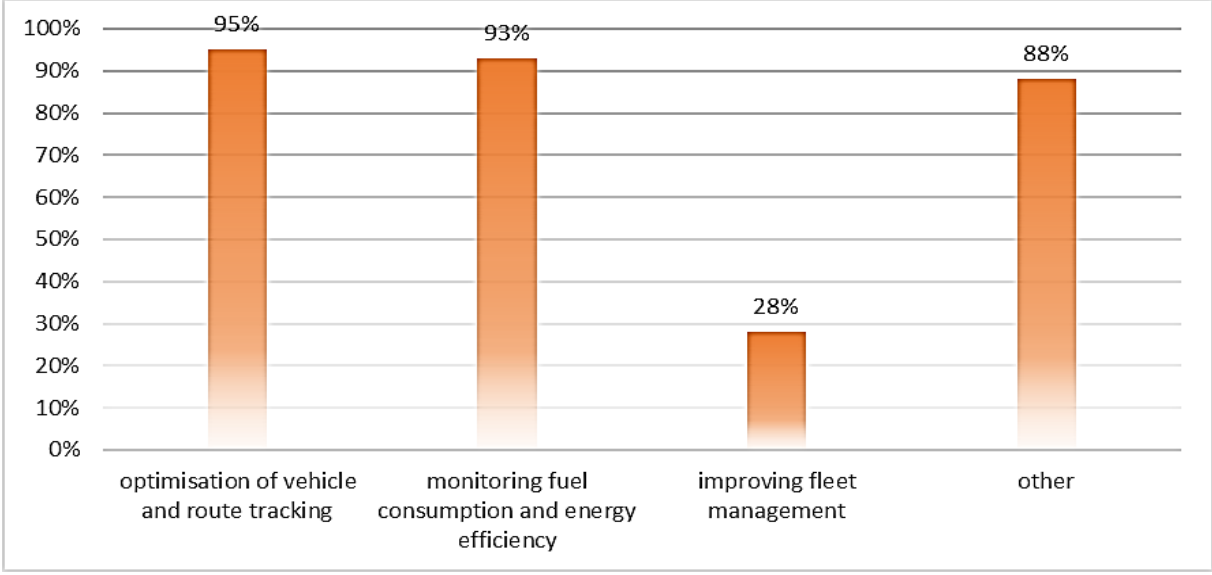

Figure 6. Question on key areas for the development of telematics in surveyed companies.

Source: authors' own elaboration based on the questionnaire of the survey.

According to 95% of those surveyed, their companies are most concerned with the development of telematics solutions in the area of vehicle and route tracking optimisation, with the area of fuel consumption and energy efficiency being only slightly less popular (93%). Fleet management is important to 28% of the respondents. Among their own suggestions, the respondents also pointed to two other areas: driver time management (82% of total respondents) and fleet maintenance in a broad sense (27%).

In the next question, the respondents had to indicate which modes of transport are used by the companies that employ them. All respondents indicated road transport, 6% of respondents also use sea transport and 4% use air transport.

The respondents were asked whether, in their opinion, telematics solutions are an important element of competitiveness in the TSL market. The responses obtained are shown in Figure 7.

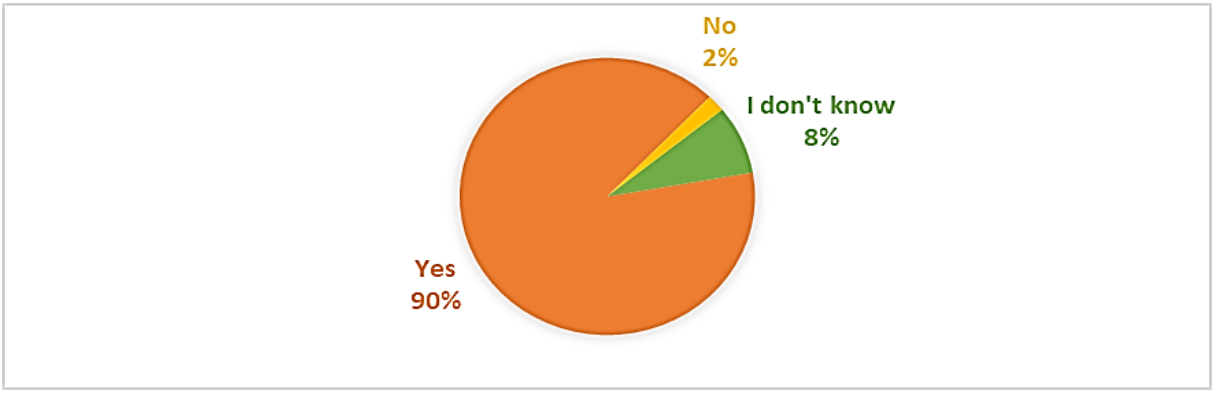

Figure 7. Question whether telematics systems are an important element of competitiveness.

Source: authors' own elaboration based on the questionnaire of the survey.

90% of the respondents agree that telematics has a significant impact on competitiveness in the industry. Only 2% of the respondents hold the opposite view while 8% of those surveyed do not have an opinion.

The next question asked the respondents how the people working with them in the companies evaluate the telematics systems used there. The overall opinion of such solutions is overwhelmingly positive, with 97% of the respondents indicating such an answer and 2% of the respondents having a neutral attitude towards the implemented solutions.

The last question concerned the participants of the survey on whether they observe a clear increase in the popularity and use of modern telematics systems. The results are illustrated in Figure 8.

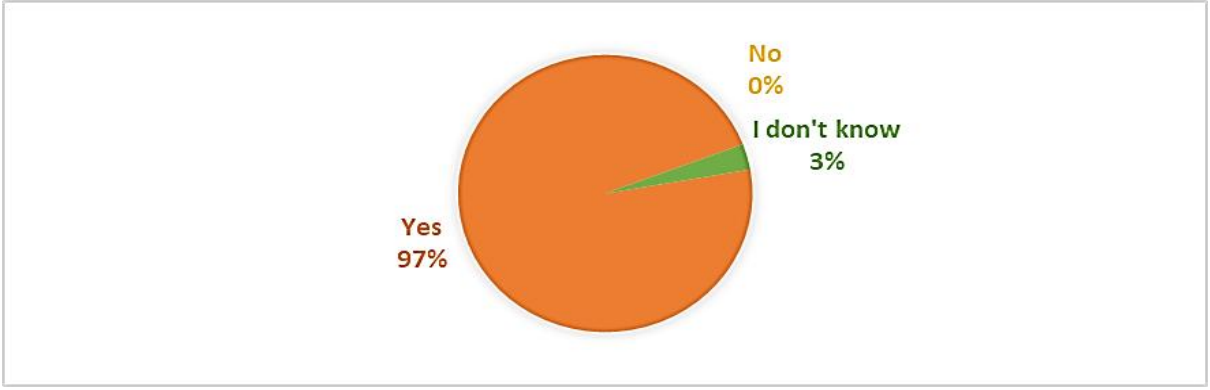

Figure 8. Question whether, in the opinion of respondents, there is currently a growing popularity and use of telematics.

Source: authors' own elaboration based on the questionnaire of the survey.

The majority of the respondents spoke in favour of the increasing popularity and use of modern telematics solutions in their companies. Only 3% are not aware of such a situation. None of the respondents expressed a negative opinion on the subject.

Telematics is undoubtedly becoming one of the most desirable methods of improving business operations. Today's digital environment is developing extremely rapidly, so it is impossible to imagine the success of modern enterprises without the use of advanced and innovative software tools and systems that will contribute to the optimisation of business operations.

4. Discusion

At present, advanced information technology is used extensively and effectively in almost every area of life. The speed and quality of data transmission play a key role. In addition to the state of the infrastructure, the efficiency and quality of the operation of transport companies is increasingly determined by how well they are equipped with information technology solutions.

The application of the ITS in road transport involves maximising the use of the transport infrastructure. Access to network nodes for traffic monitoring and forecasting, the use of intelligent traffic lights facilitating access to road transport information, information on the level of traffic congestion on certain sections and alternative detours, increased road safety are just some of the benefits of implementing the ITS. Although the use of the ITS reduces the costs burdening the state for the sake of travellers, among others, there are difficulties mainly of a financial nature resulting from the establishment and implementation of the ITS. Financial constraints consist in seeking funding from various sources. High efficiency in the use of ITS solutions ensuring a return on the costs of implementing the systems in a short period of time is the basis for the technological development of transport in this direction (Pisz, Łapuńka, 2012, p. 18).

Intelligent transport systems are a broad spectrum of many tools based on information technology, wireless communication and vehicle electronics, allowing for an effective and efficient management of transport infrastructure and reliable service to travellers. The combination of these solutions with physical transport systems, adapting them to the needs of transport systems and their operations, is referred to as telematic transport. Telematics technologies are introduced into transport infrastructure elements and vehicles. Their main purpose is to manage vehicles, loads and routes, thereby improving safety, minimising traffic, reducing journey times and reducing fuel consumption (Azkuna, 2012).

Therefore, intelligent transport systems are used in aspects such as:

- urban traffic management,
- public transport management,
- accident and emergency services management,
- providing traffic information to travellers,
- management of tolling systems and the use of transport services,
- automation and registration of traffic offences,
- advanced vehicle technologies.

Intelligent transport systems (ITS) are created by combining different telematics solutions working together, often controlled by a man supported by specific, dedicated telematics applications or tools for specific tasks. Telematic solutions can be tailored to an individual mode of transport (e.g. road transport) and a selected geographical area (e.g. administrative unit of a country), but can also integrate and coordinate a continental or global transport system. Such solutions are typically open architecture and scalable: they can be extended, improved and upgraded as needed. Their aim is to ensure interoperability between system components and interaction with users, which will ensure safer travel and transport, increase transport reliability, improve the use of infrastructure and achieve better economic results, as well as reduce environmental degradation.

One of the most important tasks for the regions of Europe or the world when introducing intelligent transport solutions is the creation of the so-called ITS architecture. ITS architecture is understood as a set of relationships (logical, physical and communications) between the elements of the systems that make up Intelligent Transport Systems in order to create measurable solutions that are easy to maintain and manage (Healthcare Smart Systems..., 2010). The widespread recognition of the structural framework for ITS development is shaped by a national architecture of three specific architectures: functional, physical and communications. The functional architecture contains the definitions and descriptions of the functions that should be used in the ITS architecture so that it can meet the expectations of the users as defined in the "User Needs". It is therefore in logical terms a representation of the system that takes into account the relationships with the environment, and in particular with the users of the system and the datasets used in the system. The data sets are sometimes presented in a separate 'information structure'. The physical architecture contains definitions and descriptions of how the elements of the functional architecture are grouped into physical units. The main feature of these units is the ability to provide specific services under the 'User Needs' tab. They are created with a variety of technical equipment (including software) on a road infrastructure platform (often referred to for example as systems) (Architektura FRAME w projektach ITS, 2017, p. 52).

Ensuring a quality service must be based on monitoring driver behaviour. At the same time, efforts should be made to ensure that drivers improve their driving methods and techniques, as this not only has a positive impact on the efficiency of the fleet, but also contributes to concern for road safety and the environment (in line with sustainable development). (Telematics..., 23 April 2024).

The numerous benefits of telematics solutions should prove sufficient to convince a company to use them in order to save time, money and improve efficiency.

5. Conclusions

The study can provide both general conclusions on the market situation of transport companies using telematics systems to a greater or lesser extent, as well as conclusions on an aspect of management.

Telematics is often seen as a logistics executive tool to improve the functioning of processes in the transport market. Its application allows improving road safety, traffic control and management, creating databases for management and planning. Thanks to the continuous use of its elements (IT networks, GPS, electronic fee collection systems), it offers the possibility of activating and increasing the rate of economic development of the country.

It should be noted that the survey conducted confirmed the validity of the hypotheses set out in the article. The use of telematic systems has a beneficial impact on the efficiency and effectiveness of a transport company. The use of GPS and fleet management systems allows for route optimisation and increased operational efficiency. The ability to generate reports from data on routes, journey times, fuel consumption, the number of completed orders and other relevant indicators, allows monitoring the efficiency of the fleet and taking up suitable strategies aimed at improving transport operations. In addition, mobile apps for drivers allow them to receive orders, view routes, report breakdowns, report delays and communicate with the dispatcher to ensure efficient and effective transport services.

An argument supporting the veracity of hypothesis one is the annotation that employees themselves recognise the positive impact of telematics on both the efficiency and effectiveness of business operations. The survey found that 78% of respondents confirmed that the efficiency of their company's vehicle fleet increased after the introduction of telematics solutions. On the other hand, 65% of respondents mentioned an increase in fleet efficiency - more efficiency means improved performance. The hypothesis has therefore been substantiated.

The veracity of hypothesis two is confirmed by the fact that respondents almost unanimously (95%) supported the need to implement extensive telematics systems in the future. Thus, it was proven that the solutions that have been implemented so far facilitate their work and that of others in the companies. The hypothesis was therefore proven.

The argument for the veracity of hypothesis three, on the other hand, is that telematics has improved the operation of their companies, increased the level of safety and increased the efficiency of the operations undertaken by their companies.

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