

Management Information Systems and Information Needs of Managers in the Frame of Managerial Decision Making

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Abstract. *Management information systems (MIS) represent an important aid (and/or useful tool) in managerial decision making process. The paper discusses following two theses: (1) MIS is a primary source for providing relevant (e.g. accurate and timely) information to managers; and (2) managers at different managerial levels have importantly different information needs, due to the nature of their work, and especially decision making. The problematic of unfulfilled manager's information needs (often perceived in business practice), despite usage of MIS, is emphasized. Some new suggestions how to more holistically address the manager's information needs in the frame of MIS design/creation process are outlined.*

Keywords. management information systems, manager's information needs, information, decision making

1 Introduction

In nowadays (turbulent and fast changing) business environment, information technology is reshaping the basics of business in various ways [23]. Information technology performs several vital roles in any type (and/or form) of contemporary organizations (e.g. support of business operations, support of managerial decision making, support for strategic competitive advantage) [21].

On the other hand nowadays (complex and fast changing) business environment put a lot of pressure on management (in organizations), which has limited time to make decisions, (and often) without appropriate information. In that frame information has become a vital component and a critical resource in the management of an organization and especially in the managerial decision making process [9].

Therefore the need for proper dissemination of information at various levels of management (in organizations) has become an important issue [1, 5, 12, 24]. In that context information should be properly managed in order to ensure its beneficial use

in the process of setting objectives and also in achieving those objectives [1, 3, 15].

Decision making is one among most important manager's tasks in everyday managers' work in nowadays organizations of any type (and/or form). Therefore proper information is crucial for manager's work. Manager's information needs are mainly determined by the decision that must be made, which in turn are determined by objectives [7, 29]. A primary source of information for managers in contemporary organizations is (also) management information systems (MIS) [1, 3, 4, 5, 9].

For the purpose of our discussion we consider MIS as a formalized computer information system that can integrate data from various sources to provide the information necessary for management decision making [3, 4, 5, 7]. MIS uses information technology to meet the information needs of managers as they make decision [5, 24]. Thus managers in nowadays organizations use MIS in order to assist their activities, (mainly) by providing timely and accurate information for decision making [3, 7, 14, 16, 17, 21].

MIS has overcome considerable and several adversities in last couple of decades, before achieve its nowadays academic and practical respectability. In late 1960s MIS was sold and presented as a grandiose solution to management's information requirements [20]. After failed to fulfill the expectations, especially of managers and their information needs, MIS was placed at considerable disadvantage, mainly in terms of management expectations and technological abilities [3]. Unfulfilled manager's information needs is very common emphasized issue (and open question) in the selected problematic, outlined by managers in nowadays business organizations.

According to above presented starting points, we can assume that nowadays is MIS widely accepted tool (and/or useful aid) for providing relevant (e.g. accurate and timely) information for manager's decision making. Since managers are usually at three main organizational level (top, middle, low) is important that MIS is appropriate (and capable) to fulfill manager's information needs at different managerial levels.

Since the unfulfilled manager’s information needs are very common reason of complaint about MIS in business practice, we want to highlight the importance of addressing manager’s information needs in the process of MIS design/creation.

In that context, we will make some new suggestions how to more holistically address the manager’s information need in the frame of MIS design/creation process in order to ensure that MIS will correspond with manager’s information needs.

In the frame of selected problematic, the papers is organized as follows. In Section 2 we provide a framework for understanding information needs of managers. In Section 3 we present MIS. In Section 4 we present a new suggestion how to more holistically address the manager’s information needs in the frame of MIS design/creation process.

2 Information needs of managers

Manager’s work is complex. In that context, information is necessary to support managerial work and especially managerial decision making, which is often considered as manager’s most challenging activity [4, 5, 9, 24]. Managers at different organizational levels have diverse information requirements [7, 16, 21]. In order to efficiently do their work, must managers diagnose (i.e. know) their information needs. In this chapter we are focusing especially on manager’s information needs according to their managerial level in organization.

From the view point of manager’s information needs for decision making process is the classic managerial pyramid still applicable, since manager’s information needs are (still) determined with the position of a manager (i.e. level of management) in organization [15, 21, 24], even thought that today is trend towards more flattened (and therefore downsized) organizations [5].

According to manager’s organizational level we can identify three main levels of managerial decision making in organizations [7, 9, 14, 17, 21]:

- Strategic decision making – most activities in strategic management are dedicated mainly to establishing objectives for whole organization and preparation of long-range plans for attaining those objectives (e.g. decision where to build a new subsidiary).
- Tactical decision making – most activities are concerned with implementation of decisions made at strategic organizational level.
- Operational decision making – main concern is to execute specific tasks in most efficiency and effectively manner.

In Table 1 are summarized information characteristic at different levels of decision making. Table is based on [7, 23-25].

Table 1. Several important information characteristics at different levels of managerial decision making.

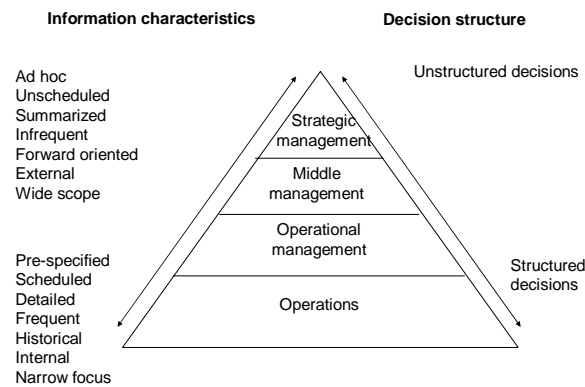
Information characteristics	Level of decision making		
	Operational	Tactical	Strategic
Dependence on computer information systems	High	Moderate	Low to moderate
Dependence on internal information	Very high	High	Moderate
Dependence on external information	Low	Moderate	Very High
Degree of information summarization	Very low	Moderate	High
Need for computer graphics	Low	Moderate	High
Use of predictive information	Low	High	Very high
Use of historical information	High	Moderate	Low
Use of what-if information	Low	High	Very high
Use of information stated in currency (e.g. €)	Low	Moderate	High
Structured decisions	Most	Some	None

At all three levels of managerial decision making exist mainly two types of decisions [7, 9, 10, 21]:

- Structured decisions – such decisions are repetitive, routine and have a definite procedure for handling them. Therefore structured decisions do not have to be treated each time as is they were new. A great proportion of structured decisions are at operational level in organization; and
- Unstructured decisions – decision maker must provide judgment, evaluation, and insight into the problem. Since each of these decisions is novel, important and non-routine, there is no definite and/or agreed procedure in advance for decision making.

Above presented cognitions about different levels of managerial decision making, types of decisions and information characteristics at each level of managerial decision making are summarized in Fig. 1.

Figure 1. Information requirements of decision makers.



From Fig. 1 are seen information characteristics according to the level of management in organization. For fulfillment of managerial information needs at all levels in organization, several major types of information systems are needed, which are defined very differently by different authors (e.g. MIS, decision support systems, executive information systems) [9, 10, 14, 16, 21]. For the purpose of our research we are focusing on MIS.

3 Management information systems

There exists a broad range of definitions of MIS in literature [1, 3, 4, 5, 9, 10]. But on the other hand there is no standard or definite definition of MIS [3]. Some authors use terms MIS and IS interchangeably [10, 13]. A simple definition of MIS defines it as any organized approach for obtaining relevant and timely information on which managerial decision making is based [10, 17]. Nowadays the term MIS is almost exclusively used and/or reserved for computerized systems [10, 14]. According to this fact is MIS a computer-based system that provides information and support for managerial decision making [4, 14].

But on the other hand, common to various definitions of MIS is that main purpose of the MIS is providing accurate and timely information and thus supporting managerial decision making [1, 5, 10, 14, 15]. This is due to the fact, that manager could not perform decision activities effectively without relevant information.

The development and increased importance of MIS in business practice is also due to the advancement of internet and information and communication technology (ICT) [9, 10, 13, 14], which on the other hand make the foundation for/of MIS (in broader sense). Another factor is also affordability of powerful personal computers and other information technology equipment for almost every organization.

In modern business environment organizations could not (anymore) compete without accurate and timely information, which are in contemporary organizations mainly provided by MIS [9, 14, 22, 27].

An effective MIS must provide information with following characteristics [2, 4, 17]:

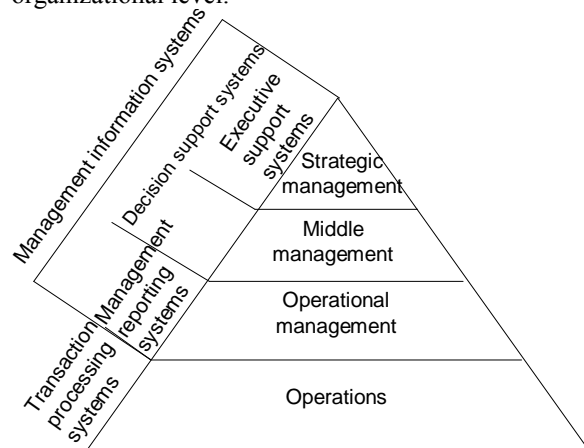
- Timely and up-to date, outdated information are useless for decision making.
- Correct and accurate information.
- Concise/limited to the most necessary, due to the limited ability of manager to absorb huge quantities of information at once.
- Relevant, because in a given situation only a small portion of given data is useful information.
- Complete information.

Information characteristics should (and also must) be view as a system. Therefore information which lack of one of above mentioned characteristics could reduce the quality of decision making process and in turn affect (most likely decrease) effectiveness and efficiency of an organization.

Most of the typologies classify information systems according to the main organizational levels (top, middle, low and operations) with the focus on the functions they perform and the people they serve in organization. According to above presented cognitions about manager's information need we can therefore assume that there are clear differences in information requirements between managers at different organizational levels (e.g. top manager and first line manager) [1, 4, 9]. Therefore MIS are not the same at all managerial levels in organizations. Managers at different organizational levels have/use different MIS, due to the different information needs of managers at different levels in organization [4, 9, 13, 14, 15].

In Fig. 2 one among several typologies of MIS is presented (Based on: [15]). In Fig. 2 are presented only very often used information systems at selected organizational level (see: [4, 9, 15, 24]).

Figure 2. Relationship of information systems to organizational level.



According to Fig. 2 several type of information systems are used to provide managers information they need [16]. Management reporting systems help managers monitor the operations and resources of an organization. Management reporting system produces mainly detailed reports, summary reports, and

exception reports [16, 21]. A great proportion in management reporting systems are detailed reports, used primarily by managers at operational level. Summary reports are also used by middle and strategic management. A decision support system is an information system which assists managers in evaluating the impact of alternative decisions.

Therefore decision support system provides managers different models, analytic tools, and the support for of ad-hoc queries. In that frame decision support system enable managers to analyze and/or predict the impact of current decisions on future conditions. Manager can also model a complex set of circumstances and manipulate various parameters in order to assess the impact of various solutions in diverse conditions [16]. From Fig. 2 is evident that in the frame of decision support systems we also have executive support systems, which are designed specifically for managers on the strategic management level [14].

From Fig. 2 is seen that MIS is supported by organization's transaction processing systems and by internal and external databases [4, 9, 10, 14]. Very commonly used transaction processing systems in contemporary organizations are enterprise resource planning systems [27] which pull together various types of information from operations (i.e. operational level of organization) in order to ensure data for MIS database. Therefore enterprise resource planning systems are a backbone of the MIS [26, 27].

However, using MIS in organizations also has several disadvantages that must be addressed. Experiences from business practice show that sometimes despite the fact, that MIS using advanced computer equipment, MIS have had relatively little success in providing needed information to managers. Main reasons are [1, 17]:

- Lack of management involvement (i.e. users) in the design of MIS which will be implemented in organization.
- Poor appreciation of management's information requirements by MIS designers, due to the lack of cooperation in the designing phase of MIS with users of MIS.
- Too much emphasis on the computer system and other needed equipment instead on MIS design/creation process.
- Lack of top management support.

MIS implementation is an ongoing process of organizational change. One important consideration must be pointed out, because the injection of technology in organization (in this case MIS) is not sufficient in order to improve the performance of organization [6, 19, 29, 30]. Researchers started to focus on human and organizational factors that affect the success or failure of implementing MIS.

Since many MIS have not fulfilled manager's information needs, MIS users' involvement in creating and designing has become almost prerequisite for successful implementation and usage

of MIS [11, 12, 25, 29]. Issues about ensuring, that MIS corresponds with manager's information needs has been discussed heavily in literature. In next chapter we make some suggestions how to more holistically address the manager's information needs in the frame of MIS design/creation process in order to ensure that MIS will correspond with manager's information needs.

4 How to improve creation and/or design of MIS

According to above presented cognitions we can conclude that adequate and timely information is inestimable for managerial work and in that frame for managerial decision making. MIS provide information for managers, therefore is important that MIS provides information which correspond with manager's information needs. We make a suggestion how to more holistically take into the consideration manager's information needs to ensure that MIS (will) provide information which will correspond with manager's information needs.

In practice various MIS design approaches exists. On one end we have MIS design approaches with no user involvement (lead by programmers) and on the other hand are MIS design approaches with considerable user involvement (lead by manager) [25, 29, 30].

Therefore the MIS design approach determines if the user of MIS will be involved in its design. But we need to keep in mind that manager is very busy person [5, 8, 17, 24] therefore we should not demand from the manager, that he/she will lead the MIS design/creation. Another reason is also lack of knowledge about capabilities of MIS. Our suggestion is that managers must active collaborate with MIS creators/designers, not to lead MIS design.

Therefore in such a situation is important, that MIS creators/designers are guiding managers, when they selecting most appropriate functions within MIS for them, especially from the view point of its information needs.

It is evident in business practice that many MIS implementation fails (e.g. MIS is very seldom used by managers) also due to the lack of user involvement in MIS selection process [1, 17, 21, 29]. Therefore is especially important, that managers are actively involved in MIS design, since they are able to recognize if information from MIS will correspond to their (perceived) information needs. In this phase of MIS design/creation corrective actions could be done and therefore failure with MIS could be prevented (e.g. MIS provide information which does not correspond to the manager information need).

Above presented cognitions are important starting points for our suggestion about improving creating and/or designing of MIS [Based on: 7, 9, 10, 13, 14,

18, 21, 22, 29, 30]. Based on above presented cognitions and experiences from business practices, we propose following steps which will lead to more holistically approach to MIS design and/or creation, with aim to improve creation (and/or design) of MIS:

- Information needs are determined on the basis of need information for operation (from all managerial levels) and holistically defined its characteristics. In that frame we study the role and importance of information and select/determine information for future consideration (i.e. determined managers needs).
- For selected (i.e. determined) managerial needs we define its quality, quantity, time and place frame and methodological repertory.
- Determined information needs of managers are starting point (and/or basis) for development of adequacy information basis for managerial decision making. In that frame manager's information needs are defined and dismembered according to the three main organizational levels:
 - operational management – for decision making at operational level are mainly used and needed general (common) information. This information is a result of processes of different functions in organization and is meant for supporting decision making in day-to-day, repetitive and mainly routine tasks (e.g. preparation of reports);
 - tactic management – decision making at this level is mainly based on general and specific information. Specific information is meant for supporting decision making for more demanding tasks in different functions in organizations.
 - strategic management – for strategic management is information specific, synthetic, more general and future oriented. Such information is meant for solving complex and unstructured problems, which require a great amount of knowledge, experiences and expertise from decision maker.
- Defined manager's information needs at three main organizational levels represent a framework for creating/designing MIS. In this step is also important active involvement of (future) MIS user.

With proposed approach to MIS creation/design manager's information needs are emphasized and are therefore a key consideration in MIS creation/design process. Therefore detailed determined manager's needs at various managerial levels are crucial in the process of creation/designing MIS. Therefore user involvement is crucial, but not sufficient; since defined manager's information needs is framework on which MIS is created/designed.

With more holistically approach to MIS design/creation we ensure, that information provided by MIS will correspond with manager's information needs.

5 Conclusion

In contemporary organizations managerial decision making process has become very complex. Therefore is important that managers get accurate and timely information for their decision making. One among most important and also commonly used possibility for providing information for managers in organizations is MIS. Since MIS is a system that provides information (and support) for managerial decision making at all managerial levels in organizations. Managers at different levels in organization have different information needs, due to the nature of their work, especially decision making.

Unfulfilled manager's information needs are very common reason of complaint about MIS in business practice. In paper we make a suggestion how to more holistically address the manager's information need in the frame of MIS design/creation process in order to ensure that MIS will correspond with manager's information needs.

Important steps which will lead to more holistically approach to MIS design/creation are especially:

- Determination of needed information on all organizational levels (e.g. study the role and importance of information)
- For determined managerial needs we define its quality, quantity, time and place frame and methodological repertory.
- Determination of adequacy information basis for managerial decision making (i.e. manager's information needs are defined at all managerial levels).
- Defined manager's information needs at three main organizational levels represent a framework for creating/designing MIS.

References

- [1] Adeoti-Adekeye, W.: **The importance of management information systems**, Library Review, Vol. 46, No. 5, 1997, pp. 318-327.
- [2] Anderson, D.: **Managing Information Systems**, Prentice Hall, New York, USA, 2000.
- [3] Collier, P., Dixon, R.: **The evaluation and audit of management information systems**, Managerial Auditing Journal, Vol. 10, No. 7, pp. 25-32, 1995.

- [4] Daft, R.: **Management**, The Dryden Press, Orlando, USA, 2000.
- [5] Daft, R.: **Understanding the theory and design of organizations**, Thomson South-Western, Mason, USA, 2006.
- [6] Daniels, S.: **The Virtual Corporation**, Work Study, Vol. 47, No. 1, 1998, pp. 20-22.
- [7] Hicks, J.: **Management information systems**, West Publishing Company, New York, USA, 1987.
- [8] Kroenke, D.: **Management Information Systems**, McGraw-Hill, New York, USA, 1992.
- [9] Laudon, K., Laudon, J.: **Management Information Systems – 7th ed**, Prentice-Hall, New Jersey, USA, 2002.
- [10] Laudon, K., Laudon, J.: **Management Information Systems**, Pearson-Prentice Hall, New Jersey, USA, 2005.
- [11] Lu, H.: **Managerial behaviors over MIS growth stages**, Management Decision, Vol. 33, No. 7, 1995, pp. 40-46.
- [12] Martin, E.: **Information Needs of Top MIS Managers**, MIS Quarterly, Vol. 7, No. 3, 1983, pp. 1-11.
- [13] McLeod, R.: **Management information systems**, Prentice Hall International, London, UK, 1995.
- [14] McLeod, R., Schell, G.: (2007). **Management Information Systems**, Pearson-Prentice Hall, New Jersey, 2007.
- [15] Megginson, L.; Mosley, D., Pietri, P.: **Management**, Harper Collins Publishers, New Jersey, USA, 1992.
- [16] Miller, L.: **Information Systems – A Management Approach**, The Dryden Press, Forth Worth, USA, 1996.
- [17] Mondy, W., Premeaux, S.: **Management**, Ally and Bacon, Boston, USA, 1993.
- [18] Munro, M., Davis, G.: **Determining Management Information Needs – A Comparison of Methods**, MIS Quarterly, Vol. 1, No. 2, 1977, pp. 55-67.
- [19] Nedelko, Z., Potočan, V.: **The role of information and communication technology in virtual organizations**, Proceedings of 18th International Conference on Information and Intelligent Systems, 12th-14th September, Varaždin, Croatia, 2007, 137-144.
- [20] Nolan, R., Wetherbe, J.: **Toward a Comprehensive Framework for MIS research**, MIS Quarterly, Vol. 4, No. 2, 1980, pp. 1-19.
- [21] O'Brien, J.: **Management Information Systems**, McGraw-Hill, Boston, USA, 1999.
- [22] Potočan, V.: **System of standardized decision making process in enterprise – dissertation (in Slovene)**, Faculty of Economics and Business, Maribor, SLO, 1999.
- [23] Rodgers, J.; Yen, D., Chou, D.: **Developing e-business**, Information Management & Computer Security, Vol. 10, No. 4, 2002, pp. 184-192.
- [24] Schermerhorn, J.: **Management**, John Wiley & Sons, New York, USA, 2001.
- [25] Schonberger, R.: **MIS Design – A Contingency Approach**, MIS Quarterly, Vol. 4, No. 1, 1980, pp. 13-20.
- [26] Spathis, C., Ananiadis, J.: **Assessing the benefits of using an enterprise system in accounting information and management**, The Journal of Enterprise Information Management, Vol. 18, No. 2, 2005, pp. 195-210.
- [27] Sumner, M.: **Enterprise Resource Planning**, Pearson-Prentice Hall, New Jersey, USA, 2004.
- [28] Trumbach, C.: **Addressing the Information Needs of Technology Managers: Making Derived Information Usable**, Technology Analysis & Strategic Management, Vol. 18, No. 2, 2006, pp. 221-243.
- [29] Wetherbe, J.: **Executive Information Requirements – Getting It Right**, MIS Quarterly, Vol. 15, No. 1, 1991, pp. 51-65.
- [30] Williams, L.: **Planning and managing the information system – a manager's guide**, Industrial Management & Data Systems, Vol. 97, No. 5, 1997, pp. 187-191.