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Optimization Of Woven Production and Human Resources Management to Maximize Profits in Business

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Optimization Of Woven Production and Human Resources Management to Maximize Profits in Business

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ABSTRACT

The Study aim of this Research is to maximize Profits in business through the optimization of woven production and human resourses management in the Textile Industry. This Research method used the Descriptive Quantitative approach and the study was conducted in districk of Cikokol Tangerang by collecting data from Textile Industry for years : 2018 – 2019 . The Data is analyzed by using the Linear Programming to maximize profits in business. Textile Industry is a manufacturing company which processes yarn and woven fabric. In the daily process the company has many problems or constrains in production planning and human resources management. Uncertaintly demand of goods fluctuation has effect on shortage or Surplus production. Others problems are the constrains in machine work hour that is spindle hour per unit including Loom hour per unit, and the labour work hour. Essentially the purpose of human resources management is to maximize the productivity of an organization by optimizing the effectiveness of an organisations employees is an essential component in driving profits into the business. This process is not done once and then magically repeats.

The Result of the study show that The Total profit earned by the Corporation at Tangerang to produce a T/C woven fabric is 6,67 doz with profit : US $ 133.400,- and for cotton 100% woven fabric is 6,67 doz with profit : US $ 100.050. with the assumtion of profit is in accordance with fixed objective and constrain function.

Keywords : Optimization, production, human resources, profits in business.

1. INTRODUCTION

The Textile and Textile Products (TPT) in the textile industry at Banten province is one of the country's sources of foreign exchange, also an industry that can accommodate a large number of workers. In 2015 the number of laborers working in that sector amounted to almost 1.2 million people spread over 2,651 textile industry companies in Indonesia. West Java Province is the largest place of textile industry, which is 1.496 pieces (56.43%) followed by DKI Jakarta 456 units (17.30%) and Central Java 381 (13.37%). The rest is spread in Sumatra, D.I. Yogyakarta, East Java, Bali and Sulawesi. One of the problems arising with the existence of textile and textile products (TPT) is the impact of emerging creativity and innovation in the Digital Economy Era that lead to increased competitiveness among producers, both in the domestic market and overseas markets. One of the most popular scientific advancements up to now is linear programming that its application can also be done on textile industry[7]. The use of linear programming is to optimize the production of woven fabric in order to obtain maximum profits in business. In a case study in the textile industry environment of PT. Argo Pantes this writer will try to apply linear programming through simplex model in order to optimize woven fabric production with the aim to achieve maximum business profit.[4]. Does Human Resources Management drive profits in business ? Human Resources management (HRM) is the term used to describe formal systems devised for the management of people within an organization. The responsibilities of a human resource manager fall into three major areas : staffing, employee compensation and benefits, and defining / designing work. Essentially the purpose of Human Resources Management is to maximize the productivity of an organization by optimizing the effectiveness of its employees. This mandate is unlikely to change in any despite the over increasing pace of change in the business world, by King Consulting – HR Consultants Sydney.[12].

As Edward L. Gubman observed in the *Journal of Business Strategy*, that " the basic mission of human resources will always be to acquire, develop, and retain talent; align the workforce with the business, and be an excellent contributor to the business. Those three challenges will never change." [13]

Optimising the effctiveness of an organisations employees is an essential component in driving profits in to the business. The process is not done once and then magically repeats. It requires a systematic and ongoing focus an activities that improve employee performance. [12].

2. RESEARCH METHOD

Hereby the researh method used the Descriptive Quantitative approach of Linear Programming to maximize a business profit.[1], and the study was conducted in district of Cicocol Tangerang by collecting data from Textile Industry for years : 2018 - 2019.

3. PROBLEM AND EQUATIONS IN LINEAR PROGRAMMING

Linear programming was developed for the first time by George .B. Dantzig in 1951. Linear programming is a problem-solving method that deals with the use of multiple resources / commodities to produce multiple products.[11]. In addition, each unit of each product produced can provide a benefit. By utilizing linear algebraic theories, several techniques or procedures can be developed.[9]. so that without having to re-explore the theories, techniques or the procedure can be used to formulate or find solutions to problems that involve the combination of resources and products.[10], mentioned above. In this way, the maximum benefit to be gained can be determined. In the field of textile industry, the use of linear programming method can be widely applied[4]. Some of these are used to analyze plant operations, production planning, fiber mixing in the spinning process, sales production coordination, marketing strategy, research activities and so on. Through this paper will be described the concept of linear programming briefly and its application in order to optimize the production of woven fabric in the company of Textile Industry. The formulation of liniear programming problem can be arranged in the form of the following mathematical model.[3]. If the factory will produce F1 type of fabric products as much as X1 units and F2 as much as X2 units, then the benefits that can be obtained are:

$Z = C_1 X_1 + C_2 X_2 + ... + C_n X_n$ ..... (1)

Equation (1) as above is called an objective function. Furthermore to make F_1 fabric as much as X_1 unit required $a_{11} X_1$ spindle - hour and $a_{21} X_1$ loom-hour. As for making F_2 fabrics as much as X_2 units required $a_{12} X_2$ spindle-hour and $a_{22} X_2$ loom-hour. So to make two kinds of fabric needed each: [2]

- Spindle - Hour as: $a_{11} X_1 + a_{12} X_2$ and
- Loom – Hour as: $a_{21} X_1 + a_{22} X_2$

Since the hour capacity - the available spindle is b1 and the hour capacity - Loom is b2 then the use of the spindle - hour number and the loom-hour should not exceed the available capacity so that

$- a_{11} X_1 + a_{12} X_2 \leq b_1$ ..... (2)

$- a_{21} X_1 + a_{22} X_2 \leq b_2$ ..... (3)

Equations (2) and (3) are called the constraint function For more details the above issues can be illustrated as table 1 below:

TABLE 1: LINEAR PROGRAMMING PROBLEMS FOR TWO TYPES OF PRODUCTS[1]

Resources	**T/C woven fabric F1**	**Cotton Fabric F2**	**Available Capacity**
Cloth production (unit)	X_1	X_2	
Spindle Hour per Unit	a_{11}	a_{12}	b_1
Loom Hour per Unit	a_{21}	a_{22}	b_2
Labourn Hour per Unit	a_{31}	a_{31}	b3
Profit per Unit ($)	C_1	C_2	

Based on the problems listed in table 1 then the formulation of the problem can be arranged as follows:[3].

Maximize: $Z = C_1 X_1 + C_2 X_2$ ..... (4)

Constrain Function : $a_{11} X_1 + a_{12} X_2 \leq b_1$ .. ..(5)

$a_{21} X_1 + a_{22} X_2 \leq b_2$ .....(6)

$X_1, X_2 \geq 0$ ..... (7)

The main purpose with the formulation of the problem or problem mentioned above is to determine the prices X 1, X 2, ... X n While aij, bi. , and Cj are constants respectively.[5].

[1] Enrick, N.L. *Industrial Engineering Manual for the Textile Industry*, Willey Eastern Privato Limitted New Delhi, 2008

4. PROBLEM SOLVING METHOD

To solve problems or problems with Linear Programming many methods have been developed. One of them is quite popular is the simplex method.[6]. Solving the problem with the simplex method in principle is to use simple formulas by means of iteration (repetition / replication steps) using matrix tables so that the results can be maximally achieved in stages.

5. RESULT AND DISCUSSION

At present the textile industry company PT. Argo Pantes makes two kinds of T / C woven fabrics and 100% Cotton woven fabrics. These two types of products can each provide a net profit of $ 20 and $ 15 per unit. The number of spindle hour per unit (in spinning process) to make cotton tetoron (T / C) product is 100 and 100% cotton fabric is 50. While the number of loom-hour per unit the T / C fabric product is 20 and the cotton fabric 100% is 25. In addition, the results of the study show that the total capacity available in the plant is 1000 and the total capacity of the loom hour is 300. Based on the data can be determined the optimum combination number of fabrics to be produced by textile factory of PT. Argo Pantes through the table 2 Linear Programming as follows :

TABEL 2 : DATA FOR THE PROBLEM SOLVING BY LINEAR PROGRAMMING[2]

product / Resources	Woven Fabric T/C	Woven Fabric Cotton	Capacity
Spindle Hour per Unit	100	50	1.000
Laboun Hour	-	-	024
Loom Hour per Unit	20	25	300
Profit per Unit ($)	20	15	

Data to determine the optimum combination of 100% T / C and Cotton woven fabrics to be produced by PT. Argo Pantes listed in Table 2, the problem can be formulated as follows: [4].

Maximize : $Z = 20 X_1 + 15 X_2$ ..... (8)

Constrain Function : $100 X_1 + 50 X_2 \leq 1000$ (9)

$20 X_1 + 25 X_2 \leq 300$ .. (10)

5.1. The Optimization by Using Simplex Method

The limiting function in the formulation of the above problem contains a sign of inequality, for it must first be changed into the form of equation by adding "slack variable" X3 and X4 so that the formulation of the problem becomes :

$Z - 20 X_1 - 15 X_2 = 0$ ..... (11)

$100 X_1 + 50 X_2 + X_3 = 1000$ ..... (12)

$20 X_1 + 25 X_2 + X_4 = 300$ ..... . (13)

The next step, the formulation of the problems that have been prepared as in equations (11), (12), and (13) done with simplex algorithm [6], as follows:

Step 1

Make table 3 below and the contents of the X and Z coefficients of the Limiting functions and Objective functions

[2] PT. Argo Pantes, Tangerang, 2018

TABLE 3: SOLUTIONS WITH SIMPLEX METHOD IN EARLY CONDITIONS

			1	2	3	4	0
Base Variable		Z	X_1	X_2	X_3	X_4	RK
0	Z	1	-20	-15	0	0	0
1	X_3	0	100	50	1	0	1000
2	X_4	0	20	25	0	1	300

Variables X_3 and X_4 are slack variables of the initial conditions also functions as a base variable. While X_1 and X_2 are called non-base variables.

Step 2
At row (0) select the cell that has the lowest negative price. This price is obtained on line (0) and column (1) or on cell (01). Since the price is obtained in column (1) then F = 1, In F = 1 is the column for the variable X1 so X1 is the new base variable candidate (will enter the base variable).

Step 3
Consider the RK column or column (0) of the newly selected column (1), then choose the smallest positive price of the price comparison in column (0) divided by the price in column (1), the result of this comparison is as follows:

$$\text{Line (1)} : \frac{1000}{100} = 10$$

$$\text{Line (2)} : \frac{300}{20} = 15$$

The smallest value is in line (1), so r = 1 in line r = 1 is a line in X3 so X3 must leave the line.

Step 4
For row (1) or r = 1 the price - the cell price becomes as follows:
Column (1) : $a_{11} = 100$ $a_{rk} = a_{11} = 100$, and then $a_{11} = 100/100 = 1$ as a new value
Column (2) : $a_{12} = 50$ $a_{12'} = 50 / 100 = ½$
Column (3) : $a_{13} = 1$ $a'_{13} = 1/100$
Column (4) : $a_{14} = 0$ $a'_{14} = 0 / 100 = 0$
Column (0) : $a_{10} = 1000$, and then $a'_{10} = 1000$ devided 100 or $(1000 / 100) = 10$

For the other rows of rows (0) and row (2), each obtained in the following way:
For line (0)
Column (1) ; $a_{01} = -20$ $a_{11} = 1$ $a_{01} = 0$
Column (2) ; $a_{02} = -15$ $a_{01} = -20$ $a_{12'} = ½$ maka $a'_{02} = -5$

In the same way as above then
Column (3) : $a'_{03} = 0 – (1/100)(-20) = 1/5$
Column (4) ; $a'_{04} = 0$
Column (5) ; $a'_{00} = 200$

For Line (2)
Column (1) ; $a'_{21} = 20 – 1(20) = 0$
Column (2) : $a'_{22} = 15$
Column (3) : $a'_{23} = - 1/5$
Column (4) : $a'_{24} = 1$
Column (0) ; $a'_{20} = 300 – (10)(20) = 100$

Furthermore the contents of cells in rows (0) and row (2) with new values have been calculated above and the results are as listed in Table 4 below:

TABLE 4; SOLUTIONS WITH SIMPLEX METHOD IN THE FIRST ITERATION

			1	2	3	4	0
No	Base Variable	Z	X_1	X_2	X_3	X_4	RK
0	Z	1	0	-5	1/5	0	200
1	X_1	0	1	½	1/100	0	10
2	X_4	0	0	15	-1/5	1	100

The results of the table above shows that on line (0) still looks negative cell value, so the next calculation is back to Step 2.

Step 2
The smallest negative value in row (0) is at value on cell (02) so F = 2. This means that X2 will enter the row variable.

Step 3
The comparison of cells in column (0) with column (2) yields the smallest ratio in cell 22 or to line (2) so r = 2 Thus the variable X4 is the variable leaving the base.

Step 4
The new tables obtained are as listed in Table 5 below :

TABEL 5 : SOLUTIONS WITH SIMPLEX METHOD ON SECOND ITERATION

			1	2	3	4	0
No	Variabel Basis	Z	X_1	X_2	X_3	X_4	RK
0	Z	1	0	0	2/15	1/3	233,450
1	X_1	0	1	0	1/60	1/30	6,67
2	X_2	0	0	1	-1/75	1/15	6,67

Note : volume in unit x 1000

Step 2
Based on Table 5, it appears that row (0) no longer has a negative cell value, so the next step is to proceed to step 5

Step 5
The optimum result is the production of T / C woven fabric of 6.67 Doz (cell contents 10) and 100% Cotton Woven Fabrics is 6.67 Doz listed in the table (content of cell 20). Maximum Business Profit or Profit ear ned is US $ 233,450,-

Human Resources Management drives profits by doing the following :
1. Hiring
2. Inducting or on boarding people into the organisation properly.
3. Training
4. Setting performance pay structures, incentives and rewards.
5. Setting key Performance Metrics or KPI's that align employee performance to profits.
6. Managing Performance to continually improve and monitor, setting boundaries and when required disciplining for improvement.
7. Employee enggement this is an area that is vitally important and of it self has many steps.
8. Aligning employees to the vision, mission and purpose of the organisation which includes the core values of the business.
9. Giving recognition where it is due and listening to the employees to ensure rewards and recognition are in align with their desires.
10. Ensuring safety at work and compliance with legislation.
11. Ensuring company compliance with Employment Law.
12. Working with company directors to maximize returns for the business while maintaining a high performing work force with minimal disruptions.
13. Maintaining a balanced workforce with sufficient employees to cover all areas while minimising cost over runs in payroll.

14. Working with Finance on employee benefits in line with budget and forecasts.

Human Resources Management drive Profits is Backed Up by Substantial Research.
Furthermore there has been a substantial amount of research in business profitability and its link to good Human Resources Management practices as sited here : "Companies that are higly skilled in core HR practices experience up to 3.5 times the revenue growth and as much as 2.1 times the profit margins of less capable companies." According to From Capability to Profitability : Realizing the value of People Management. The Report from Boston Consulting Group and the World Federation of People Management Associations is based on a cross – Industry study of more than 4.200 HR and non – HR Managers in more than 100 countries. [12]

5. 2. Conclusions

Conclusion can be drawn from Table 5 in Linear Programming and Solution with Simplex Method that :

1.The production of polyester cotton (T / C) mixed woven fabrics reaches an optimum is 6.67 Doz with profit : US $ 133.400,-
2. The Production of woven fabric for 100% Cotton type reaches an optimum is 6.67 Doz. With Profit : US $ 100.050,-
3..Maximum profit or business profit can be achieved for $ 233, 450, -

As a result of implementing just a few of these human resources management practices you will drive profits. In the final analysis, if you go about implementing these human resources management practices the right way you will have a more robust and cohesive team.

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