Available online at www.worldscientificnews.com

World Scientific News

An International Scientific Journal

WSN 106 (2018) 93-104 EISSN 2392-2192

The essence of telematics systems providing in transport

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ABSTRACT

Telematics should be understood as all information, telecommunications and IT solutions that have been used to improve the activities of specific sectors. Telematics is distinguished by so-called transport telematics. Every year, the number of telematics solutions for trucks increases. Therefore, this topic has become quite significant in recent times. The task of telematics systems is to collect and handle those messages that have been achieved during transport. Some telematics solutions provided by enterprises include devices monitoring the transport process and measuring devices, GPS as well as on-board computers. The reduction of freight transport costs through the minimization of individual expenses is considered to be the main purpose of using telematic devices. The use of such solutions makes it possible to verify transport to a much greater extent.

***Keywords*:** telematics, telematics systems, information systems, measuring devices

1. INTRODUCTION

In the transport industry, for a long time, there has been an increase in solutions for the use of telematics systems. In Poland, the concept of telematics is not well known, but its solutions have become popular. Telematics should be understood as widely understood IT, telecommunications and information solutions, which were introduced in order to facilitate

(Received 11 July 2018; Accepted 30 July 2018; Date of Publication 31 July 2018)

the functioning of individual transport processes in the supply chain. The issue of telematics is one of those concepts that arose as a result of technological progress and from the beginning of its existence constituted support, but also generated problems resulting from their imperfections. Hence the need to indicate their role in supply chains is born. [3]

To a large extent, the implementation of telematics systems in an enterprise is related to economic aspects. The task of telematics is to meet the needs of the user in such a way that he can achieve the set benefits and goals. In turn, the task of telematic systems in transport is not only to acquire information, but also to properly process and use them. [9]

Monitoring devices for transport processes, measuring devices, GPS and on-board computers are selected from telematics solutions that are offered by enterprises that are offered on the market. The devices used in telematics are used to reduce the costs of freight transport through more accurate planning of needs and effective coordination of processes. [24] Modern IT and telematics systems are a great opportunity to keep the enterprise on the European market. Thanks to the use of telematics systems it is possible to check drivers, car performance parameters, systematic monitoring of transported loads and vehicles, as well as sending the value of registered information via telecommunications means to the place where they are processed. [22]

Getting a lot of useful data in a transport company is possible thanks to the implementation of telematics solutions, because the connection of telematics with information processing through innovative information systems facilitates the increase of drivers, cargo and traffic safety, development of the best transport routes when using detailed digital maps, records of major identifiers vehicle operation including speed, engine revolutions, distance traveled, fuel consumption, interpretation and verification of vehicle movement routes, driver's work supervision based on applicable law, as well as accurate estimation of the delivery date. [3]

2. THE ESSENCE OF TELEMATICS

The concept of telematics is not only used differently but also defined in various ways. To a large extent it depends on the discipline in which it is used. In recent years, the concept of telematics can be found in various disciplines of the economy, where it is often used with the adjective defining a specific field. [18] The figure presents the concept of telematics separated depending on the application discipline.

The concept of telematics comes from French. The literature on the subject has been introduced in the 1980s. The name of telematics was born from the combination of two words: telecommunications and computer science.

Telematics of transport covers transport systems that, through their interpretation and transmission of data, allow impact on the functioning of technical elements in vehicles and impact on road traffic participants. The concept of transport telematics as a result of telematics inclusion in the European Union framework programs has started to be popularly used in Europe in the early 1990s.

As of today, the concept of telamics is most often referred to as IT, telecommunications and information solutions, as well as self-control solutions that have been adapted to the requirements of supported physical systems. [14]

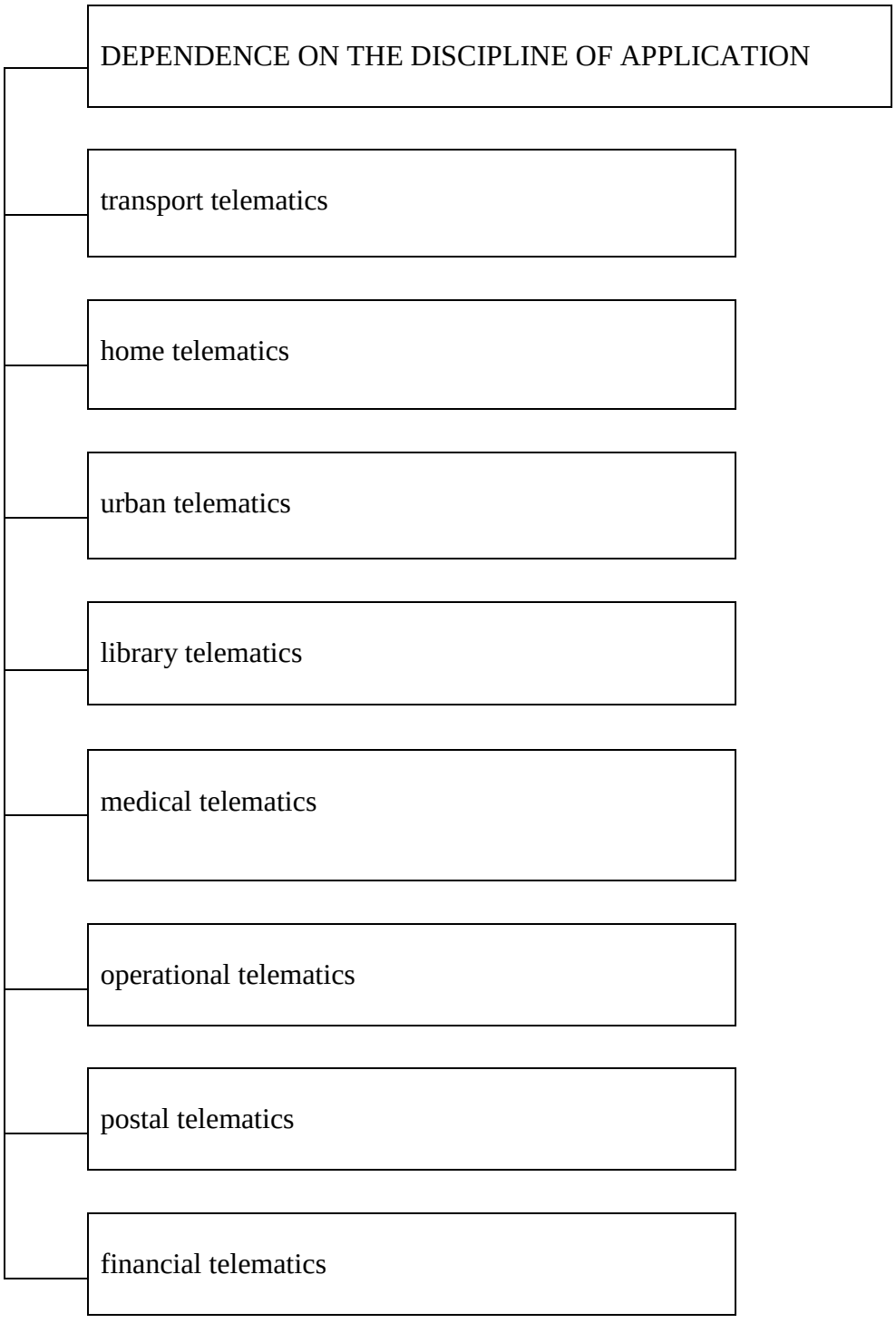

Figure 1. Telematics - dependence on the discipline of application.
Source: Own elaboration

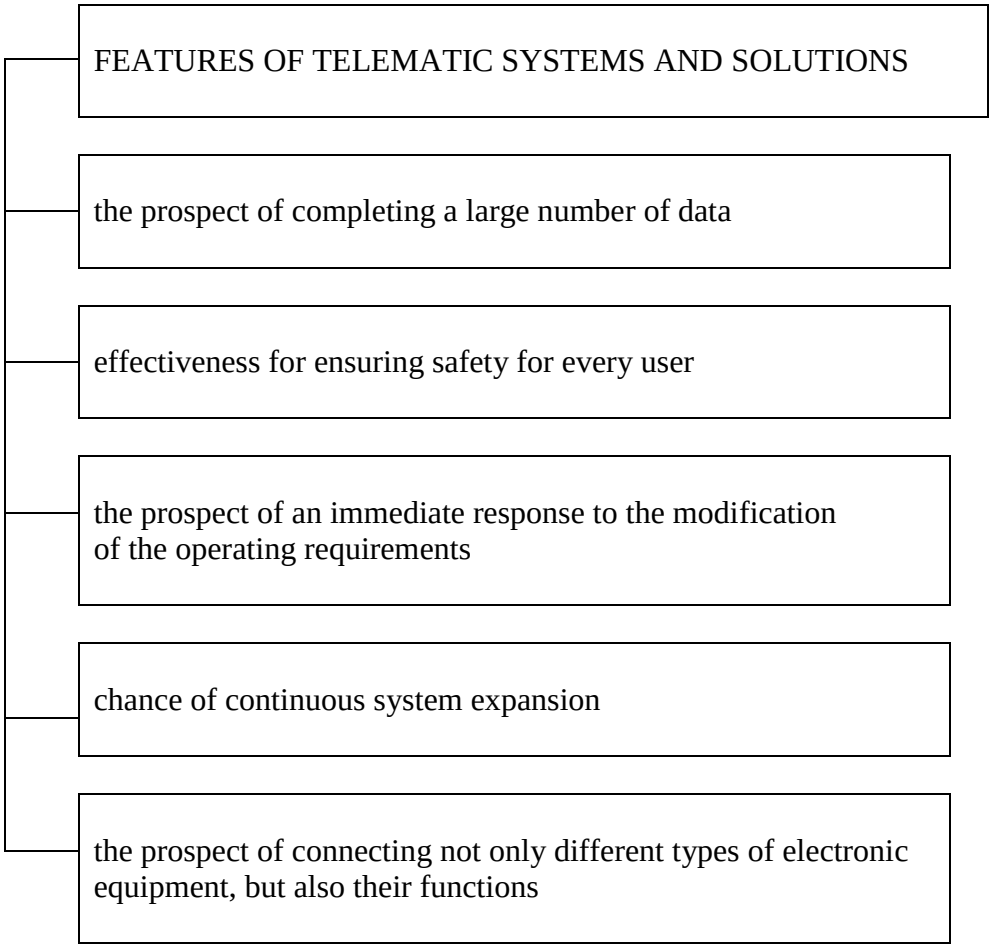

Figure 2. Features of telematic systems and solutions.
Source: Own elaboration

Telamatic systems use various types of devices, applications and software, including, among others, devices for data transfer to the operator, i.e. mass media, variable message signs, traffic lights, devices intended to acquire traffic information, i.e. cameras, sensors, detectors, radars, [5] devices used to provide information to telematics systems managers, i.e. road databases, as well as electronic communication systems, i.e. GPS satellite systems, GSM cellular networks, LAN local area networks, WLAN wide area networks and radio communication systems. [16]

3. BENEFITS RESULTING FROM TELEMATICS

The use of telematics solutions allows not only the development of a detailed route, but above all it allows you to control whether the driver moves in accordance with the route indicated earlier. Efficient transport development reduces empty mileage and saves driver time. [15]

An increasing number of entrepreneurs decide to introduce telematics systems in their company, because these systems give entrepreneurs a lot of opportunities. [7] The vehicle locator together with the GPS is a required device. [8] The system installed in the vehicle collects information on the current position of the truck and information on the parameters on the route. [23] Later, the said data is sent to the controlling servers, and then these data are developed in the form of reports. Thanks to this, the company gets real-time information related to transport, and thus can react immediately. [16]

With the use of telematic devices, the entrepreneur can constantly verify the actions of drivers. Based on the analyzes received, the company may take appropriate measures which, if insufficient opinion, allow exclusion of harmful behavior.

4. TELEMATIC SYSTEMS IN TRANSPORT

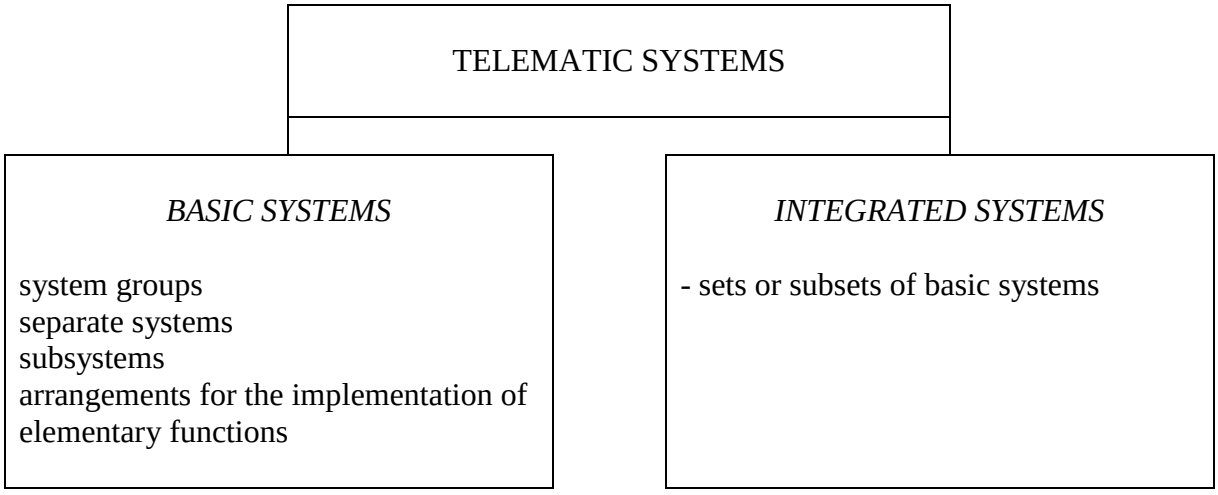

Figure 3. Breakdown of telematics systems due to their structure
Source: Own elaboration

Advanced information technologies are not only effective but also used in practically every sphere of life. [1] In the sphere of transport, the strategic role is created by the quality and speed of data transfer. [19, 20] Intensification of teleinformatic applications has contributed to the creation of various telematics systems. [12]

Adequate application of technical means contributes to the increase of safety, [6] increase of passability of communication routes, increase of economic benefits and increase of traffic flow. Among other things, telematic systems enable: [4]

- automatic speed verification,
- measurement of the heaviness of heavy goods vehicles that are in motion,
- optimization of driving time, [10]
- implementation of automatic collection of road toll payments,
- recognition of vehicles,

– traffic standardization in response to changing road and weather conditions.

The implementation of telematics systems entails the obligation to improve both vehicles and infrastructure. [2] An unquestionable benefit resulting from the implementation of steering systems is the more productive interaction of carriers in the intermodal transport chain.[11] The task of telematic systems is to simplify the operation of transport infrastructure and increase the efficiency of its management. [5] On the other hand, the task of telematic systems, which are located in the vehicle, consists in supporting and transferring information to the driver and guaranteeing safety to road users. [13]

Each system, which is equipped with devices that are located in the road lane or in its vicinity, is counted among telematics systems. [21] These include weather stations, traffic control system, LED signs, devices that measure the severity of traffic, traffic control system, a system that allows detection of high vehicles, intelligent traffic lights, video - sensors, tables with changing content, and also a road work safety system. [17]

Table 1. Entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249, 250 =>), voivodships and PKD. Status on 31/12/2015

Voivodeship	Total	Expected number of employees			
		0-9	10-49	50-249	250=>
Dolnośląskie	9486	9239	225	22	0
Kujawsko – pomorskie	6956	6800	149	6	1
Lubelskie	6268	6157	99	12	0
Lubuskie	4454	4292	144	16	2
Łódzkie	7929	7708	200	16	5
Małopolskie	10566	10343	205	17	1
Mazowieckie	22997	22465	455	65	12
Opolskie	3187	3101	73	13	0
Podkarpackie	7234	7124	98	11	1
Podlaskie	3511	3463	46	1	1
Pomorskie	8481	8259	207	14	1
Śląskie	16085	15593	440	49	3
Świętokrzyskie	4534	4455	65	12	2
Warmińsko – mazurskie	3543	3471	68	4	0

Wielkopolskie	14642	14150	447	40	5
Zachodniopomorskie	6586	6439	132	14	1
No voivodship	13	-	-	-	-
Total	134672	133059	3053	312	35

Source: Own elaboration

Table No. 1 presents the entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. The condition is given on 31/12/2015. According to the data, the largest number of entities is located in the Mazowieckie voivodship, the Śląskie voivodship and the Wielkopolskie voivodship. On the other hand, the fewest entities were registered in the Opolskie Voivodeship and the Podlasie Voivodship. Thirteen entities have not been included in any voivodship.

Table 2. Entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. Status on 31/12/2016

Voivodeship	Total	Expected number of employees			
		0-9	10-49	50-249	250=>
Dolnośląskie	9570	9324	224	22	0
Kujawsko – pomorskie	7077	6920	149	7	1
Lubelskie	6450	6340	99	11	0
Lubuskie	4502	4342	142	15	3
Łódzkie	8147	7325	202	15	5
Małopolskie	10788	10556	217	14	1
Mazowieckie	23302	22763	464	63	12
Opolskie	3217	3132	71	14	0
Podkarpackie	7513	7396	105	11	1
Podlaskie	3568	3518	48	1	1
Pomorskie	8634	8408	210	15	1
Śląskie	16174	15692	429	50	3

Świętokrzyskie	4593	4512	67	12	2
Warmińsko – mazurskie	3508	3435	68	5	0
Wielkopolskie	14956	14466	443	41	6
Zachodniopomorskie	6563	6411	140	11	1
No voivodship	15	-	-	-	-
Total	138577	134540	3087	307	37

Source: Own elaboration

Table 2 presents entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. The condition is given on 31.12.2016 According to the data presented, the largest number of entities is in the Mazowieckie, Śląskie and Wielkopolskie voivodships. On the other hand, the fewest entities were registered in the Opole and Warmian-Masurian Voivodships. There has been a change to the previous year. Fifteen entities have not been included in any voivodship.

Table 3. Table No. 3 Entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. Status on 31/12/2017

Voivodeship	Total	Expected number of employees			
		0-9	10-49	50-249	250=>
Dolnośląskie	9643	9393	228	22	0
Kujawsko – pomorskie	7099	6946	146	6	1
Lubelskie	6568	6455	103	10	0
Lubuskie	4493	4336	139	15	3
Łódzkie	8334	8107	207	15	5
Małopolskie	10898	10660	221	16	1
Mazowieckie	23793	23238	477	64	14
Opolskie	3242	3153	74	15	0
Podkarpackie	7578	7460	106	11	1
Podlaskie	3670	3623	45	1	1

Pomorskie	8724	8500	209	14	1
Śląskie	16116	15626	436	51	3
Świętokrzyskie	4628	4549	66	11	2
Warmińsko - mazurskie	3545	3478	62	5	0
Wielkopolskie	15200	14699	454	43	4
Zachodniopomorskie	6549	6388	148	12	1
No voivodship	5	-	-	-	-
Total	140085	136611	3121	311	37

Source: Own elaboration

Table No. 3 shows the entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. The condition is given on 31/12/2017. According to these data, the largest number of entities is located in the Mazowieckie, Śląskie and Wielkopolskie voivodships. On the other hand, the fewest entities were registered both in the Opolskie Voivodeship and in the Warmian-Masurian Voivodeship. Five entities have not been included in any voivodship.

Table 4. Table No. 4 Entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. Status on 31/03/2018.

Voivodeship	Total	Expected number of employees			
		0-9	10-49	50-249	250=>
Dolnośląskie	9690	9438	230	22	0
Kujawsko – pomorskie	7094	6944	143	6	1
Lubelskie	6627	6514	103	10	0
Lubuskie	4491	4336	138	14	3
Łódzkie	8367	8143	204	15	5
Małopolskie	10914	10681	216	16	1
Mazowieckie	23962	23395	488	65	14
Opolskie	3239	3147	76	16	0

Podkarpackie	7626	7509	105	11	1
Podlaskie	3678	3630	46	1	1
Pomorskie	8767	8547	205	14	1
Śląskie	16134	15644	435	52	3
Świętokrzyskie	4640	4561	66	11	2
Warmińsko – mazurskie	3539	3469	65	5	0
Wielkopolskie	15276	14784	447	41	4
Zachodniopomorskie	6557	6397	147	12	1
No voivodship	4	-	-	-	-
Total	140605	137139	3114	311	37

Source: Own elaboration

Table No. 4 shows the entities of the national economy PKD 49.41.Z registered in the REGON register, declaring business activity, according to the expected number of employees (0-9, 10-49, 50-249,250 =>), voivodships and PKD. The condition is given on 31/03/2018. According to the above data, the largest number of entities is located in the Mazowieckie, Śląskie and Wielkopolskie voivodships. In turn, the fewest entities were registered in the Opolskie Voivodeship and the Warmian-Masurian Voivodeship. Four entities have not been included in any voivodship.

5. SUMMARY

In Poland, the concept of telematics is not sufficiently widespread. However, telematics solutions are quite popular. In the transport industry, the importance of telematics has been growing for several years. According to forecasts, the demand for telematics systems will continue to grow. As of today, globalization processes that take place in the global economy place increasingly new criteria for innovative transport systems. The active growth of offering international road transport services has been visible in Poland for a long time. The incoming competition puts pressure on entrepreneurs. Entrepreneurs wanting to stay on the market must constantly look for pioneering system solutions. It is worth noting that both IT systems and telematics systems bring with them the possibility of improving safety and efficiency in road transport. Both communication problems and consequences resulting from excessive traffic need solutions that will be able to provide stable mobility in the future. There is a need to use the existing transport infrastructure wisely and, moreover, to improve flows to respect the environment, increase road safety and greater economic efficiency. Such solutions are sought in creating consolidated transport networks. In this field, it is telematics that proposes a whole host of innovative telematic instruments. These instruments affect not only the wider use of social and economic opportunities, but also affect the quality of life.

Telematics is such a discipline that integrates knowledge from both the scope of IT and telecommunications. Telematics includes methods of automatic control of physical systems. Various applications and mobile devices are used in telematics. Mobile applications and devices give you the ability to control carriers, cargo and transport. Telematic systems create the so-called Advanced Traffic Management Systems, which include: intelligent, administration center, intelligent way, intelligent vehicle.

In turn, pioneer technologies enable: even more effective driving, checking the speed of vehicles, increasing on the road of safety, adaptation of the ride to the prevailing road conditions and to the prevailing weather conditions. Telematics systems enable the recognition and navigation of vehicles, automatic weighing of vehicles, also while driving.

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