

Yönetim Bilişim Sistemleri Geliştirme

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Özet: Bilgi teknolojilerindeki gelişmeler hem kuruluşları hem de çalışanları doğrudan etkilemiştir. Hem kurumlar hem de çalışanlar bu yeni işleyişe uyum sağlamak zorunda kalmıştır. Bu kapsamda bilişimin en iyi şekilde nasıl kullanılacağı, hangi yöntemlerin doğru kullanılması gerektiği, ne tür bir bakış açısına ihtiyaç olduğu ve hazırlık yaparak doğru adımların nasıl atılacağı gibi konular tüm kurumların ve çalışanların ilgi odağı olmuştur. İşletmeler, mevcut bilgi sistemlerini iyileştirmek veya yeni sistemler eklemek için çok hantal adımlar atmak zorunda kaldı. Ne yazık ki, çok iyi araştırma yapılmadan veya gerekli altyapı olmadan yapılan bazı yatırımlar israfın ötesine geçmedi. Bu bilgiler ışığında çalışmanın temel amacı, bilgi sistemlerini iyileştirecek veya bilgi sistemlerini yeniden kuracak işletmelere uygun öneriler sunmaktır.

Sözü edilen amaca yönelik çalışma üç alt başlıktan oluşmaktadır. Öncelikle bilgi sistemlerindeki gelişmeler tartışılmış ve bilgi sistemlerinin gelişimi ile yönetim arasındaki etkileşim incelenmiştir. Ardından Yönetim Bilişim Sistemleri (MIS) ve Karar Destek Sistemleri (KDS) tartışılmıştır.

Anahtar Kelimeler: Yönetim Bilişim Sistemleri, Karar Destek Sistemleri

Management Information Systems Development

Abstract: Developments in information technologies have directly affected both organizations and employees. Both institutions and employees have had to adapt to this new process. In this context, issues such as how to use informatics in the best way, which methods should be used correctly, what kind of perspective is needed, and how to take the right steps backed with preparation subjects have been the focus of attention of all institutions and employees. Businesses had to take very unwieldy steps to improve existing information systems or to add new systems. Unfortunately, some investments that were made without very good research or the necessary infrastructure did not go beyond waste. In the light of this cogniance, the main purpose of the study is to provide appropriate suggestions to businesses that will improve or re-establish information systems.

Key Words: Management Information Systems, Decision Support System

1. INTRODUCTION

Information, both individually and organizationally, is the best resource that should be managed (Huber 1984: 929). Managerial information is processed by the "information system (IS)" of the enterprises. Businesses sit on three pillars: physical, administrative and information demand. The information system in an enterprise consists of people who collect and process information through computers and computers themselves. The established IS should provide the necessary information to the management in order to achieve the targeted goals, and the managements needs for these goals should be carefully examined (Madnick and Wang, 1988: 6).

Besides making the management of the information system strategic decision, the process of developing a suitable, correct and open system in order to manage the physical activities of the enterprise as well arises when a new system is required or when the old system should be reviewed. The arise of the aforementioned needs depends on the change in

the management's information needs or the belief that the new technology will be much more useful than the old one (Swanson, 1974: 179).

2. DEVELOPMENT IN INFORMATION SYSTEMS AND ITS EFFECT WITH MANAGEMENT

Firstly, in the 1950s, due to industrially produced computers, the data passed from the black notebook to the electronic environment. With the increase in the amount of data over time, computer-based information systems, that is, information systems as today's term, began to emerge (Summers and Heston, 1988: 2). Collected data were processed with the data processing system. However, this is both a very long and complex task. Information systems enabled the filing of data entered by data processing systems. In addition, it has created the necessity of a manager to examine many tables during the decision-making process. In the 1960s, both the speed and power of the computers increased, more and more data were able to be processed and management information

systems began to develop. With this system, the necessary information was presented and reported in accordance with the decision to be given by the managers. As a result of this professional convenience, the entire purpose of data processing is based on converting data to information for MIS and other information systems (Iveset et al., 1983: 786).

This created the database management systems. Although MIS facilitated the work of the managers, because of the fact that they could not give clear answers to the questions asked by the managers, the decision support systems (VanNievelt, 1993: 5) towards the 80s were followed by senior management information systems. Subsequently, senior management information systems were established. After the 90's, the rapid change in businesses brought along Office Information Systems (Office Automation), which enables the spread of information throughout the organization,

Expert Systems that combine rules and knowledge specific to any specialist, and Strategic Information Systems that support the competitive strategies of enterprises (Martinsons et al., 1999: 73).

However, the change in both business conditions and technology in today's knowledge causes the exhaustion of all information systems. Information systems, like all other systems, have a certain life span, they are born, develop, revised and rearnegeed accordingly and their life comes to an end. At certain points of this process, it is necessary to review the existing system and develop it to adapt to the new form in order to be able to use it again. There are many factors that trigger this situation. According to Porter, there are five types of competitive effects that will cause changes in information technology, and organizations should implement five steps to take advantage of the information revolution. These are as in Table 1:

Tablo 1: Competition Conditions Forming Porter's Information Technology and Ways to Follow

Competitive Effects	<ul style="list-style-type: none"> • Purchasers power • Competition intensity between existing competitors • Substitute product hazard • Danger of new entrants to the market
Ways to Follow	<ul style="list-style-type: none"> • Evaluating the information density • Identifying the role of information technology in the industry structure • Identifying and rating the competitive advantages provided by information technology • To determine how information technology can reveal new jobs. • Developing a plan to take advantage of information technology

Reference: Daly, Donald J. "Porter's diamond and exchange rates." *MIR: Management International Review* 1993: 121.

In an organization, managers are obliged to develop a strategic plan that will form the outline of the organization's informatics needs and determine how informatics projects should be implemented. In the mentioned planning, it is important to consider the importance of the information system in terms of organization and methodology, commitment and interest of the members of the organization, evaluation of the success of the plan and different features. In this context, the success of the information system plan can be measured with two different methods.

The first method is the dimension of reaching the planning objectives of the plan created. In this method, planning objectives are concepts such as predicting future trends, increase in management development, short and long term development, and correction in decision making. The second measurement method is the adequacy dimension of the plan, in which decision control gains importance (Bhanu and Raghunathan 1994: 327).

There are two issues that are primarily accepted in the development of information systems. The first of these is the decision of the need for the development or expansion of the system in order to both improve the service and provide value to the customers. The second is the acceptance of information systems management's determination and willingness to make the necessary changes, to open the resources suitable for its purpose and to delegate authority to the people who develop and offer software products and related technologies (Özgen and Yaçın, 1992: 251).

User participation is also very important in information system development. The important point that should not be overlooked here is the future of disagreements that come with user participation (Barki and Hartwick 1994: 423). In summary, in order for the system development process to be carried out efficiently, all objectives and information needs should be well defined and guided by the strategic plan of the enterprise.

2.1. System Development Approaches

When the literature is examined, it is observed that there are many approaches. Willis and Tesch Approach, Gane and Sarson Approach can be given as examples (Tesch, 1991: 39; Ashworth, 1988: 155). Although both approaches contain differences from each other, the common point they meet is that the loyalty of users is a necessary condition for system development to be successful. Many MIS studies have revealed that user loyalty and increase in system quality lead to the acceptance of the developed system (Tesch, 1991: 39). Many systems development projects use a combination of the two approaches. The methods mentioned are briefly as follows:

Pre-Product Creation: Rapid development and the inability to see some shortcomings without implementation often cause the requirements not to be determined ahead of time. In such cases, a system example containing the basic features is developed. The designed system is experienced, then redesigned and re-experienced and continues in this way until all the requirements of the management are met. The advantage of this method is that it is a repetitive process and it creates rapid development for the primary product. Its disadvantages are that it cannot be well organized, cannot be inspected and can result with an unfinished system (Guimaraes, 1987: 101).

Traditional Programming Methods: In the traditional method, which is the most used one, the user and the developer come together and decide what to do. The superiority of this method is that it is an evolutionary developer and its weakness is lack of documentation, lack of planning and disorder. Butterfield described the method as irrational systems (Butterfield and Nelson, 1989: 8).

Program Development of the End User: The most important question in this method is who is the end user. In the literature, the end user is divided into two types. The first type of end user is the person who is told what the work to be done and its stages. The second type is the person who designs how these goals can be achieved by internalizing the goals. Not every end user is adequately trained and this is an important criterion for the aforementioned method (Panko et al., 1984: 40).

The advantage of this method is that it is fast, effective in small and complex systems, and improves the database and end user. Its disadvantages are that it is not audited, is poorly certified and is not suitable for large complex systems.

Structural Approach: In this method, which includes the most basic seven stages of system development, each stage is considered to be completed only after achieving the determined goals, and the approval of the management is obtained by reporting (Yourdon, 1993: 56). The advantages of the method are that it is well planned and organized, and the disadvantages are that it takes more time than necessary and in the situation of requirements not being well defined, but they are not suitable.

Outsourcing the Information System: It is the method of purchasing the system or receiving consultancy services from a third party after designing the system (Lacity et al., 1996: 55). The advantages of the method are that experts who cannot be found in the business can be outsourced and the cost is low, especially when using commercially available software. The disadvantages are the high cost for a specially developed software and especially the commercial software cannot meet the user needs as much as the special software.

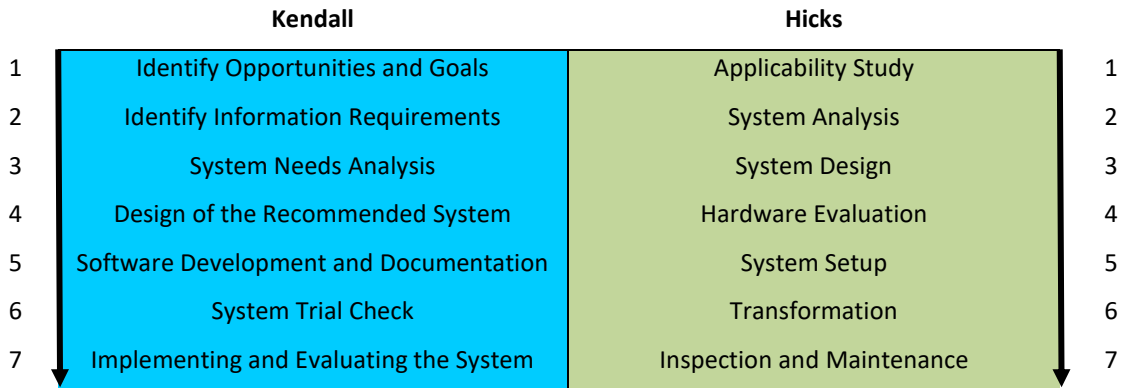
Application Software Package Use: Commercial software packages have eliminated the need for software program development in the enterprise. However, there are difficulties in adapting each organization to these packages with certain standards. In this context, the system analyst requests many software package suppliers to send promotional information about the packages and evaluates the packages in the light of this information.

Then the enterprise chooses the package that will meet the needs at the highest rate and the requirements are harmonized on the received package. The advantages of the method are maintenance, establishment, design etc. reduction in work and saving both time and money in known applications. The disadvantages follows as that enterprises cannot meet their specific requirements, are not suitable for many functions and therefore cannot fulfill them, and they can increase costs in the adaptation and development stages (Laudon and Laudon, 2004: 198).

2.2. Information System Development Process

All efforts to regulate the existing system or develop a new system are called "System Development Process" (Sebetci, 2018: 55). This process has been described with different stages in the literature. However, these stages have been examined under two sub-headings as "Analysis" and "Design". In Figure 1, system development stages of Kendall and Hicks are compared.

Figure 1: System Development Stages of Kendall and Hicks



Reference: Kendall, Julie E., and Kenneth E. Kendall. "Metaphors and methodologies: Living beyond the systems machine." MIS quarterly 1993: 150-151.

3. MANAGEMENT INFORMATION SYSTEM

The MIS model is effective on both tactical decisions and operational controls. Apart from these, managers also use MIS information in more detailed and strategic decision making. MIS can suggest the best direction of action by evaluating many options in decision support systems with the reports it offers, and also facilitates the decision-making of managers in many areas (Laudon and Laudon, 2004: 199). The useful and effective use of MIS is measured by its use in financial affairs, production and marketing, which are the main activities of enterprises. The management information systems

used for different departments of businesses are briefly as follows:

3.1. Marketing Management Information System

The most basic decisions of marketing activities are carried out in five important decision processes: market research, product development, promotion, price and distribution (Stair, 1995: 305).

Automation systems that support the decisions taken by marketing include the activities in Table 2:

Table: 2 Marketing Management Information Systems

Managing the database	<ul style="list-style-type: none"> • Taking raw data from data processing system and converting it into useful information
Market research	<ul style="list-style-type: none"> • Preparation of market research reports • Conducting market intelligence
Product development and planning	<ul style="list-style-type: none"> • Preparation of product development reports • Using computer-integrated manufacturing and computer-aided design techniques to develop new products.
Marketing plan	<ul style="list-style-type: none"> • Demand forecasting, competitors' prices, economic conditions analysis, cost calculation, targeted market revenue, entering the data of the institution's ongoing products. • Determining the market potential of the product with incoming reports • Preparation of supply-demand analysis report
Promotion	<ul style="list-style-type: none"> • Review of previous marketing campaigns • Preparation of advertisement sales statistics report • Comparison of reports from MIS with promotion and sales
Distribution	<ul style="list-style-type: none"> • Preparation of distribution points and quantities report • Obtaining statistical data of stock and sales of sales and retail points
Sales	<ul style="list-style-type: none"> • Quick access to information about products • Preparation of sales reports
Credit	<ul style="list-style-type: none"> • Determining the credits of each retailer in proportion to their sales • Constantly updating the credit status of all customers
Customer service	<ul style="list-style-type: none"> • Following the customer needs after the product reaches the customer • Identifying which customers have their demands and needs and what kind of needs they have

Reference: Snell, N. "Software To Tame The Sales Force." *Datamation* 37.11 (1991): 67.

3.2. Production Management Information System

Production Management Information Systems helps the decisions to be made during the design

and manufacture of the product. These auxiliary systems include the activities in Table 3:

Table 3: Production Management Information System

Production Strategic Plan	<ul style="list-style-type: none"> Production strategy planning systems provide support. These systems are as following; capacity planning, logistics planning, determining process options and determining resource price strategy.
Product design	<ul style="list-style-type: none"> These are the systems supporting the aim of easy production, meeting the need and producing high quality product. At this stage, Computer Aided Design CAD is used.
Facility Design	<ul style="list-style-type: none"> Assists in the design phase of the facility required to manufacture the product effectively and efficiently. The latest development used at this stage is Flexible Manufacturing Systems FMS.
Production planning	<ul style="list-style-type: none"> Designing what will be done in what amount and when. At this stage, MIS information on manufacturing and product features and quality standards are needed.
Manufacturing / Production Control Systems	<ul style="list-style-type: none"> Planning of material and capacity requirements, production time schedule, work productivity, quality and machine controls, maintenance and repair, use of robots are performed by these systems. Systems frequently used at this stage are Material Requirement Planning Systems (MRPS), Just In Time System (JITS), Quality Control Systems, Computer Aided Manufacturing Systems (CAMS), Computer Integrated Manufacturing (CIMS) systems.
Manufacturing / Production Operations	<ul style="list-style-type: none"> These are systems that assist in the readiness of all necessary parts, materials, installations, labor, etc. resources before production. The systems used in this process present reports of the production process.

Reference: Martin, James, and Carma McClure. Structured techniques: the basis for CASE (revised ed.). Prentice-Hall, Inc., 1988: 631

3.3. Financial Affairs Management Information System

Financial affairs management information systems include planning of financial affairs, budget preparation, capital provision, resource

representation, cash management, capital budget and accounting controls. The brief description of these operations is as in Table 4:

Table 4: Financial Affairs Management Information System

Financial Affairs Plan and Budget Preparation	Marketing and production plans are combined within financial affairs with this system used. While preparing the plan, the first step is to create a forecast for the future.
Cash Management	This plan, which is the most important part of the budget, is designed by knowing the expected cash inputs and past expenditures.
Fund Raising and Resource Management	The capital can be provided from inside or through borrowing method. The plan made at this stage includes the design of future revenues and expenses for the new risk to be taken.
Creating a Capital Budget	At this stage, financial status information is required. This activity is linked to production and marketing plans, investment data, interest rates, availability of resources and operational policies.
Account Control	Two types of account control are carried out: money-related controls and transactions-related controls. In the control related to the transactions, it is checked whether the company's budget and policies are complied with. In the control regarding money, it is checked whether the financial situation is correct or not.

Reference: Allen, P. M. "Intelligent, self-organizing models in economics and in finance." *Intelligent Systems für Finance and Business*, (1995): 299.

4. DECISION SUPPORT SYSTEMS

Decision making is a multidisciplinary concept that includes human psychology and behavioral sciences and is therefore quite complex. The aforementioned theories in the decision-making process, on which many theories have been written, were dealt with in behavioral, organizational and descriptive ways (Turban, 1988: 45-49). Since information systems are used to support all levels of managerial decision making, all decision-making theories play an important role in the design and implementation of information systems.

4.1. Decision Making Concept

Both the organization's structure and the decision-making process are very important in designing an effective decision support system. Organizations determine one or more goals and determine many strategies to achieve these goals. All these strategies create different information system needs according to different organizational structures. In 1963, March and Cyert mentioned four basic relational decision-making concepts of institutions (Cyert and March, 1963: 171). These concepts and their short explanations are as in Table 5:

Table 5: Relational Decision Making Concepts of March and Cyert

Alleged solution of the complication	<ul style="list-style-type: none"> According to the concept, the complication in the enterprises should be resolved in a certain order by allowing the departments or individuals within the company to set their individual goals and make individual decisions regarding this within some boundaries.
Avoiding uncertainty	<ul style="list-style-type: none"> According to the concept, the decision-making time should be kept short to get rid of this problem.
Investigating Problematic Situations	<ul style="list-style-type: none"> Efforts to solve a problem according to the concept start with the problem itself and then move on to many problems. In this context, the necessary information system should support this sequential research process.
Organizational Learning	<ul style="list-style-type: none"> The information system required in this process, which includes learning the adaptation of enterprises to environmental changes and time, should measure all changes and measure the reactions of enterprises to their incoming effects.

Reference: Cyert, Richard M., and James G. March. "A behavioral theory of the firm." *Englewood Cliffs, NJ* 2.4 (1963): 171

4.2. Decision Making Processes

Simon mentioned that there are many stages of the decision-making process. However, according to the author, the general summary of these stages consists of three steps: evaluation of all strategies, pre-identification of all results that will follow each strategy, and evaluation of the results by comparison. The process usually starts with the definition of the problem. At this stage, the decision-maker should be careful while defining the problem, knowing that not every problem will lead to bad consequences, and some may be an opportunity. After determining the problem well, the necessary data should be collected and then the solution options should be determined. In this process, an effective information system should be used according to the boundaries created by the enterprise. Among the listed options, the most appropriate option is selected and applied and the recycling of the application is followed (Simon, 1987: 59).

4.3. Decision Making Styles

There are many decision styles and decisions taken are expected to be rational both objectively and subjectively (49). The most commonly used decision styles are called "analytical" and "researcher" (Ives

et al., 1980: 914). While analytical decisions are made with a planned and sequential approach, mobility is at the forefront rather than analyzing the situations in the researcher decision style. In addition to these styles, there are also "oppressive", "client" and "democratic" styles. What is important in all of these styles is the relationship between the chosen decision-making style and the Decision Support System (DSS) and how the chosen decision support system will affect the decision (Sprague and Watson 1979: 62).

4.4. Decision Making Models and Their Relationship with the Information System

Decision making model means simplified representation or concrete form of reality and in this context, the most important feature of DSS is that it can be designed according to the model. According to Simon, decision situations are classified as structural and non-structural decisions (Simon, 1987: 60). After this classification made by Simon in 1960, Antony classified the decisions in 1965 under three sub-headings: strategic planning, management-related controls and operations-related controls (Anthony, 1965: 25). Subsequently, the matrix in Figure 2 was formed by the rankings of both scientists.

Figure 2: Decision Making Activities

Management Levels	Types of Decisions		
	Non-structural	Semi Structural	Structural
Operational	Cash Management Employee Allocation	Production Programming Employee Assignments	Implementation of the Production Program Receivable Accounts Job Sequence Inventory Control
Tactics	Budget Preparation Sales Production Organization of Departments	Comprehensive Budget Deviation Analysis Product Mixing	Short Term Forecasts Budget Analysis Product for Maximum Profit
Strategic	New Product R&D Plan Policies and Targets	Merger / Separation	Provisioning Resources Location of Production and Warehouse Facility

Reference: Yao, James, and John Wang. "Data warehousing development and design methodologies." Encyclopedia of Artificial Intelligence. IGI Global, 2009: 425.

While decision support systems have evolved over time compared to non-structural models, the role of decision makers has increased at the same rate. Keen has stated that neither the user nor the developer of the system can proceed without another. While the user needs the system developer to translate the problems into computer language, the person who developed the system needs the user to investigate the problem or situation well. Keen and Wagner use the term executive mind support system for DSS (Keen and Wagner, 1983: 325).

Wysocki and Young explained the relationship between the decision model and the information system as decision making focused on established company strategies in order to improve and support the adaptation of the end user to the computer has the conceptual foundations of the decision models developed (Wysocki and Young, 1990: 184). In other words, it is necessary to determine the position of the enterprise in accordance with the decision model, to define the existing standards, to develop the necessary controls and to emphasize the required technological priority. In this context, the most important thing to remember is that all models and classifications are not rigid definitions or fixed rules for the required action, and only serve as tools.

5. CONCLUSION

The general definition of information systems has emerged with the necessity of managing information as an important resource. Because the concept of knowledge is a much broader concept that is beyond information technology. In this context, information is not free therefore it is a very expensive product. This requires the information to be managed correctly like all other institutional

resources. Unless all the information belonging to an organization is managed like the important resources of the enterprise, integration with technology will not be beneficial. Information systems should be seen as a strategic tool and it should not be forgotten that it will increase the competitive advantage strategically.

Information systems should provide services in management decision-making. In addition, it should help institutions to compete more effectively in changing economical conditions. This is possible with the existence of flexible information systems. In order for the information system to serve at all levels in an organization, the needs of each level will also be different. Information systems may be needed for many reasons such as input, processing and retrieval of information, movement within the organization, etc. In this context, while one system converts data into information for daily operations, another system should provide reports to the sub-management, and another should assist the decision maker top management. In other words, informatics-related technology should take an integrated role in all these processes.

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