Introduction to Management Information Systems

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Universitat Jaume I

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Chapter 1. Information in the company

1.1. The concept of *information*

All individuals, companies and, in general, all organisations are continuously capturing data, many of which are of no significance to them at all. However, other data are available that would afford them a better understanding of their own environment and of themselves. These data – what we know as *information* – enable them to make more accurate decisions. For this reason, the right amount of information at the right time is a key factor for every organisation.

Company managers take decisions, prepare plans and control their company's activities using information that they can obtain either from formal sources or through informal channels such as face-to-face conversations, telephone calls, social contacts, etc. Managers are challenged by an increasingly complex and uncertain environment. In these circumstances, managers should theoretically be able to define and obtain the type of information they require. However, this is not what happens in practice; rather, the way managers perform their work depends on the available information that they have access to. Most decisions are therefore made in the absence of absolute knowledge, either because the information is not available or because access to it would be very costly.

Despite the difficulties in obtaining information, managers need relevant information on which to base their planning, control and decision-making functions.

Although the terms *data* and *information* are sometimes used indiscriminately, they do have different meanings. Data are non-random symbols that represent the values of attributes or events. Hence, data are facts, events and transactions stored according to an agreed code. Data are facts obtained through reading, observation, calculation, measurement, etc. The amounts and other details on an organisation's invoices, cheques or pay slips, etc, are referred to as *data*, for example. Data are obtained automatically, the result of a routine procedure such as invoicing or measurement processes.

Fig. 1.1. Transformation of data into information

Information is a set of data transformed in such a way that it helps to reduce future uncertainty and, therefore, contributes to the decision-making process. Information is data transformed in a way that makes sense to the person who receives it; in other words, it has a real or perceived value for that person when he or she acts or takes decisions. Information, moreover, is data that have been interpreted and understood by the recipient of the message. The relationship between data and information is similar to that of raw materials and the finished product.

Information will be meaningful insofar as it provides useful raw material for taking a specific decision.

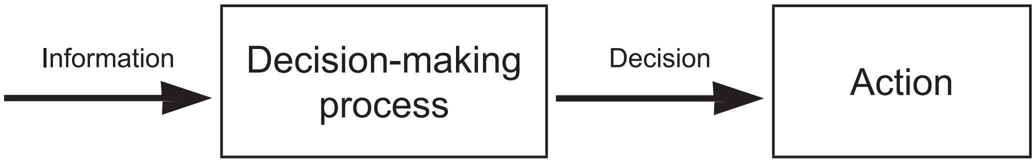

Fig. 1.2. Decision making: transformation of information into action

The process of reflecting on and understanding information is what allows the message to have different meanings for different people. This process also implies that the data analysed, summarised or processed to produce messages will only become information if its recipient understands its meaning. For data to be transformed into information, there must be an awareness of what the person receiving the message will use it for, his or her training, position in the organisation and familiarity with the language and calculations used in the message.

While all managers need information, they do not all need the same type of information. The kind of information required will depend on a range of factors: their level in the hierarchy, the work they are carrying out, confidentiality, urgency, etc. Indeed, the usefulness of information is a debatable point, and what for one person is information, for another is data. In an organisation, for example, when information is transferred from one organisational level to another its meaning may change significantly, such that at one hierarchical level it is regarded as significant information, whereas at another level it is simply data (Menguzzato and Renau, 1991).

Information is the recipient's knowledge and comprehension of data. Information reduces uncertainty and affords the recipient something he or she did not know previously.

Information is one of many company resources, alongside capital, raw materials and labour, since no company is viable without information. Regarding information as a scarce resource obliges us to consider the issue of information economics, in other words, how to establish the necessary relationship between the value of information and its cost.

According to Menguzzato and Renau (1991), information costs can be estimated by taking the following into account:

– The information content required.
– How urgently the information is needed.

– The amount of information needed.
– How accessible the information is.

In contrast, information value is more difficult to determine. The concept of *expected value of perfect information* (EVPI) can be used to estimate information value. This concept may be defined as the difference between the average expected result with perfect information and the average expected result with the available information. The cost and the value of the information must be compared in order to find out how to use this scarce resource, in what amount, and what benefits might be expected from using it.

Information is an essential factor for the company in that the possession or otherwise of opportune information will be a determining factor in the quality of the decisions it adopts, and as a result, of the strategy that it might design and put into practice at any given moment.

Well-prepared information can go a long way to avoid problems stemming from environmental uncertainty, either because of lack of clarity in certain aspects, or due to the huge amount of accumulated data when a decision has to be taken urgently.

1.2. Characteristics of information

Good information provides value. Experience shows that good information should present the following qualities:

1.2.1. Relevance

Relevance is a decisive quality. Relevant information is what increases knowledge and reduces uncertainty surrounding the problem under consideration. Reports and messages frequently contain irrelevant sections that lead to difficulties and cause frustration. Many erroneous managerial decisions are a result of data overload. The right information is not taken from an excessive accumulation of data, which tends to cause a general feeling of impotence vis-à-vis the problem, but rather it depends on getting hold of the relevant data. This characteristic is heavily influenced by the qualities explained below.

1.2.2. Accuracy

Information must be sufficiently accurate for managers' purposes. No information is totally accurate, and spending more on information in pursuit of greater accuracy does not always result in more valuable information.

The degree of accuracy should be coherent with the importance of the decision to be taken and will vary according to the decision-maker's level in the hierarchy. The degree of information accuracy required will depend on the hierarchical level in question.

1.2.3. Completeness

In an ideal world, all the information required to take a decision would be available; however in reality this is not possible. Information is considered to be completed if it informs us on the key points of the problem we are analysing.

1.2.4. Source trustworthiness

Trust in the information source increases when it has a proven track record. To increase the trustworthiness of the message, managers use reports from various sources, particularly where strategic decisions are concerned.

1.2.5. Communication with the right person

Each manager in the company is assigned a specific area of activity and responsibility and must receive information to undertake the tasks he or she is responsible for. However, this process does not always function as well as it should, and information may not reach the right level in the organisation. For instance, a superior might not provide all the information to the person who needs it, and vice versa; a subordinate may hold back information in an attempt to make him or herself indispensable. Information providers must be aware of information needs in order to ensure it goes straight to where it is required.

1.2.6. Punctuality

Good information is that which is delivered just when it is needed. To a certain extent, the need to obtain information quickly can jeopardise its accuracy, although today's data processing methods can produce accurate information very rapidly. Vital information for the company may become worthless if it takes too long to obtain, or delays occur in processing and communicating the information.

Although the punctuality of regularly produced information is important, how often information is produced should be related to the type of decision or activity it is required for. Often, companies routinely produce reports at fairly arbitrary intervals (daily, weekly or monthly) following traditions or calendar conventions without taking into account the time cycle of the activity involved.

1.2.7. Detail

Information should contain the minimum number of details for effective decision making. Every superfluous character or data entails extra storage efforts, more processing, more assimilation of difficulties and probably inferior decisions. The level of detail should vary with the level in the organisation: the higher the level in an organisation, the greater the degree of aggregation and synthesis. At times, particularly as lower levels, information must necessarily contain a lot of detail if it is to be useful, although the general rule of minimum possible detail for coherence with efficient information use should be followed. Given the need to be concise and to direct attention to where it is required, reports often purposely highlight items whose performance deviates significantly from a fixed standard or budget. An example of this type of report is seen in the accounting technique of budgetary control in which actual expenditure, measured item by item, is compared with the budgeted or desired expenditure. Small variations in these reports may be accepted, but differences exceeding tolerance levels are highlighted. These exceptions are presented to managers, thus enabling them to carry out their control function more quickly.

1.2.8. Comprehension

Comprehension is what transforms data into information. If the information is not understood it cannot be used and therefore it cannot add value. Many factors intervene in understanding information:

– User preferences. Some people prefer information in graphs or charts, while others prefer a narrative description. Some prefer presentations with statistics and figures, while others do not understand them. Research has shown that some people assimilate specific facts in detail, whereas others evaluate the overall picture without paying attention to the finer points. Inevitably, these variations mean that the same message can be interpreted in different ways.
– Previous knowledge. Comprehension is the result of memory in association with the received message.
– Environmental factors. Group pressure, available time and trust in the information system all influence comprehension.
– Language. Information is codified in signs or messages.

1.3. Information needs

We live in a world of information. Every day potential readers are presented with a multitude of books, journals and newspapers. However, human capacity is limited and we can absorb only a tiny amount of all this information. There are no clear procedures to help us to identify all information of interest quickly.

Information needs refer to the information required to take decisions correctly and to carry out the tasks deriving from them.

Three large sets of information needs are associated with the three stages in the strategic management process:

– A strategic diagnosis should be undertaken when a strategy is drawn up; in other words, an internal analysis and an environmental analysis – both general and specific – must be carried out. Information is an essential element in this strategic diagnosis stage.

  Information is needed on the main strategic environmental factors: cultural, financial, political, competition, technological. This information should attend to the evolution of these factors, as well as their present state.

  An internal analysis requires information generated by the company itself as a result of its activity. This information can be classified according to the *company's functions, namely*, *marketing*, *production, finance, human resources, R&D and management*.

– Each member of the company involved in implementing the strategy must be aware of his or her particular responsibility, and must receive information on the tasks he or she has to perform – and how to perform them – in order for the strategy and its component plans to be effectuated. In other words, those responsible for accomplishing these actions need information about what they have to do and how to do it. This information is usually passed down from higher to lower levels.

– Strategy control; efficient control requires knowledge on the outcomes of the actions undertaken to effectuate the plans, and how the different environmental components are evolving, in order to verify whether the strategy is developing appropriately and whether any changes are influencing its viability.

Some of the information used to draw up the strategy will also be required in the control stage in order to compare the strategy targets with the results being obtained. Information on the results of implementing the plans will also be needed at this stage. This information must be delivered at the right time so that when any deviations are detected in the control, opportune measures can be taken to correct them and achieve the target sets.

We can therefore consider three sets of information needs in the management process, each one of which will require different information and will be obtained in different ways.

It is extremely important to restrict the information to what is actually needed, as there is a risk of information excess, and everything that goes beyond the strictly necessity impoverishes rather than enriches the system, since it affects the cost of obtaining information. Information economics aims to determine the optimum amount of information for a specific problem, based on comparing the marginal cost of the information and the value of the sample or additional information. We know what type of information we want to obtain; we now examine the sources of information that can be used to obtain it.

1.4. Sources of information

Information is an essential, strategic resource that can be obtained from numerous sources. In this section, we distinguish between internal information relating to the environment within the company, and information about its external environment. Many of the data captured by information systems refer to the functioning of the organisation and are used to produce internal information. This internal information provides management with knowledge about how the company is functioning and whether or not it is achieving its objectives. Most internal information comes from the accounting system and statistical analyses (sales, production, etc.). Other internal information sources such as surveys and interviews with company members provide quantitative information on, for instance, workers' motivation levels or other indicators that are not easily quantified.

Company managers also need information on the environment: sales volume of their most direct competitors, potential client segments for the company's product lines, geographical distribution of its shareholders, etc. A company can only be successful if it adapts to the demands of its external environment. The environment is represented by a number of groups that vary in their capacity to influence the company's fulfilment of its objectives. Below, we identify these interest groups and the different types of information about them that the company requires:

– Customers: marketing, sales, levels of satisfaction.
– Distributors: marketing and logistics (distribution).
– Competitors: market penetration, innovations, product quality.
– Suppliers: transaction conditions.
– Trade unions: salaries and employment stability.
– Shareholders: company performance.
– Financial institutions: financial conditions and investment opportunities.
– Government: legal and political developments.

The company must be informed constantly about each of these external groups and, at the same time, some of these groups (e.g., shareholders and the government) must also receive information from the company.

Information on the environment can be obtained from the following sources:

– Personal information sources, which provide information through contact with sales staff, customers, suppliers, distributors, bankers, etc.
– Impersonal information sources, which range from general publications (e.g., reports on the current situation, bank and official entity reports, specialised journals) to specific studies (e.g., market research, opinion studies, consultants' reports).