

Quantitative methods and their role in making sound decisions in an economic enterprise

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Abstract: The proper management of institutions has a great relationship with the decision-making process, due to the fact that the wrong decision has a cost, and this process is directly related to the functions of management such as planning, organizing and control, as it is a process that takes place at all organizational levels, and it can be considered that the ability and competence of the manager is manifested in the quality of the decisions he takes and their results on the ground, and on this basis, the quantitative side has a major role in reaching sound decisions in the economic institution.

Key words: Economic institution, planning, decision making, quantitative methods.

1. Introduction:

The economy and development of any country is based on an extensive fabric of institutions of different shapes, types, and classifications. Through the economic reforms that I pursued in accordance with the development plans, as well as the attempt to implement the recommendations of international bodies (the International Monetary Fund...) and the experiences of foreign countries (the European Partnership...) to reach an extensive fabric of advanced economic institutions that have competitive power and achieve the general plans of the state, and these institutions attach great importance to the decision-making process because of the fact that the wrong decision has a cost, and this process is directly related to the management functions such as planning, organization and control, It is a process that takes place at all organizational levels.

On this basis, the following problem emerges:

What is the role of quantitative methods in making the right decision in economic institution?

In light of the problem raised, the following sub-questions can be formulated:

- What is the concept of economic institution?
- What do we mean by making decisions in economic institution?
- What are the most important quantitative methods used in the economic field?
- What is the relationship of quantitative methods to decision making?

In order to address the problem raised and to answer the previous sub-questions, the following hypotheses emerge for us:

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- Effective management in economic institution has a great relationship with sound decisions.
- The quantitative aspect in economic institution has an important role in the field of effective control and management, whether in the short or long term.
- Quantitative methods are based on reliable and quality databases in order to achieve correct and important decisions.

As for the objective of this study, it is to highlight the role of various quantitative methods in making sound decisions while giving a comprehensive view on the importance of using the quantitative aspect in the effective management of the economic enterprise and reaching the conclusion that what cannot be measured cannot be managed and controlled.

In order to answer the problem raised in this research paper, we divided the study into the following axes:

The first axis: the conceptual framework of the economic institution

The second axis: the concept and methods of decision-making

The third axis: the quantitative methods used in decision-making

2. The first axis: the conceptual framework of the economic institution:

The origin of the word institution is actually a translation of the word. Enterprise can also be used as a translation of the following two words: (FIRM) and (UNDERTAKING). (Omar Sakhry, 2007, pg. 24)

There have been many definitions of the institution according to the opinions of economic thinkers, international bodies and organizations, depending on the form, as well as a system and according to different approaches, and these definitions will be addressed as follows:

2-1-Definitions of an institution according to international organizations and bodies: On this basis, we find:

- The institution as defined by the International Labor Office is every place for conducting an economic activity, and this place has independent records.

2-2- Definitions of the institution according to economic thinkers: Where we find: (Rafiq Harouch, 2013, p. 29)

- Definition of economic thinker (K.MARX): The capitalist economic institution is represented by a large number of workers working at the same time under the management of the same capital, in the same place, in order to produce the same type of commodities.

- Definition of economic thinker (TRUCHY): The enterprise is the unit in which the human and material elements of economic activity are combined and coordinated.

- Definition of economic thinker (FRANCOIS PEROUX): The enterprise is a form of production by which and within the same ownership the prices of the various factors of production are provided by agents distinct from the owner of the enterprise, with the aim of selling a commodity or services on the market, in order to obtain cash income resulting from the shelf between two price chains.

He also defines it as: An organization is an organization that gathers people with competencies, uses capital and capabilities in order to produce a commodity which can be sold at a price higher than its cost.

Through these two definitions, we note that PEROUX focused on a set of points in his definition of the institution, namely:

- The objective of the institution when carrying out its activities and achieving profit.
- There is no difference between the owners of the institution and its managers.

2-3- Definitions of the institution according to the form: An economic institution is an economic, technical, legal and social form for organizing the joint work of its workers and operating the

production tools according to a specific method of division of labor in order to produce the means of production or the production of consumption commodities, or the provision of services.

From this definition, you conclude that:

- The institution has an economic form: because the factors of production are rationally exploited to obtain goods or services.
- The institution has a technical form: through its use of contemporary and advanced technology and techniques and keeping pace with the required technological and economic developments.
- The institution has a legal form: given that the institution has an independent capacity, an independent commercial name, and an internal system and has an independent budget of its own.
- The institution has a social form: whether by the presence of its human resources for the institution through the goods and services offered and directed, whether to institutions, individuals or society as a whole.

2-4- Defining the institution as a system: The researchers presented different concepts of the system. They knew (VONBERLTALANFY) the system as a set of interacting elements.

The researcher knew (ROSNAY) the system as a set of elements in a dynamic interaction, based on a goal.

The institution is a set of elements interacting with values that are formed according to different systems (production system, marketing system, control system, human resources system, financial system, research and development system, information system) and operate to achieve a specific goal.

2-5- Definitions of the institution according to different approaches: Where we find in this area:

The institution as an economic agent: the institution can be defined as an economic actor according to different points of view:

- The institution is a center for decision-making in the financial future.
- The organization is a production unit that exploits and operates inputs to obtain outputs in the form of services that meet the needs of individuals and other institutions, and the figure shows this.

And through the previous definitions, we conclude that the economic institution is the productive unit that is based on the collective work of its workers and is the basic unit in the national economy and works to accomplish the task assigned to it according to its own plan emanating from the general plan of the state.

3. The second axis: the concept and methods of decision-making:

3-1- The concept of the decision-making process: The decision-making process is one of the basic functions of decision-makers, whether at the level of individuals or at the level of economic institutions, according to their different classifications and ruling objectives.

Through this, it becomes clear that the decision-making process is an integral part of the tasks of managers and decision-makers. In order to define the decision-making process, we must know the concept of decision. Decision is a translation of the Latin word *Décision* which means the final transmission and the specific will of the decision makers regarding what to do and what not to do in order to achieve a certain goal.

- And the decision is linguistically: derived from the Qur'an, and the origin of its meaning according to what we want is (empowerment).

And the decision idiomatically: it is a choice among certain alternatives, and the choice may always be between right and wrong, or between white and black, and if weighting is necessary and giving priority to the right and the best or the least harmful. (Sayed Saber Taalb, 2011, pg. 33)

As defined by writers and researchers specializing in administrative sciences, as follows: (Moayad Abd al-Hussein al-Fadh, 2009, pg. 49)

Simon knew (SIMON): The decision as choosing one of the alternatives to find the appropriate solution to a problem resulting from a changing world, which is the essence of executive activity in business.

- Yong's definition (YONG): decision is the effective response that provides the desired results in a particular situation or group of possible situations in the organization.

Barnard knew (BARNARD): The decision is that rational behavior that comes as a result of measures, calculation and thinking.

- Riggs knew And KOHN (RIGGS & KOHN): The decision is the selection of a particular alternative from the available alternatives.

Harrison knew (HARRISON): The decision is the process of evaluating the alternatives related to the goal, in which the expectation of the decision-maker regarding a specific action in particular makes him adopt a choice that directs his abilities and energies to him to achieve his goal.

And the decision-making process can be defined as a process of selecting a particular solution from among two or more solutions available in the work environment, that is, it ends up preferring a suitable solution or alternative from among the available alternatives, and this is usually done after the decision-making manager (It may be an individual, group, organization, or even a community) by defining the problem and identifying alternatives to solve it. (Mohamed Abdel Fattah Yaghi, 2013, p. 17)

3-2- The importance and classification of decisions: The importance of decision-making is evident in the decision-making manager, whether he is an individual, a group or an institution. It is also of great importance on the scientific and practical level. In this context, the importance of decision-making lies on several levels, including:

At the level of the individual: it stems from the decisions that the individual takes himself, that is, under his responsibility, as he is affected or affected by others, for example: "The job of the executive director is characterized by making decisions, postponing them, or not taking them." He takes a decision when he delegates an employee to be appointed or orders him to carry out a task or That student who chooses his division in which he wants to specialize.

- At the group level: it stems from the decisions taken by the group (several individuals or groups) represented in: the family, committees (equal members committee, social services committee, public procurement committee) and associations...etc.

- At the level of the institution: it stems from the decisions taken by institutions of different types as a tool and means that express the extent of success of the administration or its affiliates in investing material and human resources to achieve its ruling goals, and the importance of the decision-making process of this institution increases as a result of the increase, expansion, and increasing challenges It faces competition and its openness to the different environment and rapid changes. These decisions affect the economic and social status of society as a whole.

- At the scientific and practical levels: the importance of decision-making at the practical and practical levels has a great impact on the survival and continuity of institutions, because the subject of decision-making is related to the various functions (planning, organization, control and leadership...), and "decision-making" deals with behavioral aspects In addition to that, the practice of decision-making gave focus to the importance of theory and to interest in research and studies related to the decision-making process.

4. The third axis: the quantitative methods used in decision-making:

Information is considered Related to the problem to be solved is the basic and main pillar in the decision-making process, and as a result of the enormity of modern institutions, there is a need to use quantitative methods in management, which can be defined as: “a set of tools or methods that are used by the decision-maker to address a specific problem or to rationalize the administrative decision taken Regarding a specific case, it is necessary to provide a sufficient amount of data related to the problem.(Suhaila Abdullah Saeed, 2007, page 15)

4-1- The importance of data in the decision-making process: The decision-making process requires data related to the problem to be processed for use by decision-makers, and we will try to highlight the importance of this data by defining its concept and sources.

A- Data Concept: Data is derived from the original word (between) and it is also derived from the word (statement), which is what makes something clear, and it corresponds to it in the English language (Data) it refers to facts, numbers, symbols, terms, and abstract (raw) statistics, which have no correlation between them.(Ali Khalaf Hajjah, 2010, p. 103)

And data can be defined as: It is letters, sentences, phrases, numbers and symbols that are not organized and not related to a single topic, and which are not used in their current form except after developing them through analysis and explanation processes, which if they are sorted, classified, classified and organized, then this data is transformed into information.

It can be said that the data is a primary and primary source of facts and is in the form of numbers, symbols and abstract statistics that are unorganized and unrelated and do not indicate any significance and cannot be relied upon.

B- Data characteristics: In order for the decision-making manager to benefit from the data, it must be characterized by two important characteristics, namely:

- **Cognitive addition** In order for the recipient to be able to benefit from the data sent to him, it must constitute a cognitive addition to him, but if he knows the content of the data sent to him in advance, then it does not constitute any cognitive addition, and therefore it cannot be benefited from, and when the data reduces the state of uncertainty when The recipient turns into information.

A distinction is made between data and information according to the standard of the recipient (beneficiary) if the data led to an addition of knowledge to the recipient, it turned into information, but if the data did not lead to any knowledge addition to the recipient, and it remains classified in the data frame.

The criterion for distinguishing between data and information is called the receiving person criterion, because what is considered data for one person can be considered information for another person and vice versa.

- **Link:** In order for the data to turn into information, this data must be related to a specific problem or event about which the decision was made by the recipient. To change or modify the decision, so what is considered data at one moment may turn into information at other times.

C- Types of data: There are two types of data:

- **Quantitative data:** It is mathematical and statistical data that highlights a specific relationship between a number of factors or variables and is characterized by accuracy and confidence.
- **Qualitative data:** It includes judgments or estimates that are not limited by numbers, so it is less accurate and reliable than its predecessor because it includes bias and lack of objectivity.

D- Data sources: In general, it can be said that the main source of data is the person who collects this data through his observations, observations, and experiences of the reality surrounding him. However,

in the administrative field and with regard to the institution, we can say that data sources are in fact can be divided into two types:

- **Internal sources of data:** It means the data collected from the various departments, sections, and workers in the various aspects of the organization's activity, such as invoices, purchase orders, and issued and received checks.
- **External sources of data:** It is that data that comes from customers and suppliers, and from various institutions related to the particular institution, the market and the mechanism of supply and demand prevailing in the market, and from the reactions of consumers...etc

Whether the data is from internal or external sources of the organization, it should be classified, classified, analyzed and processed in order to benefit from it.

E- Methods of obtaining data: There are a number of different methods for obtaining data, and they differ according to the needs of the decision-maker. Among these methods, we find:

- **Search and check records:** This is done by following up the organizational chart, files, reports and their forms, records of important decisions, complaints and problems recorded when preparing and implementing plans, as well as private correspondence.

- **Use of survey questions:** The questionnaire is a means of collecting data through a form that is filled out by the producers, and we find that the latter is the last master of the situation, as he is the one who fills out the form, and therefore the questionnaire is used to reveal the facts of current practices, opinion polls, and the tendencies of individuals, and its data is more objective compared to the personal interview as a means alternative.

- **personal interview:** It is considered one of the most important ways to obtain data and information, as there are some data that cannot be obtained in a face-to-face interview.

And the personal interview method helps in observing the behavior of individuals and the group and identifying their opinions and beliefs and whether they change with the change of people and their circumstances. It also helps to establish the validity of the data obtained by the researcher from independent sources. The only way to collect data in illiterate societies.

There are five main points to ensure the personal interview style, which are preparing a plan in advance, scheduling the interview, obtaining approval and managing the interview.

- **Observation:** Partial answers to a particular problem can be obtained by observing the events associated with it, and the data collected in this way is processed to obtain information about the problem. In excluding associated problems.

- **Results of experiments and surveys:** In some cases, it may be appropriate to introduce some sources, such as individuals, machines, equipment, etc., into a controlled experiment, and from this it is possible to impose greater control over the sources by controlling the variables whose impact is known in a specific problem.

As for the survey, it expresses the most used and rapid method of data collection, and in order for it to have a clear and complete meaning, it requires good, clear and sequential planning of the questions, as well as the need to choose the sample with caution and care in order to obtain valuable, correct and accurate data.

- **Reports:** This method is based on observations or informal conversations. These reports may be short and biased, but in other cases they may be useful.

The importance of data lies in the fact that it is considered raw materials that are processed into information used by decision makers and on this basis the relationship between them enables the transformation of data as a raw material in the form of inputs to become, after processing, information in the form of outputs.

4-2- Quantitative methods used in decision-making in the organization: Among the most important we find:

4-2-1- Statistical Methods: Statistical methods are considered one of the quantitative methods, as we find the most important of them:

-Regressive models: Econometrics is one of the branches of economic sciences that uses quantitative methods in analyzing economic phenomena. Most of the relationships that economic theory offers us can be formulated in the form of mathematical models estimated from the reality of actual data. The main objective, then, is to build economic standard models in a field-testable form, estimate and test these models using the available data, and then finally use the estimated models for the purpose of prediction, economic analysis or appropriate decision-making.

A model is a kind of representation of the real system in medium or abstract form, and the decision support system deals with this model and not with the real system.(Muhammad Sheikhi, 2011, p. 14)

- Time series models: A time series can be defined as a set of values for a specific statistical indicator arranged in sequence so that each time period corresponds to a numerical value for the indicator called the time series level, in other words it is a set of data represented through time arranged in ascending order.

When building a time series, and before using it in analysis or forecasting, it must be ensured that its levels are comparable to each other, which is a prerequisite for the validity of any analysis, any estimate and any forecast, it is required that all levels of the series be specific to a specific place, whether it is a region, state or institution, and that the unit of measurement for all levels of the time series be uniform.

-Network analysis models: This method is considered one of the methods used in planning large-scale projects represented in the BRT method (PERT) as well as the Critical Path method and the Program Evaluation Review Technique (PERT) is an integrated method of network analysis and control that helps the management to study and control engineering projects, design, development or manufacturing processes by using tables for business Critical path. The main purpose of this method is to set the time when a project is in danger of not being completed on schedule, rather than when it should be completed. This method often includes forecasting the resources required for the expected success of the work.

4-2-2- Mathematical Methods Mathematical methods are part of the quantitative methods reached by research and studies, and among the mathematical methods we find:

- Operations Research: It is the use of scientific methods, methods and tools to solve problems related to the operations of any system in order to provide the optimal solution for those in charge of managing this system.

Operations research began to be used in Britain during World War II by studying the problem of developing the radar device. The study included identifying the best locations for radar devices and linking them with anti-aircraft artillery, searchlights and interceptor aircraft.

The use of these methods has evolved to include all walks of life, such as industry and services in all fields such as transport, health, environment, combating crime, solving traffic problems, and others.

Among the problems that can be addressed within the organization using operations research, we find:

- Determine the best policies to achieve the best results.
- Distribute the organization's resources to its various activities to achieve the best return.
- Determine the best systems for dealing with human resources.
- Determine the best ways to provide the service.

Among the models that can be used to address the various problems mentioned are the following: decision theory, decay models, linear programming, dynamic programming, game theory, inventory

models, waiting lines, project planning and control, production line balancing, simulation and artificial intelligence methods.

Operations research methods can also be classified in general into similar groups as follows: linear programming methods, probability study methods, network analysis methods and other mathematical methods.

Among the computer programs that deal easily with operations research, we find (LINDO, WINQSB, ARENA, MATLAB, SAS, QM) Operations research is considered as a scientific method for researching operations and finding solutions to the problems they face, and it is characterized by five characteristics that are considered as its basic pillars, as shown in the figure below:

-Benefit and cost analysis method: This method aims to compare the benefit or interest resulting from making adjustments to a specific activity within the organization that incurs costs and expenses, and in the case of selecting a project that requires that the estimated costs be less than the financial and economic benefit or benefits, and the success of such an assessment depends on the success in Distinguishing the largest possible number of results and the extent of their evaluation in financial amounts, and this method is used primarily in the central and local government agencies.

Benefit and costs are analyzed in an organized manner through the following steps:

- Defining the project and putting forward proposals for reducing costs.

Study proposals for new investment opportunities.

- Real evaluation of each proposal separately.

Select the project to be implemented.

- **Analytical Accounting:** Industrial accounting appeared before the middle of the nineteenth century after the development of the industry and the emergence of the need to determine the cost of what is produced, then in cost accounting and as analytical accounting to reach today in its current form as management accounting.

Among the modern quantitative tools for management control we find:

-Activity-based costing: The information that is collected and classified is of great importance in making decisions in the organization, and with the developments that include the various functions in the organization, especially the production process (production systems and techniques, marketing, quality, competition ... etc.) and the inflation of its indirect burdens compared to the direct ones, And the expansion of the activity of institutions and their large size, this requires an effective control over costs and production, which led to the emergence of a costing system based on activities, which is based on a basic idea that depends on linking the resources used and the activities that use these resources, and then linking the costs of activities and the final product.

An activity-based method is developed after identifying and appointing the project team according to the following steps:

- Defining activities: A preliminary list of all activities is prepared and all aspects related to it are discussed.
- Quantitatively calculate the cost of activities: Express those activities with a quantitative scale (activity volume).
- Determine cost drivers: Determine the relationship between resources and activities or between activities and cost objectives.
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5. Conclusion :

Through this research paper, in which we dealt with the various concepts of the economic institution in addition to the concept of decision-making and its different classifications, we also touched on the various quantitative methods used (statistical and mathematical) in the decision-making process, and through this theoretical study on the relationship between quantitative methods and the decision-making process. The decision It became clear to us the importance of data and information in this process, as it plays an important role and is considered the starting point in the quantitative study, and we also find that the validity and quality of this data gives us credible and error-free results, which helps to make the right decision, and it can also be said that the survival and continuity of institutions is based in a way It is very important for the various decisions that are taken at the level of jobs and activities that they carry out, and given the size of the institutions and their development, it has become necessary to use quantitative methods in management for effective management and a sound forward-looking vision and to avoid losses that may face these The institution, due to the lack of future forecasts and data, on the basis of which policies can be drawn and correct decisions taken.

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