The Role of Linear Programming in Optimizing the Production Process and its Impact on Decision-making (a Case Study of Arib Dairy)

دور البرمجة الخطية في أمثلة عملية الإنتاج وأثرها على اتخاذ القرار (دراسة حالة ملبنة عريب

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Abstract:This study aims to clarify the steps of using quantitative methods. In particular, the linear programming method to demonstrate its importance and role in the decision-making process, where we try, through the present study to apply the linear programming model in an economic company to make the optimal decisions and determining the amount of production. The decision-making process is able to determine the nature and quantity of products, in order to reach the goals under certain constraints of the available resources.The research concluded that the application of the linear programming method helps the stakeholders to address specific problems in view to take the appropriate decisions in the organization. The manager can formulate available data mathematically and quantitatively within the framework of a numerical model. Taking into account that the adoption of such method provides the quantitative indicators necessary to support decision-making and solve the problem in a practical way.

Keywords:quantitative methods, linear programming, decision making.

JEL Classification Codes :C44

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1. Introduction

Nowadays, the Economic firms are witnessing a wide range of activities due to the expansion of their size and the large number of competitors. In certain circumstances, the administration takes a series of decisions characterized by a lack of information, uncertainty, and even unclear vision in the future. In fact, taking the right decision requires the managers to choose the appropriate system and an effective method among a variety of possibilities.

In matter of business, the decision-making is crucial, as it is one of the most important basic functions carried out by the manager. Therefore, this process constitutes the basic foundation of the organization. Hence, it is needed, in such cases, to use quantitative methods in decision-making, including linear programming which is one of the most important practical methods in the field of decision-making. Besides, it is considered as an effective scientific tool in management that allows the exploitation of the organization's resources to achieve a specific goal and helps managers to make the right decision.

Based on what has been said previously, the research question is the following:

How can a linear programming method help managers to take the appropriate decisions in an economic enterprise?

To clarify more our research question we formulate the following sub-questions:

- What is the importance of linear programming?
- To what extent the linear programming contributes to the decision-making process?
- How can a linear programming determine the optimal quantity of production in an economic company?

The research aims:

The research aims to study the possibility of applying one of the quantitative methods used by researchersto determine the optimal quantity of production which refereed to the linear programming. The objective is to evaluate the multiple options and choose the best one , in order to achieve the organization's goals which the possibility of maximizing profits, and at the same time minimizing costs.

The importance of the research:

Quantitative methods are considered as one of the most important approaches for business administration that help the organization to rationalize the use of its resources and production factors, especially in light of scarcity, as the decision-making process is considered the core of the administrative process, because the decisions taken affect deeply the future of the organization and its success and development.

2. The conception of linear programming:

The Linear programming is regardedas one of the simplest mathematical methods that can be used to solve problems facing economic firms. It aims to resolve complex issues by determining the optimal combination of production in order to achieve the main goals.

2.1. Definition of linear programming:

The linear programming denotes a variety of meanings according to many thinkers and analysts. Below we review the most important definitions:

The 1st definition of linear programming:"The linear programming is defined as a mathematical method that enables one to reach the best and most optimal possible solutions to a set of problems that meet certain mathematical conditions"(Morgan, 2002, p. 59).

The 2nd definition of linear programming:"The linear programming is a mathematical method used to find the optimal solution that allows the organization to use its resources in the right way" (Kabour, 2005, p. 114).

The 3rd definition of linear programming: "It is defined as a mathematical method that enables one to obtain the best solution to problems among a wide range of possible alternatives" (Ibrahim, Mohammed , & Sobhi, p. 46).

The 4th definition of linear programming: The linear programming is also known as "a mathematical method to overcome the problems faced by the administration .It tends to develop a practical measures to make special economic decisions related to the distribution of available resources appropriately to reach a highest outcomes and reduced the costs of the production to the lowest level possible level"(Youssef & Mohammed Al-Sumaidaie, p. 267)

From the previous definitions, it can be said that the linear programming is a mathematical method based on finding the best way to use appropriately the available resources of the firm and its capabilities. It projects to maximise the profits and minimize the cost to its lowest rate possible. It is, then, among the best methods that enable the organisation to be more efficient and effective in taking the decisions regarding its economic resources.

2.2. The model of formulating the linear programming:

The formulation of the linear programming is a significant step to conceptualize the goal of the company. It is intended to transform the problem from an abstract vision to a mathematical form that includes a variety of variables and numerical equations(Ahmed M. , 2008, p. 19).

It occurs either in the case of maximizing or minimizing a number of constraints, which are in the form of equations or inequalities:

The Maximization condition:

The mathematical model is as follows:

$$[Max]Z = C_1X_1 + C_2X_2 + C_3X_3 \dots \dots \dots \dots + C_nX_n$$

The Minimization case: The mathematical model is as follows:

$$[Min]Z = C_1X_1 + C_2X_2 + C_3X_3 \dots \dots \dots \dots + C_nX_n$$

The mathematical model consists of:

The formulation of the objective function:

It measures the efficiency of the model and determined a mathematical form of the decision which is either maximizing or minimizing(Al-Abd Jalal, 1998, p. 266). It also represents the main goal of the problem related to optimization. This function is written according to the following mathematical formula:

$$\text{opt} \int (\text{x}) = a_0 + \sum_{\text{j}}^{\text{n}} = 1 \, \text{C}_\text{J} \, \text{X}_\text{J}$$

In order to clarify this mathematic formula, we add the following explanations:

Opt: means optimum, it iseither maximizing (MAX) or minimizing (MIN).

Cj: Coefficients of the objective function.It corresponds either to the revenue unit or the cost unit for each product.

Xj: symbols for the quantities (number of units) produced for each product, which are the unknowns object of research.

j: An indicator of the number of variables (the unknowns) of the model, which is estimated by (n)

Limitations of the problem:

The limitations representa set of determinants that must be taken into account when achieving the goals if we want to achieve the maximum possible profits from the production of two goods.There is no doubt that there are many restrictions that must be taken into account when trying to achieve this goal. For example the market cannot accommodate any volume of output that it can be produced. In addition, the company's own resources such as raw materials, machines, funds and labour are also limited, so it is necessary to take into account such limitations when formulating the problem. It is expressed mathematically in the form of equations or probabilities with the following mathematical formula (Al-Abd Jalal, 1998, p. 266).

$$\sum aij\ x_j\ (\geq, =, \leq)\ b_i$$

This mathematical formula can be clarified as follow:

aij: Technical parameters of the consumed quantities of resources (production capacities) for a unit of production .

bi: Available quantities of resources .

i: The number of lines which represents the number of restrictions (m).

j: The number of columns which refers to the number of variables(the unknowns n).

Non-negative condition:

This condition means that all the values of the variables in the problem under study are non-negative, that is to say, the values must be positive or zero (Al-Ash, 1990, p. 16).

2.3. Conception of a linear programming model:

When formulating a linear programming model, whether it is a matter of maximizing profits or minimizing costs, it is necessary to know how to solve these models in three different manners such as:

Graphical method:

This method is used in decision-making situations in which the number of alternative actions does not exceed two(Azzam, p. 30).

The simplex method:

It is used whether the number of variables in the linear program is two or more, and it is based on the simplex algorithm(Ahmed & Ali , 1996, p. 34).

Algebraic method:

This method is used when the number of variables in the mathematical model is only two (Ratoul, 2004, p. 71).

3. Basics concepts of decision making:

Decision-making is considered the essence of the administrative process and its primary means of achieving the organization’s goals. Therefore, without appropriate decisions, the fundamental functions of management cannot be completed. Decision-making is not easy due to its complexity on the one hand, and the large number of influences facing the decision-maker on

the other hand. In this regard, it requires a number of practical procedures and activities to reach a decision.

3.1. Definition of decision making and its steps:

Below we start dealing by the concept of decision making and its various steps.

Definition of decision making:

We explore the most important definitions of decision making as follows:

The 1st definition of decision making: "The decision making is the process based on a deep reflection and an objective attitude to reach a specific result, taking into account the alternatives and the available possibilities"(Bakia & Ibrahim, 2001, p. 34).

The 2nd definition of decision making: "The decision making denotes "an order emerged from a higher to a lower authority. The latter is obliged to respect such decision provided by higher ranks, in order to achieve the goal and the aims of that organization"(Mahmoud Assaf, 1988, p. 503).

The 3rd definition of decision making: According to this vision, the decision making is an "administrative process, which constitutes the basic foundation of administrative activities. It is a series or sequential steps that lead to a specific result or the achievement of a targeted goal. The decision-making process is considered to be a set of sequential steps taken by the manager, in order to choose the most appropriate decision possible(Essaid, p. 20).

From the previous definitions, it can be deduced that the decision-making process is the core of the administrative process and a sequential chain adopted by the manager to make the right choice among a multitude of alternatives available.

Steps for making decisions:

Decision making is considered the key of the administrative and production process in general which should be given more attention by deciders. A decision taking go through various sequential steps(Ibrahim, Mohammed , & Sobhi, p. 38).

- Identifying the problem formulated.
- Determining the alternatives available to solve the problem.
- Evaluating the available possibilities to determine the best choice.

Other steps can be added which the decision maker may deem important to reach a sound decision. The matter is not the divers phases included in the decision-making process, but rather the effectiveness of these steps to reach a best decision.

3.2. Decision-making methods:

There are many methods for decision-making: traditional methods (non-quantitative) and the modern scientific methods (quantitative). It is worth noting that decision makers, in particular; must be aware of these methods in order to utilize them with a sufficient degree of confidence, as they can be summarized in the following chart:

Table 01. Decision-making methods

Traditional method	Specific method	Scientific method
-**Experience:** Resorting to previous experiences. - **Personal judgment**: a personal judgment based on subjective grounds. - **Opinions**: Relying on sharing and giving opinions. - **Experience:** Using previous experiences.	- **Personal intuition:** Relying on the decision maker's view. **- Reviewing lists:** making a list of a large number of options that affect the outcome of the decision. **-Descriptive style:** based on description facts and relationships between them.	The scientific method is considered as one of the scientific methods based on sequential scientific steps in making decisions through the use of all modern means in the field of decision-making, with the need for deciders to acquire relevant scientific and technical skills .

Source: Prepared by the two researchers based on:(Marza, 2010, p. 37), (Laouissat, 2002, p. 73), (Shahrazad & Hab, 2010, p. 43),(Hajjah, 2004, p. 62), (Bakia & Ibrahim, 2001, p. 62),(Ali & Mahedi Hassan , 2010, p. 37).

3.3. Decision-making environment:

Decision making varies in terms of its complexity, simplicity, and the attitude of the deciders. The environment in which the decision is made includes a number of variables that influence and affect the type of decision taken. The decision can be divided according to the circumstances surrounding it into:

Decision making under conditions of certainty: It is meant that the conditions in which all data and information related to the future of the company are supposed to be specific and known precisely. That is to say, the decision maker is fully aware of the conditions that will occur in the forthcoming. In such situations, there are no possibilities or probabilities for the expected events. Indeed, there is full certainty of the occurrence of these events. As a result, there is only one outcome for each event due to the existence of one possible situation(Belazouz, 2008, pp. 112-113).

Decision making under risk: The decision making process under risk refers to the situation in which there are a number of different strategies to achieve the goal , noting that each strategy has more than one outcome.(Laouissat, 2002, p. 75).

Decision making under a state of uncertainty: A state of uncertainty means that a situation in which there is not a sufficient quantity of data available about the variables and the results of the decision taken . This kind of decision is often taken by senior management when it determines the general objectives of the project and its policy. In such case, the manager is not aware about the possibility of any changes occurring after making the decision due to the lack of sufficient information. In such conditions, it is difficult topredictthe events to come.(Ayoub, 1997, p. 56).

From the above mentioned points, we conclude that the decision-making matter is one of the issues in which every member of the organization is implicated, because everyone tackles this question with a varying degrees and different responsibilities.The decisions taken may not always be subject to certain standards, so, it is required to choose the best methods provided it would be useful to solve the problem. In this respect, as linear programming method is considered as one of the scientific methods for studying problems and making decisions via a

combination of alternatives and then comparing them. The final objective is to reach the optimal, efficient and effective solutions, with the view to rationalizethe available resources.

To delve deeper and examine further parts of our research, we will discuss below a case study in an economic company to explore the various possibilities of applying linear programming in making decisions linked to the production.A case study of the dairy of Arib Company for the production of milk and its derivatives .

In this practical part, we try to use the linear programming method to evaluate the productive decisions and determine its effectiveness at the level of its success. We have applied this method to Arib dairycompany to help managers to take the rational decisions.

4. Definition of The dairy of Arib and its potentialities:

We wil deal first with the definition on the dairy of Arib then its various potentialities.

4.1. Definition of The dairy of Arib

The dairy of Arib is an economic company specializing in the production of milk and its derivatives. It is a shareholding company with total revenue estimated at 150,000,000.AD The Company is located in a vast area estimated at 14 hectares, in addition to the presence of various number cow breeders owned by private sectors.

The company became autonomous since October 21, 1991. From July 1997, it was known as a Milk Industrial Complex under the name of "Arib Dairy" and it is now a company with shares that controls its various products. The milk which is a strategic product whose price is controlled by the Directorate of the Production Units Complex and by order of the state. The daily production capacity of the company is 340,360 litres per day, and its capital in 2021 was estimated at 710,120,000.00 AD.

4.2. The capabilities of Arib Dairy

The Arib dairy has significant financial, human and organizational capabilities. These capabilities enable the company to cover and meet needs on a large scale that extend beyond the borders of the wilaya of Ain Defla, such as Chlef, Tipaza, and Medea.

Financial and material means:

The dairy's capabilities in 2021 were estimated as follows:

-Investments:The investment value is estimated at 82,393,600.00 AD, distributed among various branches. It owns workshops equipped for production, including (production workshop of milk , yoghurt and dairy products) In addition to a polluted water filtration station and an industrial water treatment station. It also owns two wells equipped with two pumps to bring water to the dairy.It has also an administrative buildings equipped with the necessary facilities, and warehouses for cooling and preservation.

- People's contribution:Its value amounted to 98,458,000 AD.
- Total income:Estimated at 265,500,000 AD.
- Stocks:Estimated at 282,496,529.21 AD.
- Sales:Estimated at 934,466,409 AD.

The daily production capacity is estimated at 340,360 litres per day, distributed as follows:

- Pasteurized milk 340,360 litres,
- Fermented milk 9,000 litres

- 60,000 yoghurt containers with a capacity of 100 g.
- Chocolate 59,000 bowls, 100g capacity, caramel 59,000 bowls, 100g capacity.

Human capabilities:

Arib (Ahmed & Ali , 1996)dairy has significant human capabilities, enabling it to perform easily its activities in an appropriate manner and good economic conditions.Theactivities of human resources are divided into two parts (administrative and production). The number of permanent workers in the beginning was 830, but their number was reduced in 2005 to 258, reaching in 2021 the number of 302 workers.

Table 02. represents products andquarterly salesfor each product, the unitproduction cost and the average daily during the first quarter of 2022.

Products	Production quantity for the trio	Quantity sold for the trio	Sold daily according to preparations	Unitary cost	Daily average
x1 yoghurt	1131312	1168362	15788.67	10.54	56565.6
x2 caramel yoghurt	138864	135883	3575.86	12.52	15429.33
x3 yoghurt Chocolate	318384	294616	5261	12.11	21225.6
x4 yogurt mixed with fruits	247296	247220	5749.30	13.02	22481.45
x5 yoghurt Bifidus	289968	289650	5793	9.57	28996.8

Source: Prepared by the two researchers based on data provided by theProduction Department

4.3. Applying the linear programming in decision-making in Arib Dairy

After we discussed in the theoretical part about the importance of using the linear programming and its effectiveness at the level of economic companies, we apply this method to the company economic activities. Our objective isto support the managers of Arib dairy to choose the sound decision. We try also to determine to what extent the linear programming is effective in the decision-making process.

Research methodology:

The Arab dairy Company manufactures five (05) types of yogurt, using five (05) basic raw materials. The responsible in charge of the production process wants to determine the ideal mixed product that achieves the organization's goals (maximum profit).the managers relies on five (05) constantly consumed products, namely X1, X2, X3, X4 and X5 which are respectively yogurt, caramel yogurt, chocolate yogurt, mixed fruit yogurt, and bifidus yogurt. The study focuses just on these five products, considering that the rest of the products are subject to regulations and restricted prices. The following chart shows data about the materials used in the production process.

Table 03. The quantity of raw materials available during a daily production and its composition.

	Uses of raw materials used for each product					
Materials used	**Yoghurt X1**	**Caramel yoghurt x2**	**Yoghurt chocolate x3**	**Yogurt mixed with fruitsx4**	**Yoghurt Bifidus X5**	**Available quantity of raw materials**
Fresh milk	0.027	0.0391	0.0391	0.027	0.0283	2323 kg
Cartoon	0.021	0.021	0.021	0.021	0.021	1115 kg
Crystallized sugar	0.0088	0.0083	0.0096	0.0058	0.0088	633 kg
Powder milk	0.0086	0.0087	0.0062	0.0082	0.0086	546 kg
Time taken	2.05	2.05	2.05	2.05	2.05	36000

Source: Prepared by the two researchers based on data from theProduction Department

We also present through the following table the details of the products regarding of the unitary cost , the sale price and the profit margin for one day

Table 04.shows the production costper unit, the prices, and the profits

	X1	X2	X3	X4	X5
Selling price (1)	17.01	20.00	20.00	21.00	20.00
Cost (2)	10.54	12.52	12.11	13.02	09.57
Profit (1-2)	06.47	07.46	07.89	07.98	10.43

Source : Prepared by the tworesearchers based on data from the Production Department

Formulating the optimal production program:

We will attempt to formulate a linear program to determine the optimal production with the aim of achieving the highest profit.

- The function for optimal production: Max(z)=x1+x2+x3+x4+x5

The Constraints:

0.027x1+0.0391x2+0.0391x3+0.027x4+0.0283x5≤2323

0.021x1+0.021x2+0.021x3+0.021x4+0.021x5≤1115

0.0088 x1+0.0083x2+0.0096x30.0058x40.0088x5≤633

0.0086x1+0.0087x2+0.0062x3+0.0082x4+0.0086x5≤546

2.05x1+2.05x2+2.05x3+2.05x4+2.05x5≤36000

The non-negative constraint: 0x1 ;x2 ;x3 x4 ;x5 ≥

By using the simplex charts, we deduce the optimal solution for the program:

X1=0, x2=0, x3=0, x4=0, x5=212381 z=212381

In order to reachthe optimal production of 212381,the company must produce

212381 of x5. The product represented the bifidus yogurt. We note that there is no need to produce x1, x2, x3, x4.These products are (yogurt, caramel yogurt, chocolate yogurt, and mixed fruit yogurt), in order to achieve the level expected.

- The function for optimal cost: Min(z)=10.54x1+12.52x2+12.11x3+13.02x4+09.57x5

The Constraints:

0.027x1+0.0391x2+0.0391x3+0.027x4+0.0283x5≤2323

0.021x1+0.021x2+0.021x3+0.021x4+0.021x5≤1115

0.0088 x1+0.0083x2+0.0096x30.0058x40.0088x5≤633

0.0086x1+0.0087x2+0.0062x3+0.0082x4+0.0086x5≤546

2.05x1+2.05x2+2.05x3+2.05x4+2.05x5≥36000

The non-negative constraint :0x1 ;x2 ;x3 x4 ;x5 ≥

By using the simplex charts, we deduce the optimal solution for the program:

X1=0, x2=0, x3=0, x4=0, x5=720000 z=336117

In order to reach the minimum cost of 336117,the company must produce 720000 of x5. It is represented by bifidus yoghurt, while we remark that there is no need to produce x1, x2, x3, x4. The products concerned are (yogurt, caramel yogurt, chocolate yogurt, and yogurt mixed with fruit), in order to achieve expected results.

-The function for optimal revenue: Max(z)=17.01x1+20.00x2+20.00x3+21.00x4+20.00x5

The Constraints:

0.027x1+0.0391x2+0.0391x3+0.027x4+0.0283x5≤2323

0.021x1+0.021x2+0.021x3+0.021x4+0.021x5≤1115
0.0088 x1+0.0083x2+0.0096x30.0058x40.0088x5≤633
0.0086x1+0.0087x2+0.0062x3+0.0082x4+0.0086x5≤546
2.05x1+2.05x2+2.05x3+2.05x4+2.05x5≤36000
The Non-negative constraint: 0x1 ;x2 ;x3 x4 ;x5 ≥
By using the simplex charts, we deduce the optimal solution for the program:
X1=0, x2=0, x3=0, x4=720000, x5=0 z=737561
In order to reach the best revenue of 737561,the company must produce 720000 of x4 which is represented by yogurt mixed with fruits. We note that there is no need to produce x1, x2, x3, x5. These products are (yogurt, caramel yogurt, chocolate yogurt, and bifidus yogurt).
-The function for maximum profit: Max(z)=6.47x1+7.46x2+7.89x3+7.98x4+10.43x5
The Constraints:
0.027x1+0.0391x2+0.0391x3+0.027x4+0.0283x5≤2323
0.021x1+0.021x2+0.021x3+0.021x4+0.021x5≤1115
0.0088 x1+0.0083x2+0.0096x30.0058x40.0088x5≤633
0.0086x1+0.0087x2+0.0062x3+0.0082x4+0.0086x5≤546
2.05x1+2.05x2+2.05x3+2.05x4+2.05x5≤36000
The non-negative constraint: 0x1; x2; x3 x4; x5 ≥
By using the simplex charts, we deduce the optimal solution for the program:
X1=0, x2=0, x3=0, x4=0, x5=720000 z=183161
In order to reach the maximum profit of 183 161, the company must produce 720000 of x5 .these value is represented by the bifidus yoghurt. We note that there is no need to produce x1, x2, x3, x4.The products are (yogurt, caramel yogurt, chocolate yogurt, and mixed fruit yogurt).

. Methods and tools

In the present research, we rely on the following approaches:
The theoretical part: We relied on a survey in order to collect informations and a reliable date retrieved from various references such as books, references, PhD dissertations, articles of journals, as well as national and international forums conclusions.
The practical part: As for the practical side of the study, it relied on research tools mainly: the observation, and interviews for the purpose of collecting and reviewing information to ensure an accurate analysis. In addition to statistical and numerical methods applied to specific programs to address the research question.

Results:

The results of our study consist of the use of the linear program as an attempt to determine the optimal production to reach the maximum profit at the Arib dairy company are as follow:
- In order to reach the maximum production, the Arib dairy company must providethe appropriate resources to produce bifidus yoghurt x5 with a daily production capacity of 212,381 units.
- In order to reach the lowest cost target, the Arib dairy company must provide the necessary resources to produce yoghurt x1 with a daily production capacity of 720,000 units.
- In order to reach the optimal revenue, the Arib dairy company must provide the needed resources to produce yoghurt x5 with a daily production capacity of 720,000 units.

- In order to reach the highest profit, the Arib dairy company must providethe suitable resources to produce yoghurt x5 with a daily production capacity of 212,381 units.

Finally, it is needed that the Arib dairy company focus on producing x5 yogurt with bifidus in order to achieve the main economic goals.

5 .Conclusion:

The decision-making process representsa big responsibility for managers in economic companies. The integration ofthe linear programming method is considered as a key elementof success inthe modern administrative to solve daily problems faced by decision makers.The economic companies can reach the best results through the use of linear programming. It helps to organize the concept of decision, especially with regard to its ability to measure probablerisks. It also plays a significant role in decision-making as an effective toolto reach the best and most accurate results. The adoption of such method demonstrates the quality and accuracy of linear programming results according to the manager's ability to use and analyse data. Besides, the application of linear programming would contribute to obtain optimal results,

The study allows us to formulate several quantitative applications on the data provided by the Arib dairy companyto look forthe solutions relying on linear programming to determine the optimal production, cost and revenue, in addition to the highest profit.

Based on the previous results, we suggest the following and recommendations:

- Introducing linear programming technology and other scientific quantitative methods in the economic companiesallows them to take the optimal and appropriate decision.
- It is necessity to train the human resource in companies about the use the linear programming method to develop their economic capacities of production.
- Following scientific methods to make appropriate and successful decisions.
-Relying on modern and advanced technological to achieve the best results..

6. Bibliography List:

Ahmed Mohamed Ali Mohamed. (1996). *Introduction to Research Operations.* Mars Publishing House.

Ahmed M.aher . (2008). *Decision Making between Science and Innovation.* Alexandria, Egypt: University House.

Al-Abd Jalal, Ismail.elsayed. (1998). *Quantitative Methods in Management.* Alexandria, Egypt: University House.

Al-Ash Mohamed Ahmed. (1990). *Linear Programming.* Kingdom of Saudi Arabia: King Saud University Press.

Ali Alfasaila , Mahedi Hassan Zeouilef. (2010). *Organization Management: Theories and Behaviour.* Amman, Jordan: Dar Majdalawi for Publishing and Distribution.

Ayoub Nadia . (1997). *Administrative Decision Theory.* Damascus, Syria : University Publications.

Azzam, S. (n.d.). *Basics in Research Operations.* Amman, Jordan: Modern Book World.

Bakia Aneam, Ibrahim Naib. (2001). *Decision Theory: Calculated Quantitative Models and Methods.* Amman, Jordan: Dar Wael for Publishing and Distribution.

Belazouz Hassen . (2008). *Decision Theory: A Quantitative Approach.* Alexandria, Egypt: University Cultural Foundation.

Essaid Ismail. (n.d.). *Information Systems for Administrative Decision Making.* Alexandria, Egypt: Modern Arab Bureau,.

Hajjah Ali Khalef. (2004). *Administrative Decision Making.* Amman, Jordan: Qandil Publishing and Distribution.

Ibrahim Jumua ismail, Mohammed ,Mohamed Alkhatib, Sobhi Mohamed mohamed zinet. (n.d.). *Management Accounting and the Operations Research Model in Decision-making.* Alexandria, Egypt: University House for Publishing and Distribution.

Kabour Mohame Mohamed . (2005). *Basics of Research Operations: Models and Applications.* Libya: Academy of Graduate Studies.

Laouissat Djamel Eddine. (2002). *Management and the Decision-Making Process.* Algeria: Dar Houma.

Mahmoud Assaf. (1988). *Principles of Management.* Mansoura, Egypt: Mansoura University.

Marza Ahmed Mewafik . (2010). *Basics of Quantitative Methods in Administrative Decisions.* Amman, Jordan: Majdalawi Publishing and Distribution House.

Morgan Siliane Mohamed. (2002). *Operations Research.* Ben Ghazi, Libya: National Book House.

Ratoul Mohamed. (2004). *Operations Research.* Algeria: University Press.

Shahrazad Mohamed, Hab Moussa. (2010). *The Ability to Make Decisions.* Jordan: Dar Al-Safaa for Publishing and Distribution.

othsmane YoussefRoudaina, Mohammed Al-Sumaidaie. R. (n.d.). *Quantitative Methods in Marketing.* Amman, Jordan: Dar Al-Manahid for Publishing and Distribution.

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