

COMPARATIVE ANALYSIS OF ELECTRONIC BUSINESS SERVICES IN RAILWAY COMPANIES

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Abstract: *With the development of computer systems, innovative services related to the increase in the quality of transport services are simultaneously being applied, where traditional business models are gradually being replaced with innovative solutions through the integration of services. In accordance with the trend of increasing the use of Internet technologies, railways must use and implement innovative transaction models for communication and mutual data exchange in business according to current restrictions, in order to consider the needs of real and potential service users. The basis consists of hardware and software components and information and communication technologies used for computer networking. Railway companies, in accordance with market requirements and through the application of innovative business services, make efforts to create a positive climate for increasing all segments of service quality, as well as efficient and effective development of new communication solutions for approaching real and potential users. This paper presents a comparative analysis of the services implemented in railway companies, as well as their specificities and differences between traditional business models and innovative ones that include advanced Internet technologies. The application of innovative electronic business models increases revenues and at the same time reduces expenses, creates a better image of the railway company and increases competitiveness on the transport market.*

INTRODUCTION

For the sake of quick information and collective consumption, social networking occurs. The application of electronic business affects the development of innovative business models and services that are based on the Internet. Various business models and services put the service user first. Big changes are happening in the banking sector where innovative services are being created to meet the needs of clients [1], [2].

The authors [3], note that the development of information communication technologies (ICT) and the emergence of the Internet creates a digital age, where the development of electronic business processes in a virtual computer-designed space is enabled.

The new possibilities are aimed at the digital age presenting a new paradigm of modern business where it is possible to:

- digitization and connectivity,
- application of new technologies,
- creation of conditions for the application of new business systems i
- marketing of a new service or product.

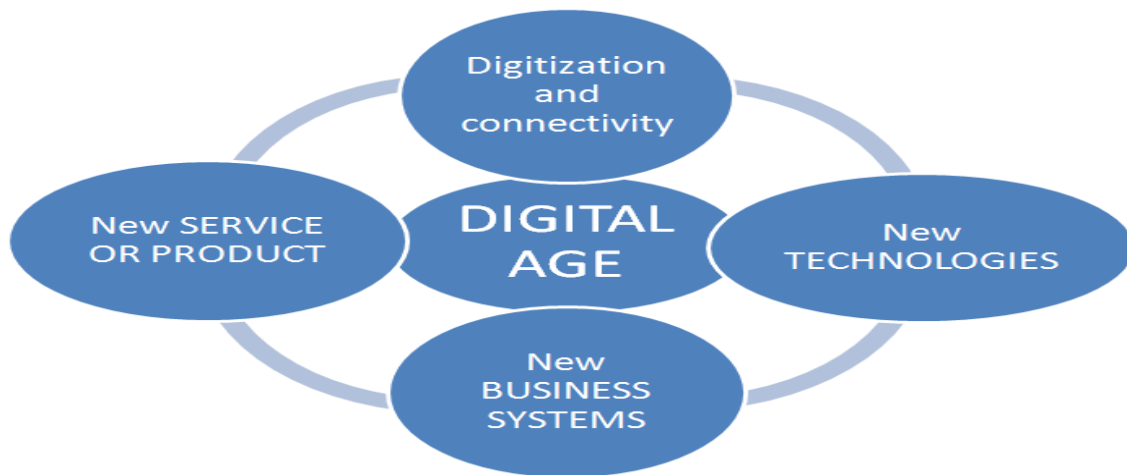


Fig. 1. Determinants of the digital age

Digitization and connection of devices and appliances is a process of functioning based on digital information. To transfer bits from one computer system or place to another, a connection or a telecommunications network is required. The new **Internet technology** has opened numerous opportunities on the market for the creation and development of organizations that change the way of doing business with the application of standards, protocols and services.

New **business systems** have caused many organizations to rethink the way they serve their target markets. Using the Internet in your business has created new conditions and opportunities for the sale of goods and services. A new **service or product** is one of the basic goals of the digital age. With the help of ICT, organizations are enabled to form such an information base for a new approach to the needs of strategically significant consumers through a new product or service.

The application of electronic business in railway traffic improves the interaction with the service user and at the same time improves the quality of business processes. The user of the service gets an active role in the process of electronic business instead of the previous traditional business. By implementing electronic business in existing business organizations, the efficiency of providing information is improved, where the user of the service has the ability to choose and make decisions. One of the most important possibilities is the implementation of the entire process via the Internet without the service user going to the business organization.

ORGANIZATIONAL ASPECTS OF THE INTRODUCTION OF E- BUSINESS

The International Business Machines (IBM) e-business application framework can be a means to achieve:

- business transformations;
- basics for the development and expansion of e-business processes and applications.

The framework is described, showing that it is based on industry standards where technologies are involved and focuses on enabling complete e-business solutions. It further describes how the system model and programmatic model of applying the framework and IBM products contribute to the approach of creating an e-business solution. The framework has evolved to support all sophisticated e-business applications and IBM is committed to working closely with industry to contribute to the development of new technologies to raise standards [4]. Business organizations, including the railways, must define and apply new strategies in order to meet the demands and needs of service users and, of course, their business activities to achieve better financial profits with the help of the Internet and advanced technologies [5]. The development of ubiquitous computing in today's time enables new models that can improve operations in transport companies. With a small investment in ICT, a company can identify critical phases in its business. One of the critical stages can be the non-utilization of the number of available places. The utilization of transport capacities can be one of the basic parameters for the positive operation of a transport company [6].

E-BUSINESS TECHNOLOGIES APPLIED IN RAILWAY TRAFFIC

The main goal of applying new technologies based on the Internet, enables the improvement and faster development of models for railway passenger transport. Technology provides the railway's ability to perform business processes in the organization itself faster and with better quality, as well as the ability to approach real and potential service users. The advantages brought by Internet technology, which are essential for railway operations, are reflected in various business models.

The possibilities of booking and purchasing travel documents for the appropriate places (seats, beds, escorted car), with the choice of the transport route, are especially current. By presenting the range of offers in passenger rail traffic, the services of railway companies become available to all potential users of its services. The technologies that are represented in the railway business do not provide a complete service that should satisfy the needs of current and potential users. In further work, the following models and services will be presented:

- Application of EDI (Electronic Data Interchange) technology;
- Service for electronic seat reservation;
- Model for issuing driving documents by mobile terminal;
- Model for issuing driving licenses with the "ORKA" software package;
- Model for issuing train tickets using the "e-karta" application

EDI (Electronic Data Interchange) technology is the exchange of standard business documents between computer applications of business partners through computer networks in order to achieve better business results. EDI technology does not imply the interactive participation of employees in transport organizations in the exchange of information, but increases the efficiency, effectiveness and level of technological automation of business processes in the field of trade.

The existing reservation and tariff systems of the EPA, enable reservation of seats for trains of foreign railway administrations through computer systems. By increasing the possibility of networking computer systems, primarily PC, further integration of sales functions in passenger traffic was achieved in relation to the central computer located in Booking for reserving seats to computers located on the carrier's territory. The user of the service needs to travel and wants to have a reserved seat in advance and can do it in three ways:

- By going to the passenger ticket office of the carrier (at the earliest two months before the intended trip) to make a reservation with the given train ticket for inspection if he has one and pay the amount provided by the passenger tariff;

- A call from the operator's fixed or mobile telecommunications network to the booking center for seat reservations and reserves seats after checking in the EPA system;
- By sending an e-mail for a request that contains the date of travel, the route and the type of seat on the train (first or second class, a bed in a couchette car or a bed in a sleeping car).

The experiences of foreign railway administrations in the introduction of mobile terminals indicate an increase in the quality of transport services, the productivity of train conductors, an easier, more accurate and more reliable determination of income from tickets sold on the train, as well as a reduction in the possibility of manipulation. This ensures more successful planning and organization of work in the process of transporting passengers by rail.

The model for electronic ticket issuance on the train consists of subsystems [7]:

1. Hardware:

- mobile terminal whose main parts are: alphanumeric keyboard, touch-sensitive display, printer, data storage medium, power supply device, other communication parts,
- a device for reading data and "transferring" it to a PC,
- a device for connecting to a PC,
- battery charging device i
- PC configuration.

2. Software:

- system software that enables the operation of mobile terminals,
- application software (programs for electronic ticket issuance),
- software for data reading and processing on a PC.

The model for issuing driving documents with the "ORKA" software package includes the networking of all personal computers in travel agencies and ticket offices via the Internet. The model is used for the traditional way of purchasing train tickets and involves the service user going to the railway facilities. The "ORKA" model has been used in railway traffic since 2006. The program package includes the issuance of driving documents in domestic and international passenger traffic. Issuance of driving documents includes: tickets, surcharges, reservation of places, berths and bedding as well as reservation for an escorted car.

The railway transport company "Srbija Voz" has given service users the opportunity to purchase train tickets for internal passenger traffic via the Internet. The application is available on the carrier's website <https://ekarta.srbvoz.rs/app/#!/home>.

The purchase of train tickets in railway traffic is made possible by the application for the online sale of train tickets. The application contains a list of trains for the given route and you need to select the appropriate one for the planned trip.

COMPARATIVE ANALYSIS OF MODELS AND SERVICES APPLIED IN RAILWAY TRAFFIC

In this paper, a comparative analysis was made with the parameters for the development of indicators that are current for the traditional and digitized transactional business model with the use of Internet services (table 1). In practice, there are a large number of electronic business models that are based on advanced Internet technologies [8],[9]. Comparative analysis includes differences but also similarities in the business processes that take place during the realization of the selection, purchase and obtaining of the train ticket. The analysis determines the operational efficiency of the model or service for providing service to users in the transport company (TC).

The needs and expectations of service users are highlighted in the foreground. By analyzing the parameters (data exchange via the Internet, time required for the realization of the e-ticket purchase process, earlier ticket and seat reservation, user / operator interaction, user / service interaction, space (place or facility) for ticket purchase, traditional ticket

purchase, modalities payment of the required service, contactless e-ticket) the advantages for the development and application of the ICT transaction model for the procurement of e-tickets with elements of electronic business are determined.

Table 1. Comparative analysis of service application in traditional and digital transaction model

Model	Traditional transaction model	Digital IT transaction model
Situation Parameter		
Human resources (Communication)	User and employees in business premises TC authorised to sell tickets and direct communication	Virtual TC Treasury based on contactless business (choosing and paying for a service, getting a digital record that represents an e-card to a user device)
Surroundings (space)	Physical access of the user to the travel / work area for the employee of the TC	Development of new services for contactless business between service users and TC for choosing, paying and receiving cards in digital recordings
Applied technology	User with card demand / employee service provider on all hardware and software devices	Ordering, selling and delivering required services via a service TC in a contactless business with a service user
Organisational processes	Customer service in f-f communication with the cashier in all transaction activities	Communication between service users and TC in transactional activities of ordering, paying and getting a ticket in digital recordings
Service / product	A printed ticket in the service premises of the carrier	Contactless inertia between service and service users in TC for ordering, buying and getting tickets

CONCLUSION

This paper presents a comparative analysis between the traditional business of a transport company, which is based on the realization of the purchase of a transport ticket. The user of the service must be physically present in the business premises of the railway in order to satisfy his needs. The modern approach to electronic business simultaneously includes the user's available computer technology, which can be at home or at the workplace, but can also be mobile, provided that the device uses a wireless infrastructure. The railway company must provide sufficiently powerful server support with clearly defined capacities that can be available to users at any time of the day of the week.

The application of advanced Internet technologies implies the transport company's readiness for changes that require the improvement of existing hardware and software components as well as the application of wireless network technologies.

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