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Change Management as the bridge from Operational to Organizational Excellence

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Abstract

One of the major problems in the implementation of projects is failure due to poor organization, lack of action plans, lack of leadership, teamwork and little organizational culture, for this reason, the development of the mercury decontamination project in water with orange peels was based on two highly effective and essential methodologies to achieve positive and sustainable results, as well as a high impact in the area of industrial and chemical engineering. On one hand, there is operational excellence with ideas that encompass quality, efficiency and effectiveness, but above all, there is a very strong focus on the organizational culture. On the other hand, there is the change management that is covering the issues related to the motivation of human capital, directing it towards the change management and leadership, reaching a point of balance with both methodologies, which will be the pillars of our project, ensuring the viability and success of this.
Keywords: Operational Excellence, Change management, decontamination of mercury, orange

1. Operational Excellence

Operational Excellence is highly essential for the growth of organizations and industries of all sizes, within the characteristics that govern operational excellence exist the quality, efficiency and effectiveness of companies (Tijerina and Tapia, 2019). Operational Excellence is not just another theoretical concept; is a philosophy that aims to achieve a better performance and finalize commercial success, operational excellence involves the organizational culture of the company, where employees have the ability to identify problems and solve them analytically (Tijerina and Tapia, 2019). Operational Excellence is the development of enablers to generate competitive benefits in a dynamic environment based on the resources of an organization (adaptability). The composition and expansion of enablers is the basis for continuous improvement, change and optimization of business processes. According to Tijerina (Tijerina and Tapia, 2019), the four fundamental vertices that jointly constitute operational excellence are presented in Figure 1, which were taken as the basis for the development of this project. Nowadays, market conditions set the tone for any organization to take the road to success and face the challenges to be able to continue in the market, obtaining significant improvements in the indicators of the organization. If operational excellence is practiced, companies aim to have lean processes. The result offers value to customers at low prices. One of the ways to achieve Operational Excellence is the reduction in the amount of waste existing either in the value chain of the product or service or in the links between them.

Being clear about the characteristics and elements of excellence is a key point for success in the implementation of projects. Due to this situation, the program proposed by Tijerina and Tapia (Tijerina and Tapia, 2019) is shown in table 1 to carry out a project starting with or taking operational excellence as a key element.

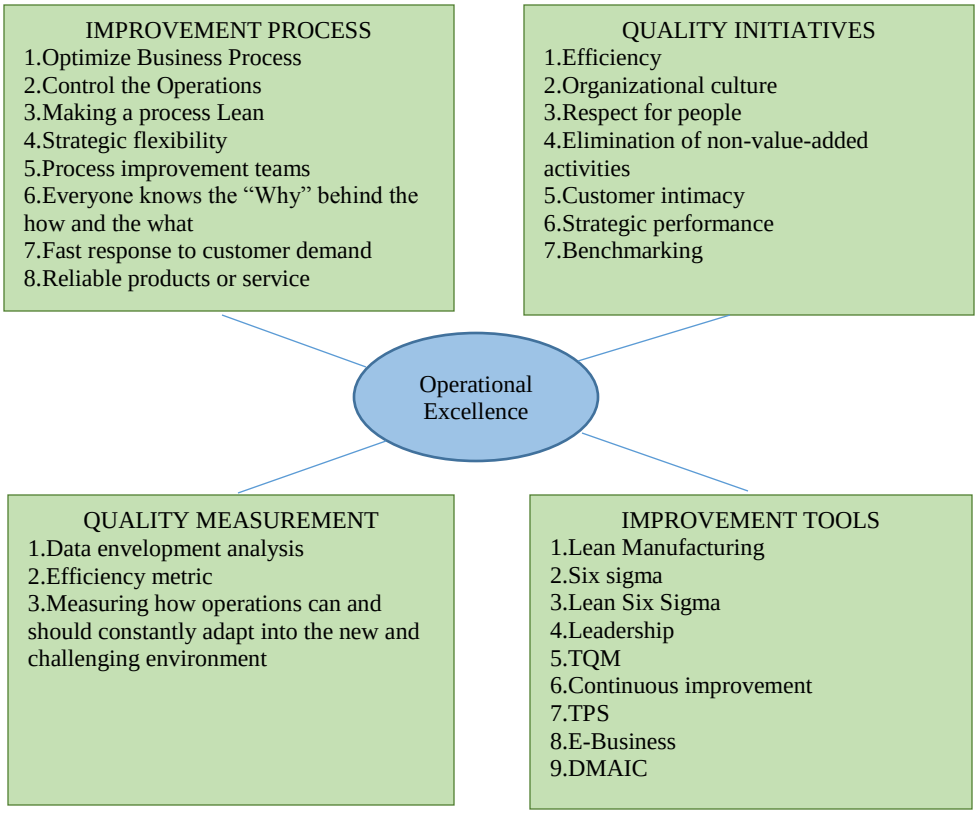


Figure 1. Components of operational excellence (Tijerina and Tapia, 2019).

Table 1. Operational Excellence Program (Tijerina and Tapia, 2019).

Operational Excellence Program	
Theory	High business strategy, aimed at improving the efficiency and effectiveness of our processes, with a punctual approach to the culture of people.
Application guidelines	1. Optimize business process 2. Control the operations 3. Making a process Lean 4. Strategic flexibility 5. Process improvement teams 6. Everyone knows the why behind the how and the what 7. Fast response to customer demand 8. Reliable products or service
Focus	Performance at all levels of the organization, focus on the process, customer.
Assumptions	Using the mix of improvement tools such as Lean Manufacturing, Lean Six Sigma, Six Sigma and Leadership will take the organization to operate at the highest strategic levels, where employees can also perceive the flow of customer value and know the ¨because" of the ¨how" and the ¨what¨

Primary effect	Optimization and control of processes.
Secondary effects	Effective and efficient processes Organizational culture Customer intimacy Elimination of non-value-added activities Lean processes Strategic Planning
Criticisms	The model tends to be little accessible to small organizations, or they are applied incorrectly.

2. Change Management

Change management can be defined as a process with generally agreed steps of an iterative and parallel nature, regardless of the methodology or approach decided to use, the definition is based on the Association of Change Management Professionals. On the other hand, the Organizational management journal, throughout its extensive research, has already developed a complete methodology within the discipline of change management. In the field of Change Management, different disciplines are concentrated to achieve a profound and persistent change of management, within these are Psychology and Sociology with themes of motivation of human capital directing them towards change, Management and Leadership in the field of the interpretation of Management principles that lead us to the consolidation of change and finally management and industrial engineering for the development of methods, processes and systems, thanks to which change occurs, each discipline provides a perspective of an organizational development. For the development of Change Management, it is necessary to implement four fundamental stages to achieve the expected success, in this project, Change Management was applied in conjunction with operational excellence, this with the aim of creating a business strategy and acquisitions. A key element to achieve it was throughout the Lean Six Sigma program. Continuing with the expansion of the program to all organizations in the world as a good practice of the company to increase the success rate of the initiatives. Another key point to start with change management is the development of a methodology for effective and clear communication, as well as identifying the identity of the program, this also accompanied by an action plan for training and creating environments with competitive vision. One of the first steps to achieve change management is to consider the essential elements to undertake this trip, one of the most important to achieve it is by the Total Productive Management (TPM). This is defined as a strategy used to increase productivity through all the processes in the organization with permanent help of all the human resources. It is very important to manage a change program to overcome the problems, this program must have an experienced project leader to help lead the change. The team must be composed mostly of representatives of each function in the organization and with the support of the change management team, another of the important points to consider within Change Management is to have a clear vision, clear success factors, necessary resources as well as a well-structured project plan. The team involved in this project must consider that it is necessary to implement the ideas successfully, be in continuous communication with the team and be working together to identify the purpose of changing things.

3. Operational Excellence and Change Management Connection

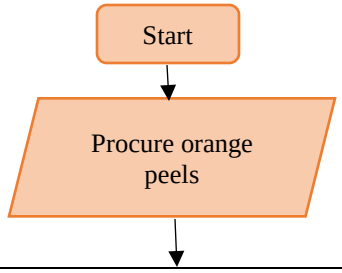
For the application of our project it was necessary to use two highly effective quality tools which were described above, these methodologies led us to the path of success since the results of the project were not only positive but also had an impact in diverse areas of science and engineering. The base of our project was the mixture of two methodologies: Operational Excellence and Change Management. Each methodology has its main characteristics. The implementation process was to apply each of the characteristics during all stages of the project, each element of the two methodologies were implemented equally creating development plans where it complemented one another to finally merge and reach to the expected results. Operational Excellence is a philosophy that aims to improve performance and finalize the success of the project where culture is a key point to achieve it. Change management

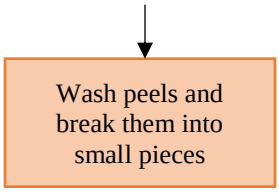
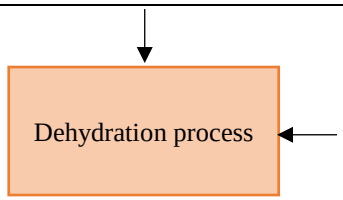
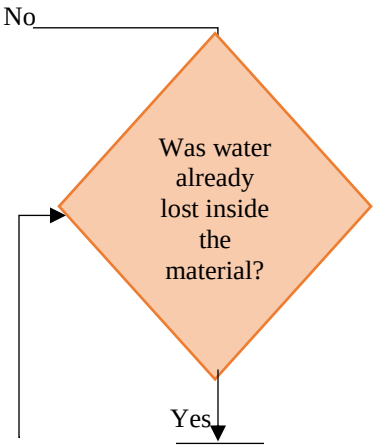
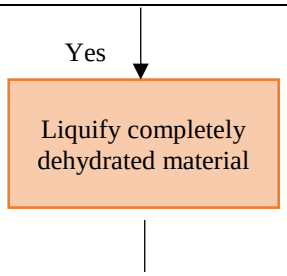
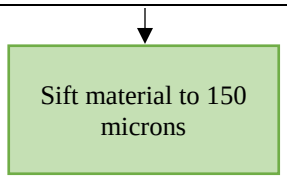
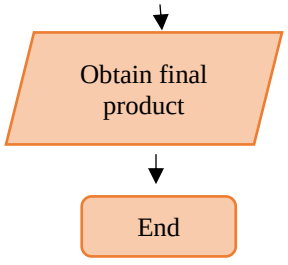
aims to promote culture with the motivation of human capital, and with the motivation and preparation of human resources to reach one of the objectives of Operational Excellence. The members of the organization will have the ability to identify problems and solve them analytically. With this, an environment with a competitive vision will be created, as mentioned in the Change Management

4. Improvements in the decontamination process using Operational Excellence

There are many companies and industrial plants where the operations do not have cyclic or repetitive patterns. Such is the case of the decontamination industry (Espinosa et al. 2017). In this sense, adsorption, which is part of the decontamination process, has proven to be an effective and cost-effective way to remove heavy metals from contaminated samples of water (Annadurai, G., Juang, R., Lee, D., 2002). The objective of this research is to test and evaluate the capacity of orange peel as an adsorbent of heavy metals that could contaminate fresh water and cause harm to people's health, as well as to the environment. The shell will be tested specifically to remove mercury (Hg), cadmium (Cd) and lead (Pb) from contaminated water samples. The biomaterial will be dehydrated and then ground in a mill to later make it powder with a 150-micron sieve. The resulting bio adsorbent will be used to purify contaminated water samples. The concentration of heavy metals will be measured before and after the use of the adsorbent to calculate how much is adsorbed. The orange peel is expected to function as an effective adsorbent to purify contaminated heavy metal water. Also, one of the main objectives is the innovation of economic filters for the decontamination of water in communities lacking economic resources and prone to be exposed to the consumption of water contaminated with any of these metals. It is believed that it is possible to make use of the chemical components of the orange peel to create an effective heavy metal bio adsorbent. To begin with the development of the project, the orange peel was dehydrated and then sifted to 150 microns and tested to show that the orange peel has different minerals and fatty acids that can be used. Then, tests will be done to demonstrate the ability of the shell to filter contaminated water. The process for obtaining the final product with which the tests will be done is as follows: Dehydration, this is done with 5 kilograms of material, first washed to remove possible contaminants or impurities that may have adhered to the shell. In order to have small pieces for dehydration, we simply took the peel and cut it into pieces. To begin the dehydration, the material was weighed in parts until it was verified that there were effectively 5 kilograms of orange peels. Subsequently, they were covered with aluminum foil to hold the samples inside the dehydrator. The dewatering machine was programmed to heat the material in heat flow deltas from 45°C to 60°C, the dehydrator was working 30 hours in total and the temperature was changed periodically to ensure that the material was not damaged. They were dehydrated the first 4 hours, where the material went from weighing 5 kilograms to weighing 1,075 kilograms. After the orange peel was dehydrated for 26 more hours, it went from weighing 1,075 kilograms to weighing 0.643 kilograms of material. This process must continue until the weight loss in the material is zero; That means that is has completely lost his weight in water. Sieving: for this next step, 0.643 kilograms of dehydrated orange peel were available. Once the dehydrated material was used, a blender, a domestic appliance, was used to grind the material. To ensure that it was milled in the most convenient way, it was put in parts to the same and it was taking out the material that was already ready to be sieved. Subsequently, the ground material was passed through a 150-micron mesh to further reduce its size. This is the part of the process that takes the longest. Finally, about 130 grams of final product refined at 150 microns was obtained. With the dehydration of the orange, the extraction of fats was carried out with the help of the Goldfisch team in our laboratories. Digestion was also performed on the sample with the help of a Microwave oven in order to find the chemical elements presented in the sample. Afterwards, the samples were taken to the laboratories where the final stage of the project was carried out, in which the orange peel was added to the contaminated water, filtration was carried out and the results of these experiments were very positive.

Table 2. Description of proposed process mapping

DFP	Entries	Outputs
	Oranges needed to obtain 5 kg of shell only	5 kg. of orange peel

	5 kg. of orange peel	kg. of orange peel washed in detail, in small pieces
	5 kg. of orange peel in small pieces	Dehydrated material; partially or totally
	Dehydrated material; partially or totally	Dehydrated material completely liquefied
	Dehydrated material in different sizes	Dehydrated material completely liquefied
	Dehydrated material completely liquefied	Sift material to 150 microns
	Results obtained from previous processes	Material to be used as filter feeder

Finally, we must remember that in our changing world, the production plants continue to be an important part of the productive sector of our country and generate a boost in economic development such as these that creates the greenhouse industry that offers its services and in the same way, it gives progress and comfort to our society (Espinosa et al. 2013).

5. Results of change in decontamination of mercury in water

Once the study of minerals, profile of fatty acids, resveratrol and phytosterols finished, the tests with different solutions contaminated with mercury were done. For these purposes, the powder was mixed with the samples that were contaminated with mercury inside the Erlenmeyer flasks. The resultant mixtures were shaken for thirty minutes to assure that these adhered with the mercury and could clean it. Finally, the water was filtered through funnels covered with Whatman 40 paper with the intention of cleaning the above-mentioned solutions of the pollutant. The filtered solution was taken to a laboratory to determine the amount of mercury and in this way, establish the quantity of this decontaminated metal.

In the first test, a solution of mercury was prepared in nitric acid in a concentration of 28.6 PPM. 40 ml of this solution were placed in each of three different flasks. In the first flask, 4.86 grams of pulp from the dehydrated orange peel were added and sifted to 150 microns. In the second flask, 5.01 grams of dehydrated orange peel were added and sifted to 150 microns and in the third flask, 5.08 grams of dehydrated orange peel were added and sifted to 250 microns. During the experiment, 30 ml of water were included to every sample to improve the adsorption. The time of contact of the samples in the solution was of approximately 30 minutes, with constant shaking. After this period, a filtration was done. During the second test, two solutions of mercury in nitric acid in a concentration of 10 PPM were prepared and another one in a concentration of 5 PPM. 100 ml were placed of this solution in both flasks. In the first flask 5.89 grams of the dehydrated orange peel were added and sifted to 150 microns. In the second flask, 5.01 grams of pulp from the dehydrated orange peel were added and sifted to 150 microns. The time of contact of the samples in the solution was of approximately 40 minutes with constant shaking. After this period, a filtration was done in which the results are presented in Table 3.

Table 3. Results of the decontamination of mercury in water with orange peel

Solution of mercury in nitric acid PPM	Sifted orange peel 150 microns	Decontamination
10	4 grams	0.755 ppb
20	4 grams	0.890 ppb
30	4 grams	0.964 ppb
40	4 grams	1.400 ppb
50	4 grams	1.723 ppb
60	4 grams	2.314 ppb

As it can be seen in Table 3, the filtering material that has been used to eliminate mercury in the water has managed to decontaminate it up to proportions of 0.7550ppb which are minor quantities to the ones allowed by World Health Organization.

6. Conclusion

The project presented above is very attractive, since it combines two branches of the exact sciences to consolidate a project satisfactorily in the branch of industrial engineering, which includes the application of quality methodologies such as operational excellence and change management with the objective of guaranteeing business competition, participation and incursion of human capital in projects. These projects aim to reduce costs, maximize productivity, spread the organizational culture in all its aspects, management, leadership, and in ensuring the permanence of the organization in the market. All these concepts were applied to the branch of Chemical Engineering in the development of the mercury decontamination project in the water with orange peels, resulting in a project with positive results and impact in the two areas, respectively, industrial engineering and chemical engineering.

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Biographies

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