Origin - destination trips of freight vehicles, survey in the territory of the city of Bitola

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ABSTRACT : *Road freight transport is considered one of the key drivers of trade and logistics. This sector is taken over by companies that are engaged in the transport of goods and materials via road infrastructure, providing services to various industries, from that to trade. Along the street network of the city of Bitola, different flows of goods, materials and cargo are intertwined daily: trade goods, finished products, semi-finished products, raw materials, building materials, shipments, secondary raw materials, waste and the like. Bitola is a city through which a large number of traffic flows transit daily, primarily due to its good road connections with the cities of Ohrid, Kicevo, through Prilep to Skopje, but also, most importantly, with neighboring Greece. This paper analyses the source-destination journeys of freight vehicles in the city of Bitola in order to obtain relevant data on the characteristics of freight traffic and its impact on urban mobility. As part of the research, a survey was conducted with drivers from various transport enterprises that regularly deliver or load goods in Bitola. The survey data identified the main locations frequented by trucks, i.e. their primary destinations in the city. The results provide a better understanding of the desire lines of freight transport movement and constitute a basis for developing measures to improve sustainable urban transport, optimize logistics processes and reduce traffic loads in the central urban area.*

KEYWORDS *Survey, Analysis, Variable, Bitola, destination*

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I. INTRODUCTION

Origin – destination journeys are a fundamental element in the analysis and planning of any traffic system. The origin of the journey marks the starting point from which the movement of the vehicle is generated, while the destination represents the location to be reached, that is, the place where the activity that initiated the journey is realized. Understanding these two components is key to determining the causes, intensity, and spatial distribution of traffic flows in a city.

Modern traffic planning takes into account the relationship between sources and destinations of journeys in order to predict transport demand, identify critical loading points and propose measures to optimize traffic solutions. Particularly in urban environments, the analysis of truck journeys is essential because of their impact on mobility, flow and traffic safety.

Freight transport plays a key role in the functioning of the urban economy, and the distribution of goods represents one of the most important logistical activities. In the city of Bitola, the delivery of goods is realized through various transport enterprises arriving from several regions and supplying trade, industry, hospitality facilities and services. These journeys create specific traffic patterns that depend on the type of goods, working hours, location of business entities and available street infrastructure. In addition, the central city area and industrial zones are among the most attractive points for distribution and logistics activities.

Travel attractiveness refers to the ability of a location to "attract" travel, i.e. to be the ultimate destination of a larger number of vehicles or people. By contrast, travel production describes the places from which travel originates, usually locations with higher economic, manufacturing, or service activity. Within freight traffic, distribution centers, warehouses, and transportation bases are typical trip producers, while commercial facilities, markets, industrial facilities, and service locations are the most common attractors.

In view of the increasing freight vehicle intensity and the need for sustainable management of the transport system, the analysis of origin-destination journeys in Bitola represents an important step to improve

the efficiency of logistics processes and reduce negative traffic impacts. This work aims to investigate the structure of freight transport in the city through a survey of transport enterprises and to identify the main zones of production and attraction of the trips.

II. METODOLOGY OF RESEARCH

The following methodology shown in diagram 1 was applied for the implementation of this research.
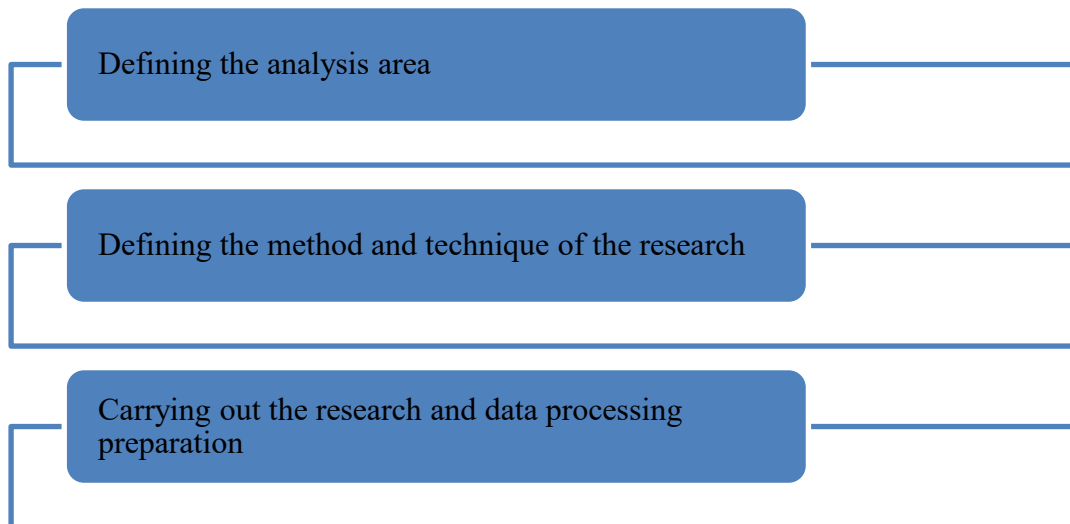
Defining the analysis area

Defining the method and technique of the research

Carrying out the research and data processing preparation

Chart. 1. Methodology for conducting the research

III. DEFINING THE AREA OF ANALYSIS

The area of analysis in this research is the city of Bitola, with a focus on the spatial zones and traffic corridors that are most used by trucks performing distribution, loading or delivery of goods. The analysis covers urban areas with different functional entities, which are characterized by different levels of economic, commercial and logistical activity, which directly affect the movement of freight transport.

The research covers:
- the central urban area, as the most attractive delivery zone due to the high concentration of commercial and service facilities.
- industrial zones, where factories, warehouses and major distribution centers representing significant travel producers are located.
- trading zones and larger markets, where delivery is intensive and regulated with limited time periods.
- peripheral traffic points, which are the main entry/exit points for freight vehicles arriving from other cities or regions.

The defined area includes:
- main urban streets and motorway corridors providing access for freight vehicles,
- secondary streets and local access roads to warehouses, markets and catering facilities,
- critical points with higher traffic loads, parking and unloading.

These parts are significant because they determine the speed, availability, and efficiency of logistics operations. The central zone, industrial zones, commercial and retail facilities, terminals, etc. were covered.

The Bitola Customs Freight Terminal is the main terminal in the city of Bitola, where services such as customs clearance, freight forwarding, loading - unloading and distribution of goods are realized.

Fig. 1 Area of analysis, Customs - freight forwarding terms Bitola

In Bitola there are several industrial zones that represent the main points for the production, storage, transportation and distribution of goods. These zones are the largest generators of freight traffic in the city, and are often the source and destination of travel. It included part of the industrial facilities along the highway and the ring road in Bitola, where we had food industry, textile, wood, metal processing, warehouses and so on. Also part of industrial facilities on the road to Prilep, around the railway station, various warehouses and own transport companies.
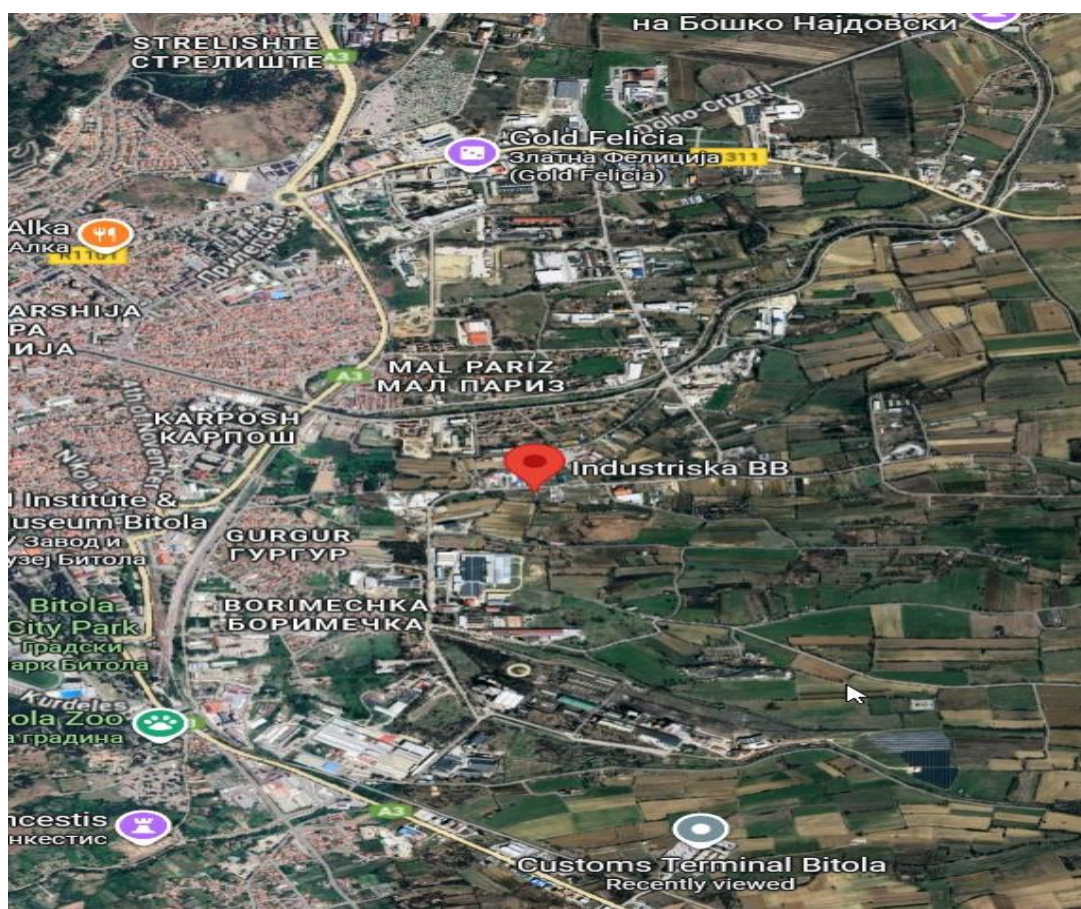

Fig. 2 Area of analysis, industrial facilities, origin - target destinations

IV. DEFINING THE RESEARCH METHOD AND TECHNIQUE

One of the most used and strongest methods for market research is the survey. Surveys are the most used because they are the easiest to conduct and the simplest to collect the information that still arrives in a form that is easy to analyze. A survey was created for this research. A survey of truck carriers in Bitola was conducted in the period from 20.05.2025 to 20.06.2025.

The questionnaire was drawn up in a word document. 15 main questions and 7 sub-questions were created. The honourable questions concerned the respondent and the transport enterprise in which he is employed, what type of transport the enterprise deals with, how often they carry out transport in the city of Bitola, what are the problems faced by the carriers, what is the current situation with the distribution of goods and a proposal for solutions to improve it. One of the questions concerned the most common destinations in the city of Bitola, i.e. which objects are the source and destination of travel.

The methodology of this research is aimed at obtaining accurate information about the origin-destination journeys of the trucks operating in the city of Bitola. The survey aims to identify the main patterns of movement, locations of production and attraction of the trips, as well as the basic logistical needs of the economic entities in the city.

Carrying out the research

The survey was conducted as a field study based on surveying transport enterprises that perform delivery, loading and distribution of goods in Bitola. The survey method was chosen because of its ability to provide direct information from relevant actors in freight transport and to enable comparability of the data obtained.

The surveyed group consists of transport companies that: deliver goods to Bitola, start the logistics route in or out of the city, regularly use trucks for supply or distribution. The sample includes enterprises of different sizes (small, medium and large companies) and from different sectors (trade, food, building materials, industrial products, etc.), in order to obtain a representative picture of freight transport. The survey was conducted by direct contact, i.e. face-to-face with the carriers, partly by telephone.

Data processing preparation

The data from the questionnaires were first organized and classified by category and then processed using: graphical representations of the data, spatial categorization of the areas of attraction (center, industrial zones, commercial areas, market, etc.). For each segment, an analysis of the sources and destinations of the journeys was made, in order to identify the dominant logistics models.

V. ORIGIN - DESTINATION TRIPS OF FREIGHT VEHICLES, SURVEY IN THE TERRITORY OF THE CITY OF BITOLA

The survey was conducted on transport companies from different cities that were encountered at the locations where the survey was made, in loading or unloading the goods. The enterprises that participated in the survey were from the following cities: Bitola, Resen, Prilep, Krusevo, Kumanovo, Demir Hisar, Skopje, Kavadarci, Ohrid.

To the question: ,,What are the most frequent destinations for the transport of goods in the city, (their addresses) ?", respondents gave the following answers given in the table.

Table 1. The most common destination for delivering goods in the city of Bitola

The entire territory of the city of Bitola	Wheat of Bitola	Simplex	Wholesale and retail trade in livestock feed production in Majnik
ZK Pelagonia	The Bitola River	Angro-marrying	Printing House of Kiro Dandaro

Figure 3 shows the locations where the respondents most frequently delivered or loaded goods.

Fig. 3 Shows the locations where the respondents most frequently delivered or loaded goods

To the question: How often does the enterprise carry out transportation on the territory of the city of Bitola? When it comes to how often transportation is carried out on the territory of the city of Bitola. At a daily level 3 or more times both (14%), 3 or more times a week (13%), and twice a month (27%).
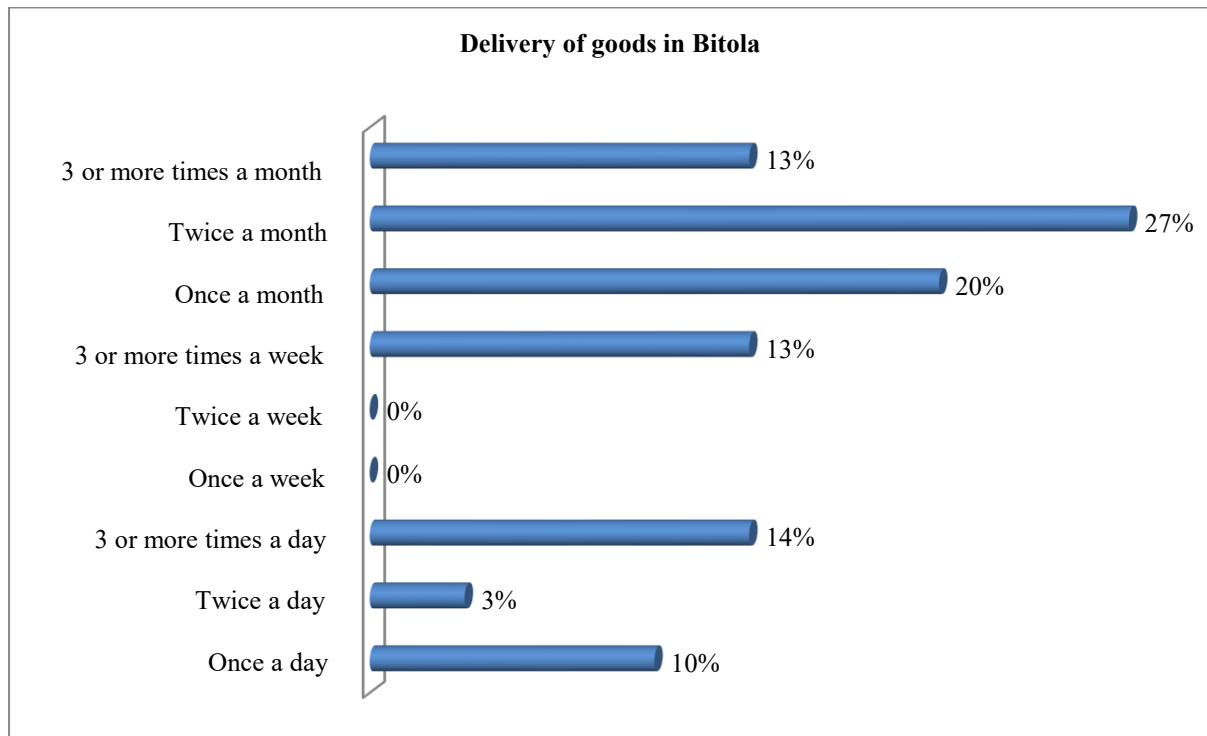
Delivery of goods in Bitola

Category	Percentage
3 or more times a month	13%
Twice a month	27%
Once a month	20%
3 or more times a week	13%
Twice a week	0%
Once a week	0%
3 or more times a day	14%
Twice a day	3%
Once a day	10%

Chart. 2. Delivery of goods in Bitola

V.   CONCLUSION

The research carried out on the origin and destination of the journeys of the trucks in Bitola allowed to obtain significant insights into the way the freight transport in the city and the surrounding area functions. Although the survey process faced a number of challenges, limited availability of drivers, insufficient willingness of some enterprises to participate, and incomplete responses, sufficient data were provided to form relevant conclusions.

The results show that trucks most often travel to industrial zones, sales centers and warehouse facilities, and delivery is most often carried out at regular intervals depending on the type of goods. The locations chosen for the survey, such as the freight terminal and the industrial zone, proved to be the most suitable for obtaining a realistic picture of the freight traffic flow.

Despite the difficulties in the information gathering process, the research confirmed the importance of an efficient freight tracking and management system. The data obtained can serve as a basis for further analysis and for proposing intelligent solutions that would contribute to improving traffic flow, reducing congestion and promoting sustainable transport practices in the city of Bitola.

REFERENCES

[1]   https://mrt.com.mk/node/118451
[2]   https://www.moepp.gov.mk/
[3]   https://www.ekonomijaibiznis.mk/News?IdNews=22358
[4]   Vaska Atanasova, Collecting and analyzing transport data, Bitola 2010
[5]   https://www.google.com/maps
[6]   https://earth.google.com/web
[7]   https://macedonia-timeless.com/mac/gradoviregioni/gradovi/bitola
[8]   https://www.bitola.gov.mk/wordpress/
[9]   https://www.sla.gov.sg/geoworks/member-products/geopartners/ptv-group
[10]   http://www.crpm.org.mk/wpcontent/uploads/2019/09/BelDokument_urbana_mobilnost.pdf
[11]   https://pari.com.mk/najdobrite-vo-tovarniot-paten-transport-minuvaat-iljadnici-kilometri/
[12]   https://www.moepp.gov.mk/informacii/nacionalni-izvestai/izvestai-indikatori-zivotna-sredina/transport
[13]   National transportation strategy 2018-2030, December 2018
[14]   https://www.tppweb.co.uk/expertise/surveys/
[15]   https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/research/reports/fdot-be277-rpt.pdf
[16]   https://www.stat.gov.mk/KlasifikaciiNomenklaturi/TransportnaKlasifikacijaNaStoki.pdf
[17]   https://www.mdpi.com/2076-3417/13/7/4214
[18]   Atanasova, V., & Stojanoska, M. (2025). „Forecast of freight traffic with the PTV VISION VISUM software tool of a small town". *Veredas Do Direito*, *22*(2), e3357, SCOPUS Q4

[19]   Nikola Krstanoski, Ile Cvetanovski, Vaska Atanasova, Marija Stojanoska, ,,Problems and Proposed Solutions to Improve Freight Transportation, Case Study", Journal of Information Systems Engineering and Management2025,10(62s)e-ISSN:2468-4376, 10/2025 Impact Factor**:** 3.6

[20]   I.Cvetanovski, V.Atanasova, N.Krstanoski & M.Stojanoska, ,,Analysis of the quality of the distribution of goods, case study", International Journal for Innovative Research in Multidisciplinary Field (IJIRMF). ISSN(O):2455-0620, Impact Factor: 9.47, Volume 11, Issue – 11, November – 2025.