

## COMMISSIONING METHODOLOGY OF A WAREHOUSE INSIDE THE MINE TO REDUCE DOWNTIME DEVELOPED IN INSTITUTO TECNOLÓGICO SUPERIOR DE FRESNILLO

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*José de Jesus Reyes-Sánchez*

<https://orcid.org/0000-0002-3866-2363>

*Mario Alberto García Camacho*

*Martha Alicia Guerrero Vega*

*Omar A. Guirette-Barbosa*

<https://orcid.org/0000-0003-1336-9475>

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**Abstract:** Instituto Tecnológico Superior de Fresnillo created in 2015 the Young Researchers Club to strengthen this area of science, derived from it, the implementation of a warehouse inside the mine is formulated, a project considered as a technological and professional advance, contributing to the personal academic development of the students. This is a methodological proposal for the development of mining companies, reducing the transit time of maintenance materials, repair of machinery and available tools.

**Keywords:** Development, applied research and technology.

## INTRODUCTION

Mining in Mexico is an activity that preceded the arrival of the Spanish. He appreciated the value of gold and precious stones such as jade and malachite, which were used in making ornaments. The arrival of Hernando Cortez in Mexico in 1521 began the trade of mineral goods from Mexico to Spain.

Mining is by far one of the oldest activities carried out in Zacatecas, as well as one of the most important. Between the second and tenth centuries of the modern era, the first settlements of indigenous tribes used rudimentary tools made of stone to extract malachite, turquoise and other minerals. With these materials, they could make dyes with which they shaped codices, as well as beautiful ornamental objects.

Implementing this the costs would be reduced with more than 60%, there would be a reduction in all the wear and tear of the transports. There will be more production and at the same time the utility for the company would increase.

The expected results are diverse and we will point out just a few: Promote the workers to carry out all their activities well, through

this project. Motivate workers to strengthen their work in all areas and provide them with tools for optimal performance. Establish an interrelation between what is taught in courses and what happens in the workplace.

## METHOD DESCRIPTION

It is focused on underground mining companies with the purpose of considerably reducing downtime and obtaining greater production, therefore, an increase in profit, since the study carried out in Minera Fresnillo indicates that there is a high level of inefficiency due to lack of tool, spare parts and work material.

The research is aimed at potentiating the world capital of silver, thereby seeking to have greater efficiency and in this way it seeks to increase the per capita value of the country, modern industry depends directly or indirectly on all types of minerals either to build machines or manufacture products.

It is a quantitative, observational and production method, based on the experience of several workers and listening to the negative comments regarding the lack of spare parts in the different shifts and analyzing the times elapsed to move from the interior of the mine to the surface, which are considerably high and warehouses are sometimes closed during business hours.

The problem within mining companies is the lack of spare parts because many machines have too much downtime, having a warehouse inside the mine is expected to reduce more than 60%.

The proposal is to carry out a distribution for the mechanical area and establish a warehouse inside the mine with all kinds of tools and spare parts for all devices, having a manager in this warehouse on all shifts, consequently, costs would be saved in diesel, stationery, transportation, time to go to the warehouses that are on the surface and in

shifts where they are not open, there are more than 16 hours in downtime. By implementing this, costs would be reduced by more than 60%.

## **DEVELOPING ACTUAL STATE**

It began with the need to have a starting point, which reflects that the results in the maintenance department are scarce, only some engineers and workers give importance and seriousness to the application of the scientific method to solve environmental problems and participate in Linking with the company to identify and participate in the solution of situations inherent to the use of an adequate methodology for collecting information and implementation of tools that have already been used and published in order to use that knowledge in solving problems.

The activities of the Maintenance Department start from the first machines that were used, developing the basic mining by the engineers, the workers have developed the use of these tools for better production.

- Less effort for each of the workers
- Better salaries.
- More technology for the company
- Self-directed groups in the industry.

In the maintenance area, there is constant development of training in the company's development center, establishing a close link with both the operation sector and warehouses for the development and implementation of all the necessary parts for the company.

As a strategy of the companies, meetings of workers are being held in collaboration with the different foreign companies to provide training in the maintenance of their machines and spare parts. Encouraging each of the employees to know each tool and piece that is used.

Likewise, it has as a strategy the implementation of courses inside the

company to know everything that is used in the procedures of each one of the works that are carried out in the warehouses and maintenance.

An investigation was carried out to know what deficit there is in the mining companies so as not to reach the goals established in each year, thus reaching the results that what is most found with an increase is the downtime of the machinery for not having close the necessary spare parts for preventive and corrective maintenance.

Derived from the previous analysis, it is notable that the Engineering Department must make the appropriate decisions for a good performance in all the processes that are carried out, because otherwise the companies will have a very important drop in the extraction of the mineral they need.

Looking for and assigning capable consultants for the different warehouse processes that arise from the same employees, as well as resource management in order to provide the necessary resources either to attend the warehouses, publish them and attend training courses and specialize in warehouse.

**Trained workers:** They will be the Advisors of the warehouses, they will guide the workers for the good achievement of results in the implementation of the adequate tools based on the needs of the problem to be solved.

**Bonding:** Generating ties with the mining industries to identify problems and are likely to apply the work method to solve the problem, also generating commitment letters and good resources for the necessary spare parts. Maintenance service release.

**Extra activities:** Considering and evaluating the workers to provide them with the necessary data and in this way be able to request the tool or spare parts for use in preventive and corrective maintenance.

**Human Resources:** Providing tools to workers to generate and obtain new knowledge.

**Communication and dissemination:** Making each warehouse inside the mine known to locate them and all part numbers to order the required material.

**Coordinators of the Different Areas:** Providing trades, supporting documents and linking with companies.

**General Manager:** They will be the Main means of Motivation for the achievements obtained by good production, removing more than 70% of the dead time.

**Quantitative variables:** Quantity of machinery, number of employees, number of hours worked, quantity of production.

**Qualitative variables:** Type of machinery, work of employees.

Applied strategic planning is the preparation, development and implementation of the different operational plans by the organization, with the firm conviction of achieving objectives and goals set. These plans can be short, medium or long term. (Godet, 2007)

## TYPES OF STRATEGIC PLANS

Strategic plans can be short, medium or long term, depending on the magnitude of planning responds to the number of activities to be carried out by the various parts of the organization. It is essential that these plans, before being put into practice, are carefully analyzed and the goals to be achieved are adequately outlined. (Ansoff, 1993)

It is preponderant to consider that strategic planning does not try to make decisions looking at the future, but responding to certain problems of the present; It is not responsible for forecasting. It is then a set of functional plans in which a certain budget is invested and whose focus is on guiding the company in a certain time, taking into account its resources

and the environment in which it develops, in order to achieve the goals. planned.

**Strategy Formulation:** The identification of external threats and opportunities to the organization, the determination of internal strengths and weaknesses, the establishment of long-term objectives, the generation of alternative strategies, and the selection of specific strategies to be carried out. (Monteverde, 1992)

**Implementation of Strategies:** Requires the company to establish annual objectives, project policies, motivate employees, and allocate resources so that the formulated strategies can be carried out; It includes the development of a culture that supports the strategies, the creation of an effective organizational structure, marketing, budgets, information systems and motivation to action. (Thompson, 1998)

**Strategy Evaluation:** Where the internal and external factors underlying the current strategies should be reviewed; subsequently measure performance, and consequently propose strategies take corrective actions. All strategies are subject to change. (Menguzzato, 1991)

Research indicates that organizations that use strategic planning concepts are more profitable and successful than those that do not. Generally, companies that have high returns reflect a more strategic orientation and long-term focus. (Porter, 1990)

Greater understanding of external threats, a better understanding of competitors' strategies, increased employee productivity, less resistance to change, and a clearer understanding of the relationship between performance and results.

- Increases the ability to prevent problems.
- It allows the identification, prioritization, and use of opportunities.
- Provides an objective view of managerial problems.

- Allows more effective allocation of resources to identified opportunities.

The project is raised in which they must be cyclical in order to correct the errors that will arise in the development and implementation of the corresponding tools.



**Graph 1d** shows an example of an external warehouse

## ANALYSIS

The number of mining companies must be considered, as well as their businesses, carry out a detailed analysis of the needs that these companies have

Sensitization sessions will be applied to employees and workers in order to make them aware of the importance of applied research, as well as the benefits to which they can obtain. Also, to analyze that companies do not have a warehouse inside the mine. See image 1a, 1b, 1c and 1d.

Generate links with companies to start a pilot test, identify problems, generate a project with its analysis, implementation and evaluation of results.

## IMPLEMENTATION

Planning will be done, generating lists of workers interested in knowing how the warehouses work. Form high-performance, multidisciplinary teams in order to ensure the expected results. Analyze the process to be carried out and assign them to the teams that, through training, can obtain the optimal results. Hold fortnightly meetings in order to show their results and progress in order to give an opinion and strengthen the tools used. Ensure the benefits of the company. Find means of disseminating results with the warehouses: publish articles, attend conference calls.

## CHART 1A



## CHART 1B

As can be seen in Graph 1 ae Graph 1 b, awareness sessions are held for employees and workers in order to make them aware of the importance of applied research, as well as the benefits to which they can obtain.



**Graph 1c** shows an example of an external warehouse

## MEASUREMENT

Those interested should meet monthly to discuss the achievements obtained, make the necessary adjustments and continue contributing to growth and contributions. The proposed strategies will always be implemented with well-established goals that allow measuring results.

## SUMMARY OF RESULTS

In this work that is in the process of implementation. The goal of this project is the methodological proposal for the motivation and encouragement of workers in warehouse processes, so that the results will be measured in the amount of time worked, calls attended, items given and results in production, of which up to now there was no noticeable turnout. In addition to generating

an information bank of projects, conferences, symposiums, magazines and books where the products generated and the increase in monthly production could be published.

## **CONCLUSIONS**

The workers will have a space to generate the processes and benefits that are taken into account to continue updating each area of the mine. The participation of employees from the different mines in continuous improvement events in warehouses will be increased.

## **RECOMMENDATIONS**

Workers interested in continuing our research should wait for the results of this work, analyze the strategies implemented and rethink the factors to identify which would be the ones that are most influencing the rate of applied research projects.

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