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The role and advantages of computer systems in agribusiness

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ROLUL SI AVANTAJELE SISTEMELOR INFORMATICE IN AGRIBUSINESS

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Abstract: *The agribusiness sector has continued to contribute significantly to Romania's GDP, and the positive results are due to Romania's agricultural potential, increased production, as well as investments in infrastructure and state-of-the-art tools made in recent years by large companies operating in this field. sector and thus contributed to increasing productivity. However, the agribusiness sector in Romania is far from reaching its maximum potential. Although Romania is a major exporter of agricultural products, the "produced in Romania" label is not enough to become a global player. Agribusiness companies should invest to understand the needs of customers and global markets and provide higher value-added products than other global players.*

Information systems as a broader, comprehensive form is an essential field of study in business administration and management - areas considered major in the economic area. Thus, IT systems must respond to issues related to the management of hardware, software, data, and computer networks, in a strategic way for business success. Today, IT systems are increasingly becoming a vital component of business success for an organization or an entrepreneur.

Keywords: *agribusiness, computer system, market*

JEL Classification: *M15*

INTRODUCTION

With the new technological discoveries, agriculture and agricultural business are undergoing radical changes, innovation being the core around which farmers seek solutions to streamline their activities, increase their production by maximizing resources. The business process consists of any group of activities performed in order to produce a specific customer-oriented or market-specific result. The business environment is constantly changing and new techniques and methods for developing this process are required.

In Romania, through the funds attracted by agricultural entrepreneurs, higher productivity and access to modern solutions for agriculture can be obtained, with a major role in increasing efficiency. An information system created in support of agribusiness companies offers farmers the opportunity to reduce raw material costs, to optimize their production flow, this being possible by applying better technologies, based on information taken directly from the field, or the production area. Each IT solution is based on microservices, on the breakdown of agricultural processes into activities and sub-activities. In this way, we are talking about the overall efficiency of production.

A good IT solution for agribusiness has the effect of performant management of agricultural farms, regardless of their size, being able to carry out the following types of actions:

→ *Management of agricultural works* - planning, execution, and monitoring of agricultural works and the necessary resources (labor, use, materials).

→ *Mapping* - mapping plots and geolocation by interconnection with GIS solutions.

→ *Treated forecasts* - forecasts based on information and alerts from weather stations and field sensors.

→ *Alerts* - alerts generated based on inspections and observations and external data (drones, other devices).

→ *Planning agricultural works* - generating work orders based on inspections and alerting with resource allocation.

→ *Treatments* - correct treatments on crops, depending on adversity (diseases, pests), weather forecasts, previous treatments, and field observations.

→ *Personnel management* - personnel allocation for each task with a specific assignation of hours and quantities carried out individually and in teams.

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- *Equipment management* - integration with GPS systems for tracking mechanized work.
- *Reports and analyzes* - tracking costs and profitability on farms, plots, works and activities.

MATERIAL AND METHODS

Information systems play a vital role in the success of a business, which must be measured not only by its efficiency (in minimizing costs, time, or use of information resources) but also by the support it provides in: elaboration of business strategies, carrying out commercial processes, improving the organizational structure and culture of the organization, increasing the turnover and value of the company in a dynamic and competitive environment.

From a managerial point of view, the computer system represents:

- an important means for ensuring the functionality of the business;
- an essential factor that influences the operational efficiency, the productivity of the employees, and the relationship with the clients;
- a basic amount of information that ensures correct decision making;
- a means to develop new products (services) that ensure a competitive advantage;
- one of the most important resources of the organization and business cost analysis.

Integrated Enterprise Resource Planning (ERP) systems took their place in business applications in the context of the information explosion and unprecedented development of information and communication technology in the early 1990s.

Integrated IT systems for business management - Enterprise Resource Planning (ERP) have made their way into enterprise applications in the context of the explosion ERP consists of software modules that cover all functional areas, structured such as: marketing and sales, service, product design, and development, production and inventory control supply, distribution, human resources, finance and accounting, IT services, being developed for processing transactions and facilitating the integration of all processes, from the planning and development phase of production to relationships with suppliers, customers, and other business partners.

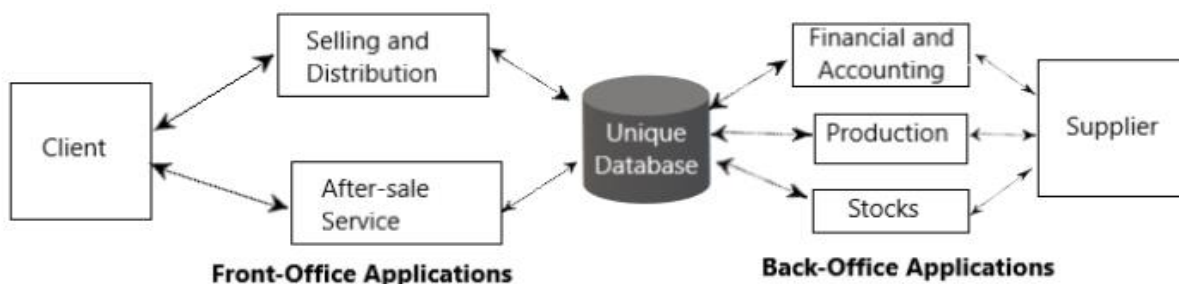


Fig. 1. The conceptual scheme of an ERP system (source: own contribution)

An ERP system, "considered the most accurate expression of the interdependence between economics and information technology, is a software multi-modular infrastructure, that provides management support and coordination of various structures and processes in the company, in order to achieve the business objectives." Concisely, ERP represents the planning of the 4 determining factors for a successful business: the human, financial, technical, and resource ones (the 4 M - Man, Money, Machines, and Materials).

In a simplified form, an ERP system can be defined in terms of two fundamental properties: functionality and integration.

→ *The integration* ensures the connectivity between the flows of functional economic processes. It can be thought of as a communication technique. Some common ways in which communication takes place through and for integration are: source code, local and extended computer

networks, Internet, e-mail, workflow, automatic configuration tools, protocols, databases. We can say that integration is achieved through communication, and communication is achieved through integration.

→ *The functional* part of an ERP system ensures the flows of economic processes within each function. Thus, in an ERP suite, there are found from a few to dozens of functional modules (general accounting, debtors, salaries, stocks, supply, production planning, logistics, orders, and sales).

The current ERP systems integrate all the management functions of a company, starting from: planning, ensuring the stock of raw materials and materials, defining technologies, coordinating production processes, financial-accounting management, human resources, stocks of finished products, developing and maintaining relationships with customers and business partners.

RESULTS AND DISCUSSIONS

Real-world computer systems are combinations of computer systems typical of a particular function. Companies see in these systems a way to share information resources and improve the efficiency and effectiveness of the business, which implies the easy fulfillment of strategic objectives.

1. Production IT systems

Computer systems are used in operations management and transaction processing and support the production of a business and can be specialized in: computer-aided engineering, computer-aided production, machines with program control, material demand planning, supply, robotics. Such systems can be used by companies in the agricultural production and processing sector, which must plan, monitor, and control stocks, purchases, and the flow of goods and services.

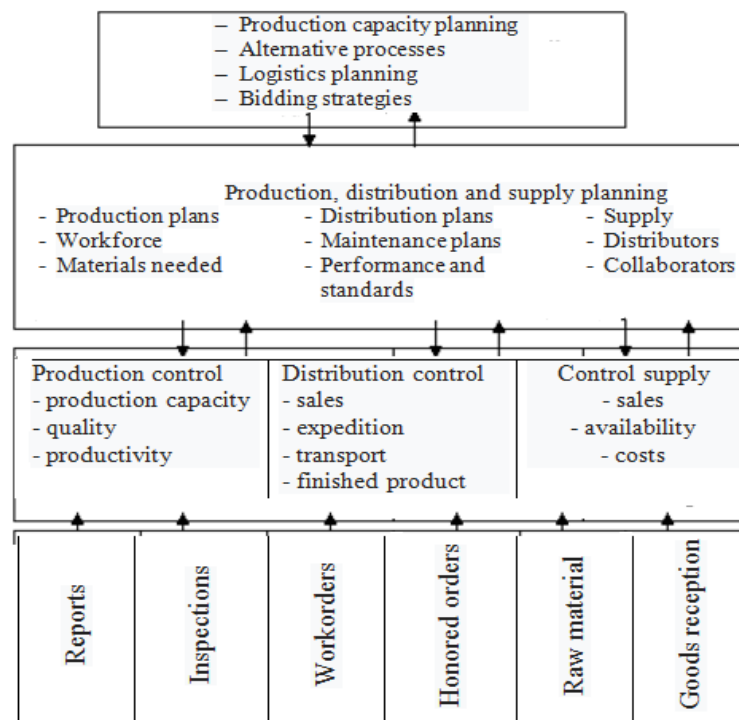


Fig. 2. The structure of a production IT system (source: own contribution)

Production information systems highlight the purposes of using the computer in a factory, with namely advantages of:

- ✓ **simplifying** the production process, product design, and enterprise organization.
- ✓ **automation** of the production process and business functions with the help of computers and robots.

- ✓ **integration** of the entire production and auxiliary processes using computers and telecommunications networks.

2. Marketing IT systems

Marketing, in a business, has the role of dealing with the planning, promotion, and sale of existing goods in existing markets and to discover new products and new markets to better serve current and potential customers. That's why marketing is a vital function of a business. Companies started to use computers more often as a way to advertise themselves optimally in daily-changing free market. As such, computers have been involved in the development of marketing information systems in the last years, which integrated the flow of information necessary for many marketing activities.

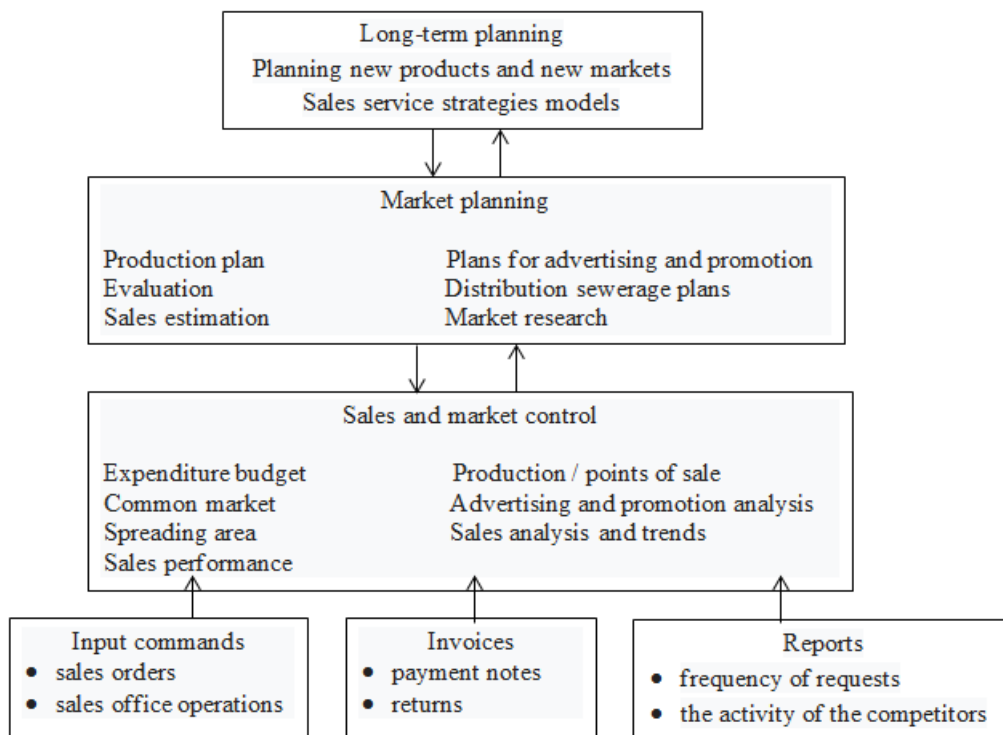


Fig. 3. The structure of a marketing IT systems (source: own contribution)

Analytical reports provide information about a company's current performance against planned objectives. The following are the most important areas in which marketing can be supported by computer-based information systems.

→ **Sales Management** – the sales manager must plan, track, and support the performance of his/her subordinated salespersons. Thus, computer systems create sales analysis reports, which help the sales manager to develop programs that will improve sales results (fig. 4).

→ **Sales automation** – the sales analysis is one of the main aspects, that sustains and coordinates sales, by having automatized records and reports of sales activities, communications and sales management.

→ **Production management** – the leaders of a production cycle need information to be able to plan and control the performance of specific production, mass production, and assortment. Computers can help set prices, costs, revenues and they can later help develop future production. Providing this information and analyzing it for evaluation decisions is a basic function of this system. The computer can provide models that can evaluate the performance of the current production and can prospect the success of the proposed production.

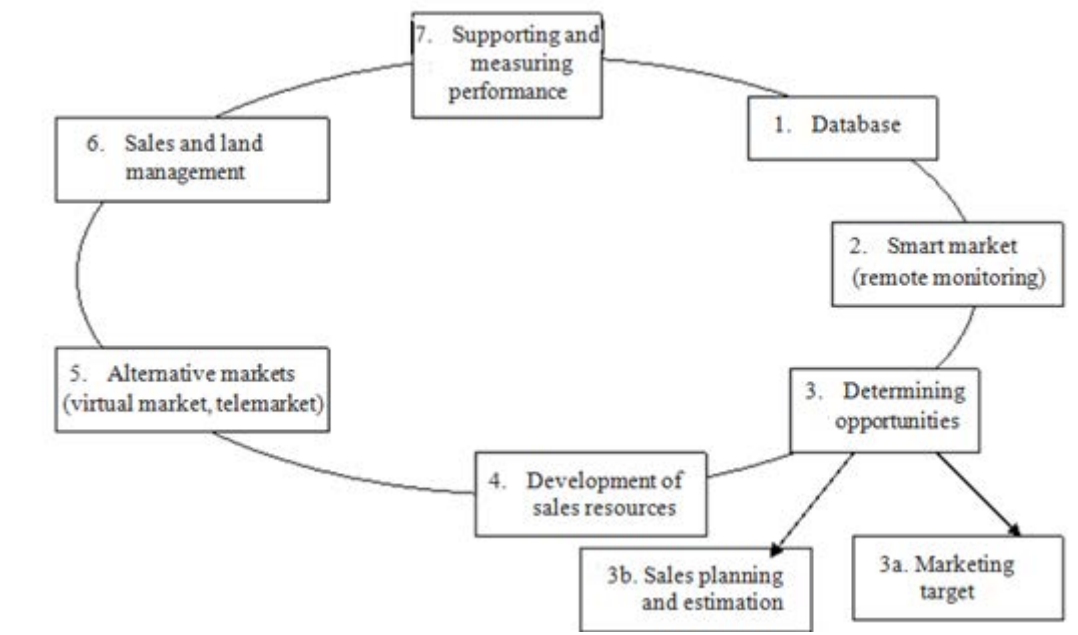


Fig. 4. The cycle of a sales report (source: own contribution)

→ **Advertising and promotion** – marketing needs information that will help it to achieve the sales goals and the lowest possible costs for advertising and promotion. Computers use information and market research models that aid the:

- selection of media and promotional methods
- allocation of financial resources
- monitoring and evaluating the results of various advertising and promotion campaigns.

→ **Sales Estimation** – the basic functions of sales estimation can be grouped into two categories: short-term estimates and long-term estimates. Short-term estimates are made for a period of up to one year, and long-term estimates are made for periods exceeding one year. Market research data, sales history, promotion plans, and statistical estimation models are used to generate these estimates.

→ **Market research** – the market research information system offers managers support in decision making, help in market research for the activities of collecting, analyzing, and storing an enormous amount of information (internal and external data) from a wide variety of markets, which are constantly changing. It can include information about sales, prospecting, consumers, competitors, economic and demographic prospects, but also development, respectively trends.

→ **Marketing management** – the use of IT systems for the realization of short-term or long-term sales perspective plans, the establishment of profit and development objectives, the development of marketing strategies, and basic plans associated with market goals and research. It also provides feedback and analysis, establishing the performance achieved against the plan for each area of marketing.

3. Financial IT systems

Computer-based financial systems support the decisions regarding business financing and the allocation and control of financial resources.

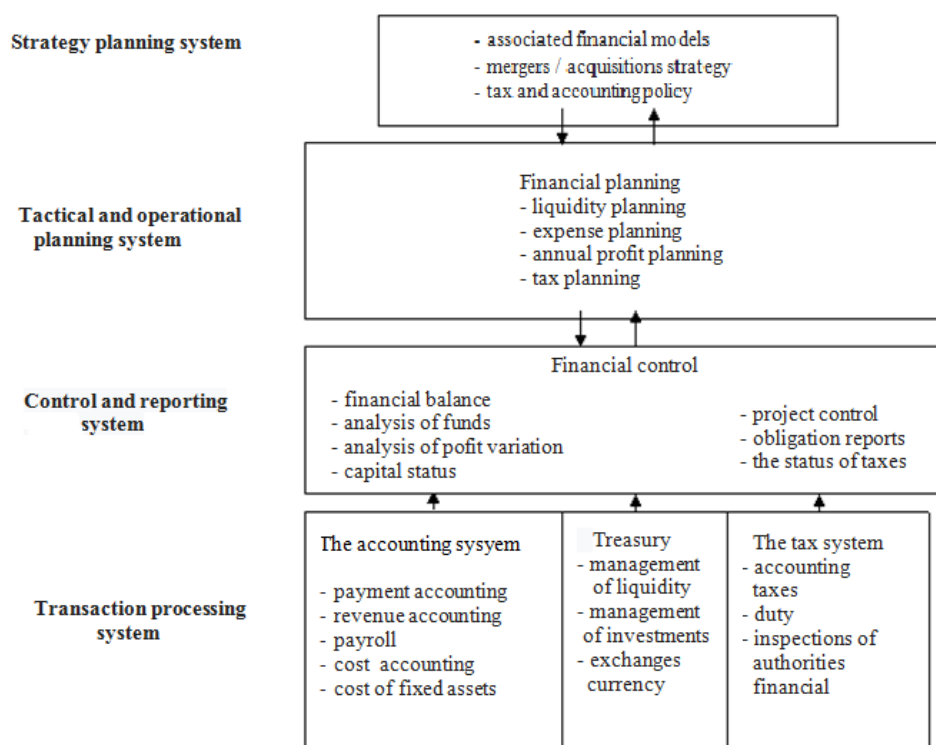


Fig. 5. The structure of a financial IT systems (source: own contribution)

The computer system for accounting is often included as a vital component of the financial system. Most financial information systems include the following categories:

→ **Liquidity management** – information systems collect information related to liquidity receipts and the necessity for real-time or periodic investments, allowing saving or reinvesting additional funds. Information systems can help the CFO make purchases, sales or make purchasing decisions so that the risks are minimal and the gains maximum.

→ **Capital distribution** – assumes the evaluation of the profitability and financial impact involved in capital expenditures. Long-term expenses for installations and equipment can be analyzed using a wide range of techniques, which includes analyzing the present value of the estimated expenses, such as analyzing the probable risks.

→ **Financial estimates** – a business must make financial and other estimates of economic trends. A wide range of statistical packages that offer analytical techniques resulting from national or local economic or financial estimates, salary level, price level, interest rate. These estimates may involve the use of data on environments outside the business generally obtained from demographic or financial databases provided by information services such as Statistical Yearbook, Internet, Official Monitor.

→ **Financial planning** – financial planning systems provided information on the economic situation, business operations, possible ways of financing, interest rates, stock prices, and bonds. They are used to develop an optimal financial plan for business and help determine financial needs and analyze alternative methods for financing business. I use financial planning models to evaluate the present and future financial performance of the business or a subdivision of it (spreadsheet packages and DSS generators are frequently used to build and use these models).

4. Accounting IT systems

Accounting information systems are the oldest and most widespread business information systems. They record and report business transactions, ie the flow of funds throughout the history of an organization, and produce financial documents such as balance sheets, income statements, and others. Such systems produce estimates of future conditions such as financial projects, budget allocation, etc. The financial performance of a company is measured by other such accounting estimates. The figure below describes the relationships between the most important computerized accounting information systems for both small and large companies.

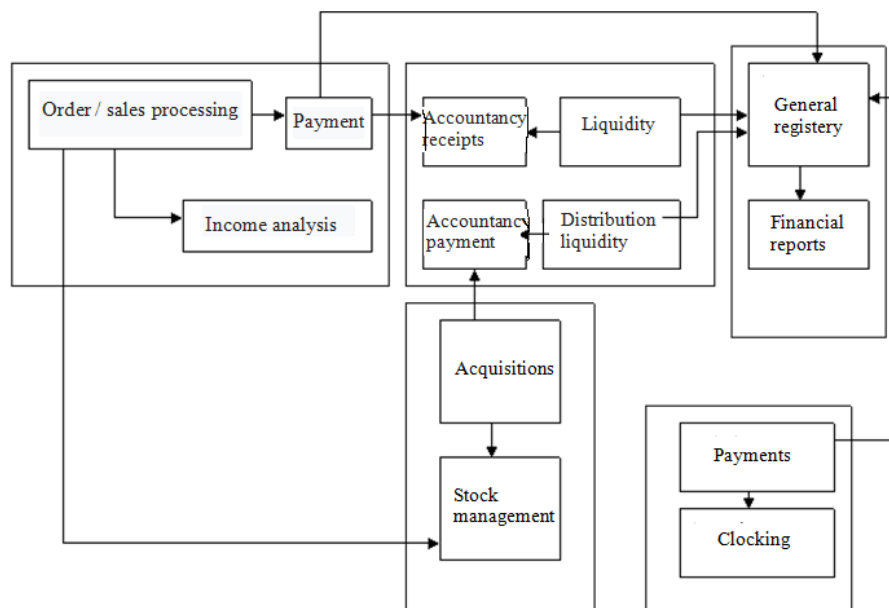


Fig. 6. The structure of a accounting IT systems (source: own contribution)

→ **Order processing** – is an important transaction processing system, which collects and processes customer orders, produces invoices and data necessary for sales analysis and inventory management.

→ **Stock management** – the inventory management system processes data that reflects the quantitative changes of the products in stock. Once the order is received from the customer, the order processing system processes and transmits the data to this system, which produces the notices accompanying the goods. It also performs stock changes, provides replenishment data, and many other inventory reports.

→ **Revenue accounting** – these systems keep records of amounts owed by customers and provide monthly payments and loans. It provides managers with reports that help them control the number of loans and the amount of money owed and help maximize profitable loans and minimize inefficient debt.

→ **Payment accounting** – it records purchases, amounts due to suppliers, payments to suppliers, and produces liquidity reports.

→ **Payroll** – records work performed by employees, compensation, leave allocation, and produces payroll and other reports to management and government agencies regarding earnings, taxes, and other deductions.

→ **General register** – it synthesizes the data received from the payment, collection, salary, and all other accounting systems and, at the end of each accounting period, the balances, journals, and other accounting documents are generated much better and cheaper than if they were done manually.

5. Human resources IT systems

Managing human resources (staff/personnel) in an organization involves establishing staffing requirements, efficient placement of employees, evaluation, remuneration, and specialization. Initially, computer-based computer systems were used in businesses to:

- generate the remuneration reports (payment statements, paychecks)
- keep the data of the employed personnel
- analyze the use of staff

Many companies later developed this function, becoming the human resource information systems (HRIS) system that deals with:

- ✓ recruitment, selection, and employment of staff
- ✓ distribution at work

- ✓ appreciation of employees' performance
- ✓ analysis of employee benefits
- ✓ training and improvement of employees
- ✓ safety and health security

CONCLUSIONS

The use of intelligent software solutions in agriculture helps to significantly increase the performance and quality of processes and thus also the quality of crops and provides competitive advantages and sustainable approaches, necessary to process the data generated and used in business operations. Currently, innovative solutions in the cloud, dedicated to farmers, help to efficiently manage all activities on the farm, from planning, execution, and monitoring of agricultural works, with the allocation of resources, forecasting treatments to be applied, real-time alerts, inspections, and observations, equipment management, up to supply, stocks, sales, financial management and P&L reports on farms, plots, works, and activities.

The main functionalities that an application dedicated to the agricultural industry should contain would be the following: monitoring and measuring agricultural business figures (financial, accounting, profitability indicators, forecasts, etc.), risk management, inventory management, activity measurement, and evaluation, respectively measurement data/performance through integration with IT technologies and systems.

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