Műszaki Katonai Közlöny

XXVIII. évfolyam, 2018. 1. szám

Péter Boda[1]

THE DEVELOPMENT OF THE CONCEPTUAL SYSTEM OF MOVEMENT, TRAFFIC, TRANSPORTATION AND FORWARDING OF GOODS

A MOZGÁS, A KÖZLEKEDÉS, A SZÁLLÍTÁS ÉS AZ ÁRUTOVÁBBÍTÁS FOGALMI RENDSZERÉNEK KIALAKULÁSA

Movement, traffic, transportation and forwarding of goods are almost synonyms in the colloquial language, since these concepts are interrelated and connected to each other in the everyday life. There is no traffic without movement; there is no transportation without traffic. It might be the topic of interesting study if we were to examine whether traffic or transportation was before the other. I review, in this paper, the interpretation of the concepts and the correlations of the system.

Keywords: *movement, traffic, transportation, forwarding of goods.*

Mozgás, közlekedés, szállítás, fuvarozás a köznyelvben szinte szinonimák, hiszen ezek a fogalmak a hétköznapokban összefüggenek, egymáshoz tartoznak. Mozgás nélkül nincs közlekedés, közlekedés nélkül nincs szállítás. Érdekes tanulmány témája lehetne, ha megvizsgálnánk, hogy a közlekedés, vagy a szállítás volt-e előbb. Ebben a cikkben e fogalmak értelmezését és a rendszer összefüggéseit tekintem át.

Kulcsszó: *mozgás, közlekedés, szállítás, fuvarozás, árutovábbítás.*

INTRODUCTION

During my research, I have undertaken to elaborate a topic that scrutinizes the vulnerability of civilian transportation systems against the effects of disasters and the possible solutions to increase safety and security. In order to be able to examine this topic in an adequate way, I need to clarify some concepts such as transport, traffic, transportation of goods and their relationships. I undertake in this paper to review this system and its contexts in order to clarify the principles. Without this knowledge, it would not be possible to interpret system vulnerability and there would be no identifiable possibilities to increase the protection against hazards. "During emergencies, one of the basic conditions of protection against disasters is that society devotes more and more emphasis on prevention and elimination. Another condition is to choose protection forms in line with the incidents and adapt the means to this." [1; 103] All this is needed to investigate the entire system. Let us examine the historical background of the subject.

[1] Doctoral student of DSMT NUPS, pureglas@gmail.com. Orcid:0000-0001-6085-4196

HISTORICAL ANTECEDENTS

Movement, traffic and transportation are almost synonyms in the everyday language, since these concepts are interrelated and connected to each other. We could say there is no traffic without movement and there is no transportation without traffic.

History of traffic and transportation, let us honestly admit, began with the history of mankind. Just as the past of prehistoric humans is obscured by pre-historic times, we know little about the start of traffic as well. It took a long time to replace their feet, the single means of traffic, i.e., transport to something else. The question still arises what transportation is. By comparing everything, we realize that transportation is fundamentally nothing else than traffic.

Yet, the two concepts separated at some instance in ancient times. Ancient people began to separate organized travel and the transportation of goods - from the perspective of the goal/destination, task, process and organizations providing them.

The Egyptians traveled primarily for religious and trade reasons. The ancient Chinese travelers were mainly motivated by trade to move in an organized way. India was one of the destinations and the starting country of long distance trade, so here, traffic primarily served as means of transportation. The construction of Persian roads served for the faster movement of the army. When designing them, an important goal was to bridge the gap between the capital and the submerged areas as soon as possible. Much of the knowledge of the Greek of travel and road construction can be traced back to Phoenician antecedents. Shipping played an important role in the long-distance transportation of persons and goods, and in commerce. With the establishment of the Roman Empire, the role of transportation of goods and persons in the Mediterranean increased both in volume and significance, thus, maritime and land transport (traffic) were combined.

AD 476 was the end of the ancient times and the beginning of the Middle Ages. This reoriented the world of traffic, including transportation, which underwent a huge downturn. This decline was quick and shocking. With the fall of the Roman Empire, an era ended in the history of road traffic and transportation. The quantity of goods to be transported suddenly began to decline, the development completely stopped. States with smaller territories and provinces were unable to maintain roads; building new roads were not envisaged at all.

Contemporary decision-makers during this period, due to influencing factors listed above and the results of the era of great geographic discoveries, transportation was shifted to the seas.

Historically, a major leap in the history of land transport (transportation) was coal mining, steel manufacturing and inventing steam engines. These findings made it possible to launch rail transport (traffic), which also changed land and water transportation as well. During this period, traffic, transport and communications also evolved together with industry.

In the first half of the 19th century, steam energy appeared also in the field of traffic. The first steamship was invented by the American Fulton (1809), but on the seas, sail ships were still faster and were only replaced in the second half of the 19th century.

Chappe's semaphore telegraph, then Morse's electromagnetic telegraph and signal system revolutionized communications. The transformation of traffic and communications had an impact on the economy: it reduced the price of the products delivered, and increased their volume and expanded their composition.

In the history of traffic and thus of transportation, turning point was when, in 1876, Nikolaus Otto built the first internal combustion engine. It was much smaller than the steam engine, and it worked with a new fuel, gasoline. The emergence of the combustion engine revolutionized traffic and transportation as well.

An old desire of humanity was flying. The first airship rose to the sky sometime at the end of the 1700s. In 1904, the Wright brothers flew 12 kilometers at a speed of 75 km/h. In 1909, Louis Blériot flew over La Manche. The First World War gave a decisive boost to the development of aviation.

Following this large-scale summary of the history of transportation, now I review how this concept has changed by now, what the content background behind the hidden definitions is.

RELATIONSHIP BETWEEN TRAFFIC AND TRANSPORTATION

As I have already mentioned, traffic is just as old as mankind. At the beginning of traffic, when it was only implemented on foot, than later, the primitive means of traffic, people of the time did not even know that they, while moving around, were traveling, they were participants in traffic.

I wonder why people did not even realize that they were traveling. The reason is because, to participate in traffic, the following factors are necessary[2]:

- society (tribes, towns, states, institutions, etc.);
- traffic objectives (expected results formulated by society);
- traffic routes;
- traffic technology;
- traffic engineering systems;
- traffic arrangement;
- traffic environment;
- others (service quality, traffic information technology, sustainability, etc.)

According to an approach, traffic is none other than "*changing location depending on human will and determination, overcoming distance in space and time, usually carried out by using a suitable device or equipment and for the sake of a useful purpose. Simply, we can call it changing location. Location change always has a goal and a result. Its purpose is to move people or things from one geographic and physical location to another, in space, and time. It has a result: a new geographic situation and a higher value*". [2]

Based on the foregoing, it can be stated that traffic has a goal and a result. Nowadays, traffic is almost only interpreted in terms of human mobility, but then: what is transportation? We use the phrases *"transportation of persons and goods"* every day, but the questions arises what the correlation between traffic and transportation is.

Traffic, transportation, transportation of goods, forwarding of goods? Though it seems they are synonyms, but unfortunately, practice shows that these concepts (traffic, commerce, forwarding of goods) are often confused even by experts, not to mention everyday language.

[2] Compiled by the author.

Surprisingly, transportation is not traffic-related but a commercial concept. In literature and professional circles, under transportation, one understands a sales transaction, which means that the owner (seller) of the goods renounces the right of disposal of the goods to the buyer and transfers it to the buyer. Consequently, if this is done, a transportation contract is nothing more than a sales contract. As a result of the foregoing, I can state that transportation does not mean movement of goods by itself, i.e.,, it does not have a direct connection with traffic.

If transportation is not necessarily a movement of goods by itself, I need to further look at what activities ensure the planned change of location of the goods, i.e., what activity is related to traffic. My judgment is that one of them is certainly the transportation of goods, as it is nothing else but the *"movement of goods made by and for a fee to be paid to entrepreneurs specializing in it."* Then, what is the situation with forwarding of goods?

Forwarding of goods is the organized activity of the process of moving goods from one place to another, whose goal is to send the shipment at the lowest possible cost, safely, at the right time to the optimum destination. It is considered a branch of logistics. As forwarding is primarily an administrative activity that links transport with transportation of goods, it coordinates and assists it, with administrative and other solutions, with no direct relationship to traffic.

In order to understand the relationship between transportation, the transportation of goods, forwarding and traffic, I briefly summarize their conceptual definitions.

Movement of goods is delivering a particular product to a particular point, within which we distinguish between transportation, forwarding and traffic activities.

Transportation means the fulfillment of the sales contract where the seller is always the carrier. The seller, by fulfilling the terms of a transportation contract, renounces the right of disposal over the goods and transfers it to the buyer; therefore, in this case, this is only a legal contract and does not involve the movement of goods.

Transport of goods is a movement of goods made against a fee, by entrepreneurs specializing in this. Transportation of goods (forwarding/movement of goods) is implemented on traffic routes, by means of traffic, in a traffic environment. The carrier is paid a fee for his activity.

Forwarding is an activity whereby the forwarder performs tasks as a commissioner, which originally would belong to the responsibility of the principal. Based on this, on its own behalf, cost and risk, the principal concludes contracts on moving (transporting) (eventually intermediate storage, reloading, etc.) the goods by carriers and other participants and ensures compliance with official regulations (environmental, customs, health etc.).

Traffic is an organized change of one's location (movement), which is implemented by means of traffic tools on routes established and defined for it (land, water or air), in a given environment. The expression ‘‘traffic’’ is mainly used for the transportation of people, but as the foregoing prove, transportation (forwarding/moving) of goods belongs to traffic, since, during the movement/forwarding of goods, the parties involved and their means of transporting goods become elements of the traffic system.

Based on the fact previously studied, I have come to the conclusion that transportation and forwarding have absolutely no connection with moving of goods, consequently either with traffic, however, forwarding (movement) of goods (just as transportation of goods) is part of traffic.

THE TRAFFIC SYSTEM

Just as mentioned by me already, *traffic* is none else than an organized movement of persons and goods from one place to the other[3]. Starting off from this concept we may ascertain that *"a traffic system is the entirety of system components that, interacting, provide the requirements for the transportation of persons and goods according to the current and ubiquitous human, economic needs, using the traffic network*[4]*available"*.[5]

It should be noted that the traffic system is indispensable from a social point of view, on the one hand, it ensures the free flow of people and goods; on the other hand, traffic also harms the human environment as a result of accidents, energy consumption, air pollution and land seizures. Consequently, the effects of globalization processes need also to be taken into account in order that traffic development consciously contribute to the improvement of the quality of life, sustainable development consistent with the environment.

Figure 1 shows the features of the traffic system and its typology[6]. Accordingly, the system serving the fulfillment of traffic demands is complex, dynamic, open, stochastic[7] and effected by complicated system interrelations. [3]

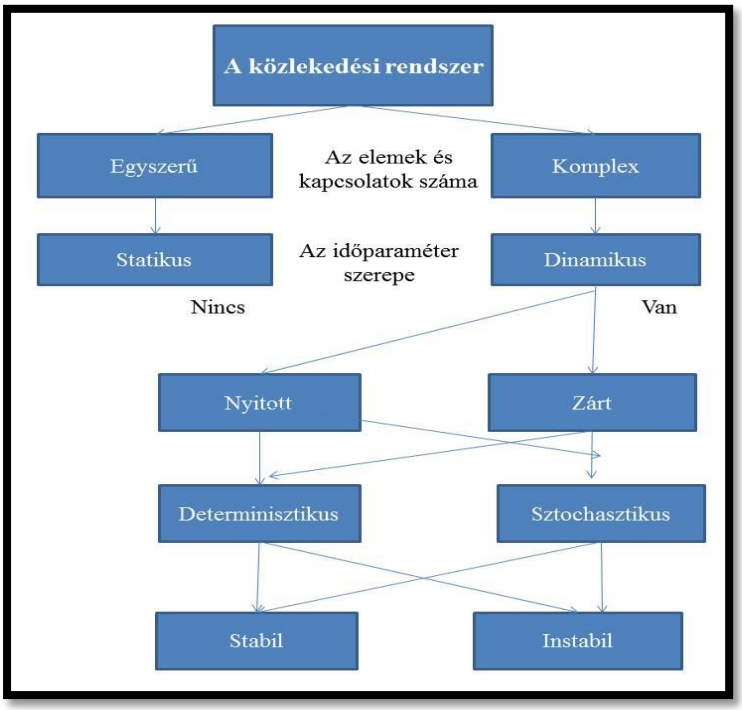

Figure 1: The typology of the traffic system [3; 3].

[3] According to some specialists, the location changes of news and information belong here, but in the context of this article, I will not deal with this issue. (Author).
[4] Under traffic network, I understand the entirety of traffic routes, traffic technology, traffic technology systems, traffic arrangements, traffic environment, service quality, traffic information technology, sustainability and traffic safety.
[5] Concept by the author.
[6] Typology: auxiliary science dealing with grouping, comparing and systemizing types. Source: http://www.kislexikon.hu/tipologia.html. Downloaded: 19 August 2017
[7] Stochastic: built on probability calculation, based on statistical probability. Source: http://idegen-szavak.hu/sztochasztikus. Downloaded: 20 August 2017

In addition to the above characteristics, the figure also helps understand that the traffic system is an artificial system with the following features.

1. Intentful, since it is a state in the operation of the system, the achievement of which it seeks. For this reason it is able to correct its own operation. An example of this is public transport, when, without central intervention, travelers will choose less crowded services. This feature originates in the complexity of the traffic system.

2. Open, since the traffic system consists of material, energy and information contexts with its environment, i.e., it is complex, dynamic and open.

3. Active, that is, its structure differs considerably due to the influence of external and internal regularities of the system, that is, this change can be influenced, which originates from the openness and dynamism of the traffic system. Its results are that a given traffic system continuously develops according to the needs and goals.

4. Complicated – meaning that the number of elements and possible element relationships is so high that it is impossible to review them from all aspects. This feature provides an apropos for my paper, since I can only examine it from one aspect, the *sensitivity of civilian transportation systems against the effects of disasters.*

5. Being organized means it has some degree of autonomy in connection with its operation, which is mainly due to its dynamism and openness.

6. It is hierarchical, total, self-organizing and adaptive, originating from the transportation of goods, the organizational forms of traffic, destination, the type of means of transportation, movement processes, the distance of forwarding goods, i.e., the grouping of traffic systems.[8]

7. I think that the *directionality* of the traffic system needs not to be explained, because it comes from its complexity, dynamism and openness.

8. The hierarchical structure and orderliness of traffic, in my opinion, should not be explained either, since in the absence of these features, the traffic system (the forwarding of goods itself) would collapse and would end up in the state of chaos[9].

9. The *state space (*the *set of possible states),* the *behavior (operation, development)* of the traffic system, *the processes that take place in it and the direction of communication resulting in connection with them* is difficult to outlive due to its dynamism, openness and stochastic features.

[8] I will discuss the grouping of traffic systems in detail later. (Comment by the author).
[9] Chaos is characterized by a kind of determinism, a random-looking irregularity, which can be summarized from three sides, such as irregular movement, lack of predictability and loss of precise geometrical structure. Read more: http://crescendo.hu/2008/10/12/6-kaosz-komplexitas-es-veletlenszeruseg. Downloaded: 21 August 2017

GROUPING OF TRAFFIC SYSTEMS

Object of transportation:	**Form of organization:**	**Destination/purpose:**
- persons; - goods.	- individual traffic; - public (mass, community) traffic/transport;	- residence; - profession; - official activities; - training, educations; - shopping, purchase; - supply; - services; - leisure/recreation; - economy/transportation.
Means of traffic/transport: - on foot; - bicycle; - motor bicycle; - car; - other motor vehicle; - power machinery; - taxi (person and freight); - bus; - trolleybus; - tram; - city train (suburban railway); - underground railway (metro); - suburban train; - mountain railway; - long-distance railway; - vessels (ferry, boat, submarine, special water vehicles); - aircraft; - lift (elevator); - escalator; - moving walkway; - cable-way; - spacecraft (space shuttle, booster, etc.).	**Traffic routes:** - public road; - railway; - water; - air; - fix-lead (pipeline); - conveyor belt; - other moving routes (e.g., moving walkway); - combined. **Movement process:** - moving traffic[10]; - standing traffic[11]; - combined traffic[12] **Distance range:** - short range (local); - mid range (regional); - long range **Settlement-wise:** - internal traffic; - dispatch and destination traffic; - thoroughfare	

Table 1: Grouping of traffic systems (professional division) [3]

The fact that systems of forwarding goods are parts of the traffic systems is proved by Table 1 and the definitions of forwarding/transporting goods, since based on them we can distinguish:

[10] In my opinion, we can speak of moving traffic if the given means of transport (on an open or fixed route/line), moved by humans or animals, or driven by a built-in power source in 2 or 3 dimensions, according to the given traffic regulations, is capable of covering a relatively large area and the given means of transport is not tied to a given facility. (Definition by the author).

[11] We can speak of standing traffic if the given means of transport cannot leave a given facility, but it is still capable of transporting using its own power source (e.g., lift, escalator, conveyor belt). (Definition by the author).

[12] The combination of the latter, the best example of which is the metro where the set of wagons itself and the escalators at the stations satisfy the needs of the passengers.

- *direct traffic*, when the forwarding of goods takes place between a consignor and an addressee by using a means of transportation, during which the amount of goods to be transported is constant, i.e., there no loading or off-loading en route;
- *line traffic*, during which the location change (movement) takes place between the place of dispatch and the destination with the same means of transportation. Loading and off-loading of consignments takes place at transfer points;
- *goods collection and distribution system*, when the dispatch and destination points of the means of traffic are the same;
- *goods forwarding and collection system*, where, from collection point to collection point, organized scheduled traffic takes place and between collection points, the goods reach their destination through mainly direct traffic;
- *star point or hub-spine system*, according to which air express or fast mail services operate, which undertake the delivery of goods door-to-door, up to a certain time or before time.

The above list confirms the relationship between the transportation of goods and traffic, since the definitions of the above goods forwarding types include the definitions of traffic, the means of transport, the location change, the starting and end points (route) which are clearly bound to traffic.

Based on the above, I have come to the conclusion that transportation and shipping do not have any connections with forwarding of goods, consequently, either with traffic, so, their further study is irrelevant from the aspect of my topic. For the sake of the correct application of professional terminology and the correct completion of my scrutiny, I will only use the definitions of transportation of goods, forwarding of goods, traffic and traffic systems.

OPERATING CONDITIONS OF THE TRAFFIC SYSTEM

The topic itself evokes several questions like what factors are necessary to operate a traffic system. In my opinion, they are *traffic routes*, traffic *technology*, traffic *technology systems*, *traffic arrangement and traffic environment*.

Under *traffic routes, we understand* natural[13] or artificial roads[14], on which traffic is implemented. *Traffic routes, originating in the peculiarities of traffic, are generally lined establishments or facilities[15], which can be developed into networks with the growth of traffic demands.[16]*

[13] "Natural routes are ground, water and air. Their advantage is that they are suitable for the movement of means of transport without any special intervention. Additional facilities (e.g., ports, airports) must be built on both natural routes" Source: http://tudasbazis.sulinet.hu/hu/szakkepzes/kozlekedes/kozlekedesi-alapismeretek/a-kozlekedesi-palya-fogalma-fajtai-vonalvezetese-a-jarmu-es-a-palya-kapcsolata-az-aktiv-es-a-passziv-erok-a-jarmure-hato-ellenallasok/a-kozlekedesi-palya. Downloaded: 14 August 2017

[14] "Means of transport move on artificial routes (roads, railways, cableways) established by artificial means. Different terrain obstacles, such as mountains, valleys, water obstacles may be overcome by using structures (tunnels, bridges, etc.)." See ibidem.

[15] "Lined facilities as far as their spatial location and their purpose are highly varied engineering works. They have a longitudinal dimension that is substantially larger than their cross-sectional dimensions." Source:

[16] Definition by the author

Traffic technology is "the entirety of methods and procedures, with their help, of which the product of traffic, changing the location of persons and goods, is regularly implemented." [4]

Under the concept of *traffic technology systems* we mean the systems relationship, whose components develop the demand and supply relations, interacting with each other. The change of any component in space or time impact on the stability of the system. The components of traffic technology systems may be characterized together with the object of transportation, the forms organizing traffic, the purpose and destination of changing the location, the function of the means (vehicle) of traffic/transport, movement process, distance range and settlement-wise. [5]

I have not found (any) adequate definition for *traffic arrangements. In my opinion, traffic arrangements are the planning and implementation of the functioning and operation of the technical elements (route/course, vehicle) of traffic and other technical elements (traffic and technical bases, traffic control equipment, repair and maintenance facilities, commercial establishments, loading and material moving devices, fuel stations, etc.) in order to maintain and ensure traffic.*[17]

Traffic environment, in my opinion, is the well-definable area (region), in space and time, where traffic is implemented.[18] Requirements against traffic environment (from a user perspective), should be:

- safe and secure;
- obstacle-free and quick;
- up-to-date and affordable;
- reliable and comfortable;
- informative.

Operators, naturally, considering the expectations, would like the traffic environment be:

- efficient and economic;
- with no malfunctions;
- having sophisticated communications means and IT support;
- having up-to-date support and servicing facilities. [6]

Traffic environment developed and operated in this way can ensure the satisfaction of the participants in traffic, traffic comfort and last but not least, the safety and security of those participating in traffic.

Based on the above-mentioned, one can ascertain that traffic would only be successful if the purpose/destination of traffic, the selection of the means of traffic and the use traffic routes are coordinated, i.e., would operate a traffic system. In my next article, I will review what a traffic system is, what components and features it has.

[17] Definition by the author.
[18] Definition by the author.

SUMMARY

In this article, in harmony with my research, I have demonstrated the changes in the system of definitions of movement, traffic, transportation and forwarding of goods. I have highlighted that transportation and the carriage of goods have no relations to traffic. This relationship is found between the forwarding of goods (transportation of goods) and traffic, i.e., they are parts of the traffic system.

I have pointed out that the impacts of the globalization processes should also be taken into consideration in order that the development and upgrade of traffic consciously contribute to the improvement of the quality of life and sustainable development in harmony with the environment. I have proven my ascertainment by demonstrating the features of the traffic system.

I have shown what factors are necessary to operate a traffic system and highlighted that the correct operation of these factors serves for the satisfaction of the participants in traffic, traffic comfort and last but not least, the safety and security of those participating in traffic.

Based on these findings, in my next article, I will study what a traffic system is, what components and features it has.

REFERENCES, SOURCES

[1] Hornyacsek, Júlia: A katasztrófák elleni védekezés műszaki szakfeladatainak rendszere, a végrehajtás követelményei, módszerei és eszközei. Military Technical Gazette, year XXVIII, 2018, No. 1, pp. 103-139

[2] Dr. Magyary, István: Szállítmányozási ismeretek (manuscript), "Károly Róbert" College, Gyöngyös, 2005. http://exim5.hu/_user/file/Oktat%C3%A1si%20anyagok/Sz%C3%A1ll%C3%ADtm%C3%A1nyoz%C3%A1si%20Ism_%20Magyary%20Istv%C3%A1n.pdf. Downloaded: 19 August 2017

[3] Professor Dr. Gilicze, Éva – associate professor Dr. Havas, Péter – assistant professor Dr. Debreczeni, Gábor – assistant professor Dr. Mészáros, Péter – assistant professor Dr. Tóth, János – assistant professor Mándoki, Péter: Közlekedési rendszerek, University of Technology and Economics of Budapest, Budapest, 2004.

[4] MNO Sarnyai, Gábor: A menekültek, akiknek sikerült eljutniuk Bécsig, mno.hu http://mno.hu/belfold/a-menekultek-akiknek-sikerult-eljutniuk-becsig-1290009

[5] Http://tudasbazis.sulinet.hu/hu/szakkepzes/kozlekedes/kozlekedesi-alapismeretek/a-kozlekedesi-palya-fogalma-fajtai-vonalvezetese-a-jarmu-es-a-palya-kapcsolata-az-aktiv-es-a-passziv-erok-a-jarmure-hato-ellenallasok/a-kozlekedesi-palya.

[6] Http://www.kukg.bme.hu/kukg/oktatas/bsc/tantargy/BMEKOKUA176/Kieg_jegyzet.pdf. Downloaded: 15 August 2017

[7] Közlekedési rendszerek, http://www.kukg.bme.hu/kukg/oktatas/msc/tantargy/BMEKOKUM204/kozlrendsz.pdf. Downloaded: 15 August 2017

[8] Http://oktatas.epito.bme.hu/pluginfile.php/11334/mod_resource/content/5/kozl_kornyterv-2016_01_dertszs0907.pdf. Downloaded: 15 August 2017