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Escuela Académico Profesional de Ingeniería Industrial

Tesis

Impact of Machinery Modernization in the Peruvian Textile Industry: A Case Study of the Company Diseño y Color E.I.R.L.

Eduardo Antony Parraga Arotinco
Rosmeri Pilar Cardenas Martinez
Jose Luis Misari Baldeon
Javier Romero Meneses

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Autores:

1. Eduardo Antony Parraga Arotinco – EAP. Ingeniería Industrial
2. Rosmeri Pilar Cardenas Martinez – EAP. Ingeniería Industrial
3. Jose Luis Misari Baldeon – EAP. Ingeniería Industrial
4. Javier Romero Meneses – EAP. Ingeniería Industrial

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Impact of Machinery Modernization in the Peruvian Textile Industry: A Case Study of the Company Diseño y Color E.I.R.L.

1st Eduardo Antony Parraga Arotinco
Department of Industrial Engineering
Universidad Continental, Huancayo, Peru
71215191@continental.edu.pe

2nd Rosmeri Pilar Cardenas Martinez
Department of Industrial Engineering
Universidad Continental, Huancayo, Peru
74438324@continental.edu.pe

3rd Jose Luis Misari Baldeon
Department of Industrial Engineering
Universidad Continental, Huancayo, Peru
71039475@continental.edu.pe

4th Javier Romero Meneses
Department of Industrial Engineering
Universidad Continental, Huancayo, Perú
jromerom@continental.edu.pe

Abstract — In the textile industry, equipment modernization is crucial to increase efficiency and competitiveness. However, many companies continue to use obsolete machinery, which not only limits production capacity, but also generates additional labor costs and slows down processes. These older machines are less efficient and require more manual intervention, which increases the likelihood of errors and physical wear and tear on operators, in addition to increasing maintenance costs. The objective of this research was to evaluate the impact of replacing the SIRUBA 757 machine with the JACK DIGITAL C6-4-MO3/333 in the company Diseño y Color E.I.R.L. It was analyzed how the incorporation of this new technology, characterized by its advanced functions, lower energy consumption and reduced maintenance requirements, improved the production of T-shirts. To achieve this objective, several methodological tools were used, such as direct observation, analysis and operations diagrams, Ishikawa diagrams, time recording, and path and flow diagrams. These tools allowed a detailed evaluation of operational changes and their effects on productivity and working conditions. The results showed that the integration of modern machinery not only increased production capacity, but also significantly improved working and environmental conditions within the company. Specifically, the new machinery reduced production time in the assembly of T-shirts from 2735.52 minutes to 2129.76 minutes, representing a 22.14% improvement in efficiency. This increase in efficiency reflected the versatility and effectiveness of the JACK DIGITAL C6-4-MO3/333 compared to its predecessor.

Keywords—Time taking, Operations Analysis Diagram, Process Diagram, Ishikawa Diagram, Ishikawa Diagram

I. INTRODUCTION

According to the National Institute of Statistics and Informatics (INEI) of Peru, in 2018, the textile industry is fundamental to the economy, contributing 2.5% of the Gross Domestic Product (GDP), it is estimated that there are approximately 37,000 textile companies, with annual sales reaching 2 million dollars, equivalent to 1700 Tax Units (UIT),

mainly concentrated in Lima [1], [2] [3]. In addition, the sector employs more than 424,000 people in micro, small and large companies [4]. Despite their significant contribution to GDP, many of these companies, such as MICHELL Y CIA S.A., INDUSTRIAS NETTALCO S.A. and PRECOTEX S.A.C. [5], use old machines and obsolete technology, which slows down production and causes ergonomic problems in their workers, such as musculoskeletal injuries due to repetitive movements, excessive noise, and generation of dust and lint that can be inhaled by workers [6], [7] [8]. Technological innovations in machinery could significantly improve this situation, operational efficiency, reducing the number of workers needed due to the increased automation and precision of these machines. By operating at higher speeds and with greater accuracy, higher throughput is achieved, decreasing energy consumption and completing daily goals in less time. In addition, modern machines reduce noise and harmful emissions thanks to their advanced pollutant removal systems. They offer additional functions and require less maintenance, minimizing the need for human intervention and reducing downtime. Being easier to use, they simplify operation and reduce errors, which also reduces manual monitoring and correction. With durable components and integrated functions, these machines allow workers to spend less time in the same position, thus improving their overall well-being and efficiency [9], [10].

This research analyzes the production of T-shirts in the company Diseño y Color E.I.R.L., with the objective of using modern machines and optimizing costs by implementing the JACK DIGITAL C6-4-MO3/333 machine. This advanced technology offers functions such as auto-cutting and speed control, in addition to requiring less maintenance and consuming less energy compared to the old SIRUBA 757 machines. The investment increased shirt production capacity and improved working conditions by reducing ergonomic and environmental risks, positioning the company as a leader in innovation in the Peruvian textile sector.