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APPLIED STUDY ON THE USE OF SENSITIVITY ANALYSIS AND LINEAR PROGRAMMING METHOD IN THE GENERAL COMPANY FOR PAPER INDUSTRIES (PAPER FACTORY IN CITY OF BASRA)

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ABSTRACT

The study is based on using the method of linear programming, sensitivity analysis in the General company for paper industries in the southern city of Basra, where the study through the use of linear programming to customize materials better and thus will increase the company's production level at the lowest possible costs.

That some of the major problems faced by the constructors of the industrial sector in Iraq in non-optimal use of available resources as a result of not using scientific methods in planning and decision-making, resulting in low production levels and the fact that the General company for paper industries in the southern city of Basra is one of those companies that have an active role in the development of the industrial sector, the company must reduce wastage and loss of economic resources by adopting sophisticated methods, linear programming method to raise the technical and economic efficiency in the Future.

Where most industrial facility in Iraq generally and the General company for paper industries, especially the problem of misuse of available economic resources, lack of reliance on scientific methods in planning for these resources correctly, thus wasting the company's opportunity to achieve production and profits and reduce costs.

The research seeks to achieve certain things and targets to assist the company concerned in the allocation of company resources available optimally by using method of linear

programming to achieve an increase in the level of production and reducing costs in the future.

The research also seeks to use sensitivity analysis of the results of the changes that may take place to form the perfect solution with optimum bekah.

Where data technical feasibility and feasibility study concerning the creation of writing & printing machine in 2012 and for all types of costs and sales prices and profits and production and other data that were used to complete this research.

1. Introduction

Prepare the General company for paper industries production strategy companies nationwide, and has a major role to use in supporting the national economy and improve the social and economic situation of the community.

Was effective and efficient in its entirety and have a privileged status in the market, but they gradually lose the internal capacities and its position in the market as a result of damages sustained because of war suffered by the country in General and in Basra in particular Subversion organization campaigns against facilities and production lines and partial reform cases returned good restoration company facilities and the lines already so it became necessary to renovate facilities and production lines of the company to recover and the large role by different methods To improve production lines, including linear programming method

So often departments of industrial establishments difficulties in securing certain types and quantities of resources available in the productive process to good use of the resources of the (the machinery and manpower and raw materials). To achieve efficiency in the degree of achievement of the objectives established.

Model and linear programming tool that enables management of the best use of the limited resources, and limited resources these departments aspires through mathematical methods in General, linear programming, in particular better the allocation or distribution of these resources to activities and events

2. The importance of research

That some of the major problems faced by the constructors of the industrial sector in Iraq in non-optimal use of available resources as a result of not using scientific methods in planning and decision-making, resulting in low production levels and the fact that the General company for paper industries in the southern city of Basra is one of those companies that have an active role in the promotion and development of the industrial sector, the company must reduce wastage and loss of economic resources by adopting sophisticated methods, linear programming method to raise the technical and economic efficiency em in Future.

3. Search problem

Most industrial enterprises in Iraq generally and the General company for paper industries, especially the problem of misuse of available economic resources, lack of reliance on scientific methods in planning these resources correctly, thus wasting the company's opportunity to achieve production and profits and reduce costs.

4. The research hypothesis

Study on the premise that "the method of linear programming, sensitivity analysis in the General company for paper industries Basra branch plant in Basra province will allocate available resources optimally and therefore will increase the company's production level at the lowest possible costs"

5. The objective of the research

The research seeks to achieve the following objectives:

A. assist the company concerned in the allocation of company resources available optimally by using method of linear programming to achieve production and Ziad reduce future costs

B. using a sensitivity analysis of the results of the changes that may take place on the model of the optimum solution with optimum survival.

6. The productive sections in the lab[(12)]

The plant contains several sections, each section performs the initialization phase is the paper industry until it reaches the final stage of these sections:

6-1-dough production section: this section includes the following units

- Hacking and purification unit: where cutting reeds and purification of dust and wash albkas and free from the bone marrow.
- Cooking unit and cook Reed walbkaz and extract the fibres.
- Washing unit: Wim when washing the dough with warm water to remove chemicals for non-cellulosic material melted during cooking process.
- Chemical recovery unit: this unit include evaporators for concentrated liquid resulting from cooking to 40% of phase retrieval and soda recovery unit, in addition to air compressors.

6. Paper production section: this section contains the following modules:

- Dough preparation unit
- Paper production unit
- Cardboard production line
- Winding and cutting equipment for cardboard
- Manufacturing unit

6-3-section control and quality control

Contains the laboratories section production of pulp and paper and questions.

7. Raw materials for the paper industry [(12)]:

7-1 reeds: it is the basic material for this industry and the plant is consumed than in the case of function with maximum power about 50,000 tons annually.

7-2 -Albkas: the article remaining juice sugar Reed stalks after extracting the juice from it.

7.3 importing pulp (wood pulp.): non-restricted, kravit dough dough limited

7.4. waste paper: waste paper are good raw material manufacture paperboard in different proportions ranging from 20-100% of the estimated needs of the plant remnants of paper

approximately 3 000 tonnes annually so the company adopted Center for assembling and pressing waste paper processing plant needs of this article

7-5 limestone: the plant is consumed in case he maximum power about 12,000 tons of limestone.

7-6 different chemicals: consists of subjects of sodium sulfate and approximately 26,000 tons per year, and a soda and a minimum quantity of 1500 tonnes annually.

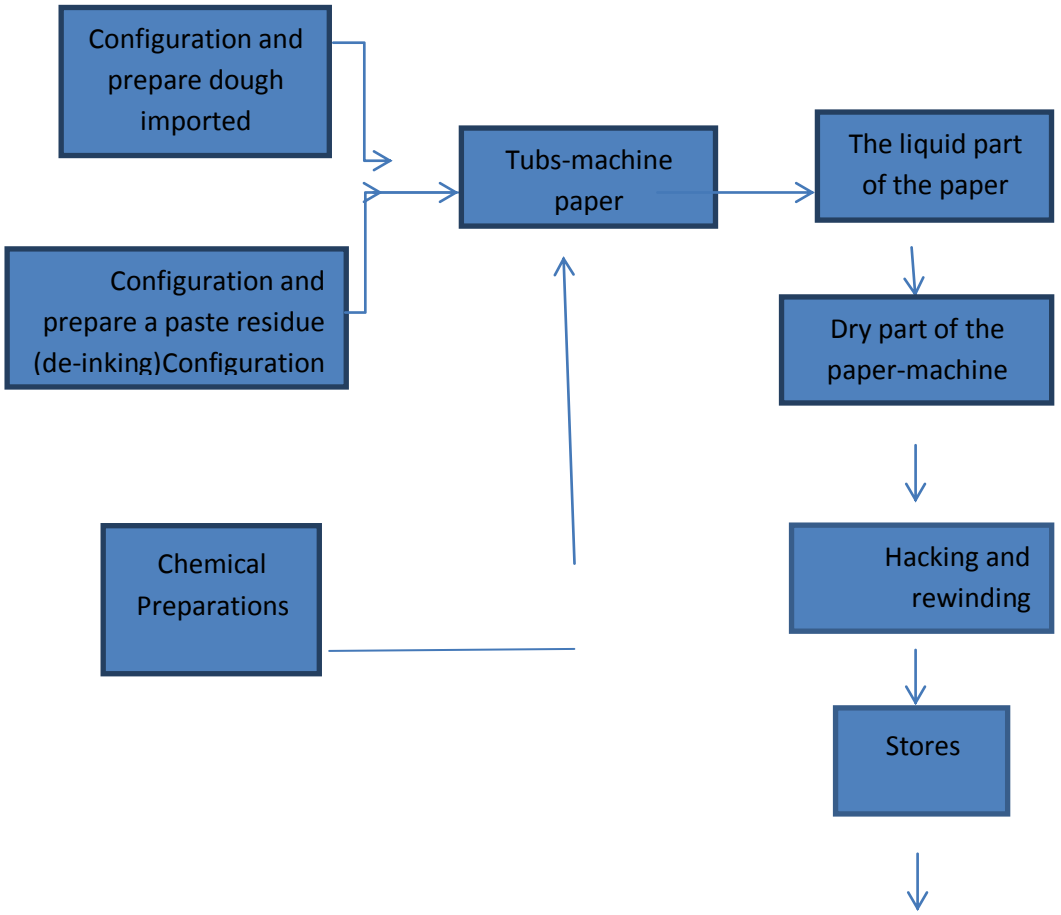
There are other articles help many sulphuric acid aluminum sulphate 530 tonnes per year and other materials kalshab[17].

8. Technology course: Block diagram [18]

Divide the paper into velocities product line:

- Prepare dough: it consists of mixing units and the development of the paper and prepare it for production.
- Unit preparations alkimioih for creation of chemical additives to improve the specification alviziaoih for paper product.
- Equipment for the production of paper containing paper and dried tape configuration through special equipment.
- Winding and cutting equipment product

The course can be illustrated by the following chart: technology-



(write-print)[18]

9-Applied entries

Since linear programming is one of the methods used at the end of the thirties of the last century in 1939 where Soviet sports world kastrovig that there is a range of production problems solved in accordance with the model content, and use digital methods in solving them, and in 1941 the world Hitchock-frank Addressing transportation problems in linear programming method to minimize costs, and in 1947 the world sports George-pantzing to solve problems of military planning by linear programming. [14]

9.1. Method of linear programming

The linear programming method is one of the branches of the science of operations research operation research It is with the game theory Games Theory User analysis and product Input analysis put out known written economicsLinear Economics

The word don't talk about programming to computer programming, but refers to a mathematical technique used to find the optimal solution, and described as a sin because assuming linear relationships between variables, objective function, constraints, the problem also describes the relationship between input and output model

The linear programming method looks at the distribution of limited resources bin different uses within the constraints to achieving the objectives of productive units if expand maximize Or minimize minimize The value of the objective function, you may know programming as a tool for allocating scarce resources (such as work, material, machinery, capital) with best possible cases to reduce Melasma or maximize profits, so the decision maker set of alternatives required to choose from. (2)

Also known as strongman manner the optimum material co., Ltd., also known as a mathematical method to choose the optimum allocation of resources to maximize profits or reducing costs. (3)

Also known as mathematical method to choose the optimum allocation of resources to maximize profits or reducing costs(4)

Also known as mathematical method which focuses on the optimal use of limited resources to suit the desired goals(4)

We can also draw linear programming known as one of the mathematical methods and planning do not develop optimal solutions in the allocation of limited economic resources and achieve the planned objectives. (6)

9-2 the importance of linear programming method

Show the importance of linear programming method in the diagnosis of primary solutions possible and then exclude the money achieves optimal, with linear programming to determine the optimal allocation of scarce economic resources between competitive products and activities(5)

9-2-1-uses the method of linear programming [10]

A. use to determine the best major slowdowns are to produce the same product

B. used to solve problems of maximizing revenue and minimizing the costs associated with production requirements, whether material or machinery working hours and labour

C. is used to solve the problems of production planning and determine the policies of the production in any industrial sector or in the case of multiple products[1]

D-use it to select the most efficient economic activities geographical distribution[1]

E-the trade-off between domestic production or import based on economic efficiency [1]

And-used to select the best combination between outputs Out putunder major slowdowns are prevalent factors of production available [1].

9.2.2. The factors that led to the widespread use of linear programming [1]

1. representation of all problems in linear programming models pictures

2. multiple methods of solving linear programming models

3. plentiful information given by linear programming method

4. development of linear programming method using electronic calculators

10. The assumptions and elements of linear programming method

10-1 the assumptions of linear programming method

For the application of the linear programming method must have a set of basic assumptions before using this method in solving problems which could be clarified as follows:

10-1-1-linear relationship[9] linearity

According to this property imposes an express objective function and Hardy sharp weighted norm inequalities, equations or linear relationship which implies to the realization of the principle of proportionality and additionality

Proportionality refers proportioality The fixed relationship between input and output and the relationship between resources and production within a certain time period[16]

Addendum Additivitymeans total inputs equals the total output is necessarily any that use the total resource input should equal the total production quantity, that endure on profits.

10-1-2-check certainty

Where the linear programming method takes care of problems fully confirmed and did not address potential problems as it is supposed to resolve factors, resources and manufacturing arts and parameter values are known and fixed[(1)].

10-1-3-fractional (retail)

Retail means or fractional values of decision variables can be incorrect numbers as units of production can be divided into fractional values it has determined the optimal production output integer part from unity to resolve a product[(13)] .

10.2-elements method of linear programming

The kits use programming method in solving problems facing the various establishments is the availability of the following conditions

10-2-1-goal setting

There should be a specific target must be achieved and expressed in quantitative form which must be a function of the target goal for example let it maximize profit or minimize freckles [(3)]

Objective function represents a linear equation contains variables for the resolution that sets our solution to the problem and that this equation describes the effects on the target due to test different values for the decision variables [(15)]

And the objective function can be expressed mathematically as follows

Max or Min$Z= C_1X_1+C_2X_2+...+C_nX_n$

10.2.2. the resource constraints (restrictions)

Require limited resources achieve optimal and should include the mathematical model equations are restrictions on limited resources, these constraints represent a set of parameters

that limit the degree of achievement of goals to reach and could explain these limitations the following [9]

* Enrolment is less than or equal to (≥) and includes an upper limit determined by the constraints of more expensive resources

* Enrolment is greater than or equal to (≤) means using usable resources or greater than any they represent minimum to be achieved in the final solution, that define the constraints of the least expensive resources or resources available

* Under the equal sign (=) in this constraint limits the amount of resources available for use accurately

10-2-2-types of restrictions[4]

1. technical limitations or technology

What is the quality of machinery and equipment and operational capacities available as well as the amount of productivity of each machine or machine and the amount of time required to produce one unit of the product.

2-human or human resources constraints which comes from labour in all disciplines to contribute to the productive process

3. material restrictions and production requirements such as major raw materials and assistance and also known by material conditions based on production quality

4. commercial or marketing restrictions and known restrictions or conditions of supply and demand as is the quality and production volume to be put on the market during the current or future period

10-2-3-resolution alternatives

There must be several alternatives to solve the problem and that we must choose one of them for the purpose of achieving the optimum solution[2]

10-2-4-decision variables

Mathematical expressions are of objective function and mathematical expressions for each constraint, are variables that we want to take the decision as

$(X_1 ,X_2,X_3,...,X_n)$

10-2-5-non alsalbeh

This requirement reflects the lack of visibility values of variables is negative no negative outcomes for any productive activity(2)

Namely, that:

$X_1 ,X_2,X_3,...,X_n \geq 0$

Sensitivity analysis

After reaching the optimal solution to the problem of linear programming, it is useful to investigate the impact of the change in the basic elements of the problem of linear programming, through sensitivity analysis sensitivity analysis The changes after the best solution any so-called analysis beyond optimization Analysis post optimality

Sensitivity analysis identifies that the measurement of the extent or limitations change in values or components of the mathematical model with perfect solution reached without change(4).

There are a lot of important questions presented in the working life of the most different projects, and these questions on what might happen if changed the prices of raw materials or labour costs or Awad per unit of project or products we were able to increase the resources available for the project (capital, raw materials, labour, etc.), you can keep the optimum solution with such changes?

The sensitivity analysis to answer many of these questions within the optimum solution can be survival method persists despite changes but within certain limits, as well as possible access to new solution via the old solution but under certain conditions also here can save considerable time and effort if rebuilding and resolve the problem.

11. The practical side

First: data obtained from company

T.	Paragraph	Paper machine	Paperboard machine
1.	Annual production capacity (ton)	108,000	144,000
2.	Fixed capital	47.5	71
3.	Invested capital	63.5	83
4.	Productivity and annual operating costs	64	48
5.	Annual total fixed costs	10	25
6.	Operating working capital	16	12
7.	Annual sales	108	94
8.	Operational quarter	33.9	19.8
9.	Annual cash flow buildings	38.6	37.8
10.	The annual rate of return	81%	56%
11.	Payback period	2 years	2 years
12.	Internal rate of return	25%	22%
13.	The value of each instalment payment equal annual	23	30.8

Table (1)

Summary of feasibility studies for the project of new productive lines[17]

- Amounts in million dollars

1- General company for paper industry paper lab – Department of statistics, research and information unit for the year 2011.

The company will adopt paper envelopes a key raw material costs and reduced availability in the country and rising productivity earnings added to the wonders of long fibres and other materials such as regards printing and writing paper is as follows:

A. The quantity of raw material (tonnes)

T.	Details	(1) 70%	(2) 80%	(3) 90%	(4-10) 100%
	Paper residue	40720	103680	116640	67500
	Imported pulp	17539	889	22550	25056
	Chemicals	1500	1715	1928	2142

Schedule No. (2)

The quantity of raw materials for paper[18]

B- The cost of raw materials

T.	Details	(1) 70%	(2) 80%	(3) 90%	(4-10) 100%
	Paper residue	27693	31104	38880	38888 MTD
	Imported pulp	17539	889	22550	23,810 MTD
	Chemicals	2998	3427	3855	4284 MTD

Table (3)

The quantity of raw materials for paper[18]

1- General company for paper manufacturing – planning – technical feasibility of printing and writing paper velocities.

2- NRDC – 2012.

We note from table 2 the percentage used is as follows :

From paper waste = 0.8735%

From dough imported = 0.16%

Of chemicals = 0.0135%

As for cardboard (cardboard) is the percentage used raw material is the same used in writing and printing paper, despite the lack of details about cartoons, the researcher extracted from raw materials and are as follows [2]

Total raw materials x percentage of waste = quantity of raw materials from waste

Total raw materials x percentage of dough = quantity of raw materials from dough

Total raw materials x percentage of chemicals = quantity of chemical raw materials

 Since the initial dynamometer College material = 157000 tonnes per year

114000 × 0.8735 = 159514.5 of paper waste

114000 x 0.16 = box 30880 dough imported

114000 × 0.015 = 2605.5 of chemicals

1- Prepared by researcher

2- Prepared by researcher

The results can be illustrated as follows in table:

T.	Details	
1.	Paper residue	159514.5
2.	Imported pulp	Box 30880
3.	Chemicals	2605.6

table (4)

Table prepared by researcher

The quantity of raw materials for cartoons

As for paper, despite the lack of adequate data for the researcher didn't rely on percentages used in the productive process by extracting raw materials and are as follows

Total raw materials x for used him percentage = raw materials from waste

Total raw materials x for used it = raw materials from dough

Total raw materials x for used it = raw materials of chemicals

 Total raw materials for paper = 109759 (17)

 Raw materials of waste = 0.493 109759 x

= 54111.187

 Raw materials of dough = 0.493 109759 x

= 54111.187

 Raw materials of chemicals = 0.0139 × 109759

= 1503.698

The results can be put on the table as follows:

T.	Details	
1.	Paper residue	54111.187
2.	Imported pulp	54111.187
3.	Chemicals	1503.698

Schedule No. (5)

The quantity of raw materials for paper [17]

The annual cost of the three products (species)

This can be illustrated in the following table

Annual production costs white paper	64305
Annual production costs for carton	57600
Annual production costs for paper	48736

Table (6)

Represents the production costs for the three species

(White paper, cardboard, paper) in million dinars

Production capacities of the three machines

Be explained in the following table

The annual production capacity of white paper	108,000
The annual production capacity of reinforced	144,000
The annual production capacity of paper	75600

Table No. (7.)

Represents the annual production capacity (tonnes) to three machines[18]

Note that the paper machine is running at 100%

And tissue machine run by 70%

And the cardboard machine by 90%.

The cost per ton

You can find the cost per ton for the three species through the following mathematical formula:

The cost per ton =

The cost per ton of paper = = 0.59548 MTD

Cost per tonne of cardboard = = 0.4 MTD

The cost per ton of paper = = 0.6447 MTD

The results can be put in the following table

T.	Details		
1.	The cost per ton for white paper	0.59542	MTD
2.	Cost per tonne of cardboard	0.4	MTD
3.	Cost per tonne of paper	0.6447	MTD

Table (8)

Represents the cost per tonne for each type of

Table prepared by researcher depending on table (6) and (7)

The percentages used materials

And that can be percentages used raw materials for each of the three types according to the following table:

T.	Details	Paper%	For reinforced%	For sanitary paper%
1.	Paper waste	0.8735	0.8735	0.493
2.	Imported pulp	0.16	0.16	0.493
3.	Chemicals	0.0135	0.0135	0.0135

Table prepared by researcher

Table (9)

Represents the percentages used in the productive process of three types

Total raw materials(*)

Total raw materials can be calculated for the three substances as follows:

As working time is 300 days,

Total daily waste materials = total waste materials of three species/300

Tons per day

College of materials daily dough = total articles dough for three types/300

= 366.824 tons per day

College materials of chemicals per day = total chemical materials of three species/300

= 20.84 tons per day

* Preparation of a researcher with reliance on spreadsheet (2) and (4) and (5)

Previous results can be illustrated in the following table

The amount of waste materials of three species	1144.04 tons per day
The amount of material imported for the three types of dough	366.824 tons per day
The amount of the total chemical materials for the three species	20.84 tons per day

Table (10)

Total material represents the three types (*)

And easily applied in software we are divided on the number 1000 is as follows

1- The amount of total waste materials of three species = 1.14409 thousand tons

2- College of materials quantity imported three types of dough = 0.366824 thousand tons

3- The amount of the total chemical materials for the three species = 0.02084 thousand tons

* Preparation of a researcher with reliance on spreadsheet (2) and (4) and (5)

II: building mathematical model of linear programming to issue general company for paper industry paper plant Basra

1- Objective function

Since we use linear programming to minimize costs, would be objective function as follows

Min = $C_1 X_1 + C_2 X_2 + C_3 X_3$

Plants X_3	Plants X_2	Plants X_1	Reference	Objective function
0.6447	0.4	0.59542	=	Min

Table No. (11)

Represents the objective function and transactions (*)

Where:

Min Represents a function type is low

X_1 : Represents the quantity of white paper

X_2 : Represents the amount of cardboard

X_3 : Represents the amount of toilet paper

* Setting up int depending on table (8)

1- Structural constraints

Include raw materials and auxiliary materials, here we will use the raw material (waste paper pulp and imported chemicals) due to lack of adequate data to introduce other new restrictions, as follows:

Right side R.H.S	Left side L.H.S					
Quantities available	Signal type	Plants X_3	Plants X_2	Plants X_1	The name of the place	Number constraint
-1.144009	≥	0.493	0.8735	0.8735	Paper residue	1
0.366824	≥	0.493	0.16	0.16	Imported pulp	2
0.02084	≥	0.0135	0.0135	0.0135	Chemicals	3

Table No. (12.2) represents the structural constraints for raw materials (*)

2- Under non-negative

$X_1\ X_2\ X_3 \geq 0$

* Setting up int depending on table (9) and table (10).

In light of the above, it can write the formula of linear programming in the following form (*)

Min Z = $0.59542X_1 + 0.4\ X_2 + 0.6447X_3$

S.T : $0.8265\ X_1 + 0.8265\ X_2 + 0.493X_3 \geq 1.14409$

$0.16\ X_1 + 0.16\ X_2 + 0.493X_3 \geq 0.366824$

$0.0135\ X_1 + 0.0135\ X_2 + 0.0137X_3 \geq 0.02084$

$X_1 , X_2 , X_3 \geq 0$

* Setting up int depending on previous data.

Solution linear programming question using QSB (1)

After the formulation of linear programming, data is entered into the program QSB Agencies OK

1. QSB Methods of solution

Resolve issue

After entering the issue is resolved in steps and analysis of linear programming and prepare a summary report containing the final results as well as the analysis we choose it Solve the problem .

The issue was introduced with the following table:

R.H.S	Direction	X_3	X_2	X_1	variable
		0.64466	0.4	0.5959	Minimize
1.14409	≥ =	0.493	0.8735	0.8735	C_1
0.366824	≥ =	0.493	0.16	0.16	C_2
0.02084	≥ =	0.0135	0.0135	0.0135	C_3
		0	0	0	Lower Bound
		M	M	M	Upper Bound
		continuous	continuous	continuous	

Table No. (13)

Represents how data entry problem

Allowable Max . c(J)	Allowable min . c(J)	Basis Status	Rebuced Cost	Total contibution	Unitcostor contibution	Solution value	Deoson varable	
M	0.4	Atbonnd	0.1954	0	0.5959	0	X_1	1
0.5959	0.2022	Basic	0	0.4698	0.4	1.1759	X_2	2
1.2325	0.4029	Basic	0	0.2353	0.6447	0.3624	X_3	3
				0.7040	(min) =	Function	Objective	
Allowable Max RHS	Allowable min RHS	Shadow Pice	Stacle or suplus	Right Hand Side	Direction	Left Hand Side	constraint	
1.1506	- M	0	0.0065	1.145	≥ =	1.1506	C_1	1
0.3730	0.2470	0.7221	0	0.3668	≥ =	0.3668	C_2	2
0.0310	0.0208	21.0719	0	0.0208	≥ =	0.0208	C_3	3

Table (14)

Represents the output of a program QSB

Interpretation of results

Note the results shown by the program QSB My agencies

1- The quantity of material produced for paper = 6/tons/day

2- The quantity of material produced for cardboard = 1.1759/tons/day

3- The quantity of material produced for toilet paper = 0.3624/tons/day

And the objective function representing the costs for the three species we find that value amounted to 0.7040 x 1000 million

Any that daily production capacity are as follows (daily)

Ton $X_1 = 0$

Ton $X_2 = 1175.9$

Ton $X_3 = 362.4$

MTD Min Z = 704

The production of one ton of white paper would increase the value of the objective function by 0.1950 million dinars, which increased total costs .

To produce the white paper must have cost less than 0.4 million dinars in the objective function and the value obtained from the seventh column minimum for X_1 from table (14)

Shadow prices

Note from the output of a program QSB That is the table (14) that the shadow prices are (21.0719, 0.7221, 0), respectively, in column (14) of table no. (2) i.e. the increase of available materials (0.021, 0.3668, 1.145) b a ton by one unit the objective function (minimize min Z) will increase the amount (21.0719, 0.7221, 0) respectively which represent the shadow prices of three products, X_1 and X_2 and X_3 .

As appeared in the field 13 of table (14) which mean stacle suplus or value corresponding to the first entry, the company must take into account this limitation and optimally it is important that the company you need frequent and non-optimal use leads to an increase in production costs [(1)] .

Sensitivity analysis

As the sensitivity analysis is often the determinants matter the sensitivity analysis work has be selected less than or equal to (≥) because it's under control, because such parameters are fully or resources available to them, and more likely to change within the administrative control[(6)] .

Since the question covered by our research this with delimiters (≥) it cannot perform sensitivity analysis process, so we'll show only boundaries that can change for survival and optimum solution are as follows:

1- Note in column VIII to column VII of schedule (14) that the values of the coefficients X_1 in the objective function can change within the boundaries between 0.4 and M and the following product X_2 paint 0.2022 and 0.5959 product III X_3 between 0.4029 and 1.2325 this regarding the objective function coefficients Min Z .

2. on the left side who represents the available resources for the first product X_1 Is between - M and 1.1506 b tons and the second product X_2 is between 0.2470 and 0.3730 b thousand tons for the third product X_3 are between 0.021 and 0.0310 b tons so that if, for example, increased raw materials C_1 By one unit the objective function remain intact and are not changed because the price of product I = 0 = X_1 If increased following resource C_2 by one unit the objective function will increase the amount of 0.7221 because circumstances for this resource appearsPremier League 0.722 (column 14) from the table (14.2) and if increased resource III C_3 by one unit the objective function increase the amount 21.0714 for the shadow price for this resource amounts 21.0714 (column 14) from the table (14.2) or can be many cases for ease of use so that doesn't cost so only one step $^{(*)}$.

* Adoption searcher on the output (QSB) .

Conclusions

1. Note from the output of a program QSB Production white paper needs to cost an estimated 0 g 1950 to produce one ton of it.

2. the productivity of paperboard rose from 144,000 tonnes to 352770 tonnes.

3. paper production capacity rose from 75600 tons annually to 108720. Note that the actual annual working days has reached technical feasibility studies are the 300 and three meals a day

And that total costs reached 211200 million Iraqi dinar annually and note its height to increase the number of tons produced.

4. the use of linear programming method gives optimum solutions to living in the company.

5. the use of linear programming in the company increases production capacity in record time webakl effort.

Recommendations

1- Using modern scientific methods and methods of operations research including linear programming method does not counter the optimum production plans based on optimum economic material represented and which would lead to the minimization of the costs of the company and maximize production and profits.

2- Select the dedicated staff belonging to the Department of planning and follow-up in the company to update data and information on available energy and raw material mixing ratios (standard) as well as the preparation of charts illustrating the path of technological products and other information to enable researchers to undertake studies and research raises the efficiency of the company in all areas

3- Take advantage of sensitivity analysis method in the company and to its importance in the process of rationalization of production plans and related resolutions

4- Provides a method for decision maker know how achieve optimum use of the factors of production and the limits of change possible in Melasma (costs) without affecting the optimal solution.

5- Using sensitivity method shows the impact of the factors of production to optimize production line

6- Prepare more studies about the General company for paper industries not supported by research studies long ago.

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