

OPTIMIZATION OF PACKING COMBINATION FOR PRODUCTION OF SILICONE EMULSION

CASE STUDY FOR A COMPANY

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Degree of Master of Science

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Thesis/Dissertation submitted in partial fulfilment of requirements for the degree
of Master of Science in Operation of Research

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DECLARATION

I hereby declare that the research work submitted, entitled Optimization of Packing Combination for Production of Silicon Emulsion Case Study for Company is a record of an original work done by me under the supervision of Dr. Pasan Manuranga Edirisinghe, senior lecturer of the department of mathematics at the university of Moratuwa. This research work is submitted for the fulfillment of the requirements of the Master Degree in Operation Research.

The results documented in this report have not been submitted by anybody to any other university or institute for the award of any degree or diploma.

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Date: 3rd August 2023

“I assure that out of the best of my knowledge, the information given above is true and correct”

Name of supervisor: Dr. Pasan Manuranga Edirisinghe (PhD in Mathematics)

Signature:

Date:

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DEDICATION

I whole heartedly dedicate this thesis to my beloved parents, late Mr. U. L Tuder and late Ms. D. G. D. Gimara Yapa, who have been my source of inspiration.

Last but not least I am dedicating this to my teacher Mr. Mal Wijarthna who coached me to climb the ladder of education in the right direction.

ABSTRACT

Company strategy is patented by the efficient use of resources at every production stage. The analysis and efficient utilization of resources are made sustainable by effective management decisions making techniques employed by the Company. A quantitative decision-making tool called linear programming can be used to the optimize problems of product combination. Chemical manufacturing firms are especially concern about silicone base profit mainly depends on the proper allocation and usage of available, material, and production time.

With limited resources such as capital, production capacity and sales demand, production planning can be challenged in terms of determining which product to manufacture in each month of the financial period. The production planner needs to offer a minimum number of appropriate products by examining the product demand sequences and the purchased order received of every customer in each month. The proposed problem formulated for an optimization with conditional constraints based on integer linear programming establishes an approach for efficient product planning.

The research out come advising process assisted by this optimization allows production planning to engage in an appropriate procurement requirement in every month. In this paper, optimum product combination determined by the mathematical model is validate considering the increase in profitability, and the justification of revision of packing size from customer point of view. The study also considers the revenue retention plan of the company by forecasting sales in scientifically in bootstrapping and simulation techniques.

Finally, the model considers 64 combinations of productions mix in each month. Model quantitatively demonstrate that the optimum product combination can achieved in spite of several resource constraints.

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ABBREVIATIONS

Autocorrelation function (ACF)
Central Bank of Srilanka (CBSL)
Confidance Interval (CI)
Coronavirus Disease (COVID)
Critical Path Method (CPM)
Document Against Acceptance (DA)
Documents Against Payment (DP)
Euro (EUR)
Federal Express (Fedex)
Government of Sri Lanka (GOSL)
Graphical User Interface (GUI)
Integer linear programming (ILP)
International Standard of Operation (ISO)
Key Performance Indicators (KPI)
Letter of Credit (LC)
Linear Programming (LP)
Management Information System (MIS)
Material Requirement Planning (MRP)
Material Safety Data Sheets (MSDS)
Metric Tonnes (Mt.)
Mixed Integer Linear Programming (MILP)
Miocro Meter (μm)
Non Preforming Assets (NPA)
Pay as You Earn” (PAYE)
Partial Autocorrelation Function (PACF)
Potential of Hydrogen (pH)
Program Rvaluation and Review Technique (PERT)
Qubic Meter (m^3)
Research and Development (R&D)
Simulation and Modelling (SM)
Stocks Keeping Units (SKU)
The Sri Lankan Rupees (Rs.)
United Sate of America (USA)
Unites State of Dollar (USD)

Value Added Tax (VAT)
Standard Deviation (DS)