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"Emerging Creativity and Innovation In the Digital Economy Era (ECIDEE)"

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Optimization of Fabric Production through Linear Programming to Maximize Profit of a Textile Industry

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Abstract. This study aims at maximizing a business profit in a textile industry. By using a descriptive quantitative approach, the study was conducted in the district of Cikokol, Tangerang, Indonesia by collecting data from a textile company producing yarn and woven fabrics for the years 2016 until 2017. The data was analyzed by using linear programming to maximize a business profit. In its daily process, the company faced many problems or constrains in its production planning. Uncertain demand fluctuation has caused shortage or overproduction. Other problems are the constrain of raw materials, machine working hour, labour working hour, spindle hour per unit, loom hour per unit, and demand of products. The result of the study showed that the total profit earned by the company to produce 6.67 dozen (80 pcs) of T/C woven fabric is US$ 133.400. On the other hand, total profit to produce 6.67 dozen (80 pcs) of cotton fabric is US$ 100.050, with the assumption that the profit is in accordance with fixed objective and constrain function.

1. Introduction

The textile and textile product (TPT) manufactured in textile industry in Banten Province is one of the main sources of country's national income, besides accommodating large number of workers. In the year 2014, total number of workers employed in this sector reached up to 1.2 million people, which spread over 2,651 textile companies in Indonesia. West Java Province is the largest producer of textile products in Indonesia, consisting of 1.496 companies (56.43%), followed by DKI Jakarta with 456 companies (17.30%) and Central Java with 381 companies (13.37%). The rests are spread over Sumatra, Yogyakarta, East Java, Bali, and Sulawesi. One of the problems arising from the existence of TPT is the impact of emerging creativity and innovation in the Digital Economy Era that lead to the increased of competitiveness among producers, not only in the domestic market but also foreign markets. One of the most popular scientific advancements is linear programming, which is also applicable for textile industry [7]. The linear programming is used to optimize the production of woven fabrics in order to obtain maximum profit. Based on the case study conducted in PT. Argo Pantes, the linear programming technique with simplex model was applied in order to optimize woven fabric production with the aim at maximizing business profit. [4]

2. Research Method

The descriptive quantitative approach of linear programming was applied to maximize profit.[1]. The study was conducted in the district of Cikokol, Tangerang by collecting data from textile industry for the years 2016 until 2017.

3. Problem And Equations In Linear Programming

Linear programming was developed for the first time by George B. Dantzig in 1951. It is a problem-solving method dealing with the use of multiple resources/commodities/factors/products to produce various products. In addition, each unit of the products can provide a maximum benefit. By utilizing linear algebraic theories, several techniques or procedures can be developed [9]. Thus, without having to re-explore the theories; the techniques or procedures can be used to solve the problems that involve the combination of aforementioned resources and products [10]. By employing this method, the potential maximum benefits could be determined. In the textile industry, the linear programming method has been widely applied. For instances, plant operations analysis, production planning, fiber mixing in spinning process, sales-production coordination, marketing strategy, research activities and so forth [2].

In this paper, a brief concept of linear programming and its application in optimizing the production of woven fabric in the company will be described. The formulation of the linear programming problem can be arranged in the form of the following mathematical model. If the factory plans to produce F_1 type of fabric products as much as X_1 units and F_2 as much as X_2 units, then the benefits that can be obtained are: