

## TELEMATICS COMPLEX – A TOOL FOR PROACTIVE BUSINESS DEVELOPMENT AND A DRIVER FOR LONG-TERM NATIONAL SOCIO-ECONOMIC GROWTH

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In a transitional economy, socio-economic systems are undergoing significant changes for the aim of sustainable development at the micro-, meso- and macro levels. At the same time, the strongest aspects of the system are taken as the main criteria and the foundation for growth, which in the transition period is a growth driver and support for many areas of the economy. Considering the national economy of the Republic of Belarus, when do analysis and substantiation of the ways for long-term development, we proceed from the goals and objectives of state program documents that describe strategic steps to achieve the final result in the social and economic sector. Among these documents is the National Strategy for the Socio-Economic Development of the Republic of Belarus until 2030, in which the basis of sustainable development and ensuring socio-economic security is the basing of the Belarusian economy on innovative solutions, the effective use of national resources, as well as the country's comparative competitive advantages [1]. If we consider growth and development, which, in principle, are not interchangeable or equal categories, then for their balanced position it will be essential to rely on the advanced development of science, the information technology sector as structures for optimizing the production process, as well as drivers of sustainable development of the national socio-economic system. We also should pay much attention to the perspective that means to regard not just "right away" situation but also see in the future predicting the possible results of our tactics and strategies we use to achieve the goal. There is a psychological theory of proactive behavior that means doing things or active in accordance with today-tomorrow situation and predicting the result you'll get when applying these or those steps [2].

According to our opinion, the Republic of Belarus has everything in order to provide socio-economic growth: beneficial geographic position, a great amount of natural resources, high-level education that delivers top-qualified specialist for different socio-economic spheres. The last one includes way more components such as the level of human capital and the amount of business approaches the country provides: agriculture, transportation, education, insurance, medicine, etc. and definitely an IT-sector, that is one of the leading economics sectors and possibly the strongest driver for proactive and long-term business development. As of 2020, the Republic of Belarus retains the 50th place in the UNDP International Human Capital Development Ranking [3]. The stability of the position in the growth dynamics relative to other countries is supported by the growing indicators of the index structure. From 1995 to 2018, life expectancy at birth in Belarus increased by 3.9 years, the average duration of schooling by 3.8 years, and the expected duration of education increased by 2.5 years. GNI per capita grew by 103.8 percent between 1995 and 2018 [4]. The interconnected level of health care maintains high positions in the international rating "Healthcare Index", which considers the health infrastructure, the competence of medical workers (doctors, nurses, etc.), cost (costs in US dollars per capita), the availability of quality drugs, government readiness improve the health of the population. High development indicators in the healthcare sector allowed the

Republic of Belarus to take 57th place in 2019, overtaking Russia (58th place in the rating) [5]. Talking about an IT-sphere it produces 5.7% of Belarusian GDP in comparison with agriculture and forestry 6.4%, building 5.4%, transportation 5.8%. IT export volume in 2018 amounted to 3.1 billion US dollars [6]. In addition, 24% of students in 55 higher educational institutions are enrolled in education in the field of exact sciences with the prospect of employment for the period of 2018 in the Republic of Belarus, and about 4000 Belarusian software engineers graduate to the labor market annually [7]. Their further employment largely depends on the readiness of the market and the demand for labor resources. Meanwhile, the portrait of a modern IT company constitutes a criterion of readiness to train young specialists, to provide them with places of practice with the possibility of further employment in the company. This approach to the search and development of human resources is available in many IT companies in the Republic of Belarus, including Huawei, Wargaming, Akveo, Panda Doc, A1QA, etc. It is worth emphasizing that Huawei, founded in China in 1987, has one of the largest offices in the Republic of Belarus and belongs to the ICT sector. In 2018, Huawei announced its proposals [8] on the construction and development of ICT to support IT-industry in the Republic of Belarus, the share of which is planned to increase up to 10% in the GDP structure by 2023 [9]. In his report, Huawei Chairman Guo Ping emphasized the Republic of Belarus has the potential to become the largest trade center between Europe and China, Europe and Russia, providing fast, convenient and hassle-free transit due to location at the intersection of several international transit routes. It is assumed that the volume of logistics services will increase by 1.5 times, and revenues from transit will grow 3.7 times by 2020 compared to 2015. According to the proposal, digital technologies give the Republic of Belarus the opportunity to build an internationally competitive logistics center. The digital solutions most relevant to Belarus include intelligent transport systems for highways, rail transport management systems, intelligent customs solutions, logistics services and contractor verification systems [7]. In addition, the National Strategy of the Republic of Belarus emphasizes the optimization of logistics structures, the introduction of IT tools for the development of the sector, as well as increasing its competitiveness. The result of the successful implementation of the steps should be the entry of Belarus in 2020 among the top hundred states in the ranking by the level of logistics development (against 120th position in 2016) [1]. In addition, the transport channels "West-East" and "North-South" are already equipped with modern logistic terminal systems for serving consumers, automated systems of customs and border control, satellite navigation, and roadside service facilities [10]. In our opinion, it is worth highlighting satellite tracking systems as products of the IT sector and tools for optimizing logistics processes, reducing costs and monitoring the quality of activities. GPS monitoring is a specialized system designed to control moving and stationary objects, including vehicles, people, animals, real estate, etc. Location tracking solutions that in addition provide statistical data are called telematics, and the solution structure (the collection of its components) is called a telematics complex. The concept of telematics appeared in international practice in 1978 and was coined by the French authors Simon Nora and Alain Minc. They describe telematics as the transmission of information using telecommunications [11]. The very concept of a telematics complex includes components that together create a solution for satellite tracking - a telematics solution. Among the components, the following are distinguished, highlighted in table 1.

Table 1 – The variety and functions of telematics solution components

Component		Variety   Examples	Functions   Usage way
Telematics block	GPS-trackers (equipment)	-AVL equipment -software for using a smartphone as a GPS tracker -personal trackers -video monitoring equipment -asset tracking devices -tachographs -OBD trackers	Thanks to the built-in SIM card, receiving a signal through the GSM tower from the GPS satellite, it transmits data about the monitoring units to the platform - the tracker is a kind of data collection point for transferring them to the software, data is also collected from all available sensors installed at the monitoring units (if any).
	Sensors (if necessary)	-moving -open   close -temperature -humidity -lighting -fuel level sensors etc.	Transmitted via GPS equipment to software, this allows you to track additional information about the monitored units (car, people, assets, etc.).
	SIM-card	-standard; -M2M (for IoT).	-Standard serves as a means for SMS and Internet traffic. -M2M are used to transfer data between machines (equipment) without human intervention.
Monitoring software		-Wialon -Geotab -GPS-server -GPSWOX -Navixy -GPSGate -Traccar и т.д.	They present data from GPS equipment and sensors in the required form to control the state of the monitored units (location, the level of the communication signal in the equipment)
GSM tower (data transferring)		-mobile; -stationary.	Mediator for signal transmission between GPS satellite and GPS equipment, which further transfers data to software
GPS satellite		NAVSTAR GPS (USA, 1995), GLONASS (Russia, 2015), GALILEO (EU, 2020), BeiDu Navigation Satellite system (China, 2020) + (not implemented into work) DORIS (France), IRNSS (Japan)	transmit a signal from space, and all GPS receivers use this signal to calculate their position in space in three coordinates in real time.

Source: author’s development based on the reference [12, 13].

According to the author, the above technology can become a tool for reducing costs and optimizing the process of selling goods, works and services. One of the areas of application, in our opinion, can be transport logistics, in which there are several potential monitoring objects at once: vehicles, drivers, cargo. It is thanks to this versatility that the telematics solution is one of the central elements of fleet management. GPS equipment with additional sensors can record the following data: vehicle location, geographical area of location (geofence),

vehicle speed, situations leading to road accidents (hard braking, acceleration and quality of cornering - driving behavior or Eco-driving), diagnostics of the technical condition of the car (for example, odometer), vehicle status (free, busy), remote vehicle inspection reports, SOS signals, submitting assignments and messaging, electrical activity or activity of sensors (via PTO), video recordings from the dashboard to monitor the condition of the driver or the situation on the roads, etc.

This is just a small amount of data that e.g. a logistics company can track to monitor the driver, the quality of cargo delivery, the moment the cargo is stolen, or the condition of the vehicle itself. In addition, telematics systems, including vehicle routing and maintenance scheduling with quality driving behavior, provide a comprehensive and comprehensive solution to the key problems facing fleet management. Analysis of this data allows us to solve several problems. First, companies receive a tool to reduce costs by, for example, lower fuel consumption and more accurate monitoring of the technical condition of vehicles. Second, data analysis helps to identify bottlenecks in business processes: reduce fleet downtime, increase mileage without increasing costs, plan timely service and adjust the driver's driving style. Together with information from the CAN bus - about 5 thousand types of data - telematics allows cars to be embedded in the "smart city" model, when the car fleet becomes part of a large-scale digital ecosystem. All of the above can demonstrate the process of how innovative technologies of the fourth industrial revolution are transforming logistics processes, making them more inclusive and efficient. Thus, one of the reasons for the economic and technological development in the field of logistics is the introduction of a new high-quality product and its use, as well as a decrease in production costs in order to optimize business processes. Telematics solutions can integrate with existing applications and systems, allowing for a variety of use cases for fleets of all sizes. According to an international study by the McKinsey Global Institute (2019), telematics solutions can reduce delivery and customs clearance times by 16-28%, as well as potentially increase total trade by 6-11% by 2030, compared to the baseline, which will be an annual turnover - 4.7 trillion US dollars. In addition, a 1% decrease in trade costs could lead to a 0.4% increase in trade flows. Thus, the growth of the global telematics market is justified as a driver for the development of international logistics and trade. It is expected that in 2022 the global market for telematic vehicles will be about \$ 103 billion [14].

Thus, with telematics solutions for monitoring goods delivery, transportation, vehicles and international trade processes, GPS technology has changed the traditional aspect of the logistics business and has become an important tool for proactive business development. Here we emphasize that fleet owners and business can take full advantage of the opportunities offered by GPS systems. Senders, recipients and transport companies can observe the movement of their vehicles and thus the delivery of goods, which makes vehicle management more efficient and responds to disruptions and other emergencies faster. Providing up-to-date transport data allows to continuously optimize transport operations: routing, queuing, loading and unloading order, etc. At any time, 24 hours a day, the dispatcher can receive complete information about the date, time, vehicle speed, time and place of an individual vehicle, a given group or all vehicles at the same time. Thereby, an employee full control over vehicles up to several hundred kilometers from the base. Constant monitoring of the transport also



13. GPS и ГЛОНАСС оборудование / Вебсайт компании «Gurtam» [Электронный ресурс]. – Режим доступа: <https://gurtam.com/en/gps-hardware>. – Дата доступа: 19.10.2020.
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**ТЕЛЕМАТИЧЕСКИЙ КОМПЛЕКС – ИНСТРУМЕНТ ПРОАКТИВНОГО  
БИЗНЕС-РАЗВИТИЯ И ДРАЙВЕР ДОЛГОСРОЧНОГО НАЦИОНАЛЬНОГО  
СОЦИАЛЬНО-ЭКОНОМИЧЕСКОГО РОСТА**

*В статье автор рассматривает телематический комплекс как продукт телематики, который взаимосвязан с одной из ведущих сфер экономики Республики Беларусь – ИТ. На основании проведенного анализа статданных, индикаторов развития белорусской экономики, а также показателей деятельности ИТ-компаний, автор приходит к выводу, что сфера телематическая сфера является инструментов проактивного (на перспективу с оценкой результата и предугадыванием последствий и решений) развития бизнеса. Кроме того, создавая положительный экономический результат на микроуровне (предприятия, организации, малый и средний бизнес) телематические решения являются драйвером долгосрочного социально-экономического роста Республики Беларусь.*

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