Raw Material Production Revenue Optimization Using Information Technology-Based Distribution Modifications

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Abstracts. The economy and business world that continues to develop very rapidly lately, demands every organization to enter a very hard level of competition, demanding that all business organizations, large or small, private or government sector that compete in the modern world must make plans to face future plans, including income for the production benefits . Optimization is a process, a method or an act to make the best and highest of thing, a more efficient (smaller and faster) production process program through the selection and design of data structures, algorithms, and sequence of instructions and others. The best known tool for storing and optimizing a system is a computer. The Modified Distribution (MODI) method is one of the profit income models used in this study as a method that provides a minimum cost solution to the transportation problem. Revenue is the amount of money received by the company from its activities, mostly from the sale of products and services to customers. The better the revenue results, the better the benefits obtained at the company. Profit is a revenue or benefit obtained from investments in securities, such as stocks, bonds or in the property sector, where the value exceeds the purchasing price. The application of the Modified Distribution method in the system in optimizing the production profit income based on the delivery of raw materials should be used to obtain conditions that provide maximum or minimum value so as to minimize the effort required or to maximize what is desired.

Keywords : Optimization System, Modified Distribution, Profit Revenue

1. Introduction

Optimization is a process, method or act to make the best and highest of things, a more efficient (smaller and faster) production process program through the selection and design of data structures, algorithms, and sequence of instructions and others. The best-known tool for storing and optimizing systems is a computer. In general, all existing companies use computers as processors and data importers in a company. One of them is PT. Medan Jaya Pangan mutu, this company already uses computers in its business activities.

PT. Medan Jaya Pangan Mutu is a company engaged in the production of food from raw materials into basic materials, which provides, sells and distributes various types of snacks and others. Sometimes companies experience problems in the accumulation of goods that are not sold at a certain time, and vice versa, namely the lack of goods when there is a lot of demand from customers, this of course will harm the company. With the optimization of the demand for goods from the customer, the company is expected to be able to produce goods efficiently.

ACEIVE 2019, November 16, Medan, Indonesia

DOI 10.4108/eai.16-11-2019.2293279

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MODI method or often called modified distribution is one of the optimality testing methods of transportation problems. This means that the higher the level of demand, the greater the benefits and vice versa, the decline in demand, the benefits will also be reduced.

2. Research Method

Optimization

Optimization is a process, way or act to make something the best and highest. According to the KBBI, the word optimization is a process, a way, an act of optimizing. Whereas the word optimize means to make the best, to make the highest.

Optimization is the process of maximizing or minimizing the functions given to several types of constraints. Optimization is a series of processes carried out systematically aimed at increasing the volume and quality of traffic on visits through a search engine to the website. certain by making use of the mechanism of action or the logarithm of the search engine.

Optimization System

Optimization systems are always used to obtain conditions that provide maximum or minimum value of a system of work functions so as to minimize the effort required or to maximize the desired benefits. In this optimization system acts to obtain the best results given the circumstances in obtaining production profits based on raw materials.

MODI *(Modified Distribution)*

MODI (Modified Distribution) method is a method used to regulate the distribution of sources that provide the same products in places. which requires optimal. This product allocation must be arranged in such a way because there are differences in transportation costs (allocation) from a source to several different destinations and from several sources to a destination also varies, and the formula is:

$$\text{Minimum } Z = \sum_i^{m\,R}{}_{=1} \sum_j^{n\,K}{}_{=1} C_{ij}X_{ij} \quad \text{3.1}$$

Where

m = Number of Rows
R = Value of each Row
n = Number of Columns
K = Value of each Columns
i = Value of Row
j = Value of Columns
C = Freight Cost
X = Freight Volume
Z = Minimum Value

3. Results and Discussion

Developments in the sales business field must always be considered, this is because it is supported by the activities of the company in the sales process, one of the activities is to make optimal sales. The fluctuation of income achieved can be used as a measurement of the development of a company. Cash inflows or other increases in assets of a business entity or the repayment of debt (or both) during a period originating from the delivery or manufacture of goods, delivery of services or from other losses that are main activities of business entities. In carrying out sales activities there are many opportunities both in the present and in the future. However, opportunities that come to a company do not always produce good opportunities or generate good profits.

3.1 Analysis of Profit Revenue Design with the Modified Distribution Method

Data collection on the number of snacks in warehouses in July 2018, the amount of product distribution in July 2018, and the transport rates from warehouses to distribution points. These data can be seen in the following tables:

Table 1. Product Inventory Amount for July 2018

No	Warehouse	Location	Product Total
1	T.MORAWA	MEDAN	3.318.270,00
2	JOHOR	MEDAN	2.895.437,71
3	MABAR	MEDAN	3.379.212,29
4	L.DELI	MEDAN	385.170,00
5	T.TINGGI	T.TINGGI	1.294.575,00

Table 2. Distribution in July 2018

No	Warehouse	Distribution Point	Product Total
1	T. MORAWA	Perbaungan	524.865
		Deli Serdang	2.739.405
2	JOHOR	Serdang Bedagai	347.777
		Langkat	2.418.270
3	MABAR	Langkat	218.730
		Binjai	166.440
4	L.DELI	Deli Serdang	2.648.982
		Medan	208.410
		Binjai	521.820
5	T.TINGGI	Tebing Tinggi	334.575
		Pematang Siantar	960.000

The initial solution with VAM is then re-evaluated using the MODI method to get optimal results. The first step is to determine the value of the row (Ui) and column (Vj) for each base variable by using the relationship Cij = Ui + Vj, where Cij is the transport cost and the value of U1 = 0.

$X_{12} = 78,13 \quad = U_1+V_2$, if $U_1 = 0$, then $V_2 = 78,13$

$X_{14} = 91,13 \quad = U_1+V_4$, if $U_1 = 0$, then $V_4 = 91,13$

$X_{24} = 90,73 \quad = U_2+V_4$, if $V_4 = 91,13$, then $U_2 = -0,4$

$X_{25} = 86,33 \quad = U_2+V_5$, if $U_2 = -0,4$, then $V_5 = 86,73$

$X_{26} = 93,74 \quad = U_2+V_6$, if $U_2 = -0,4$, then $V_6 = 94,14$

$X_{56} = 89 \quad = U_5+V_6$, if $V_6 = 94,14$, then $U_5 = -5,14$

$X_{53} = 73,5 \quad = U_5+V_3$, if $U_5 = -5,14$, then $V_3 = 78,64$

$X_{45} = 92,66 = U_4+V_5$, if $V_5 = 86,73$, then $U_4 = 5,93$
$X_{41} = 76,16 = U_4+V_1$, if $U_4 = 5,93$, then $V_1 = 70,23$
$X_{31} = 73 = U_3+V_1$, if $V_1 = 70,23$, then $U_3 = 2,7$

After determining the value of rows and columns, then the cost change value of each non-base variable will be searched using the relationship Xij = Cij - Ui - Vj, where Xij is a non-base variable.

$X_{11} = 71,22 - 0 - 70,23 = 0,99$
$X_{13} = 100,39 - 0 - 78,64 = 21,75$
$X_{15} = 87,12 - 0 - 86,73 = 0,39$
$X_{16} = 94,53 - 0 - 94,14 = 0,39$
$X_{21} = 71,62 - (-0,4) - 70,23 = 1,79$
$X_{22} = 77,73 - (-0,4) - 78,13 = 0$
$X_{23} = 99,60 - (-0,4) - 78,64 = 21,36$
$X_{32} = 81,69 - 2,77 - 78,13 = 0,79$
$X_{33} = 103,16 - 2,77 - 78,64 = 21,75$
$X_{34} = 94,69 - 2,77 - 91,13 = 0,79$
$X_{35} = 89,89 - 2,77 - 86,73 = 0,39$
$X_{36} = 97,30 - 2,77 - 94,14 = 0,39$
$X_{42} = 84,45 - 5,93 - 78,13 = 0,39$
$X_{43} = 105,92 - 5,93 - 78,64 = 21,35$
$X_{44} = 97,45 - 5,93 - 91,13 = 0,39$
$X_{46} = 100,07 - 5,93 - 94,14 = 0$
$X_{51} = 102,44 - (-5,14) - 70,23 = 37,35$
$X_{52} = 111,14 - (-5,14) - 78,13 = 38,15$
$X_{54} = 119,45 - (-5,14) - 91,13 = 33,46$
$X_{55} = 90,98 - (-5,14) - 86,73 = 9,39$

From the calculations using the MODI method, all non-base variable values are positive.

4. Conclusion

Based on the research results, the conclusions that can be drawn from this study are, based on the results of the process of production profits based on the delivery of raw materials at PT. Medan Jaya Pangan Mutu found that cash flow income or other increases in assets derived from the sale of goods or services in the form of activities or activities of the company. With the establishment of an optimization system of production profit profits based on the delivery of raw materials at PT. Medan Jaya Pangan Mutu obtained five forms namely: Login Form, main menu form, customer data form, income statement form, income data form. So it can facilitate the company produced more effectively and efficiently.

5. References

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