LAPORAN ARTIKEL RISET DOSEN

APPLICATION OF GRAND TECHNO – ECONOMIC STRATEGY BASED ON LINEAR PROGRAMMING IN TEXTILE INDUSTRY

Oleh :

Ketua Peneliti :
Dr. Ir. Raden Achmad Harianto, MM. – NIDN 0418045804
raden.achmad@dsn.ubharajaya.ac.id

Anggota :
Pratiwi Nila Sari, SE, M.Ak, Ak., CPA - NIDN 0319018601
pratiwi@ubharajaya.ac.id

PROGRAM STUDI MANAJEMEN & AKUNTANSI
FAKULTAS EKONOMI
UNIVERSITAS BHAYANGKARA JAKARTA RAYA
MARET 2022

Application of Grand Techno-Economic Strategy Based On Linear Programming in The Textile Industry

Raden Achmad Harianto
haribast@gmail.com , Universitas Bhayangkara Jakarta Raya, Bekasi, Indonesia

Pratiwi Nila Sari
Pratiwi@ubharajaya.ac.id Universitas Bhayangkara Jakarta Raya, Bekasi, Indonesia

Abstract---The main objective of this paper is to review of the evolution of management science, overview of grand strategy and its linkage with the techno – economic as a tactics to trigger productivity to win global competition. A review of the relevant literature was conducted and a connection between management science, grand strategy and techno – economic based on the linear programming can be applied in the textile industry. It was found that the industrial world in the midst of the Covid-19 pandemic has an impact on the market which is increasingly shrinking and is plagued by a quite severe sluggishness. Simultaneously the labor productivity is getting weaker. This is what is known as the negative impact of the global financial crisis. Will the Indonesian nation be able to maintain the momentum of economic growth amidst the tsunami waves of the global financial crisis? A grand strategy that combines the roles of technology and economy (*techno-economic*) strategy based on linear programming needs to be implemented immediately. The success of the techno economic strategy cannot be separated from the role of three pillars, namely mastery of technology, productivity and competitiveness. All of this can only be successful if it is supported by a systematical analysis such as linear programming and sustainable policy.

Keywords-- Grand strategy, techno-economic, linear programming

Introduction

Technology which is considered as an exogenous factor of the economic system causes economic policy makers to only orientate toward the macro economy. Meanwhile, the element of microeconomics is often neglected. In the future, it is time for the independence and competitiveness of the national economy to rely on increasing productivity and efficiency. This increase can only be created through a process of continuous improvement and reform of techno-economic policies that can bring about changes in the investment climate through monetary and fiscal

instruments. Another factor in the context of stimulating productivity and efficiency is support for infrastructure development in the real sector in the form of a logistics system, transportation, and a system for producing goods and services. All of these systems must be closely related to the Indonesian human resource development system based on mastery of science and technology.

The term techno-economy used in this paper is expected to lead the Indonesian nation towards a more integrated approach to future economic policy.(Aroef, 2009). The direction of the macroeconomic approach is to maintain fluctuations in the "business cycle" within a single span of control that can foster an investment climate, exchange rates and market forces that are immune to inflation attacks and economic recession through the application of monetary and fiscal policies.

The concept of grand strategy, which is defined as the broad patterns and principles of a states foreign policy. Grand strategy encompasses some of the most critical distinctions in state behaviour: isolationism versus expansionism.(Narizny, 2001)

There are three basic planning elements time, cost, and quality. These concepts are in a close relationship with each other. Labour productivity is also a key concept of construction planning efforts and has a direct interrelationship with the triple constrain mentioned above. The present study reports an investigation of construction labour productivity described as numerical. Concerning the concept "labour productivity" Here, the system which is the source of labor productivity rates in Turkey was also introduced and its criticism was carried out. Toward this aim, labour productivity rates of the most fundamental to work items of any construction project (formwork – erecting and reinforcement – fixing).(Aroef, 2009). Were obtained by means of a questionnaire survey applied to planning engineers, site / project managers, and chief executive officers of about 82 general.

The research shows that service productivity should be lower when factors (e.g., higher profit margin, higher price) motivate the provision of better service quality and that service productivity should be higher when factors (e.g. higher market consentrations), higher wages,) discourage the provision of better service quality. The emperical result also provide preliminary evidence that large service companies may tend to be too productive relative to the Optimal less emphasis (in short run) on cost reduction through automation and more emphasis on service Quality. (Rust & Huang, 2012).

Neoclassical economics, in particular the orthodox theory of the firm, offer, little insight into the question of company strategy. It contributes even less to the understanding of the strategic management of technological change each Outhor examines the contributions from his own discipline, (economic, sociology organization and system theory) in order to build new multidisciplinery theories of the firm, which will contribute to the debate surrounding the effect of new technology on company strategy and economic growth.(Callon, 1992).

Method
This research method uses descriptive quantitative method.
How to apply the strategic grand techno-economic based on linear programming in the Textile Industry ?

To solve problems with Linear Programming many methods have been developed. One of them is quite popular is the simplex method.(Utomo, 2018).

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 or by using the application of linear programming.

Discussion

One of the Techno Economic Strategy up to now is linear programming that its application can also be done on Manufacturing Industry.   The use of linear programming is to optimize the production in order to increase profit in business.(Handoko, 2013).

Linear programming was developed for the first time by George B. Dantzig in 1951.(Mulyono, 2017). Linear programming is a problem – solving method that deals with the use of multiple resources commodities to produce multiple products. In additions, each unit product produced can provide a benefit. By utilizing linear algebraic theories, several techniques or procedure can be developed so that without having to re-explore the theories, the procedure can be used to formulate or find solutions to problems that involve the combination of resources and products mention above. In this way, the maximum benefit to be gained can be determined.

Subsection 1

The result show that At present the textile industry company in Tangerang makes two kinds of product which include 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 fabric100% is 25.

Subsection 2

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 the textile industry through the table 1 Linear Programming as follows :

Table 1
Data INPUT of Linear Programming

Resources	Woven Fabric of		Production Capacity
	T/C	Cotton	
Spindle Hour per Unit	100	50	1.000 024
Operator Hour			300
Loom Hour per Unit	20	25	
Profit per Unit	20	15	

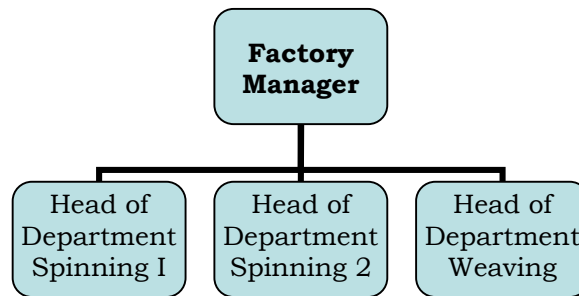Resources : PT. Argo Pantes Tangerang

Figure 1. The Organisation of the Textile Industry

Data to determine the optimum combination of 100% T / C and Cotton woven fabrics to be produced by The Textile Industry at Tangerang listed in Table 1, 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)

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], or it can used by the Linear Programming Application, so that the optimum result is the production of T / C woven fabric of 6.67 Doz and 100% Cotton Woven Fabrics is 6.67 Doz and total maximum business profit or profit earned is US $ 233,450,-

Conclusion

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 the man power management practices the right way you will have a more robust and cohesive team

Acknowledgments

The author is deeply grateful to Ir. Suseno Utomo, MSc., formerly of the Department of Industrial management, Textile Institute of Technology, at Bandung, for his advice during the course of the work reported here and to Mrs. Ratih, STT., MM. as a Manager from PT. Argopantes Tangerang for supplying the data and Information used in the studies

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