

# Information System Development for Riga Coach Terminal

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**Abstract:** - The paper presents the information system “Baltic Lines” for the coach terminal: architecture, operating principles and users’ work organization. The further development of this system concerning the Decision Support System modulus is considered. The task of this system analytical part development is being set. The development of modern information technologies and their availability allow to provide services to passengers and hauler companies. Thereby, the development of information systems and their wide application in practice is one of the most essential factors that allow the coach terminal to function as a passengers’ logistics hub.

**Key-Words:** - Coach Terminal, Logistics Hub, Information System, Organization, Analytical Part

## 1 Introduction

Bus and coach transport today is in hard and constant competition with the other modes of public transport. One of the main tasks for bus and coach terminal authority is to do this mode of transport more attractive for customers.

The good information system becomes the key moment of the development strategy of transport industry. During the last years the problem of construction of *the corporative management systems* grew into the separate branch of science about the management and became the reason of development of the whole industry of high technologies. On the former tradition it is accepted to name programmatic complexes the informative system, which is not correct, because it is only its part. The information system (IS) is the whole infrastructure of the enterprise, involved into the process of management of all the informatively-documentary streams, including the following mandatory members [1]:

- Information model, being the aggregate rules and algorithms of IS functioning and including all forms of documents, structure of reference books, information etc.
- Regulation of development of information model and rule of correcting and adding it.
- Human resources (department of development, attracted consultants), responsible for forming and developing the information model.

- Software configuration, which conforms to the requirements of information model. Requirements to the supplier of software must take into account the procedure of technical and user support during the whole life cycle.
- Human resources, responsible for configuring the software and its accordance with information model.
- Regulation of making alterations in configuration of the software and composition of its functional modules.
- Hardware proper requirements to the exploitation of the software (computers on workplaces, periphery, channels of telecommunications etc).
- Human resources responsible for exploitation (including personnel on maintenance of hardware).
- Procedures of using the software and instructions for users, regulation of teaching and certification of users.

The role of information system in transport is important from the point of view of the quality of service for travellers. The German experience can be mentioned as an example of using such systems, DELFI system starting its development in 1996 and its test exploitation happening in 2000. The vision of DELFI - to create an integrated travel information service for the customer out of an apparently integrated information base - led to the approach of connecting existing systems by means of communication [2]. Advanced techniques for optimising the “inter-system” search continuous

itineraries have been developed. Itinerary information will be created by composing the information of all the participating systems through the open interfaces and harmonised meta information.

Another example of bus information system is NextBus, which functioned in San Francisco and other American cities. The core of the NextBus system is a GPS satellite [3]. The system tracks public transportation buses in the real time and dynamically calculates the estimated arrival times of the bus at each stop. This estimated time was displayed on the Internet and on the screen at each bus stop. Users can access the information from their mobile phones or PC. The NextBus system is used in Finland (in rural areas) [4] and other countries.

From our point of view, the very advanced approach to the development of such kind of system took place in Bangkok [5]. There is the bus transit system with the developed analytical part. The analytical part of bus transit system can be used for evaluating bus performance through the developed bus indicators.

## 2 Riga International Coach Terminal

JSC "Riga International Coach Terminal" being a leader in the area of passengers' bus transportation services in Latvia provides both the international, intercity and regional trips. JSC „Riga International Coach Terminal” co-operates with 53 hauler companies and 5 travel agencies. 13 foreign countries are the destination of coaches from "Riga International Coach Terminal" and 63 international runs were serviced per day. RICT provides services to regional (local) and long distance routes - 565 domestic runs per day. Every day the terminal sells 8-10 thousand tickets to carrier routes. The JSC "Riga International Coach Terminal" is the member of the Pan European Association of Coach Terminals, and one of the main objectives of this Association is to develop the logistic services within the area of passengers' transportation for both passengers and haulers.

The role of the "Riga International Coach Terminal" in passengers' transport infrastructure today complies with the passengers' logistics hub. Several essential factors must be provided for the full-value operation of the passengers' logistics hub[6]:

- Strategic location of the coach terminal - favourable geographic location, close to administrative, trade and culture centres with a possibility to transfer to other kinds of public transport.

- Support by the government. The governmental institutions play a significant part in regulation of services in public transport and coach terminal operation: government orders, policy of state subsidies, tax policy.
- Logistics infrastructure services. When running a coach terminal it is very important to have internal logistics of its operation, the level of infrastructure, the variety and quality of services rendered. The most significant preconditions are characterized by the following factors:
  - access possibilities for bus and coach passengers,
  - participants of external traffic,
  - content and layout of information for passengers,
  - comfort level,
  - security and protection of passengers.
- Partnership and opportunities of logistics development. The coach terminal, while providing services to passengers, cooperates with numerous partners. First, they are hauler companies that fulfil their own marketing policy, mutually competing or/and forming unions. The coach terminal must provide services to haulers taking into account their interests, however, preserving neutrality so that passengers' interests do not suffer. Besides, it is very important for the operation of the coach terminal to ensure multiple services involving external service providers.
- Quality of labour force. The decisive factor in high service quality insurance is the human factor – professionally trained and motivated employees.
- Development of information technologies. Along with the other important factors determining a successful operation of PLM is the development of information technologies. The development of the internet, spread of e-commerce, possibilities to organize client services more efficiently, widening access to the provided services.

The authors considered this concept and the point connected with the question of strategic location in detail in the article [7]. The project of New Coach Terminal was developed on the base of simulation model (in VISSIM package) [8].

## 3 Development of Information Technologies in Coach Terminal

The development of the information system is an essential factor for coach terminals, as passengers' transport infrastructure objects, in their transformation into passengers' logistics centres.

The development of information technologies that includes the IT and telecommunication infrastructure, the WEB based easy interface and e-commerce platform allow to ensure the access to both the passengers and hauler companies, thus widening the range of the coach terminal operation and services. The information system used by the coach terminal collects, processes, stores, analyses and disseminates the information providing the following principal functions:

- coach timetable and operative information about the changes;
- information about the coach movement - arrival, departure, location at the platforms, delay;
- ticket reservation and sales system, including: planning of routes, using services of several

- hauler companies and vehicles; different ways of payment and communication;
- observation of passengers' rights in accordance with normative documents;
- management and control system of the coach terminal service processes;
- processing of operational information in economic activity accounts and control.

In order to ensure these functions, the coach terminal must process a large amount of operatively changing data coming from multiple sources of information, both internal and external. The data processed in the system is exported both for the internal use at the enterprise and to external users. The information flow is depicted in Fig.1.

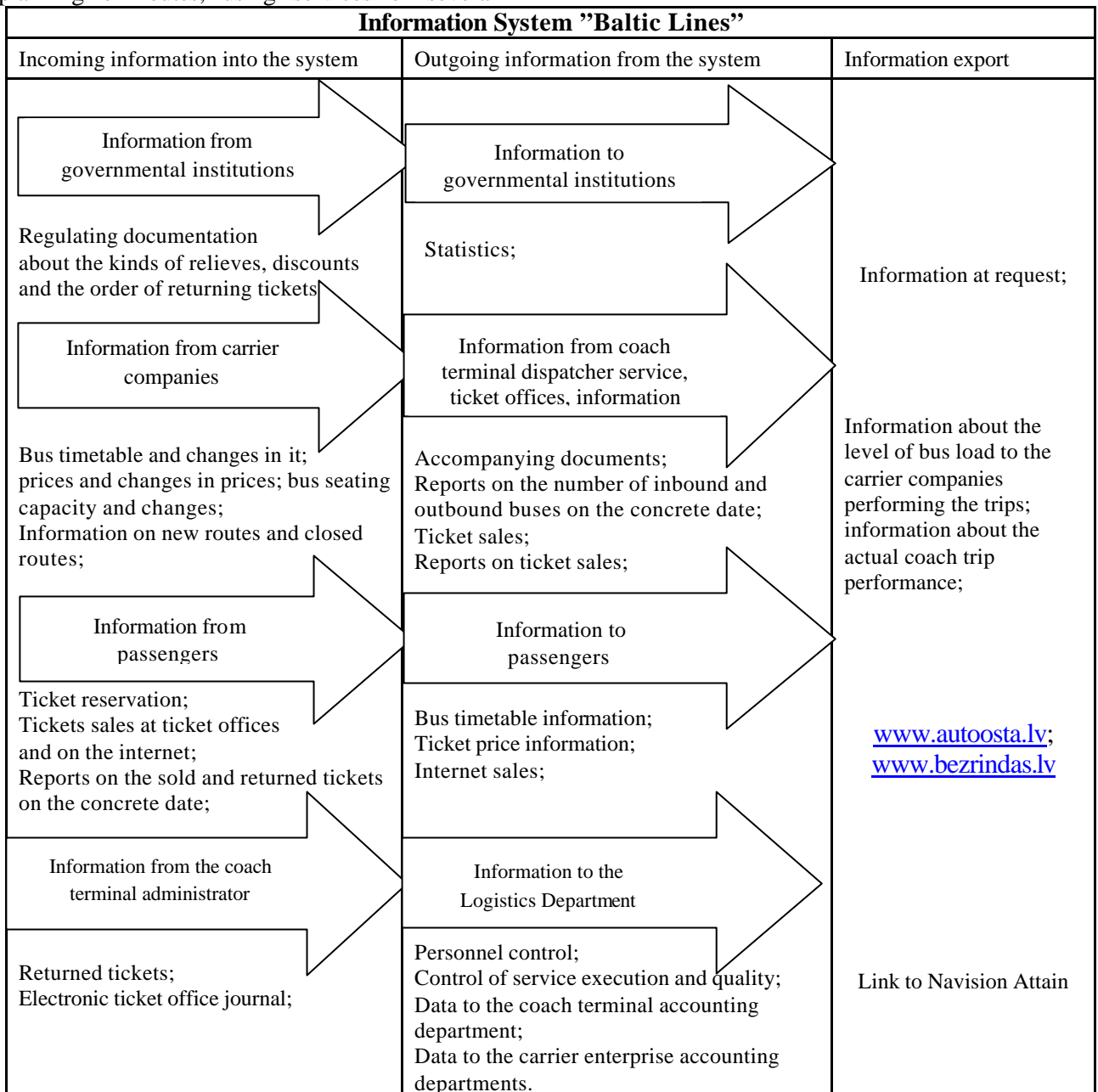


Fig.1. Information flows of the coach terminal information system

The first realization of the coach terminal information system (IS) „Baltic Lines” was implemented in Riga Coach Terminal in 2003. From 2004 the system is used in the other cities of Latvia.

#### 4 Architecture of IS „Baltic Lines”

The coach terminal information system „Baltic Lines” comprises a three-level architecture using 72EE solution. The characteristic indices of the information system „Baltic Lines” are the following:

□ *Database.* Primary database server uses Oracle SE 9.2 RDBMS, planned to change to Oracle 10g version [9]. Database works on Intel platform server with Red Hat Linux Enterprise OS [10]. In order to reduce the primary database workload there is used a Reporter server – an alternative server on which a regular data base replication is carried out, and which is basically used for reports, as well as for handling DEMO database operations. Database is regularly saved to reserve copies using „Hot Backup”.

□ *Application server.* JBoss 3.0 Java Application server [11] ensures business logics to all activities.

□ *Fiscals.* The fiscal block is connected with the application server. The fiscal block receives and stores information about all the performed finance operations. The fiscal block consists of 4 PCs, each containing 4 fiscal modules with PC ISA cards, FCS software, JBoss AS 3.0, Win 98. The PCs used in the fiscal block must have PC ISA slot. Every module is registered for one legal entity at the State Revenue Service regional institution according to the State Revenue Service regulations.

□ *Workstations.* Depending on the user’s functions there are two solutions:

- Cashiers’ and dispatchers’ work with Java Browser.
- Others use Internet Browsers (Ms Internet Explorer, Mozilla Firefox, Opera).

□ *Data flow.* Database server, Application server and Fiscal block work in the local network with 1 Gbit/s. The database with Application server use JDBC database connection protocol. Workstations work remotely using the Internet network, VPN (virtual private network) connection is provided to ensure security of data transfer to workstations. Data transfer to Navision is provided – financial information is sent daily to carrier enterprises after trips.

*Internet sales* (www.bezrindas.lv). The system of electronic ticket sales is produced by the enterprise

□ „Mikromaksajumi” in co-operation with the S Factory SIA [12]. The website is made using PHP 4.4.4 programming language and integrating the E-ticket System user’s interface.

The enterprise provides the system maintenance, administration, data reserve copy storage up to 10 GB, a 24-hour data protection against unsanctioned access. The system has a guaranteed 99.5 % level of availability on workdays from 09:00 to 18:00 and total availability of 99% per month. The guaranteed data transmission speed is:

- in Latvia up to 100 Mbit/s;
- from/to abroad, up to 2048 Kbit/s.

□ *Other possibilities.* The user’s right control is based on authorization mechanisms according to IP addresses, IDs and passwords. The access rights are maintained on the application server level.

Every user’s configuration parameters are stored in database; therefore it is possible to administrate the users centrally.

#### 5 Organization of IS „Baltic Lines” Operation at the Coach Terminal

The implementation of the coach terminal information system „Baltic Lines” made it possible to form an integrated ticket sales/reservation accounting system which ensures a new level of passengers’ and carrier service quality. In 2004 the coach terminal received the Quality Standard ISO 9001:2000 certificate within the operational sphere of passenger traffic servicing and provision, ticket sales and trip record keeping management.

The organization of the information system „Baltic Lines” operation at the coach terminal has been worked out. Every activity has been described and regulated according to the relevant instructions ensuring the provided services timeliness quality and uniformity.

When operating the ticket sales and coach route accounting system „Baltic Lines” the functions are divided in the following way:

- the logistics specialist registers and describes the coach route in the system after having received the information from the state LLC „Road Transport Administration”;
- the dispatcher:
  - receives phone calls from the carrier enterprises about the changes in the coach routes and enters the changes in the system database, if any changes occur after the start of the ticket pre-sales;

- registers the coach arrival and departure time in the „Baltic Lines” system database;
- after the termination of ticket sales, prints the accompanying document from the system and hands it to the carrier enterprise driver;
- the cashier performs selling and returning of tickets;
- the information operator, using the „Baltic Lines” system database, informs passengers about bus timetables and performs ticket reservation;
- the terminal administrator deals with non-standard situations (cancels routes, assigns the status „delayed” in case the trip is delayed), draws up a report on the ticket return if a passenger is late for the trip.

The implementation and launching of the information system „Baltic Lines” is the basis of the coach terminal organization management system complying with the Quality Standard ISO 9001:2000 within the operational sphere of passengers’ traffic servicing and provision, ticket sales and trip record keeping management.

## 6 Development of Analytical Part for the IS „Baltic Lines”

The coach terminal information System is created to fulfil all the principal functions described in the work. The principal peculiarity of the information system lies in its diversity both from the points of information character and business interests (Fig.2).

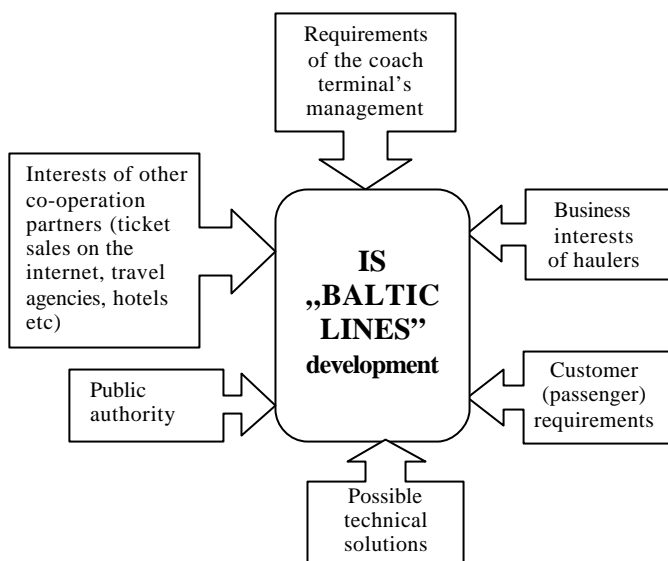


Fig.2. The interests of the users influencing the development of the coach terminal IS

Although the information system principal function is to provide the coach terminal daily operation of carriers’ and passengers’ service, it includes the functions of tactical planning and control, as well as the strategic planning. The development of the system is determined by the requirements of the users and changes in the business environment.

### □ Strategic planning

The State Department „Road Transport Administration” with the help of the „Baltic Lines” system performs the control of passengers’ transport implementation. The character and amount of information is sufficient to be used in making strategic decisions – on the further route network development and forming the state order in passengers’ transport. The coach terminal management, certainly, plans the terminal future long-term economic activity by adapting strategic resolutions to the further market by analysing the existing and new service development, basing it on the coach terminal information system data. The determination of organizational objectives is also within the scope of strategic planning.

### □ Tactical planning and control

Tactical planning and control using the information system „Baltic Lines” is performed by the coach terminal medium level management, as well as by the corresponding management of carrier enterprises and the state LLC „Road Transport Administration”. Tactical planning and control involves the multiple activities: observing and analysing the passengers’ transport and bus service process; focusing on the opening the new and additional routes or reduction of routes, changing the load of buses, performing other changes in passenger services that are of a seasonal character.

### □ Operative planning and control

The ticket sales system provides all the operations necessary for passengers’ service: ticket reservation, selling, information etc., providing for passengers their rights and guarantees. The dispatchers’ service activities have been fully automated. Information for operational planning and control is generated almost exclusively within the organization (including requests from passengers), it is highly detailed and immediately relevant. The operation of the information system ensures the efficiency growth of the coach terminal.

The current developing task in this system is the development the system of quality indicators on the base of sampled data from IS „Baltic Lines”. One of the indices is punctuality index [13]. This index indicates the magnitude of time gap between actual

and scheduled arrival times. The realization of this task will give the possibility to analyze the reliability of the bus service and to improve the level of quality on the base of these results.

## 7 Conclusions

Bus and coach terminals being passengers' transport infrastructure objects are of great significance in the passengers' services. It is necessary to form and develop the information system of the coach terminal more efficiently in order to optimize the operation of the coach terminal, to improve the work with haulers and to make the services of the coach terminal and carriers' companies more comfortable for passengers, thus providing the better access to coach and bus transport services.

The development of the information system influences both the functions necessary for a coach terminal operator and the interests of different users.

The information system of the coach terminal corresponds to the Decision Support System (DSS), thereby providing the compatibility of the organization management system with the Quality Standard ISO 9001:2000 within the operational sphere of passengers' traffic servicing and provision, ticket sales and trip record keeping management.

The coach terminal information system technical architecture and the users' work organization allow to enhance continuously the system operation in providing the coach terminal functionality.

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