
SOME THOUGHTS ABOUT DATA AND INFORMATION

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ABSTRACT

This paper focuses on some aspects of data and information and gives a short overview based on the professional literature: Why it is necessary to collect, process and store data and information? What is the difference between the two concepts? Can they be distinguished and how? What is the role of information in the different stages of decision-making? How many ways information can be grouped and what are the main sources of the data? How much and what type of information do enterprise executives need at each leadership levels? What is an information crisis and how can it be avoided? If information is a resource of the enterprise what is its value? Does it have value at all? What are the consequences of the information explosion and how can it be handled?

NECESSITY

With the development of the manufacturing industry, with the growth and the segmentation of the organizations, the personal control performed by the executives and managers no longer correspond to today's requirements. Formal information like accounting and statistical reports came to the front and became regular (Susánszky, 1985). The effective business information available at the proper time is not only necessary for success, but it is a requirement of survival too in today's rapidly changing environment (Lönnqvist, Pirttimäki, 2006).

In addition to the traditional resources, data and information have been available as new resources for several decades. Data is the heart of the organization. Without converting the data to the appropriate form, namely information, the executives and managers cannot make good decisions (Hannon, 2005).

INTERPRETATION

The interpretation of data and information and their relation to each other have been under the examination of several researchers for a long time.

The concept of information is probably interpreted most widely by the devotees of the reflection theory. According to their view, information is the reflection of reality (Horváth, 2002). The broad interpretation is also professed by those who are engaged in the mathematical theory of information. The information theory works with mathematical concepts which try to describe information, or to be more precise, describe the quantity of information with the help of mathematics (Cullmann et al., 1973).

Although the data and the information are used as synonyms in everyday life as well, several authors and researchers try to separate the two concepts almost mandatorily in accordance with some aspects (Halassy, 1994). Researchers generally use the following characteristics to separate information from data:

- processing (Jánoki, Kocsis, 1986) (Dinya, 1987) (Kacsukné, Kiss, 1999) (Varga, 2003) (Tarnóczy, 2008) (Szekeres, 2004),
- novelty, new knowledge (even for a machine) (Berey, Dobos, 1986) (Dinya, 1987) (Gábor, 1993) (Tarnóczy, 2008),

- reducing uncertainty (Dinya, 1987) (Chikán, 2005) (Tarnóczy, 2008),
- communication. (Boros, 1995)

As it can be seen from the above list, there are several factors which can help to separate data from information. But if human factors, like subjectivity and thinking are also distinguishing marks of information (Cullmann et al., 1973) (Alföldi, Straub, 1988) (Z. Karvalics, 2004), separating two concepts unequivocally from each other may become very difficult, or as a matter of fact, impossible.

ROLE IN DECISIONS

Several authors mention the role of information (or sometimes data) in decision-making. (Dunajszki et al., 1970) (Dinya, 1987) (Kacsukné, Kiss, 1999) (Horváth, 2002) (Szekeres, 2004) (Chikán, 2005) Information has a defining role at all the stages of decision-making:

- The decision-making process starts with information recording.
- This is followed by the gathering and analysis which allows the identification of the situation.
- The development of strategies, goals and action alternatives are all based on information.
- The implementation of the decisions is actually transforming information into actions. (Enyediné, 1997)

GROUPS AND SOURCES

Business organizations always need information. The information dependency affects all aspects of their operation.

On the one hand, information necessary for management decision-making can be data which are required regularly to manage an enterprise. These data can be constantly found in the financial, the accounting, the statistical records and other parts of the internal reporting system of the enterprise (such as detailed data of production, inventories, supplier, sales, customer, financial situation, assets etc.). On the other hand there are pieces of information which managers need only occasionally to support some of the business decisions (such as information about the company performance or company and market assessment).

Dunajszki et al. grouped the information emerging during the existence of an enterprise in 1970 as: trade, statistics, development, accounting, engineering, product and economic analysis (Dunajszki et al., 1970).

In the 1970's Berey and Dobos categorized the information by the types of activity, the flow of direction, the usability, the form, the frequency and the manner of publication (Berey, Dobos, 1979). The origin can be: written, oral or visual source (Berey, Dobos, 1986).

Chikán classifies the information into three groups based on the impact made on the decision-maker. Thus there is: semantic information which affects the selectable alternatives of the decision maker; pragmatic information which inspire to implement one of the alternatives; motivation information which is influenced by the values of the decision maker and the values of the achieved results (Chikán, 1978).

Kindler writes about fact information and value information. Fact information is natural, numerical data from the past and the present about the organization and the environment which become information after processing. During the processing fact information flow toward different areas of the organization, generally up, towards the chief executives and

then back down again. This type of information can be well handled by computer aided information systems from the outset. Value information means interests, preferences, goals, knowledge and abilities of the decision-makers and the whole organization. People have different information processing capabilities and limits of rationality. These are all factors which make handling and transforming value information much more difficult than processing fact information (Kindler, Kiss, 1981).

According to Land and McGregor, the required information for the organization management can be: descriptive in nature; probabilistic models, or values of systems and variables; explaining and assessment; unexpected, unscheduled; persuasion, propaganda type (Land, McGregor, 1981).

Wallace and Kremzar separate two types of data necessary for decision-making: less strictly accurate and strictly accurate data. In case of strictly accurate data, the margin of error can only be very small. These include for example inventory, ordered products and supplies, material invoices or route planning. The enterprise has to make huge amount of efforts and spend a lot of time to make these data more accurate. The less strictly accurate data also cannot be ignored; one has to treat those within reasonable scopes as well (Wallace, Kremzar, 2006).

The information used for decisions can originate from inside the enterprise, from its internal information system or from databases outside the enterprise. While information systems are very good at handling internal data, in most cases there is no system which can handle the diverse area of external information. Often a system of external information does not exist within the enterprises.

According to Szabó, Lehota, Badacsonyi, Szekeres and their colleagues the internal and external sources of information are:

- internal reporting systems (internal database), own surveys, own researches and analyses (these are primary information sources);
- numbers and text, speech, graphics, diagrams and video published on paper, broadcast on the radio or in television, or in the internet (secondary information sources). (Szabó, 2001) (Lehota et al., 2001) (Badacsonyi, 2003) (Szekeres, 2004)

In Bögel's opinion everything what comes into the manager's office is information. (Bögel et al., 2002) The manager can receive information in many different forms, thus meeting minutes, memo of the colleagues, messages of the employees, self-made memos of the managers, internal periodicals, circular letters, newspapers, books, business letters, reports, electronic messages, other publications and informal conversations etc. can all be sources.

NEEDS

Managers need information which optimally serve decision making. The quantity of information to be processed depend on factors such as the volume of products produced and sold, the number of customers, the complexity of the resource allocating decisions and the section of the work. In addition, the information needs depend on the level of performance aspiration of the enterprise as well. The need of information processing grows with the increase of uncertainty of the activity too (King, Shuker, 1987).

To find – and even sometimes phrase – the information necessary for decisions can cause problems for enterprise managers (Salles, 2006). Thus supplying executives with information is a constantly changing and persistent dilemma. Executives often have different needs and expectations towards the creation of business information. One can frequently hear them saying, “we are overwhelmed with plenty of data but there is only a

small amount of good information which can be used for management. The information I get are not the ones I would like to get... The required pieces of information are not at my disposal or they are not available." (Véry, 2002).

The statement, according to which when moving up the organization hierarchy, the executives need to see more, is not true. On the contrary, when going higher in the hierarchy, increasingly cumulated information is needed for the effective decision-making. In case of information, one should not go too far, the needed internal and external information should be carefully picked (Dobay, 2003). The main characteristics of the information needed at the different levels of the leadership are:

- At the senior management level the information should not be too detailed, it cannot be too wordy. The reports prepared for this level must contain summaries of a broader context. Weighted points have to be highlighted, thus offering decision situations and alternatives. It is not easy to prepare information of interest for this level but it can be an important orientation point for the chief executives.
- The middle management needs adequately detailed and accurate information primarily belonging to the functions they are responsible for. Time and its planning and keeping are the most important parameters at this level. The information should apply to the performance of the processes, the achieved results, the expenses and the deviation from the plans.
- At the lowest level of management, the information should be relevant to solve production problems. Detailed information is needed related to the different production areas (Anderson, 1992).

Table 1. shows the summary of different information needs for decision-making at the leadership levels (Kacsukné, Kiss, 1999).

*Table 1. The decision levels and the characteristics of the required information
(Source: Kacsukné, Kiss, 1999)*

Information characteristics	Level of decision-making		
	Operational	Tactical	Strategic
Dependence on internal information	very high	high	moderate
Dependence on external information	low	moderate	high
Degree of information summation	very low	moderate	high
Prompt information request	very high	high	moderate
Forecasting information request	low	high	very high
Archive information request	high	moderate	low
Financial information request	low	moderate	high
Dependence on information system	high	moderate	less than moderate
„What if...” type of information request	low	high	very high

CRISIS

Sometimes one can speak of an information crisis in organisations which has the following characteristics:

- Executives are flooded with more and more quantity of information;
- The information already gathered cannot be properly distributed in the organisation;
- There is no system in the organisation which could help the executive to find the requested information;
- The received information are bad quality, that is inaccurate, late, inconsistent and in incorrect format.

It can also lead to a crisis when executives are made to believe that all kind of information can be easily and quickly acquired with modern information tools.

To avoid the information crisis, it is practical to manage the enterprise information as a resource and plan their acquisition and utilization. The information has to be purchased and can be and should be managed, just like the other resources of the enterprise: it has costs, it has to be financed (Dobay, 2003).

RESOURCE AND VALUE

Decision-makers believe that information has economic value, since they can get into better position if the decisions are based on economic variables and signs (ie. information). However, such information is often not spontaneously given, it has to be procured. Therefore, a lot of business actors are even willing to pay for the information (Arrow, 1979).

Information means costs, however the additional information reduces uncertainty, thus information has benefits too. The value of information is determined by how much it can reduce the costs which arise because the uncertainty accompanying the decisions (Enyediné, 1997).

On the one hand it is a generally accepted opinion, that the value of the information (when carefully selected and processed) is more than the cost of its acquisition, storage and processing. The problem with this statement is that it is not based on reliable calculations, it is only a manager opinion: somebody with adequate quantity, quality and form of information may gain advantage in business (Dobay, 2003). Although the value of information cannot be always quantified, it may provide a variety of economic values in the hand of the executive: greater efficiency, greater effectiveness and a higher level of compliance (Szekeres, 2004).

On the other hand there is also a radical theory of the information. According to this theory the information has no meaning and has low value. Sveiby grounds his opinion on the fact, that in the chaotic information market, a report full of data can be easily refuted in the near future by another report on the same subject but containing different data. Or: when collecting or choosing information, an expert supporting a particular viewpoint, can have significant influence on the process. Or: there can be a lot more wisdom of life in an experienced executive than in any database or book. This radical definition of the information prepares better for future happenings and saves money for the enterprises, according to Sveiby (Sveiby, 2001). In comparison most firms behave as if the information is meaningful and has a high value.

QUANTITY AND HANDLING

Due to the information explosion the available information is unusable and unmanageable for the business actors. The more information is available, the less useful it is, due to the redundant items which ultimately prove to be useless and because of the time spent with searching.

Since executives need only relevant and adequate information for their decisions, the main goal is to make the right information available to the right user, at the right place, at the appropriate time and in sufficient quality for the right price (Kiszl, 2005).

Hanyecz sees the negative consequences of the inappropriate information supply in the following (Hanyecz, 1997):

- As a result of the too much data, decision-makers do not focus on the significant points, so critical success factors may be overlooked.

- The data can quickly lose its actuality in a rapidly changing environment and the consequence is the narrowing or losing the scope of actions.
- The inconsistent data may increase uncertainty of the decision-making.
- Data not fully accurately reflecting the situation and relations, missing or incomplete data can lead to incorrect and incomplete interpretation as well as decisions with the same characteristics.

In an information-rich world the wealth of information means the scantiness of something else, namely the scantiness of what the information consumes. Information consumes the receiver's attention (Simon, 1982/b).

An effective method to manage the information oversupply is to create and operate a modern, computer supported information system. Although, according to Simon, this statement is only valid if the computer solves the problem of the information flood. An information system can only help if it absorbs more information than it creates (Simon, 1982/a).

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