MODERN COMPUTER SYSTEMS, SUPPORT OF SEEKING COMPETITIVE ADVANTAGE IN THE ROMANIAN RAILWAY TRANSPORTATION

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Abstract: Today, competition in the globalization of markets has become increasingly tough, so to cope with increasingly high competition, companies in Romania (as well as anywhere in the world) have to use new information technology as competitive leverage for the survival of reference markets in a global economy / global crisis. Shipping companies are those that have experienced large losses from the reduction in international trade during the crisis. Reducing costs but also make investments in information technology to streamline the business are the main leverage on the market success of reference.

Keywords: IRIS model, railway information system, trains management

1. Role of IT in a company's competitive advantage

"An organization's ability to learn, and to transform learning into action is the supreme competitive advantage" (Jack Welch, President of General Electric Company).

A manager needs to see the management information system more than a set of technologies that help in making decisions and create the conditions for successful business operations. The computer systems allow a company to develop databases that contain strategic information and giving it a strategic advantage. Valuable information has always been active in promoting business operations. Firm information on suppliers, customers, competitors are viewed as strategic resources and used for strategic planning and other strategic initiatives.

Michael E. Porter in his famous work "The Competitive Advantage: Creating and Sustaining Superior Performance" presents five competitive forces that determine the profitability and survival of firms in an industry (the threat of new entrants, threat of substitutes, bargaining power of customers bargaining power of suppliers and rivalry among existing competitors) and five strategies to achieve strategic advantage:

(a) through cost leadership strategy - a company that has the lowest costs in an industry can practice the lowest prices and will become the market leader. Also, a firm can find solutions for its suppliers to cut costs;
(b) differentiation strategies - product differentiation allows a company to impose such products in certain market segments or niches;
(c) innovative strategies - they may involve the development of unique products or services or to make radical changes in the production and distribution of products or services;
(d) growth strategies - these strategies may take the form of increased production capacity to benefit from economies of scale advantages, or penetration into new markets;
(e) strategies of alliance formation - establish business links with suppliers, customers, even some competitors such as acquisitions, joint ventures allow firms to obtain a strategic advantage.

James O'Brien in "Management Information System" presents the different ways in which information technology can be used to implement competitive strategies.

A) Through cost leadership strategy
- use of information technology to substantially reduce costs in business processes;
- use of information technology to reduce costs of key suppliers or customers;
B) Differentiation strategies
- development of computer technology to highlight products or services;
- use information technology to reduce the advantages held by competitors;
- use of information technology solutions offered to positioning of products or services in selected market niches;

C) Innovative strategies
- creation of new services or products that incorporate information technology components;
- making radical shifts in business processes using information technology;
- observation of market niches using solutions provided by information technology;

D) Growth strategies
- use of information technology in managing business expansion on a regional or global;
- use of information technology in the diversification of products and services;

E) Alliance formation
- use of information technology to create virtual organizations and links with business partners
- development of inter-organizational systems that create strategic business relationships with suppliers, subcontractors etc.

F) Improving the quality and efficiency
- use of information technology to improve the quality of products or services;
- use of information technology to business strategy through efficiency improvements process;
- use of information technology to substantially reduce design time, production and distribution of products;

G) Building a platform for information technology
- carrying out major investment in hardware, software and networks but also in training staff to use information technology;
- building a strategic database with data collected and analyzed information with technology support;

H) Other strategies
- use of information technology to create barriers to entry for those who want to enter to a given market;
- use of information technology to determine the substitute products witch are unattractive to consumers.

Figure 1 shows some examples of strategic information systems that help companies in earning strategic advantage.

The strategic role of management information systems development involves the use of information technology products, services and capabilities that give a company strategic advantages over the competitive forces of a globalized business environment.

2. Use of IT by hauliers and rail travel in Romania
Railway companies of Romania manages and operates one of the largest rail networks in Europe, a network that is fourth in terms of length but also lines of traffic volume carried (freight and people).

As carriers in Romania and as factors linking Western Europe, Eastern Europe and the Middle East Railway companies are operating in a competitive environment, at the same time have public service obligations.

To conduct efficient railway activities the companies operating in this sector has a support modern, based on new technologies and software products under the IT & C market, some of them already used widely by most railways in world.

„Integrated Railway Information System” (that we will call IRIS) is the base for carrying out activities of one of the largest carriers in Romania (Railway Company). IRIS was developed using external funding from World Bank, as part of a comprehensive modernization project, which was intended to increase the competitiveness of the railway company in the context of free access to European railway system, the globalization of markets and workload reduction resulting from economic and financial crisis in recent years.

IRIS provides an integrated solution for computerization of activities in the transport company concerned, a solution that included investment in complex hardware solutions, modern database management as well as a number of software applications, all connected into a national network two levels - WAN and LAN (Local Area

<table>
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<th>Strategy</th>
<th>Strategic Information System</th>
<th>The main benefit brought to business</th>
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<tr>
<td>Leader by costs</td>
<td>information systems machinery monitoring production</td>
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<td>Differentiation</td>
<td>analysis systems of customer needs</td>
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<tr>
<td>Alliances</td>
<td>systems based on electronic exchange of data between partners</td>
<td>increase market share</td>
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Fig. 1 – Types of information systems and competitive advantage
Networking). In this solution, the architecture of user access to the intranet and external Internet access, the interface was built using Microsoft technologies.

Developing and implementing the IRIS system involved finding solutions to the following issues:
- Acquisition of modern information technology solutions;
- Providing technical assistance to a qualified and effective knowledge transfer;
- Global Computerization, from the activities and operational processes and management through to business;
- Construction equipment of modern architecture, which ensures protection of investments;
- Reengineering computer activities;
- Accumulation and synthesis of information obtained from the levels for all levels of management, operational, tactical and strategic.

IRIS aims primarily to provide a modern information support for operational activities and maintenance of the Railway Company, an instrument designed primarily for financial and strategic management of the company.

Implementation of this system was and still is (in the phase of operation, maintenance and improvement) a very ambitious project, based on a unique concept in Europe, because it is involved the whole railway and its activities in their natural interdependence.

The contribution of this system to make more efficiently the work monitored is based on its innovative concept that involves:
- shift from the use of historical data to use real time data of the prediction;
- moving to a unitary perspective from fragmented view of the company;
- moving from activity reporting results to the optimization of business processes based on a real understanding of the processes and factors of influence.

2.1. Architecture - IRIS Model Systems
IRIS system consists of several subsystems - applications, made modular, integrated and designed in modern architecture, opened. Implementation involves installing the entire railway network of the following components: application servers and central database; regional servers, servers, printers, workstations.

2.2. IRIS Subsystems
IRIS system subsystems are: infrastructure management, stock management, transport management and freight trains.

2.2.1. IRIS - AMI Infrastructure Management
The management subsystem offers the following activities:
- Fixed assets management of infrastructure - lines, bridges, tunnels, buildings, facilities, etc.
- Management of maintenance of fixed assets;
- Management of working with management units of work equipment, materials;
- Project Management of major repairs and new construction.

Infrastructure Management application is built based on two software packages: "MP5i" from Datastream and "GeoRail" from Intergraph, allowing users to view geographic information either by plane or using relational detail. Application is made so users can get information on the technical characteristics of objects of infrastructure, maintenance history, cost and work. Furthermore, using this model can follow the chart works, repairs to the various investment categories.

2.2.2. RSMA - Rolling Stock Management
RSMA component was designed and drawn to ensure:
- The management of such assets, wagons, locomotives, etc.;
- Stocks of materials and spare parts for maintenance of fixed assets above;
- Management of maintenance
- Management of technical documentation for rolling stock.

With this module, the management company at any time can be informed about the stock situation (in circulation in repair, obsolete, etc.) and on maintenance costs, location (in depots / workshops in movement, factory). It is used at different levels of business interested in rolling stock, from leadership and ending with the operational staff of yards, wagon shops and receptions.

2.2.3. Freight and trains management
Logistics Management and trains is part of the system that requires interaction between open, flexible following components:
- ATLAS - planning timetables
- CRONOS - Train Reporting System
- FOCUS - monitoring the movement of trains
- MERCURY - commodity trading system
- ARGUS - operational activities of passenger and freight

Operation ATLAS modules, CRONOS, FOCUS, MERCURY and the ARGUS interdependence can be represented as in Fig. 2 below:
a) Planning timetables (ATLAS)
The system allows you to create and train paths of a program of movement. By programs can be created more traffic, but usually are used only two: one in progress and the next. Once the timetable has been established, it can operate on short-term changes that are made in the timetable for a determined period. Daily is sent to the application program CRONOS, so that trains may refer to several railway stations. You can make last minute changes at the program that has been already sent. An important feature is the graphical editing mode, where the traditional chart is drawn on the screen and train path marked with the mouse.

b) CRONOS – Train Reporting System
ATLAS the timetable for the next day and adapt to the timetable for the day, prepare the list of trains that travel through each station and transmits to CRONOS station customers. Each CRONOS station operator reports the passing time, arrival or departure of a train according to actual traffic. For reported delayed trains is reported the cause of delay. Facilities are provided for transmitting movement provisions.

c) FOCUS – Monitoring the movement of trains
FOCUS application provides clear, concise and updated, allowing visualization of the movement of trains across the railway network. FOCUS application used to display information from CRONOS trains shown in several ways. Users can choose:

- Geographical map of the rail network where trains are displayed according to reports made in the application CRONOS.
- timetable for a service station - shows paths planned for the next two hours in advance and those with six hours ago. Each train path is updated by train movements reported by CRONOS;
- sketch map - shows the movement of trains on schematic maps of stations and service stations.

d) MERCUR- Merchandise trade Subsystem
MERCURY System is an application developed with Oracle Forms and an Oracle database used together with ARGUS and communicated data between the two systems. The system allows the creation and use of consignment notes for calculating tariffs and charges for transportation. Ensure constant maintenance of files on the stations, customers, costs, distances and percentage of VAT applicable, etc. so that the amount of
charges to be fully and correctly calculated in accordance with the conditions of transport. The system contracts and customer orders are recorded for empty wagons. Commercial data (customers, contractual details, type of merchandise, prices, etc.) can be viewed from ARGUS operating system providing a complete picture of wagons and locomotives.

MERCURY system enables the following functions: customer file maintenance, file maintenance fees, maintenance of goods file, remote file maintenance; kilometer updating consignment notes; interface return international transport contracts management, interface between data letter carriage and financial system, processing information about the events of the journey from the ARGUS.

e) ARGUS – Operational activities of freight and passenger

The system contains records for all freight and passenger cars and stationary engines that are in circulation or on the railways, including foreign cars entering / leaving the border stations. Products are reported and recorded events in the database ARGUS.

A wide range of queries is available to managers. Information is stored for a month, after which they are placed in a historical database.

ARGUS client application key feature is the graphical representation of station line map, which displays the icons in vehicles that stop on each line, in their true order. Each different type of vehicle is shown by a specific icon, which suggests the kind and condition of the vehicle (loaded, empty wagon foreign).

ARGUS characteristics:
- Is an application Client-Server.
- Is installed on all workstations (PCs) located in stations, yards, Regional Headquarters.
- Is installed on a central server located in the headquarters company's Information Center. On his are installed application programs, the communication program and ORACLE database system.
- Exchange of data between ARGUS client and ARGUS Server is done via the network data transmission CFR.
- ARGUS application as part of the IRIS system ensuring the exchange of data with application MERCURY (Commercial Goods) with application CRONOS (Train Traffic Management).

System users are divided into two categories, as follows:
- Authorized to transmit information in the System
- Authorized only to view data made available by the system without the ability to transmit information or execute changes.

Both categories of users may query the system and according to the rights established by contract and the subscription will have access to one or more modules of the application.

The application is composed of reporting modules and modules for management. Access is made via password protected sessions at different levels of access. You can see all lines where the program is implemented and can action in a short time to correct any faults. Graphical interface is friendly and accessible to anyone.

Application IRIS - ARGUS starts by double-clicking the icon.

The display window will appear ARGUS user validation. ARGUS user name will appear in the system for all messages that you receive or send. Registration is required.
3. CONCLUSIONS

Implementation of IRIS in the analyzed company had the short term following advantages:
- Developing business, increasing efficiency and ensuring the development prospects for rail transport, attracting new customers.
- Availability and quality of services provided to railway operators are visible immediately after the implementation of application.
- Information on time, correctly and completely, quickly and easily connect with customers and partners to make decisions and act effectively.
- Provide differentiated services for each client company, benefiting from economies of scale generated by using a common IT infrastructure, managed under the critical piece and available 24 hours a day, 7 days a week.
- The possibility of occurrence of an object moving on the map in accordance with the actual movements of vehicles on the ground.
- Launching queries to map objects (cars, locomotives, trains), regardless of access mode.
- View and query in real time to all trains in circulation that goes to a station.
- Ease of identification of type, owner and status of vehicles due to the graphical representation of map objects (shapes and colours, distinctive signs).

Informatization of production processes and automation the establishment of railways and rail traffic monitoring will provide an opportunity for timely intervention in crisis situations. It will greatly reduce time delays, and customers will be offered to the railways with more added value services.

References