

## PAPER DETAILS

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## IMPORTANCE OF QUANTITATIVE INFORMATION IN MANAGEMENT SYSTEMS

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### 1 - INTRODUCTION

Information is significant for all types of decisions. In case of management and business decisions it is the basic input of the decision making process. Uncertainty involved in business life increases the need for information in order to reduce uncertainty and convert the opportunities to benefits. Accuracy of the decisions in business life are highly correlated with the availability, accessibility, accuracy, clarity and timeliness of information. Apart from these attributes, quantifiability of the information is also very important especially to evaluate the alternative courses of actions in decision making process.

The purpose of this paper is to discuss the importance of quantitative information in management information system which occupies a significant portion of the required information. However, in managerial decision making process besides quantitative information, the importance of qualitative information can not be ignored. Whether quantitative or qualitative, information is always valuable if it is a right kind of information. Information is of a right kind if it is desired, needed, accurate, timely and feasible.

Quantitative information is obtained as a result of processing the quantitative data. Quantitative data is collected by research methods which

may be exploratory, descriptive or causal. Through quantitative techniques like as mathematical models, statistical tools, the data is classified, organized, summarized, analysed to make estimations and inferences about the items, people, transactions, events, or any type of the population interested in.

## **2 - ASSESSMENT OF NEED AND USE OF QUANTITATIVE INFORMATION**

Assessment of the information need is the first step in developing an information system and producing information. Type of the information needed by the managers depends on hierarchical levels of managers and managerial function they perform. However type of the information they desire depends on their skills and abilities.

In a rapidly changing environment where the complexities are growing, managers' need for information is increasing. Because in performing management functions by means of their decisions, they are effected by the changes occurring in inflation rate, interest rate, investment incentives, consumer behavior, customs regulations, and other government policies or by the events like material shortages, energy crisis, competitors actions, etc. Thus; they have to consider multiples of variables at the same time. That is why quantitative information plays significant role in management decision making process. Lack of quantitative data would avoid the development and evaluation of the courses of actions objectively which will in turn reduce efficiency and effectiveness in decision making process.

### **2.1 - Needed information varies with respect to the hierarchical level of managers:**

Top level managers mostly consider strategic information to use in strategic decisions and long term plans concerning the nature and the size of the business. Information about the on-going business and opportunities are needed at this level. Thus, information is needed for determination of mission, goal and strategic objective; for formulation, implementation and evaluation of strategy. For example, decision about the entrance of a bank to credit card market is a strategic decision and requires a wide range of quantitative information both from external and internal sources.

Middle level managers mostly engage with short term activities and allocation of resources such as formulation of budgets, funds flow analysis,

product development and improvement, sales operations, research and development. Therefore they are in need of quantitative information related with those issues for their tactical decisions.

Managers at operational levels are mostly interested in technical information related with day to day operation of the business. Their decisions are repetitive and often depends on regularly flowing information. For example, approval decisions of consumer credits are made on the basis of the predetermined principles mostly specified as in quantitative terms like as credibility ratings. Decisions such as the type and the number of the shipments to be made or the production orders to be issued are such kinds of decisions made at operational levels which requires routine quantitative information.

## **2.2 - Needed information varies with respect to the managerial functions performed:**

Relevant quantitative information needed for each of the managerial functions which are marketing, finance, production and human resources, are briefly described below.

- Marketing Management: Managers and the other decision makers related with marketing activities need information mainly about consumers, competitors, dealers and external forces in the market, and the cost of the marketing effort. Demographic characteristics of consumers, sales volume of outlets, market share of a company and time series related about sales are examples of needed quantitative information. These information are necessary to make decisions about the marketing mix, to manage the sales force, to design sales territories, to forecast new product sales, to select sites for retail outlets, to develop advertising policies etc.

- Production Management: Information needed to perform production activities are mainly related with the input materials, labor and energy, production facilities, process technology, inventory levels and the costs related with the production activities.

These information are needed to make purchasing decisions like as determination of the suppliers, transportation of materials and supplies; to prepare production schedules and provide plant capacities; to make inventory policy decisions which are quantity to be ordered or produced and the time of order or production. Thus information needed to make production

decisions are mostly quantitative and it is necessary to make use of quantitative techniques to produce them.

- Financial Management: Information needed for financial decisions are mainly related with the current and future financial status of the organization and mostly in quantitative terms. Accounting system supplies information on revenues, costs, profits. In accounting system transactions are recorded in monetary terms and classified on the basis of accounting principles. They are then summarized into financial reports called financial statements as balance sheet and income statement.

Besides them accounting statements on profitability can be produced to evaluate the performance of the organization. In general all the accounting forms are produced to aid in determination of the results of operations, to keep track about the assets and liabilities of the business, to facilitate planning of business activities, and to follow up performance and adjustment of plans. In order to produce the relevant information for financial management which is mostly quantitative, besides accounting techniques some mathematical and statistical tools are also used.

- Human Resources Management: Basic information needed in human resources management are about the manufacturing labor, office personnel, administrative and sales personnel. Information on geographical labor sources, their skills and prevailing wage rates may be needed in recruiting decisions. For evaluation of the performance of the current workers, their efficiency can be measured. Information about personnel requirements from functional units are necessary for management development and manpower planning and recruitment. Compensation administration and training activities are responsibilities of human resources for which quantitative information is necessary.

As a result of evaluation of the information needed for several managerial functions, it can be concluded that required information is mostly quantitative which is produced by a mathematical model, accounting method or statistical tool. For example, unless associated with a specific quantity and degree of reliability, sales forecasts expressed as high or medium may not be sufficient to prepare the sales budget. Lack of cost estimates, together with a reliability measure, may not allow the decision maker to make correct decisions related with production and inventory systems like how much to order or produce and when to order or produce.

In auditing function it is necessary to make use of statistical sampling techniques to investigate the proportion of erroneous accounts. While checking the items received, it is necessary to know the probability of acceptance or rejection with a given parameter. In order to evaluate the appropriateness of admission test, personnel administrator should know the probability of selecting a good worker among the candidates qualified on the test.

### **2.3 - Desired information varies with respect to managers' skills and abilities:**

Professional knowledge and experience of managers and other decision makers play important role in specifying the required information. In order to demand the needed quantitative information and make effective use of this information, the manager must have the knowledge about the potential information which can be supplied through several mathematical and statistical tools and must have understanding of how the figures were put together and what they mean.

Managers and especially manager candidates should pay attention to quantitative methods. They don't need to be a management scientist or statistics experts but they should participate in developing, designing, providing data or use the output of quantitative models.

Result of the research (1) conducted about essential knowledge, skills and abilities for managers shows that, for a manager, degree of importance of knowledge of quantitative methods is high. Respondents in this research were composed of managers and manager candidates and they have evaluated the knowledge of law, accounting and finance, production and marketing, quantitative methods as equally important for middle and top level managerial positions.

In the same research, groups with different professions were compared with respect to their attitude on knowledge related with quantitative methods. Professions were classified into three groups. First group was consisted of engineers, second group graduates of Faculties of Economics and Administrative Sciences, and the rest of the respondents formed the third group. Within the third group, there were medical doctors, lawyers etc. Result of the ANOVA model showed that, with respect to evaluation of importance assigned to quantitative methods, third group professions differed significantly from others. They have evaluated the knowledge of quantitative methods as

less important when compared with the other professional groups. This might be due to the familiarity of the first two groups to quantitative methods. As they had an idea about these methods they could have easily diagnosed the need for it in management training.

Hence, the managers should at least possess the knowledge of the existence of various quantitative methods so that they will be able to desire the needed and right kind of information.

### **3 - DEVELOPMENT OF QUANTITATIVE INFORMATION**

Within the scope of the management information system (MIS), information systems like as strategic management information system, marketing management information system, financial management information system, personnel management information system, production and operational management information system are designed to develop the relevant information for the corresponding managerial functions. Information needed for the managerial functions and the type of the decisions for which these information will be used is briefly described in section 2.2.

What we claim is the necessity of quantitative information in managerial decisions which naturally requires to make use of quantitative methods. That is in order to produce right kind of quantitative information, application of scientific methodology is necessary. Application of scientific methodology as mathematical models, statistical tools to managerial problems and decision making is named as management science.

In management science, models are formulated inductively for the purpose explaining and predicting real world behavior or deductive methods are used like deducing new truths by formulating hypothesis.

However quantitative information can be obtained just as a result of describing the collected data by summarizing through graphical displays or measures of central tendency and dispersions or as a result of application of complex mathematical models. Use and importance of the information obtained, absolutely do not depend on the complexity of the method used but depend on the appropriateness of the method applied to the event considered in the decision making process.

In some cases, additional information which could be obtained by

applying more complex but costly methods may not improve the decision or improvement in decisions may not cover the cost of the extra information. Therefore appropriate techniques should be adopted and the marginal cost of obtaining the information should not exceed the marginal benefit of that information.

Development of quantitative information through quantitative methods may necessitate to conduct a research which may be descriptive, exploratory or causal. By the research, data obtained from primary or secondary sources and external or internal sources are gathered classified, organized, summarized, analysed for the purpose of making estimations, forecasts, predictions, drawing conclusions and making interpretations.

#### **4 - CONCLUSION**

The importance of information in decision making process is obvious. Among the required information, quantitative information for managerial decisions occupies a significant place due to complexity of business life. Quantitative information is developed by making use of the quantitative methods. Therefore design and development of quantitative methods deserves significant attention to produce accurate, timely, clear and reliable information.

In fact, in today's computerized environment, formulation of quantitative methods and production of quantitative information can be regarded as easier and faster because of the decrease in burden of computations. By using computerized quantitative techniques, more emphasis can be given to the estimations and interpretations of results rather than the computations. Hence the optimal focus is better to be the conceptual framework of the quantitative technique like the kind and the use of the information produced. Computers also facilitates the storage and quick retrieval of the information.

As a result increase in the complexity of the business life increases the need for quantitative information to be able to convert opportunities to benefits; objectively evaluate the courses of alternatives in decision making process; and efficiently and effectively perform the managerial activities.

(1) Özmen, Şule; Management Training and Development; Research on Essential Knowledge, Skills, Abilities for Managers in Turkey. T.C. MARMARA ÜNİVERSİTESİ İstatistik ve Kantitatif Araştırmalar ve Uygulamalar Merkezi (İSKAR) Yayın No. 92/1, İstanbul 1992.



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