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Characteristics of SPLDV and POAC Management in The Perspective of Sales Optimization

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***Abstract* - Implementation of POAC management carried out by CV's manager includes the planning, namely creating an appropriate model design; the organizing, namely carrying out analysis and solutions; the actuating, namely formulating ways to gain profit; and the controlling, namely providing recommendations. This research is multidisciplinary research because it involves two academic disciplines (mathematics and management) to solve a particular problem together.**

Keywords: POAC, management, linier programming

I. INTRODUCTION

Linear programming is an optimization method for finding the optimum value of a linear objective function under certain conditions of constraints [1]. These restrictions usually relate to resources such as raw materials, money, time, and labor. Linear programming problems can be found in various fields and can be used to help make decisions to choose the most appropriate alternative and the best solution [2]. Linear programming models can determine the values of decision variables. According to [3], the methods that can be used to find solutions to linear programming models are divided into two, namely the graphic method and the simplex method. The graphic method is used if the number of decision variables in the linear programming model is two decision variables [4]. The simplex method is used if the number of decision variables in the linear programming model is at least two decision variables [5].

Organizations cannot create knowledge without the role of individuals. The reality shows that if individual knowledge is not shared with other individuals or groups, individual efforts have limited impact on organizational effectiveness [6]. The approach helps to understand what managers do, namely considering work as a process. A process is a series of actions to achieve something for example, making a profit or providing a service [7]. To achieve goals, managers use resources and carry out four main managerial functions, namely POAC (Planning, Organizing, Actuating, Controlling). Research by [8] shows that the implementation of the Planning, Organizing, Actuating and Controlling management pattern in the Bina Achievement Study Group is running well in the planning function with communication about the vision and mission which is in accordance with the standards set by the institution [9].

CV. Samudra Karya Sejahtera is a business entity operating in the convection and printing sector in Pringsewu Regency, Lampung Province. The company has managers who will design and carry out detailed and comprehensive studies through studies and analysis. Available resources include 78 meters of wool and 36 meters of cotton. The manager was asked to design suits and dresses for capital artists who were willing to pay high prices. One suit requires 6 meters of wool and 1 meter of cotton while one dress requires 1 meter of wool and 4 meters of cotton. One suit is priced at IDR 2,400,000 and one dress is priced at IDR 1,300,000. Based on this data, managers are asked to conduct studies to obtain maximum profits. This paper is aim to help solve the problem and what method can be used to determine the maximum profit from CV. Samudra Karya Sejahtera.

II. THEORETICAL

A. Planning

Planning is a number of decisions that serve as guidelines for achieving the desired goals [10]. According to Tjokroamidjojo in [11], planning in the broadest sense is the activity of preparing something systematically, activities that will be carried out to achieve a goal. Planning is a way to achieve goals well with existing resources so that it becomes effective and efficient [12].

B. Organizing

Organizing functions to synchronize and regulate all activities related to personnel, finances, materials and procedures for achieving predetermined goals [11]. Organizing is carried out through several procedures, including make details of the tasks that must be carried out, divide the total work load into rational workloads to be

completed by individuals so that work can be carried out effectively and reduce unnecessary costs [13].

C. Actuating

Actuating or directing is an activity to achieve the goals set by the company through directing all parts of the company to cooperate in carrying out activities effectively and efficiently guided by planning and organization [14]. Directing activities have several elements, including coordinating, namely communication activities to harmonize differences interest in achieving goals; motivating [15].

D. Controlling

Control can also be said to be a series of processes carried out to ensure that all planned activities can be realized in accordance with the targets that have been set [16]. Controlling includes continuing tasks to see whether activities are carried out according to plan. The implementation of activities is evaluated and undesirable deviations are corrected so that objectives can be achieved well [11].

E. Two Variables Linear Equation System (SPLDV)

Two Variables Linear Equation System (SPLDV) is a pair of two variable values x or y and equivalents in the general form of ordered pairs (x_0, y_0) [17]. The general form of SPLDV is as follows:

$$ax + by = p\ cx + dy = q\ \}$$

There are several methods that can be used to solve SPLDV, namely the elimination method, substitution method, Cramer/determinant method, and matrix method.

III. METHODS

This research is a qualitative descriptive research and literature study. Qualitative research is research that intends to understand phenomena experienced by research subjects, for example behavior, perceptions, motivations, actions by means of descriptions in the form of words and language, in a special natural context and by utilizing various natural methods [18]. This research was conducted at CV. Samudra Karya Sejahtera on 7-14 September 2023. The data used in this research is primary data obtained from managers. The data source in this research is a primary source. The steps of the research are:

1) Identification of planning phase is creating the right model design.
2) Identification of organizing phase is carrying out analysis and solutions.
3) Identification of actuating phase is formulating how to get profit.
4) Identification of controlling phase is providing recommendations.

IV. RESULTS

Linear programming is a part of applied mathematics that consists of linear inequalities. Linear programming problems are problems of determining the magnitude of each variable value that optimizes (maximum or minimum) the value of the objective function by taking into account its boundaries. Linear programming or also known as linear optimization is a program that can be used to solve optimization problems [19].

In order to maintain the sustainability of convection business, the manager of CV. Samudra Karya Sejahtera implements the management functions of G. R. Terry which consist of Planning, Organizing, Actuating, and Controlling.

1) Planning phase: Creating the right model design.

   In this phase, variables are identified, constraint inequalities are determined, and an objective function is determined based on the information provided by CV Samudra Karya Sejahtera management. Identification of variables and raw material components is stated in Table 1.

Table 1. Variable and raw materials

Design type	Wool (meter)	Cotton (meter)
Suit(x)	6	1
Dresses(y)	1	4

Identification of the maximum available raw materials is stated in Table 2.

Table 2. Available raw materials

Material	Unit (meter)
Wool	78
Cotton	36

Identification of product prices is stated in Table 3.

Table 3. Product selling prices

Product	Price (rupiah)
Suit	2,400,000
Dresses	1,300,000

Based on the information listed in the three tables above, the following mathematical model is obtained:

$$6x + y \leq 78$$
$$x + 4y \leq 36$$
$$x \geq 0, x \in R$$
$$y \geq 0, y \in R$$

Objective function $z = 2{,}400{,}000x + 1{,}300{,}000y$.

To make it easier to determine the solution set, the inequality model above is expressed in equation form as follows.

$$6x + y = 78$$
$$x + 4y = 36$$

2) Organizing phase: Carrying out analysis and solutions.

   At this stage, managers carry out analysis and find solutions to the SPLDV mathematical model.

Equation 1: $6x + y = 78$

Table 4. Intersection point for equation 1

x	0	13
y	78	0
Intersection point	$A(0,78)$	$B(13,0)$

Equation 2: $x + 4y = 36$

Table 5. Intersection point of equation 2

x	0	36
y	9	0
Intersection point	$C(0,9)$	$D(36,0)$

We will look for the intersection point P of both equations using four methods.

a. Using elimination method

$$\begin{aligned} 6x + y = 78 \mid \times 1 \rightarrow 6x + y &= 78 \\ x + 4y = 36 \mid \times 6 \rightarrow 6x + 24y &= 36 \quad - \\ -23y &= -138 \\ y &= 6 \end{aligned}$$

$$\begin{aligned} 6x + y = 78 \mid \times 4 \rightarrow 24x + 4y &= 312 \\ x + 4y = 36 \mid \times 1 \rightarrow x + 4y &= 36 \quad - \\ 23x &= 276 \\ x &= 12 \end{aligned}$$

We have the solution is $(12, 6)$.

b. Using substitution method

$$6x + y = 78 \rightarrow y = 78 - 6x$$
$$x + 4y = 36 \rightarrow x = 36 - 4y$$

thus

$$\begin{aligned} y &= 78 - 6x \\ y &= 78 - 6(36 - 4y) \\ y &= 78 - 216 + 24y \\ 23y &= 138 \\ y &= 6 \end{aligned}$$

Similar way to determine x:

$$\begin{aligned} x &= 36 - 4y \\ x &= 36 - 4(78 - 6x) \\ x &= 36 - 312 + 24x \\ 23x &= 276 \\ x &= 12 \end{aligned}$$

The solution is $(12, 6)$.

c. Using Cramer's method

Let:

$$\Delta = |A| = |6\ 1\ 1\ 4\ | = 23$$
$$\Delta_x = |78\ 1\ 36\ 4\ | = 276$$
$$\Delta_y = |6\ 78\ 1\ 36\ | = 138$$

thus

$$x = \frac{\Delta_x}{\Delta} = \frac{276}{23} = 12$$

and

$$y = \frac{\Delta_y}{\Delta} = \frac{138}{23} = 6$$

We have the solution is $(12, 6)$.

d. Using matrix method

The matrix equation is formed:

$$[6\ 1\ 1\ 4\ ][x\ y\ ] = [78\ 36\ ]$$

$$[x\ y\ ] = \frac{1}{23}[4\ \ -1\ \ -1\ 6\ ][78\ 36\ ]$$

$$[x\ y\ ] = \frac{1}{23}[276\ 138\ ]$$

The solution is $(12, 6)$.

The four methods above produce the same solution of SPLDV that the solution is $(12, 6)$. The graph of the SPLDV solution set is displayed on Figure 1.

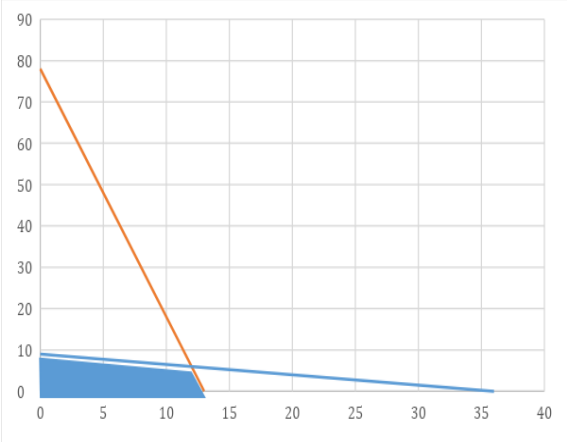

Figure 1. Graph of solution

3) Actuating phase: Formulating how to get profit.
Actuating is an effort to realize a plan so it requires a leadership function [20]. At this stage, the manager of CV. Samudra Karya Sejahtera is able to formulate ways to gain profits from production and product sales.

Table 6. Objective function

Point	O(0, 0)	B(13,0)	P(12,6)	C(0,9)
x	0	13	12	0
y	0	0	6	9
Objective function $z = 2{,}400{,}000x + 1{,}300{,}000y$	0	31,200,000	36,600,000	11,700,000

4) Controlling phase: Providing recommendations.

The controlling function plays a vital role in a company so that the entire implementation process is carried out in accordance with the provisions of the plan and aims to make improvements if there are deviations [21]. At this stage, the manager provides recommendations that from the results of the analysis, CV. Samudra Karya Sejahtera gets the maximum profit if it makes 12 suits and 6 dresses, namely IDR 36,600,000.

V. Conclusion

Implementation of POAC management carried out by manager of CV. Samudra Karya Sejahtera includes the planning phase as creating an appropriate model design, the organizing phase as carrying out analysis and solutions, the actuating phase as formulating ways to gain profit, and the controlling phase as providing recommendations. From the results of the analysis, CV. Samudra Karya Sejahtera gets the maximum profit if it makes 12 suits and 6 dresses, namely IDR 36,600,000. Implication of the research results is that linear programming can provide recommendations in determining the amount of batik production to maximize profits, and can be useful in recommending the amount to be produced, by looking at the resources available such as raw materials and labor.

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