USING VARIOUS DATA SOURCES TO OPTIMIZE THE FLOWS REQUIRED IN ECONOMIC APPLICATIONS

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Abstract: *The paper presents the usage of various sources of data for optimization in economic applications. Economic IT systems are designed to streamline and automate the processing, record keeping and reporting of transactions. Record current information and maintain database of transaction information. The quantitative and even qualitative increase in the information obtained from the processing of daily transactions did not lead to significant changes in the quality of the decisions made. There are numerous options for data processing, information evaluation, adaptation to changes. While transactional systems emphasize the integrity and consistency of data, being managed as a whole, interactive decision support systems regroup data spread across several databases according to a defined purpose, manage data organized distinctly by analysis subjects. Broken down by operational departments, the decisions are found in directives necessary for operational management and consider the particularities of the functional departments. The simulation is done on models of the field of application and facilitates the decision-maker's choice of measures imposed by reality, by the concrete conditions in which the activity is carried out. Presented and sometimes even used independently, management systems make up a unitary system at the company level. Integrating specific information and communicating at different managerial levels, based on the data recorded in the primary documents, builds decisions for the entire company. By implementing some mathematical models and using the calculation technique in the specific activities, the information system prints increased valences to the information system from a quantitative and qualitative perspective.*

Keywords: *economic problems, computer systems, economic flows, data from external environment, data interpretation, design for economic applications*

JEL Classification: C23, C26, C38, C55, C81, C87

1. Introduction

The use of the computing technique produced changes in the way of carrying out the activities carried out within an information system, and implicitly determined the emergence of the concept of an information system. The computer system is a set of functionally intercorrelated elements for the purpose of automating the obtaining of the information necessary to support decisions. Computer systems are presented in the form of a „black box" that has information inputs that are transformed into information to substantiate decisions by means of resources, rules, procedures. The information system connects the managed system and the management system, being subordinate to them. This link is bidirectional. It can be said that the information system is the „shadow" of the economic processes in the unit. The computer system is included in the information system and has as its object of activity, in general, the process of collecting, verifying, transmitting, storing and automatically processing data (data is the raw material, and information is the finished product).

By implementing some mathematical models and using the calculation technique in the specific activities, the information system prints increased valences to the information system under a quantitative and qualitative aspect. It is about increasing the computing capacity in terms of the volume of data processed and the operations performed, increasing the accuracy of information, increasing the operability, complexity and completeness of reporting-information situations, etc. All this determines a closer proximity of the decision-maker to the economic phenomena and processes that he has in mind, with the multitude of positive economic aspects that derive from this (Coronel, 2023; Gessert, 2023).

Regarding the relationship between the computer system and the information system, it can be appreciated that the computer system tends to equalize the dimensions of the information system, but it does not have the same scope as the latter, because within the information system there may be activities that cannot be automated. The computer systems are included in the information systems, and they are intended to serve the management of the economic unit, so it can be appreciated that the main objective of the IS coincides with the general objective of the basic economic activities.

The main objective pursued by the introduction of an IS is the selective and timely provision of all levels of management with necessary and real information for the substantiation and operative elaboration of decisions regarding the most efficient performance of all activities in the economic unit.

2. Usage of economic data in the applications that are included in information systems

The main objective of the economic activity therefore refers to the entire activity in the economic unit. In order to get to know the activity more closely, and to carry it out in the best conditions, other secondary objectives can be defined, which are called "conditions" for the achievement of the main objective. There must be compatibility between the main objective and the secondary objectives, in the sense that the achievement of the secondary objectives must lead to the achievement of the main objective.

From the point of view of the fields of activity on which the economic effects are reflected, they can be classified into:

a) General objectives – are the objectives that affect the basic activity within the economic unit (supply, production, sales).

Objective example: Increasing the degree of loading of the production capacity. It is achieved by implementing mathematical models, planning, programming, ordering, launching and tracking production. OR through the implementation of advanced models and techniques for planning overhauls and capital repairs of machinery.

Objective example: Increasing labor productivity. It is achieved through the rational use of the labor force (the operative monitoring of personnel activity is carried out on the computer).

Objective example: Optimum use of transport capacity. It is achieved by implementing mathematical models that optimize transport routes, correlating the volume of goods to be transported with the capacity of the means of transport.

Example objectives: Reducing the number of administrative staff. Increasing the profit and profitability of the economic unit.

b) Specific objectives - are the objectives that affect the functioning of the information system.

Objective example: Increasing the response speed to beneficiary requests. Increasing accuracy and precision in the process of processing data and informing management. Ensuring the completeness of information necessary for management. Ensuring the appropriateness of information necessary for management. Simplification and rationalization of information flows.

The economic effects of achieving the objectives related to the functioning of the information system are difficult to quantify, but they can be estimated. In the end, they will positively influence the development of the

basic activity. In conclusion, the economic effects of IT implementation are direct and indirect.

From the point of view of the possibilities of quantifying the effects of the objectives, they can be classified into:

a) Quantifiable objectives (quantitative): increase in production volume, decrease in transport expenses, decrease in specific consumption of raw materials and materials;

b) Non-quantifiable objectives (of a qualitative nature): increasing the prestige of the economic unit - it is achieved, for example, by increasing the quality of production (or services), decreasing the refusals of the beneficiary (the number of complaints).

At the level of an economic unit, a lot of objectives can appear, but since the resources to achieve them are limited, it is necessary to know and prioritize them according to the management's requirements. By presenting the objectives to the management and then among the employees, there is the possibility of getting to know them, of better understanding the requirements that impose the achievement of the objectives, and as a result, a closer and wider acceptance of all the factors that can compete in the implementation of the systems will be acquired informatics (Paton, 2023; Dayal, 2023).

Depending on the field of activities to which it refers, the field of use:

a) The computer system for the management of economic and social activities. Their specificity is the fact that the input data is usually provided by human-made documents (or manually entered data). The output data are provided by the system in the form of documents (lists, reports, graphs, etc.) for a better perception of them by humans.

b) The computer system for the management of technological processes - it is characterized by: The input data are provided in the form of signals (electronic impulses) transmitted by certain devices automatically, which characterize various parameters of the technological process: pressure, temperature, humidity, composition. The output data are transmitted in the form of signals to execution bodies (regulators) that automatically change the parameters of the technological process. This is how the command and automatic control of the technological process is executed. Differences appear between the objectives of the two categories of systems (A and B). Those for the management of technological processes have as objectives the improvement of aggregate yield, the monitoring of operational safety, the increase of product quality indicators, the improvement of other technical-economic indicators.

c) Computer systems for research and design activity - they aim to ensure the automation of scientific calculations, computer-aided design and other facilities necessary for specialists in the respective fields.

d) IT systems for the management of special activities (domains) - intended for specific domains of activity: information and documentation, medicine, the legal domain, etc.

Depending on the hierarchical level occupied by the economic system in the organizational structure of society:

a) IT systems for managing the activity at the level of the economic unit - can be broken down into IT subsystems associated with the functions of the economic units: IT for production, financial-accounting IT, commercial IT, IT for human resources, etc.

b) IT systems for managing the activity at the level of organizations with a group structure - IS at the level of autonomous directorates, at the level of some departments, etc. The structure of an IS of this type results from the integration according to systemic principles of the IS related to the component units, the outputs of these IS being taken over by the IS of the management body of the entire organization (Chaudhuri, 2022; Hirouchi, 2022).

c) Territorial IT systems - at the level of administrative-territorial units, serve to substantiate the decisions adopted by the local governing bodies (city, county).

d) IT systems for the management of branches, sub-branches and activities at the level of the national economy - are developed and administered by the ministries, departments or bodies that are tasked by law with methodologically coordinating the respective groups of activities.

e) General functional IT systems - intersect all the branches and activities that take place in the space of the national economy: the financial system, the banking system, the statistical system.

Depending on the major roles they fulfill in an organization:

Information systems fulfill operational, managerial and strategic support roles in businesses and organizations, being able to be grouped into information systems for company functions, operational information systems and managerial information systems.

3. Application of different types of data in information systems

It is important for a manager to understand that IS (Information Systems) directly supports functions operational and managerial aspects of the organization in accounting, finance, human resources, marketing and operational management. For example, marketing managers need information about volume and sales trends, provided by marketing IS (Applications: Sales management, market research and forecasts, promotion and advertising, automation of the activity of sales, Interactive Marketing, Customer Relationship Management – Customer

Relationship Management = CRM-, Production Management). Economic directors need information about financial costs and benefits, provided by financial IS (Applications: Preparation of the income budget and expenses = BVC, Financial planning, Cash management, Investment management).

Managers responsible for production need information to analyze resource needs and labor productivity, provided by manufacturing IS. HR managers need information about entitlements employee salaries and professional development, provided by human resources IS (Applications: Personnel record, Payroll, Improvement of personnel qualification). In conclusion, IS for enterprise functions provides managers with a variety of information for substantiating decisions in the functional areas of business (Gessert 2023; Dayal, 2023).

Operational IT systems process data generated and used in business operations. In the depending on the role they have, there are several categories: processing systems a of transactions - records and processes data resulting from transactions, updates databases of data and produce a variety of documents and reports; process control systems – provides operational decisions that control physical processes; automated systems of services - those that support communications. Computer systems have always been necessary for the processing of data generated and used in business operations. Operational SIs produce a variety of information, but they (the information) do not highlight which information products are the most suitable for managers. For this reason, further processing via computer systems.

Operational IT systems include most transaction processing systems, which have evolved from manual IS to mechanical data processing systems and then to systems of electronic data processing. Transaction processing systems record and processes data resulting from transactions such as sales, purchases and changes of inventory. They can process data created by modifying items in a database file of data (for example the name and address changes of a customer), generating a variety of informational products for internal or external use (for example invoices for customer, paychecks, sales receipts, purchase orders, dividend payments, payments of taxes and financial invoices) and highlighting the databases used by an organization for further processing, through managerial information systems (Coronel 2023; Hirouchi 2022).

An IT system specific to economic applications can access data from databases structured as data warehouses, such as the one in the following example:
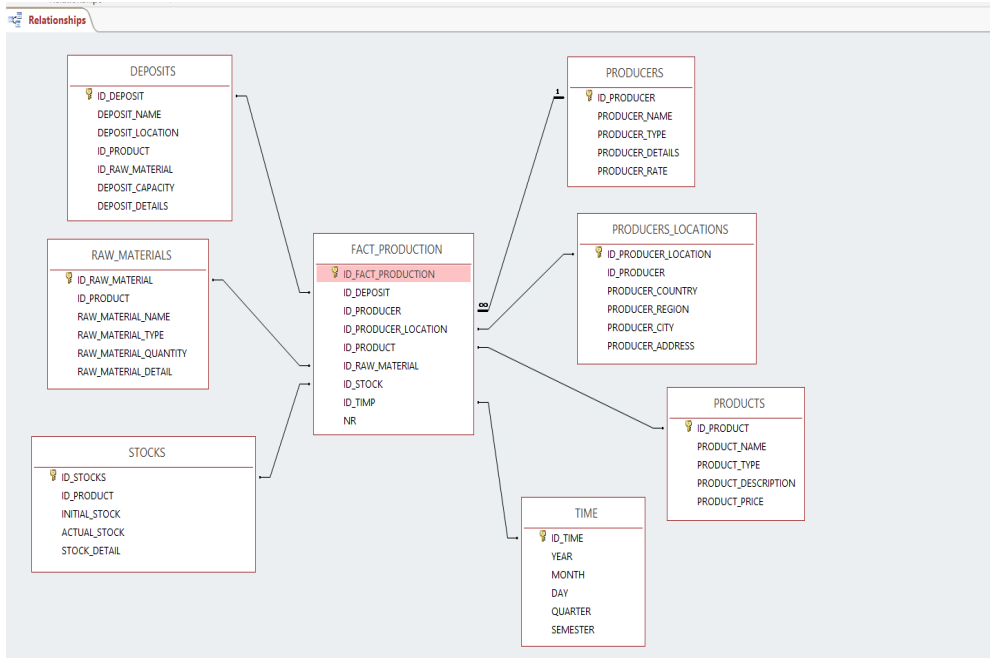
Fig. 1. A database star schema for a production company

The dynamic analysis of the present and future situation is based on solid documentation. A well-founded decision requires internal and external information, expressive indicators that reflect the processes and phenomena of the company's economic and financial activity, determine the limitation of the uncertainty that characterizes the company's behavior in the context. Together with the information, in identifying and choosing the courses of action, an important role is played by the rigor and personal experience of the decision-maker, because in the last instance, decision-making is an attribute of management. In the financial-accounting field, Interactive Decision Support Systems help the analyst establish a diagnosis of the company's present and future based on data extracted from an accounting information source. Considered a computerized documentation system, based on knowledge in the financial-accounting field, it helps the decision-maker to solve problems related to the analysis of the existing patrimonial situation, the conditions of financial balance and profitability, to highlight weak points and strong points, to make forecasts (Paton, 2023; Dayal, 2023).

The analysis is mainly based on the information provided by the Balance Sheet, the Profit and Loss Account and Appendices, supplemented with information on the commercial, technical and human potential, with information highlighting the company's position on the market and the intensity of the competition.In the financial-accounting field there are no unique decision

criteria, the elements of the result being sensitive to a multitude of factors, to assumptions regarding prices, the market, or economic growth. For example, a cost-effective solution from the point of view of general liquidity may be less good from the point of view of the treasury. The advantages of using a star database schema are multiple and can include interactive analyzes created by managers through friendly interfaces, detailed business reports or graphs that can be easy to use for calculating future trends. Such an interactive analysis can be easily performed as in the following example:
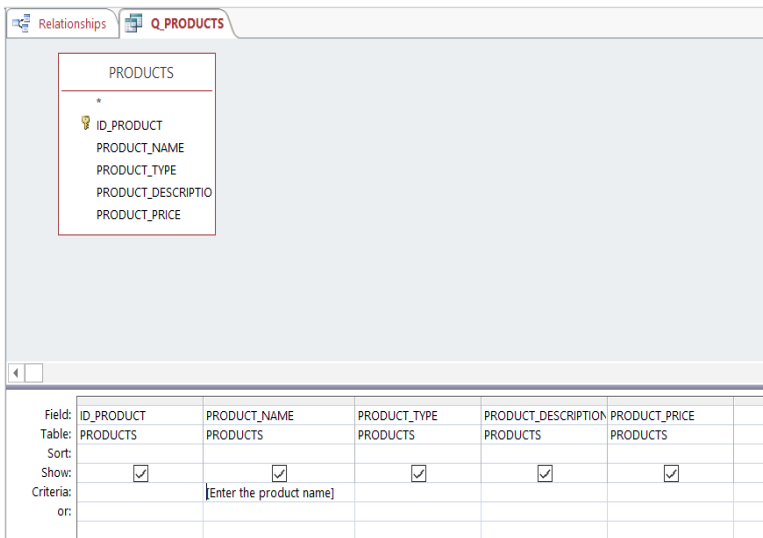

Fig. 2. A query based on products table

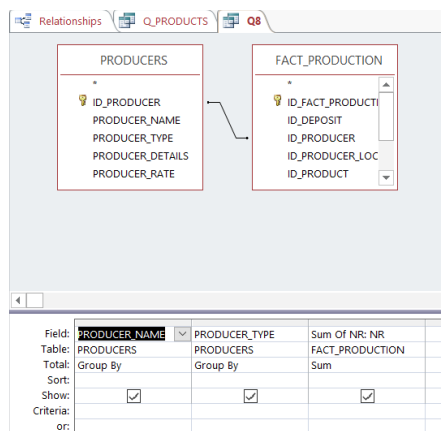Another example of interactive analysis is the following:

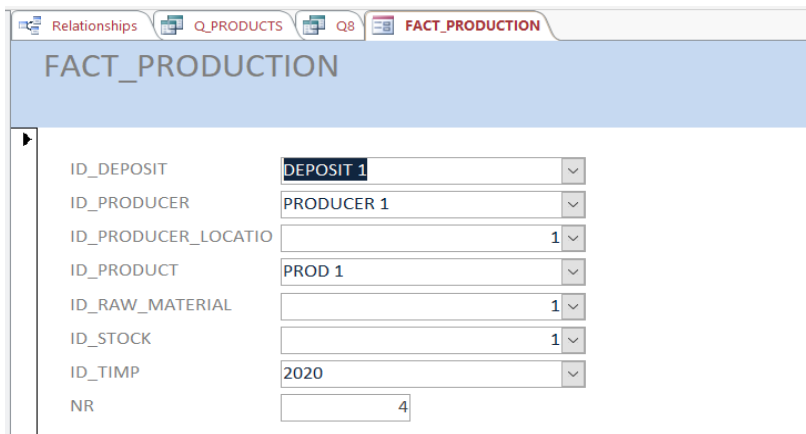Fig. 3. A query based on producers table and fact_production table

The accounting information is correlated with the specifics of the activity, with the results of exploitation or with the objectives established depending on the context. Thus, the interpretation of financial flows is done in a different way in the phases of expansion, maturity or decline of the company (Chaudhuri, 2022; Gessert, 2023).

The results of the financial analysis are obtained most of the time on mathematical models. They are subordinated to some general objectives, they are useful in formulating general economic policy recommendations. I am looking either to improve the framework necessary for making decisions, or to carry out a preparatory study to decide.

Theoretically there are several models for the same situation. The decision-maker, specialist in financial analysis, remains the last mediator who, interactively and depending on the context, performs calculations within the offered models, changes the representation model if necessary. Success is essentially based on the ability of the decision-maker to foresee events and to anticipate the consequences of their production.

A form used to enter data can be the following:

Fig. 4. A form used to enter/modify data in the table and fact_production table

A report used by managers may be as follows:

Report_1

DEPOSIT_NAME	PRODUCER_COUNTRY	DEPOSIT_LOCATION	PRODUCER_ADDRESS	PRODUCT_NAME	PRODUCT_PRICE	RAW_MATERIAL_NAME	First Of PRODUCER_NAME Sum Of ACTUAL_STOCK	
DEPOSIT 1								
	COUNTRY 1	LOCATION 1	ADDRESS 1	PROD 1	107	RAW MATERIAL 1	PRODUCER 1	127
Summary for 'DEPOSIT_NAME' = DEPOSIT 1 (1 detail record)								
Sum								127
DEPOSIT 2								
	COUNTRY 2	LOCATION 2	ADDRESS 2	PROD 2	132	RAW MATERIAL 2	PRODUCER 2	179
Summary for 'DEPOSIT_NAME' = DEPOSIT 2 (1 detail record)								
Sum								179
DEPOSIT 3								
	COUNTRY 3	LOCATION 3	ADDRESS 3	PROD 3	154	RAW MATERIAL 3	PRODUCER 3	24
	COUNTRY 4	LOCATION 3	ADDRESS 4	PROD 4	165	RAW MATERIAL 2	PRODUCER 4	24
	COUNTRY 5	LOCATION 3	ADDRESS 5	PROD 5	172	RAW MATERIAL 5	PRODUCER 5	55
Summary for 'DEPOSIT_NAME' = DEPOSIT 3 (3 detail records)								
Sum								103
DEPOSIT 4								
	COUNTRY 4	LOCATION 4	ADDRESS 4	PROD 4	165	RAW MATERIAL 4	PRODUCER 4	48
Summary for 'DEPOSIT_NAME' = DEPOSIT 4 (1 detail record)								
Sum								48
DEPOSIT 5								

Fig. 5. A report used for decision makers based on details of sales

In the general framework of the company's IT system, Interactive Decision Support Systems are included in the category of management systems. It is based on information from transaction processing systems and assists the managerial process at different decision-making levels. They expand towards the implementation of the decision, the orders resulting from the decomposition of the decisions reaching the level of the operative management system (Dayal, 2023; Hirouchi, 2022). Charts can be used to calculate future trends if time dimension data is also used, such as the following example:
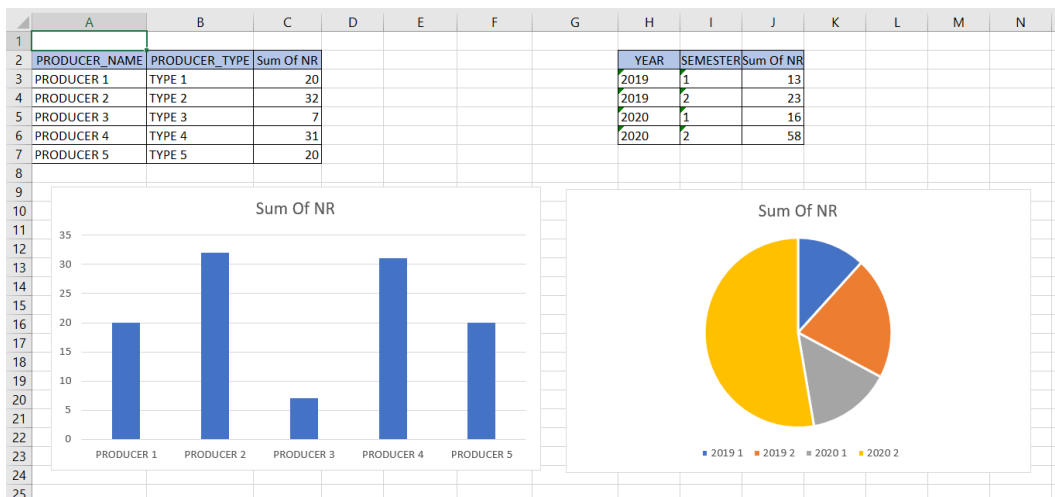
Fig. 6. Charts used to calculate future trends

Used in company management, Information Systems are present in various stages of the decision-making process, at the tactical or strategic level they emphasize the flexible elements, assisting ad hoc requests and analysis.

4. Conclusions

Within them, the management information systems, executive information systems are intended for tactical management, emphasizing quick access to information, providing elements directly related to the management of the company's resources, and support systems for management executive support system are intended for the strategic management of the company, taking more information from the external environment of the company (Chaudhuri, 2022; Paton, 2023). Transactional systems are designed to streamline and automate the processing, record keeping and reporting of transactions. Record current information and maintain database of transaction information. The quantitative and even qualitative increase in the information obtained from the processing of daily transactions did not lead to significant changes in the quality of the decisions made. There are numerous options for data processing, information evaluation, adaptation to changes. The use of information systems that use databases optimizes data storage, but also offers multiple possibilities of using them through queries, reports and graphs, which can help managers in the decision-making process.

References

Carlos Coronel, Steven Morris, Peter Rob, (2023). *Database Systems Design, Implementation and Management.* Course Technology, Cengage Learning.

Chaudhuri, Surajit, (2022). *Data Mining and Database Systems: Where is the Intersection.* Microsoft Research.

Chaudhuri, S, U. Dayal, V. Ganti, (2023). *Database technology for decision support systems*, IEEE Publisher.

Gessert, Felix, Wolfram Wingerath, Steffen Friedrich, Norbert Ritte, (2023). NoSQL database systems: a survey and decision guidance. *Computer Science - Research and Development*.

Hirouchi, Tetsuo, and Takeshi Kosaka, (2022). An effective database formation for decision support systems. *ScienceDirect - Information & Management.*

Paton, Norman W., Oscar Díaz, (2023). Active database systems. *ACM Computing Surveys*. Volume 31, Issue 1, pp 63–103. https://doi.org/10.1145/311531.311623.