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DESIGN OF THE PROGRAM FOR THE TRAINING OF MANAGERS AND MIDDLE RANKS IN A RENEWABLE ENERGY COMPANY

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Mexican technology companies specializing in renewable energy are small and medium businesses with a reduced workforce, usually less than 100 employees, highly specialized in a particular branch of the energy market [2]. Like all companies, have a leadership and organization scheme, this organization concept assumes the correct order of resources and precise functions to satisfy the objectives of the business [1]. The organization supposes that a structure is established for the adequate systematization of the existing resources, through hierarchies, correlation, arrangement and grouping of tasks with the purpose of carrying out the different functions of the organization in the simplest possible way [3].

Within the organization chart of the staff of technology companies in Mexico, we have three different hierarchical levels, which encompasses all the functions, being the lowest: technician or engineer, the next one: area manager or middle command and finally owners of the company [3]. Business owners provide direction, objectives and goals to the staff, middle managers help in planning, execution and improvement of the vision, while technicians only execute the plan [2]. The owners of the companies are rarely changed, the middle managers and technical personnel are the ones that have the most turnover [4]. Considering the above information, we can see that the middle managers are the ones who transmit the knowledge to the new staff, and form the link between lower-ranking and senior managers [1]. As a link and vector of knowledge transfer, middle managers become the key and driving force within small companies. Having a plan for replacement, or increasing their number is important. With a short selection, recruitment and training scheme to allow the integration of new managers personnel in an organic and harmonious way in the companies.

With the previous approach, we will then analyze the plan implemented by a renewable energy company: AGRO ENERGY SA DE CV, in coordination with 4 technological universities in Mexico: Technological University of Morelia (UTM), Technological University of the Costa Grande of Guerrero (UTCG), Technological University of the Hot Land of Guerrero (UTTg), Technological University of Paquime (UTP). The company decided to make the educational link with the technological universities because their educational system includes the following phases: A Bachelor's degree or Engineering, which is studied in eleven quarter-semester, plus a professional stay of 480 hours in the companies, and the curricular contents are 60 % practical and 40 % theoretical [3]. The study and training plan was planned based on the engineering curriculum called: Renewable Energies. This plan is nationally approved by the secretary of public education. With this plan, engineers are trained in a total period of 16 months, taking into account that 8 months are considered within the curriculum of the universities, the following 8 months are financed by the technology company, the study topics for managers are in table 1.

Students were given the opportunity to participate in the program based on their socio-economic situation and belonging to indigenous communities, giving greater importance to low-income students from highly marginalized indigenous communities, having participation of the indigenous Tzotzil communities of the sierra and the Nahuas of the coast, between the ages of 20 and 24 (table 2).

Table 1. Study topics

Training center	Study topics			
Months of training	4	4	4	4
University	Electrical fundamentals	Fundamentals in solar energy implementation		
Technology company	Electrical fundamentals	Fundamentals for the installation of solar pumping systems	Specialization in solar pumping systems	Leadership and accountability

Table 2. Student participation during the 5 years of application of the program

University	Student	2016	2017	2018	2019	2020
UTM	Male	4				
	Female	1				
UTCG	Male		8		10	8
	Female		1			
UTTG	Male			8	8	7
	Female			1	1	
UTP	Male			4	3	
	Female			1	1	

Conclusions: In this way, the plan considers the immediate vertical integration of the students within the company, through a selection process, according to the acquired knowledge, skills and attitudes developed within their preparation period in the technology company, having a job at the end of their university studies and a promotion to a middle managerial position in a period of 8 months.

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