Available online at www.sciencedirect.com

ScienceDirect

Procedia Economics and Finance 20 (2015) 59 – 64

Procedia Economics and Finance

www.elsevier.com/locate/procedia

7th International Conference on Globalization and Higher Education in Economics and Business Administration, GEBA 2013

How does business intelligence solutions can streamline and influence transport networks?

Antoniu Ovidiu Balint[a], Mihaela Toma[a]*

The Bucharest University of Economic Studies, 6, Romana Squere, Sector 1, Bucharest, 010374, Romania

Abstract

For the development of a successful and modern economy, transport companies must be able to ensure a fluently and efficient transport mode for goods and persons. Failure to comply with these requirements constitutes a threat to the competitiveness and also reflects the unsustainable use of transport infrastructure. The importance of developing new Intelligent Transport Systems (ITS) is essential for the growth and evolution of the economy because companies from around the world have to transfer goods between them, communicate and establish new connections.

The central theme of this paper is represented by the fact that Intelligent Transport Systems are indispensable for companies worldwide. The extension and development of new ITS can represent a solution on improving and enhance the actual economic environment

Peer-review under responsibility of the Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iasi.

Keywords: Intelligent transport systems, development, transportation networks, business intelligence

1. Introduction

Intelligent Transport Systems represent the combination of the information and communication technologies with all types of transport networks that create a smart movement of persons and freight (Kan and Miles, 2000).

* Corresponding author. Tel.: +0-074-937-3331.
E-mail address: balint_antoniu_ovidiu@yahoo.com

Peer-review under responsibility of the Faculty of Economics and Business Administration, Alexandru Ioan Cuza University of Iasi.
doi:10.1016/S2212-5671(15)00047-7

The Intelligent Transport Systems (ITS) are currently facing a number of challenges that led to an increasing competitiveness in the actual economic environment. The purpose of ITS is to promote the use of cleaner energies and means of transport especially in the context where the volume of urban traffic areas is constantly increasing. Thus, a more accessible transport system should be prioritized in traffic management (Banciu and all, 2003). The efficiency of the passenger and freight transport systems depends on the optimization and correlation of the ITS with other systems and make them work as a whole. ITS plays an essential role in achieving the objectives and policies aimed by governments worldwide that want to improve the development and efficiency of their transport networks creating this way an efficient and sustainable economy (Perrett and Stevens, 1996).

The effects of the current economic crisis on transport networks are very hard to be predicted on a long term and they appear to be unpredictable at this moment. The present crisis of the economic environment can be seen as a sum of conflicts between different systems and processes that can lead to major dysfunction and require an immediate solution (Mortensen and all 2002).

In general ITS vary from country to country and depends on what type of transport they are used: rail, car, inland or sea navigation.

2. ITS Architecture

Like any other systems of high complexity, integrating ITS applications requires a strategic framework as a basis for the choices that are related to the design and effective use of them, as well as an investment decision; generally such a framework is called system architecture. ITS architectures require covering all the technical, organizational legal and commercial aspects; they can be created at the national, regional or city level and linked to specific sectors or services.

From the definitions given to intelligent transport systems we can say that in order to achieve the required functions of these systems it is necessary to apprehend the integration of systems of different nature in a single system. Intelligent Transport Systems are integrated systems of high complexity, which implies a specific approach in designing and developing such systems.

Defining the objectives and the development goals of Intelligent Transport Systems Architecture can be grouped into two main categories:

- To facilitate the understanding of both the problem and its solutions;
- To provide a stable basis for the design and development of ITS systems.

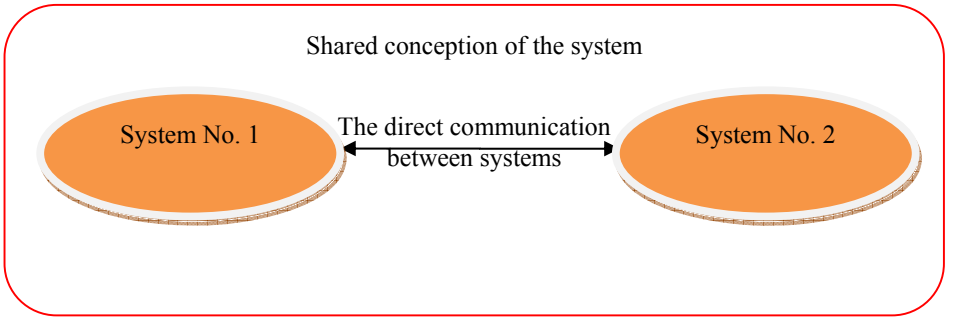

Fig. 1 The integration of ITS

Source: BALINT A. O., TOMA M., Proposed model, 2013

An ITS architecture is important for several reasons:

- Ensures the interoperability between different types of components, even when they are made by different manufacturers, which is also favourable for SMEs;

- Provides consistent information for the end-users;
- Ensures an open market for services and equipment, because there are "standard" interfaces between components;
- Allows an adequate level of technological independence and an easy incorporation of new technologies;
- Provides a mechanism for determining the objectives and requirements of all those involved: public authorities, transport operators, ITS manufacturers and the end users.

To deploy faster and well coordinated ITS it is necessary to establish an extensive coordination structure and an official forum that should be attended by all stakeholders and within which public authorities and commercial stakeholders to get together and discuss the consensual activities that can promote the collaboration between the public and private sectors. It is necessary for the administration of ITS structures to achieve an agreement and to coordinate the implementation at a local, regional, national and international level.

3. The benefits of implementing ITS in the actual economic environment

The implementation of Intelligent Transport Systems represents a key factor for the development of the economic environment. Analyzing the development of ITS and how to approach them, it can be said that Information Technology (IT) and Business Intelligence (BI) solutions represent the result of integrating electronic systems, communications, storage and processing information and control (local and remote) with transport systems (road, rail, air, inland waterway and maritime transport) in order to increase the economic efficiency, saving human labour, reducing environmental pollution, reducing transport times and increase passenger comfort.

The selection and implementation of ITS applications and services are based on the assessment of needs and comply with the following principles:

- Effectiveness – the ability to contribute in a tangible way to solve major challenges faced by road transport (e.g. reduction of congestion, reduce emissions, increase energy efficiency, achieve high levels of safety and security);
- Profitability - the ratio of costs resulting from the perspective of achieving the objectives;
- Geographical continuity - the ability to ensure the same services throughout all communities and countries;
- Interoperability - the ability of systems to exchange data and to enable the exchange of information and knowledge;
- Maturity level - the degree of development.

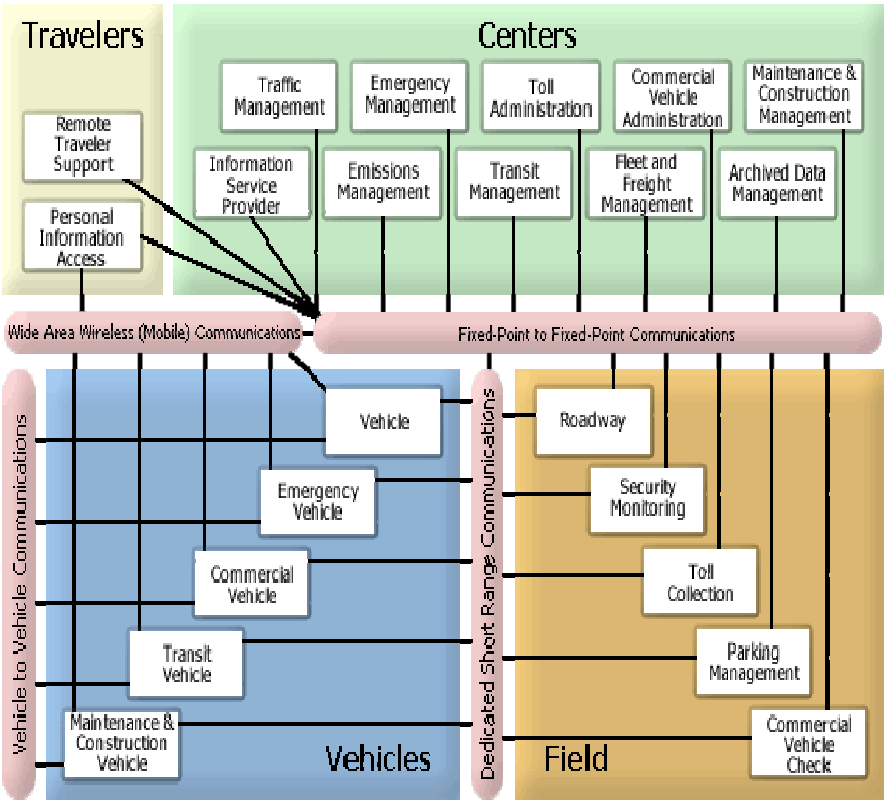

Fig.. 2: ITS Architecture implemented in USA which represents the link between different types of transport systems, travellers, centres and vehicles

Source: Central Federal Lands Highway Division USA
http://www.cflhd.gov/ttoolkit/flt/FactSheets/ITS/ARCHITECTURE.htm

The implementation of ITS is proving to be a difficult challenge throughout all countries around the world because of the differences between the architecture of ITS and the mode of implementing them. The effective use of Intelligent Transport Systems requires integrating the technologies used for the traffic of vehicles, ships and trains in traffic control along with information procedures to assist management decisions.

From the point of view of a system, ITS operates with the following categories of information:

Inputs:

- Information about the status of streets, intersections, etc.
- Vehicle location information
- Information about travelling routes
- Information regarding traffic safety
- Information about specific technical problems.

Outputs:

- Reports for informing the passengers;
- Information for the driver;
- Information for carriers;
- Information on various details.

The structure of transformation (in fact the procedures of processing the information and obtaining the desired results) is based on technology and communication information and depending on its objectives it can define the type of intelligent transport system it uses.

ITS helps in providing a complete service for people that uses different types of transport: from travel planning and guidance on a particular route to booking tickets and parking. The development of Intelligent Transport Systems will create numerous new working places, will help reduce the elimination of greenhouse gases and most important will help reduce the number of victims that are implicated in accidents.

4. Why we need intelligent transportation?

Intelligent transportation is done by business intelligence, more specific through the ITS system. But what is business intelligence more exactly and how does it work?

Business Intelligence is an important tool for the companies because it helps them to transfer the existing data into knowledge to help companies to take the right decisions. The large amounts of data (e.g. orders, customers, financial data) will help the companies to better understand the customer behaviour, the supply chain partners and overall, the business conditions. Furthermore, the business intelligence solutions will give the companies the ability to forecast the trend of corporate business development [10].

The business intelligence system architecture of a transportation channel can be split into data layer, application layer and presentation layer.

According to the needs of business analysis and of course, the management, the data layer will organize the information that exists in the present situation. Also, the company will have full access to different data sources.

The application layer can be divided into the presentation services, security services, scheduling services, events services, audit and reporting, operating services and data integration [10].

For this reason, intelligent transport systems (ITS) can be split into operational business information systems and management information systems.

A business support system is the system that contains information related to machine departure (e.g. airplane, train, car, ship) and arriving. Also, it includes control systems, passenger baggage system, statistics, departure systems, broadcast systems and so on.

The data and web layer are divided into:

- Intranet portal: everything that is related to news announcements, industry information or e-commerce.
- Extranet portal: everything that is related to operational- reports, queries, scorecards, graphic functions.

Wang presented in his article an airport business intelligence functional structure, module that can successfully be applied to other transportation channels, as well as: cars, trains or ships. According to Wang, the system contains the following:

- **Market Analysis System**. It is used to forecast demand for products and services, analyze the supply of products in the market (in this way it determinates the size of the market) and forecasts the economic benefits. This module is a strategic one for the marketing department because it is an important tool to obtain information related to passengers: clusters and data mining.
- **Financial Analysis System.** Includes financial information, reports, and statistical data, including the energy consumption for the transportation vehicles or operational capability and profitability.
- **Customer Management System.** Through this system we can observe the passengers behaviour. It also provides a valid distinction between potential and intention to customers and customers with feature clustering, development trends, analysis of the spending power consumption characteristics.
- **Decision Support System.** Provides different types of report for the top management, which allows them to take decisions. It comes with charts, tables and other easy to read and interpret report.
- **Information distribution system.** The module that provides news, announcements, events warnings or other types of messages.

- **Data Mining.** All the tools necessary for analysis are included in this module. Customer classification model, business data analysis and prediction models can be defined through a wide series of ranges.
- **System Management Module.** Includes all the backup data, user management or security management. This model used by Wang and his team, is a clear exemple on how a business intelligence system can provide a comprehensive usage of business and management data. The tools described can be applied to other transporation systems, not only to airports.

Business intelligent solutions helps companies to collect information through its three main components: data extraction and integration, enterprise reporting systems and data mining. Some of the most important sources of data are: OLAP (Online Analytical Processing), ERP (Enterprise Resource Planning), CRM (Customer Relationship Management); these systems are usually used to process and collect initial data in digital manner.

Business intelligence is an important tool for all companies regardless the industry because it transforms the information into knowledge. Knowledge is the resource that helps in the process of decision making.

Modern businesses should provide the right information with the right dimension and shape so that it suits the needs of the clients. A mix between communication through all the channels with the clients and a brand image communications through the inteternet, email and print media will be the success key for a company. The future for this success company will be to increase their knowledge and innovation.

5. Conclusions

The ITS domains has grown in a considerable manner in the last decade and the trend will continue in the following years because its benefits on the economic, social and international level linking all the transport network between them and offering benefits for the industry, companies and people worldwide. For the development of future ITS, it is necessary to harmonize all the systems and make them “work” together and develop new ITS architectures. The international ITS architecture should be a frame work for the future systems that will precede the existing ones and create new connections between countries and eliminate all boundaries.

6. Reference:

Banciu, E., Hrin, A., Anghel, M., 2003. “Sisteme inteligente de transport - Ghid pentru utilizatori si dezvoltatori", ISBN 973-31-2154-1, (Ed.) Tehnica Bucharest, pp. 23.

Calvanese, Strianti, E., Domenico, A., Herault, L., 2011. Green Communication: An Emerging Challenge for Mobile Broadband Communication Networks, Journal of Green Engineering 3,pp. 267-301.

Chongjun, F, Haixu, X., 2011. Research and Planning Hongqiao Airport Management Information System, Journal of Systems Science and Information 7, pp.301-308.

Kan, C., Miles, J., 2000. ITS Handbook 2000 - Recommendations from the World Road Associations (PIARC), ISBN 1-58053-103-2.

Mortensen, S., Harris, M., Hill, C., 2002. Investigating ITS Concepts for the Dulles Corridor Rapid Transit Project, Mid-continent transportation symposium, California, U.S.A.

Moss, L.,T., Atre, S., 2003. Business Intelligence Roadmap: The Complete Project Lifecycle for Decision- Support Applications, (Ed.) Addison-Wesley Information Technology Series, Boston, U.S.A.

Nemtanu, F., C., Minea, M., 2005. The development of ITS architecture for urban transport – new components and new relations, Transport Systems Telematics – 5th International Conference. Katowice-Ustron, Poland.

Perrett, K., E., Stevens, A., TRL Report No. 220: Review of the potential benefits of Road Transport Telematics, April 1996.

Waltz, E., 2003. Knowledge Management in the Intelligence Enterprise, Artech House Publishing House, ISBN-13: 978-1580534949, pp. 211.

Wang, J., Fan, C., Fu, H., 2012. Discussions on Airport Business Intelligence System Architecture, International Journal of Business and Social Science 13,pp 42-51.

Whiting, R., 2003. Look Within - Business Intelligence Tools have a New Mission: Evaluating All Aspects of a Company’s Business, *Information Week*, pp. 32.

Road Transport - Europe on the move, 2004. Luxembourg: Office for Official Publications of the European Communities, ISBN 92-894-6649-9.

Central Federal Lands Highway Division USA, http://www.cflhd.gov/ttoolkit/flt/FactSheets/ITS/ARCHITECTURE.htm, acc. 02.05.2013.

ITS Network, http://www.its-network.com , acc. 28.04.2013.

U.S. Organisation for Intelligent Transport, 2001. http://www.itsa.org, acc. 02.05.2013.

Corporate performance management : One Step Further Than Business Intelligence, 2005, www.sap.info, acc 02.05.2013.