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Technological Aspects of Accounting Automation System as a Decision Support System

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Abstract. **Nowadays all businesses need access to an extensive pool of information. Reporting, financial and accounting analysis, financial planning and budgeting are key factors for market-oriented corporate management and successful business. In the digital economy, strong competition, responsible entrepreneurship and corporate social responsibility the business feels a need for revolution and new decision sciences for complex systems that collect big data, analyze it and create reports that can be used by managers for decision-making. The present study aims to prove that the accounting automation system is an important tool for managing the economic activity of companies, because it mediates the interrelationships between managers/decision-makers, or *subjects of management*, economic activity and its results, or *object of management*, in support of Business intelligence, or *BI*, Data and Analysis, Power Platform, etc. The following research tasks have to be settled for reaching the above-mentioned goal: 1. to analyze the components of decision support systems; 2. to research the types of decision support systems; 3. to demonstrate the impact of the accounting automation system as a decision support system on the optimization and improvement of the working processes and making adequate timely management decisions; 4. to analyze the technological aspects of accounting automation system as a decision support system; 5. to research the challenges and solutions regarding ERP systems and SAP. In the course of the study shall be justified the thesis that the successful business is based on true, accurate and reliable information which is mostly generated by automated accounting system as a decision support system and contemporary information technologies. The results of the research are expressed in establishing the way to ensure and guarantee the unification, acceleration and optimization of the *input-processing-output process*, analysis, financial modelling, financial planning, etc. about decision support and respectively wealth management.**

Keywords: accounting automation system, decision support system, information technologies, system structure.

I. INTRODUCTION

Accounting as an information system provides information to various stakeholders to support decision making. In modern economic conditions, the introduction of information technologies will allow the company to increase profits, reduce routine operations, increase employee motivation, which has advantages in the form of cost reduction, lower risks of loss and duplication of information, etc. [1]. These technological transformations also assign to an accounting. Its automation can be a very useful tool for managing the economic activity of companies (enterprises). Making use of Accounting Automation System (AAS) is characterized by a number of advantages. It helps the process to reduce errors in calculations and in accounting records and operations, which will increase the accuracy and timeliness of information in financial statements. AAS also helps in the context of better data management – a process of more efficient storage, management and protection of financial data, which facilitates current and periodic accounting, reporting and analysis. Automation of accounting processes can help businesses to reduce costs regarding to manual data entry, paper-based document processes, and errors correction. By automating accounting activities, companies can free up time for other important activities such as strategic planning, social activities, analysis and making quality management decisions.

All these advantages prove that AAS can successfully be treated as a Decision Support System (DSS) because it supports the automation of the collection, processing and analysis of financial data and its transformation into management information. Specifically, AAS is implemented as a DSS in the following directions:

- Data collection and Data mining. AAS may collect financial data from various sources, such as bank

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statements, invoices and receipts in order to organize, structure and store in a way making it easier to analyze and report [2],

- Financial analysis. The collected and structured financial data from AAS can be used by managers for various analyses such as ratio analysis, trend analysis, and benchmarking, to illustrate the financial position and performance of the company and to support management decision-making [3],
- Reporting. AAS successfully generates financial statements such as balance sheets, income statements, and cash flow statements. These reports can provide a clear picture of a company's financial condition and help stakeholders make informed decisions,
- Strategic decision-making support. AAS allows the generation of forecasts and simulations that managers can use as a basis for scenarios that, after analysis and evaluation, can turn into successful long-term decisions.

In conclusion, an automated accounting system can successfully be associated with a decision support system as it provides timely, accurate and relevant financial information by automating the collection, analysis and reporting of data to serve managers and others stakeholders in the process of preparing operational and strategic management decisions.

II. Materials and Methods

The problems of the implementation of information technologies in business, as well as the current state and the future prospects of management and accounting in modern business conditions and intense challenges, are discussed in a large number of scientific forums and in specialized literature and considered in the works of authors such as J. A. Hall, Joseph W. Wilkinson, Michael J. Cerullo, Vasant Raval and Bernard Wong-On-Wing, G. Tsoncheva, N. Grozeva, F. Filipova, N. Nenov, D. Petrova, A. Deneva and R. Aslanzade, M. Chipriyanov [4] - [12], etc. Of particular importance is the current legislation in Bulgaria – the Accountancy Act, the Bulgarian Electronic Document and Electronic Certification Services Act (EDECSA) on the application of electronic signatures, Regulations, Decrees of the Council of Ministers, National strategy "Digital transformation of Bulgaria for the period 2020-2030", The National Program "Digital Bulgaria 2025", National Recovery and Sustainability Plan from the Council of Ministers of Bulgaria from 2022 [13] - [17], and other.

A research was made by the help of the structured interview methodology amongst non-financial enterprises in Bulgaria, using the method of random sampling without replacement. The sample was formed from small, medium and large enterprises in Bulgaria. The sample does not include micro-enterprises, because the dimension of their economic activity and, accordingly, their volume of work in making managerial decisions, do not impose the need for a Decision Support System (DSS). The methods of Content analysis, induction, deduction, Crosstab and Dynamic SWOT Analysis were also used.

III. Results and Discussion

A. Components of Decision Support Systems

DSS is responsible for the information provision of the decision-making process by providing complex data, analyzing problem situations and preparing possible models. It is an interactive computer-based system and can be research as a composition of different components, as follows:

- User interface. Through this component, the interaction between DSS and all users is achieved. It provides in a convenient way (graphics, text, image) the possibility of entering data, viewing results, visualizing models, adjusting parameters, requests to perform certain activities, generating reports, etc.,
- Data management system. This component is responsible for collecting, organizing and storing data from various sources. It includes tools for data entry, validation, ordering and cleaning, sorting, as well as techniques for data integration and transformation,
- Knowledge base. The database includes information from internal and external sources that is relevant to decision making. Such sources can be records in the accounting system, internal regulatory documents, various legal requirements, press information, information from Internet [18],
- Model management system. This type of system contains multiple models (statistical, mathematical, optimization, simulation, semantic) that managers can use to make management decisions, as well as tools for preparing, testing and validating models [19],
- Communication and collaboration system. It provides managers' and stakeholders' opportunities to connect, share, evaluate, prepare and promote management decisions.

B. Types of Decision Support Systems

The optimal implementation of the goals of DSS is achieved through the information processing of data, the construction of models, the application of specific techniques that support the management process. During the process of its development, the following types of DSS are distinguished depending on the used tools and the role of functional performances [20]-[21]:

- Model-driven DSS: This type of DSS uses mathematical and analytical models to help decision-makers solve problems or make decisions. These models can be simple or complex, and they can include statistical models, optimization models, and simulation models,
- Data-driven DSS: This type of DSS focuses on analyzing large amounts of data to extract meaningful information that can be used to support decision-making. These systems use data mining and machine learning techniques to identify patterns and trends in data,

- Document-driven DSS: This type of DSS is designed to manage and analyze unstructured data, such as text documents, reports, and emails. These systems use natural language processing and text mining techniques to extract information from unstructured data sources,
- Knowledge-driven DSS: This type of DSS is based on expert knowledge and experience. These systems use rule-based reasoning and knowledge management techniques to provide decision-makers with advice and recommendations,
- Web-based DSS: This type of DSS is designed to be accessed over the internet. These systems allow decision-makers to access relevant information and data analysis tools from anywhere, using any device with an internet connection.
- Each type of DSS has advantages and disadvantages. They are decisive in the process of choosing the type of system to be successfully applied in the decision-making process according to the specific needs of managers and other stakeholders.

C. Impact of the Accounting Automation System as a Decision Support System on the management decisions

The progress of information technologies, incl. in accounting, has a significant impact on the optimization and improvement of the working processes and making adequate timely management decisions.

The processing of economic information in ASS is based on the model *input-processing-output*. Users of accounting information are in the role of subjects. At the input of the information system, information provided by users is collected for all registered business processes and operations and economic events.

In the information processing component, the processes of collecting, measuring, storing, analyzing, reporting and managing the information take place as a result of the application of accounting methods and techniques. The results that are generated as outputs are in a state of financial reports, budgets, reports, forecasts and analyses. They are provided to users to support management decision-making [22].

The *input-processing-output* model applicable in AAS is relevant to management because of its multiple advantages, making it a high level DSS. For example, this type of AAS allows the provision of **real-time financial data** to decision makers. This data may include information about business processes and operations related to purchases, sales, revenue, expenses and cash flow. The access to real-time financial data provides options to managers to make decisions based on up-to-date information. A significant advantage is also the possibility of high-quality data analysis - improved data analysis by automating data collection, cleansing, and analysis processes. This helps managers to identify trends and patterns in financial data. They can later be used to optimize processes and improve decision-making. By automating all processes, AAS can also save time and reduce the risk of errors in regard to manual data entry and analysis. Better financial planning via AAS can help managers better plan cash flows. The system provides managers with accurate financial forecasts and planning tools. The tools can help managers to foresee the course of financial needs and respectively to correct and change their strategies. Based on greater clarity about the financial situation, managers make more informed decisions about budgeting, resource allocation and investment opportunities. AAS increases the efficiency of the reporting process, i.e. it **streamlines reporting** by automating the creation and disclosure of financial statements. This helps managers to save time and reduce the risk of errors in regard to manual reporting. In addition, it ensures that all stakeholders have access to accurate and up-to-date financial information. AAS as DSS can be systematized in several types: Management Information Systems, Financial Decision Support Systems, Budgeting and Planning Systems, Performance Management Systems, Enterprise Resource Planning (ERP) Systems. All of them serve certain activities in the management process – planning, organization, reporting, analysis, control. This shows the effective collaboration between accounting, information technology and management. AAS as a DSS provides managers with timely and accurate information to support better decision making, improving the performance and financial results.

D. Technological aspects of the Accounting Automation System as a Decision Support System

AAS as DSS uses various technologies to automate and streamline accounting processes. The quality processing of incoming accounting information is a key factor for the success of organization, because it is the basis for making management decisions. The role of the AAS is to ***data capture and processing***. AAS collects large amounts of data from various sources quickly and accurately. This data can be captured electronically and automatically imported into the system, reducing the need for manual data entry. AAS processes them quickly and accurately, and specifically classifies business processes and operations/categorizes transactions, makes relevant entries in accounts on an ongoing basis, periodically summarizes the information in accounting registers and generates financial statements. In addition, AAS successfully integrates with other management information systems, such as CRM, payroll management systems, inventory management systems, that exchange and process data each other in real time.

Artificial Intelligence and Machine Learning are modern technological solutions that can be successfully integrated within AAS as DSS. They have wide applications in various directions. For example, AI-powered systems can perform automated data entry, expense categorization and financial statement preparation. These activities include extract data from different resources and financial documents and automatically input it into accounting systems, automatically categorize expenses based on factors such as suppliers, category, and amount and then generate financial statements such as balance sheets and income statements automatically. This

save time, reduce errors associated with manual data entry, and help streamline the expense reporting process.

Machine learning algorithms can analyze large amounts of financial data to identify patterns that may indicate fraud activity (fraud detection) more quickly and accurately. Also they can analyze historical financial data to predict future cash flow and help businesses manage their cash flow more effectively.

Artificial Intelligence and Machine Learning together can be used to analyze financial data and make predictions about future trends and outcomes. This can help businesses plan more effectively.

Cloud computing provides numerous advantages to AAS. They can successfully provide users with remote access to accounting information from anywhere in the world through an Internet connection. The accounting process within cloud technologies also allows automation of repetitive tasks and real-time financial reporting and analysis. This means that accountants can work from anywhere, which can save time, increase productivity, reduce errors. An advantage of Cloud-based accounting systems is an opportunity for integration with other software and management systems such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM). Users, channels, storage and features can also be easily added or removed. Thereby AAS as DSS provide a comprehensive view of an organization's financial and operational performance. This definitely increases the quality of management decisions [23].

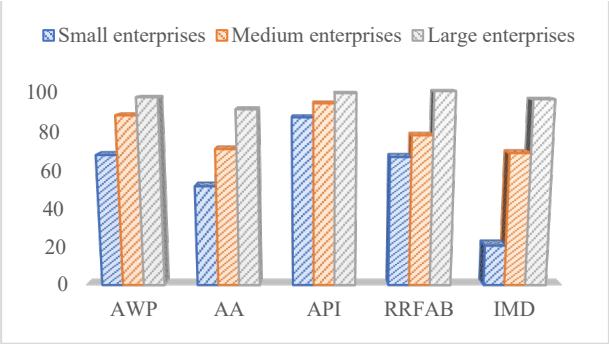

Fig. 1. Level of knowledge of the functional capabilities of the ERP according to the categories of businesses in percentage.

AAS uses ***analytics and reporting tools*** to generate financial reports, dashboards and other visualizations. These tools allow users to analyze financial data and identify trends, risks and opportunities to support management decision making.

E. ERP systems and SAP in practice

A research was carried out, which aims to establish to what extent enterprises are familiar with the functional possibilities of ERP: automates all work process (AWP), accelerates the activities (AA), accumulates and processes information (API), rapid reporting, planning, forecasting, analysing and budgeting (RPFAB), integration with mobile devices powered by Windows Mobile and Android (IMD).

The sample was formed from small, medium and large enterprises in Bulgaria by the method of random non-recurrent selection. The sample does not include micro-enterprises, because the dimension of their economic activity and, accordingly, their volume of work in making managerial decisions, do not impose the need for a Decision Support System (DSS) such as the ERP system. Period of the survey March 2018-March 2023. The results have found expression in (Fig. 1).

100% of respondents believe that ERP is an analogue of maximum automatization of the working processes and provides fast, secure and reliable information in real time for making decisions. More than 70 % of them consider that this is a successful way to add business value. The largest percentage of respondents associate ERP with the fact that it accumulates and processes information. The lowest percentage observed in small and medium-sized enterprises refers to integration with mobile devices powered by Windows Mobile and Android. At the same time, this is mainly within the power of large enterprises.

Based on our research, we propose the following model of DSS (Fig. 2).

Our next step was to determine whether the different types of enterprises of the sample have the financial resources and competent personnel to work with ERP.

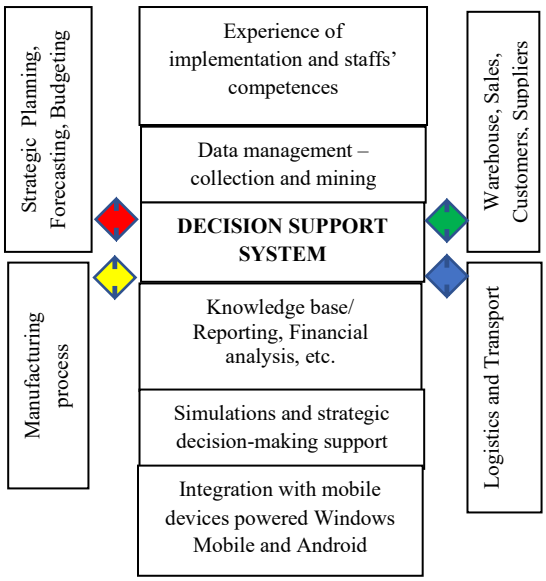

Fig. 2. Model of Decision Support System (DSS).

The results (authors' own research) have found expression in Table 1 by Crosstab. 55,84 % of the sample answered *yes, definitely*. Nearly 27 % of all respondents answered *more than likely* and almost 17 % of them answered we *will analyze further*.

Respondents of the sample define as the most popular ERP systems: SAP, Zeron ERP Business software and Microsoft Dynamics NAV.

Regarding SAP our research shows that SAP is a leader in ERP for the business sector. This software for managing the business processes is sold as Windows – worldwide.

Decision-making software such as Zeron ERP Business Software and Microsoft Dynamics NAV, for example, are sold in Bulgaria and are developed and adapted in accordance with Bulgarian accounting and tax legislation.

TABLE 1 FINANCIAL RESOURCES AND HUMAN CAPACITY

			Categories of businesses (Accountancy Act, amm. SG/ 26 dated 22 March)		
			Small enterprises	Medium enterprises	Large enterprises
Are you ready to adapt your business model…	definitely yes	Count	17	12	14
		% within categories	43,59%	57,14%	82,35%
	more than likely	Count	13	6	2
		% within categories	33,33%	28,57%	11,77%
	we will analyze further	Count	9	3	1
		% within categories	23,08%	14,29%	5,88%
Total		Count	39	21	17
		% within categories	100,0%	100,0%	100,0%

TABLE 2 DYNAMIC SWOT ANALYSIS

External Factors	
OPPORTUNITIES	THREATS
▪ ability to successfully develop market Segments.	▪ counteraction to the risk of entry of new competitors.
Internal Factors	
STRENGTHS	WEAKNESSES
√ increasing the flexibility of the price policy; √ facilitated development of strategies for entering new markets; √ increasing the efficiency of the logistics system; √ increasing customer and consumer satisfaction.	√ increased management costs; √ potential difficulties in the phased integration of all modules of the system √ need for constant improvement of staffs' Business Intelligence (BI) competences (regular trainings).

It was a challenge for us to do a SWOT analysis as well. We use a dynamic SWOT analysis (Table 2) as a technique for assessing the aspects of using ERP in the business as follows: in the past, currently and in the future.

The opportunities, threats, strengths and weaknesses resulting from the implementation of business intelligence solutions are analyzed.

By implementing the ERP in the enterprise, the external environment cannot be influenced. The use of the software for the management of business processes and developing solutions cannot analyze market conditions and cannot influence consumer demand or tax legislation.

It uses information one and only from the warehouse, manufacturing process, sales, etc. as well as all internal processes to support management.

For example, disrupted supplies as a result of the Covid-19 crisis and the war in Ukraine will be treated as an external threat, as for all enterprises and businesses.

IV. CONCLUSION

Under the conditions of a market economy, one of the most important resources is the information, and the computerization of enterprise management in the context of planning, forecasting, decision-making and control is an important competitive factor. Therefore, it is extremely important for every enterprise to create and develop a system that supplies it with true, reliable, accurate and timely information, so-called Decision-support system (DSS).

First. DSS can be researched as a complex system of components and subsystems that are characterized by continuous connection and exchange of data in the relationship *input-output*. The outgoing information possesses the qualities of elasticity, quality and usefulness and is intended to increase the managerial productivity of the management.

Second. In order to achieve speed and accuracy in the process of processing a large amount of data with high quality of output information, minimizing errors and convenience in using information in time and space, DSS should be computer-based, automated and with an option to work across different mobile devices.

Third. The AAS, as a system that provides a comprehensive and reliable coverage of all business operations and processes in the enterprise – performs a major informative and controlling role in the reporting process. It can reasonably be analyzed as a decision support system with basic principle characteristics: objectivity, connectivity, integrity, stability, adaptability, productivity, effectivity.

Fourth. AAS as DSS can provide advanced analytics tools, such as predictive modelling and data visualization, that can help identify trends, patterns, and insights that may not be immediately apparent from traditional financial reporting. This can help managers to make more informed decisions based on deeper insights into financial and operational performance.

Fifth. DSS can improve communication and collaboration among employees, departments, and stakeholders by providing a centralized platform for sharing and accessing financial and accounting data. This can help

reduce the risk of miscommunication, duplication of effort, and data inconsistencies.

Sixth. Nowadays, in the conditions of digitization, transformation and automation of all business processes, it should be noted that ERP system can successfully be analyzed as a high level DSS in the companies. Its core is the main and most important module – the accounting module, through which varied information in a direct and feedback relationship flows with all other modules.

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