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Supply Chain-Supplier Evaluation Using the Fuzzy Swara and Fuzzy Copras Methodologies for Macro and Micro Supplier Companies: Peru Case Study

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Supply Chain - Supplier Evaluation using the Fuzzy SWARA and Fuzzy COPRAS methodologies for macro and micro supplier companies: Peru Case Study

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***Abstract*—The research proposal analyzed five suppliers of explosives for mining, in this case two are macro companies and three are micro companies, with which the application of fuzzy SWARA and fuzzy COPRAS methodologies is evaluated, for the analysis of supplier selection numerically evaluating decision-making criteria, classification and prioritization of suppliers that meet the demands and characteristics requested by the mining companies for the choice of suppliers. The fuzzy SWARA fuzzy methodology was used to calculate the fuzzy weightings, and for the fuzzy COPRRAS methodology, decision making matrices were made using benefit and cost criteria.**

The proposed research concluded that the macroenterprises meet the numerical selection criteria, it also indicates that the first microenterprise can also be a very viable option and the last two microenterprises are discarded according to the selection criteria because they do not meet the evaluation criteria given by the methodologies proposed in the research.

Keywords—Suppliers, numerical equations, decision making, numerical prioritization.

I. Introduction

Currently the supply chain has been reinventing itself with new configurations, playing a vital role for business continuity [1], seeing the involvement of workers as a sector of the collaborative economy [2], generating value for the company under an economic supply, with a stable value within the national economy [3]. So analyzing the effect caused by the supply chain on the effect on the company generates is of vital importance [4], since customers play a key role in assessing the effects and characteristics that companies generate in their financial policy [5].

Now while it is true that many big brands or companies resonate globally, but it is thanks to the products that many suppliers distribute with high quality and efficiency, which is why a supplier within the supply chain is vital [6], which is why these suppliers are regulated, audited by stakeholders when acquiring products in order to maintain their quality generating corporate sustainability [7], this can lead to generate financial arrangements in the acquisition of novel products in order to increase the value in the supply chain [8].

Globally, supplier selection is characterized by many points such as understanding the concepts of sustainable supplier management that refers to selection, development and evaluation [9], or the evaluation by design, methodology and approach in order to provide defect-free products to companies with high quality standards [10], or the risks assessed within suppliers in a business, in order to restructure long-term suppliers with optimal characteristics that add value to the supply chain [11].

Within the mining companies, the supply capacity of equipment, materials, labor, among others, becomes a point of great interest due to the large magnitude that many mining companies represent, which is why the selection of optimal suppliers with high standards is of vital importance [12], due to the large amount of money that companies disburse for the acquisition of equipment, materials, among others, in order to extract material [13].

That is why this research seeks to evaluate macro and micro mining explosives suppliers [14], in order to evaluate numerically the most suitable supplier [15], and to analyze whether micro suppliers can compete with large macro companies. Therefore, the fuzzy SWARA methodology for the evaluation of selection criteria [16] and the fuzzy COPRAS methodology for the matrix identification of suppliers [17] will be used.

II. Materials and Methods

This research evaluates the application of the Fuzzy SWARA [16] and Fuzzy COPRA [17] methodologies in the selection of equipment suppliers to mining companies, for which five companies dedicated to the sale of explosives for mining