

CONTRIBUTIONS TO INCREASING THE QUALITY OF URBAN LIFE THROUGH THE USE OF AN INTELLIGENT ROAD TRAFFIC MANAGEMENT SYSTEM

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ABSTRACT

Traffic congestion is a phenomenon which occurs when road traffic is disturbed. In Galati city, traffic congestion increases rapidly due to an increase in the number of vehicles on the road. This work is an attempt to analyze the effects of traffic congestion by applying the waiting theory. Traffic congestion is frequent during the day, and the locals accept it as a daily routine. Urbanization in developing countries indicates that more people live in cities than before. The trend of urbanization, the population growth and the increasing number of registered vehicles put pressure on traffic and make life in the urban area more difficult. General data congestion and congestion management are the mitigation measures proposed but they are labor intensive and a heavy investment would be needed. Therefore, in order to find feasible measures, latest technologies such as GIS and GPS help analyze the live traffic situation and suggest cost effective measures to alleviate congestion. A previous attempt was effective in data collection, data analysis and display of results [1, 2]. A Geographic Information System (GIS) is a computer-based mapping tool that geographically analyses events and phenomena occurring on Earth. GIS technology integrates common database operations such as query and statistical analysis with unique viewing and the benefits of geographic analysis provided by maps [2]. In Galati, the GIS system is still not applicable because it has not been purchased by the competent authorities. In Romania, the GIS system is partially implemented. The traffic congestion has begun to be solved globally through GPS positioning technology with vehicle data collection, transport and operation. Using GPS Vehicle will provide direct and objective data on the behavior and status of the trip and the transport system that influences this behavior [3].

KEYWORDS: GPS, GIS, vehicle, traffic congestion, urban life

1. Introduction

Nowadays, there are a number of challenges lying ahead of the transport system. The idea of a Single European Transport Area, promoted by White Paper for Transport 2011, sets the goals to be achieved by 2050. The transportation has to become more competitive and resource efficient within this time frame. The goals for urban transport, in this respect, are to promote the use of cleaner cars and cleaner fuels. The need is also to reduce the number

of fatalities and incidents. Yet another challenge is that the amount of traffic in Europe's urban areas has been increasing rapidly during last decades. The task of people involved in urban traffic management is to best allocate the scarce resources of road and kerbside space to potentially competing transport modes, within a network that has finite capacity. A more accessible public transport system has to be prioritized in traffic management.

2. Applications in traffic congestion management

The intelligent system for traffic management implemented in England made an impact in UE legislation by contributing mainly to an increase in the quality of urban life. England, even though they leave UE, is looking for a continuous improvement of the intelligent system of traffic especially because the safety of the population is the most important. The safety of people is achieved by decreasing the number of accidents and by increasing the quality of urban life through controlling and considerable reduction of pollutant emissions in areas with high traffic.

Traffic congestion occurs when a volume of traffic or modal split generates demand for space greater than the available street capacity; this point is commonly termed saturation. A 2011 study in *The American Economic Review* indicates that there may be a fundamental law of road congestion. The researchers, from the University of Toronto and the London School of Economics, analyzed data from the U.S. Highway Performance and Monitoring System for 1983, 1993 and 2003, as well as information on population, employment, geography, transit, and political factors. They determined that the number of vehicle-kilometers traveled (VKT) increases in direct proportion to the available lane-kilometers of roadways. The implication is that building new roads and widening existing ones only result in additional traffic that continues to rise until peak congestion returns to the previous level [4, 5].

2.1. Decision-makers in policy-making

The role of intelligent transport systems is generated by problems caused by traffic congestion and the development of new information technologies for real-time simulation, control and communication networks, offering the ability to address issues such as managing urban traffic in an innovative environment. Traffic congestion has increased as a result of increased traffic motor vehicles, population growth and changes in population density. Increased urbanization has led to many large cities experiencing high traffic levels in the peak hours, traditionally between 07.00-10.00 and 16.00-19.00. The result is that the road network in many urban areas in Europe operates at or near capacity during several days. The problem of traffic congestion is an increasingly pressing issue and because of the harmful effect it has, there is an increased need to mitigate its consequences.

Congestion reduces the efficiency of transport infrastructure and has negative impacts on travel time and reliability, increases fuel consumption and air

pollution. Congestion also has a particularly negative effect on the economy distribution services.

3. Intelligent transport systems to reduce congestion in urban traffic

Proposed intelligent transport systems allow to reduce significantly the idle time in traffic congestions and to increase movement speed of traffic participants, to reduce electrical energy and fuel consumption. Such a solution allows to save up to 26% of electrical energy of the total consumption by city transport, as well to reduce idle time for electric transport at crossroads up to 13% and increase traffic speed up to 28% [6].

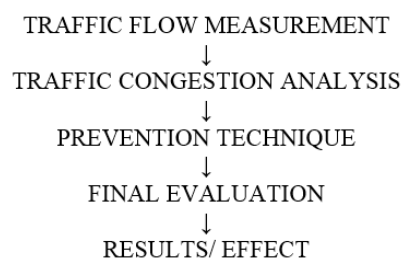


Fig. 1. Steps for Preventing Traffic Congestion

Galati City, one of the most important economic centers in Romania, is under a continuous pressure determined by the increasing road traffic. The system bought responded to the identified needs by the council of the city through the implementation of a complex program to manage the traffic. This included sub-systems of traffic lights, road signaling, communications, urban video surveillance, automatic identification of vehicles' registration numbers, defects management. All the systems will be coordinated in a performant center of control [7].

In Galati county, the intelligent system to manage the traffic on city roads is relatively new, being implemented in august 2016. The purpose of implementing this intelligent system is to fluidize the traffic, to increase the safety of the traffic participant, to reduce the number of accident and road blockages, but also to reduce pollution.

The implemented system is in accordance with the European regulations and allows for the identification in real time of traffic situation, communication between crossroads, modification of traffic lights time considering the number of vehicles. This generates a fluency of vehicles in all 35big crossroads in the city. Also, 26 crosswalks contain synchronized and adapted lights, with an activation system by button which can be pressed by pedestrians. They are also correlated to the crossroads

in the city in order to maintain a better fluency of the traffic.

Developed devices are easily integrated in the existing infrastructure, functioning in united network with wireless communication. They are flexible,

modular and re-programmable and allow for fast and easy extending of functionality by user request for the solution of other tasks and adapt them to requirements and standards of different countries [8].

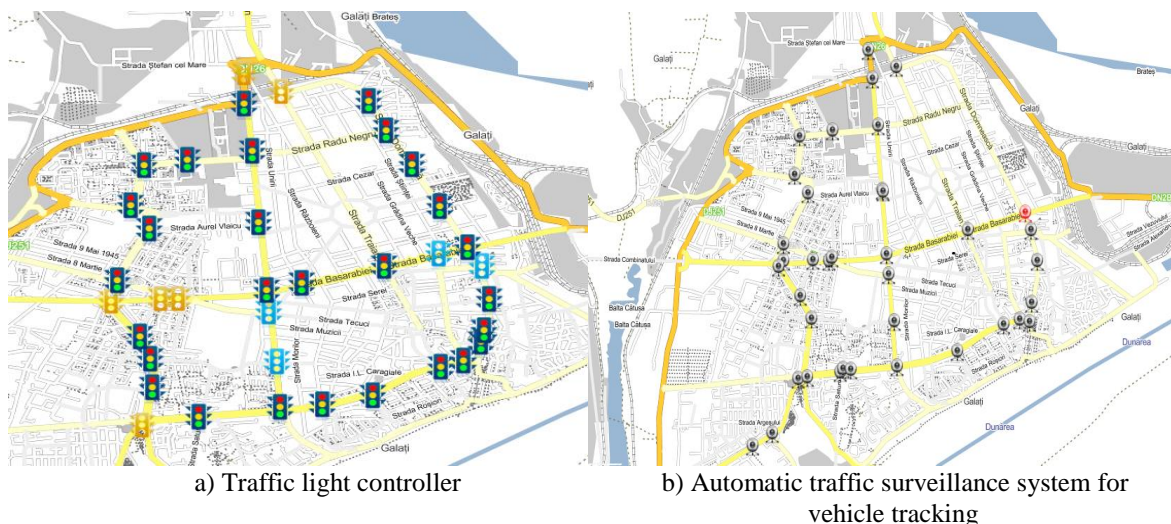


Fig. 2. Work Centre Utilization Report [7]

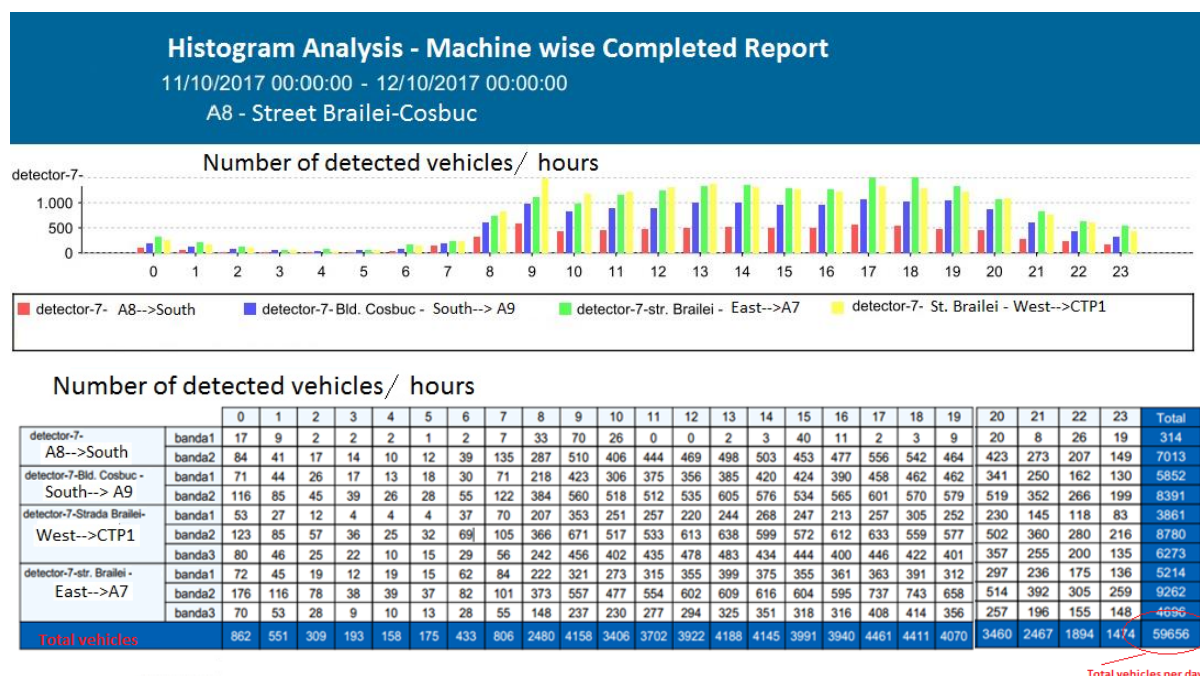


Fig. 3. Machine wise Completed Report A8: Brailei – Cosbuc Street

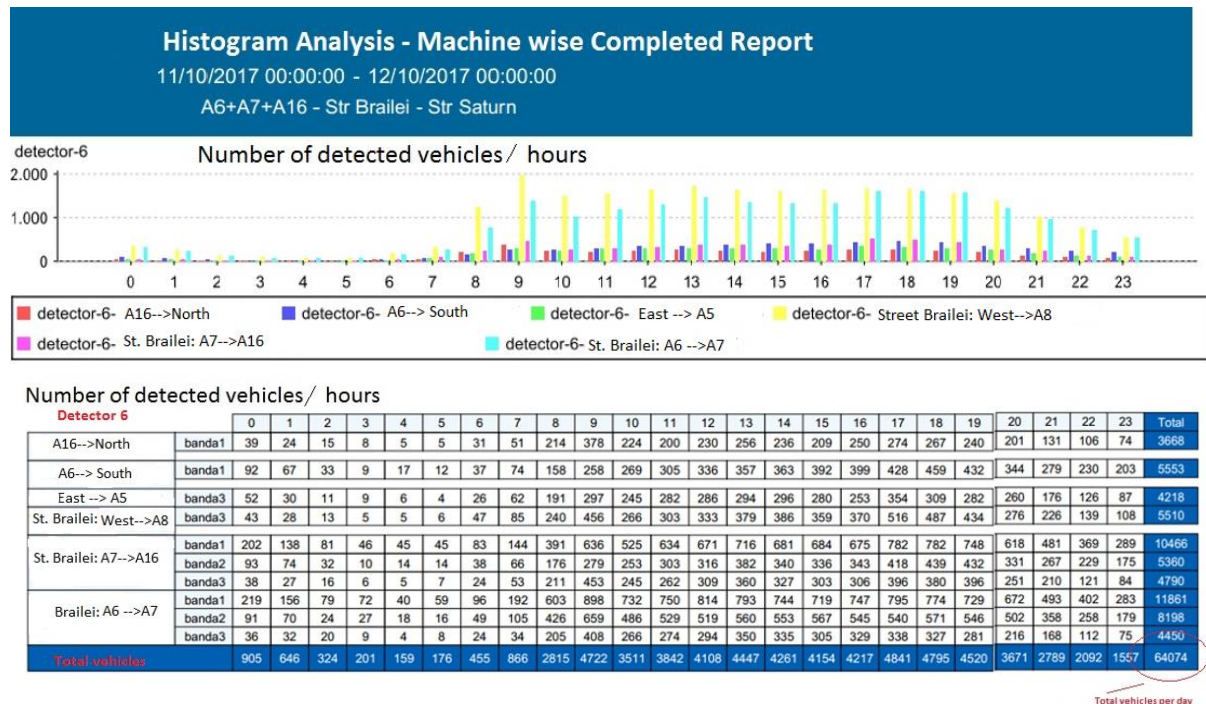


Fig. 4. Machine wise Completed Report A8: Brailei – Cosbuc Street

3.2. Negative impact of the traffic congestion

- Wasting time of drivers and passengers in blocked traffic affects the economic health of the nations.
- Wasted fuel increases air pollution and carbon dioxide emission because of the increased idling, acceleration and braking.
- Due to blocked traffic, emergency vehicles may get delayed in reaching their destination where they are urgently needed.
- Spillover effect from congested main routes to secondary roads and side streets as alternative routes is attempted which affects the real estate prices.
- Delays may result in late arrival for employment, meetings and education, resulting in lost business, disciplinary action or other personal losses [4, 8].

4. How does the EU contribute to improving the quality of the urban environment?

Road traffic significantly affects the health of the population in overcrowded urban areas where traffic jams are formed. This is most obvious today when the chronic disease age remains a link between the health of the population and the environment.

People choose to live in urban areas so they can have a better quality of life. They want to be at the

heart of economic activity, and to have more job opportunities and other social and economic advantages. However, city living brings a range of challenges. While living in close proximity to our daily activities can be more efficient and contributes to sustainability, other factors such as air pollution can be far more acute in cities.

Overcrowding, traffic pollution, noise, and industrial emissions are just a few of the issues that have to be constantly monitored and addressed to achieve a high quality of life without high environmental costs. But doing this will also bring benefits beyond city borders.

The Urban Environment is important for all of us, because so many of us live in cities. The European Commission recognizes the role that cities play in the lives of so many Europeans and has committed itself to act in this area. Urban environments directly influence the lives of millions of European citizens and, in turn, have a substantial impact on the wider environment. European cities need more than ever to be sustainable and should offer the kind of quality of life and opportunity that make people want to live there and make businesses want to invest [9].

4.1. The EU and the urban environment

Key elements of the EU's approach to the urban environment [10]:

1. The Thematic Strategy on the Urban Environment aims for better implementation of the

existing EU environmental policies and legislation at local level through the exchange of experience and good practice between Europe's local authorities, in order to achieve 'a better quality of life through an integrated approach concentrating on urban areas.' Its principles and approaches are reflected further in other strategies such as the Thematic Strategy on Air Pollution.

2. The Leipzig Charter on Sustainable European Cities demonstrates a further commitment to making our cities healthy, attractive and sustainable places to live and work in.

3. The renewed Sustainable Development Strategy for the EU calls for the creation of sustainable local communities with a high quality of life, attention to urban transport and greater cooperation between urban and rural areas.

4. The renewed Lisbon Strategy sets as a priority the high quality of urban environments to 'make Europe a more attractive place in which to invest'.

5. The Europe 2020 Strategy builds on the Lisbon Strategy and sets out a broader approach aimed at achieving a resource efficient Europe. This means decoupling economic growth from the use of resources, supporting the shift towards a low carbon economy, increasing the use of renewable energy sources, modernizing our transport sector and promoting energy efficiency – actions that will affect the cities of Europe.

5. Conclusions

The importance of road transport in the Union's transport policy is also highlighted by the share of this mode of transport in both freight and passenger transport. Cities make up only two percent of the earth's surface, yet they are home to over half of the world's population. In Europe, the proportion of urban dwellers is even higher. Today, nearly 75% of

Europeans live in cities and urban areas, and by 2020 this is expected to rise to 80%.

In the light of these considerations, the proposed work justifies its importance and usefulness in the field of traffic management in order to improve the quality of urban life.

We considered it useful to highlight the general objectives of EU policy in the transport sector, especially in metropolitan areas, where pollution is expected to increase, as a consequence of increased vehicle purchases.

EU legislation on road transport must be adopted taking into account social, technical, tax, safety and environmental regulations. That is why road transport regulations generally have the objective of providing a unitary framework for Member States in the field.

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