

Artificial intelligence and participation in environmental protection, industry, and society

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Abstract. - Cleaner production is considered one of the essential means for manufacturing companies to achieve sustainable production and improve their competitive advantage. However, implementing the cleaner production strategy faces obstacles, such as the need for comprehensive data and valuable insights that can be used to provide better support in making optimization decisions in product lifecycle management and throughout the cleaner production process. Fortunately, with the extensive use of intelligent sensing devices in cleaner production, a large amount of real-time, multi-source lifecycle big data can now be collected. This paper presents results obtained in terms of proposals for cleaner production in areas such as the use of materials, the use of artificial intelligence, and obstacles to its use within the social and industrial world.

Keywords: Environmental protection, development proposals, life cycle.

Inteligencia artificial y su participación en la protección del medio ambiente, la industria y la sociedad

Resumen: La producción más limpia se considera uno de los medios más importantes para que las empresas manufactureras logren una producción sostenible y mejoren su ventaja competitiva sostenible. Sin embargo, la implementación de la estrategia de producción más limpia enfrenta obstáculos, como la falta de datos completos y conocimientos valiosos que puedan utilizarse para proporcionar un mejor apoyo en la toma de decisiones de optimización en la gestión del ciclo de vida del producto y durante todo el proceso de producción más limpia. Afortunadamente, con el uso extensivo de dispositivos de detección inteligentes en una producción más limpia, ahora se puede recopilar una gran cantidad de big data en tiempo real y de múltiples fuentes de ciclo de vida. Este artículo presenta los resultados obtenidos en términos de propuestas para una producción más limpia en áreas como el uso de materiales, el uso de inteligencia artificial y los obstáculos para su uso dentro de un mundo social e industrial.

Palabras clave: Protección del medio ambiente, propuestas de desarrollo, ciclo de vida.



I. Introduction

In the production process, there is a large amount of waste and emissions due to the continuous transformations that the raw material has, which implies a waste of the resources used and inefficiency during the processes [1]. As a result, socioeconomic problems translate into the costs of production, treatment, and final disposal of waste. In the same way, they directly affect people's quality of life and the environment surrounding them. Generally [1], companies control the amount of waste once generated after production processes, so they do so through technologies and tools that require a high sum of investment. Cleaner production strategies focus on integrating preventive solutions for managing natural resources and reducing global pollution. Environmental management applies Cleaner Production techniques focused on processes, products, and services that require transforming inputs to give added value to customers. Its main objective is to optimize these resources by modifying, eliminating, or replacing raw materials [2]. The deterioration and exploitation of the environment are the problems that a realtering climatic conditions.

Environmental management is an issue that involves not only Cleaner Production strategies but also goes hand in hand with Industry 4.0 because the development of new green technologies allows the reduction of inputs in high quantities such as gasoline, but in the same way, these bring negative consequences to the environment in which people are surrounded [3]. The responsibility for sustainable development lies with all people to improve the quality of life and environmental conditions.

II. Development

Ecuador is a country in which a large amount of products resulting from the raw material cocoa is produced and exported, this since the country is present one of the highest quality seeds which allows to generate chocolates with the highest level. Thus, in figures, Ecuador has 12% of the land area cultivated by cocoa and approximately an income of \$ 800,000 after the export of beans in the region [4].

Within the industrial sector, measures or programs have been promoted that contribute to the proper management of resources, increase efficiency and strategies that reduce the impact or risks for both people and the environment. In this way, around the world companies opt for cleaner production projects because it allows them to be much more sustainable over time. This is how in the country, the Saquifracia farm, which is located in the province of Pastaza is responsible for the cultivation of cane and cocoa; however, they have begun applying this type of projects especially in the process of obtaining cocoa, for this they had five phases:

- Stage 1: Corresponded to the definition of the objectives and goals of PML about the environmental policy of Saquifracia. In addition, the company's current state was known, roles and responsibilities were delegated, obstacles to implementation were identified, concepts and good practices were defined and environmental regulations were considered.
- Stage 2: A technical-environmental-economic diagnosis is generated before the process considering the raw materials used and relevant information about the activities.
- Stage 3: A technical-economic-environmental evaluation considers materials, monetary units, and inefficiency costs, such as prioritization in terms of action.
- Stage 4: Cleaner production alternatives from waste and/or scrap of raw material, water, energy, products, facilities, methods, and personnel.
- Stage 5: Implementing alternatives within the company through an action plan must be controlled and evaluated periodically, considering the indicators generated in Stage 1.

With this analysis carried out in the company, inadequate water consumption and high levels of waste were generated. Primarily, the PML alternatives focused on improving the processes in which resources such as water and electricity were implemented or used and work was done to generate correct waste management. In addition, the feasibility analysis found that it is a viable process since the return on investment turned out to be approximately one year [5].

III. Methodology

The methodology developed was documentary since different sources of published information were reviewed to know the impacts of cleaner production in industrial scenarios and the participation of society in this regard. In addition, artificial intelligence's new development to face the new times' environmental challenges was evaluated.

III. Results

A.Elements that prevent the creation of cleaner production proposals in Industry 4.0

Although industry 4.0 seeks to reduce the amount of waste and emissions created by old or few automated objects, it must be taken into account that when manufacturing these new tools, many of them require the exploitation of mines to obtain organic minerals that allow improving the properties of automation, Without realizing that they are altering the ecosystem in an impactful way, due to the amount of natural space they require to obtain these minerals.

The industrial 4.0 market is so changing and exponentially way is growing. Therefore, old objects become obsolete, which makes people throw them, generating more pollution. This is because the market will always look for more efficient products that can have better characteristics in terms of connectivity. The internet has eye-catching features and new functions. Generally, by selling their new products, telephone companies make the old phones or lower versions no longer have the same compatibility with new updates. Therefore, in a certain way, they force their customers to acquire their new products more efficiently and innovative.

When discussing creating renewable energies, you can observe a certain number of problems, which will be described below; when using solar energy for large industries, they need to realize that solar panels affect biodiversity. This is because migratory birds that pass through these places can get burned by the vital emanation of heat. As for the use of wind energy, in the same way when using large mills, this affects animal biodiversity and generates hearing problems for people near these places.

B.Materials that prevent better use and use of cleaner production

Around the world, different industries generate or require materials that, despite being treated and/or handled in various ways, their consequences on the environment continue to be greater; according to the United Nations, the metals considered to have the most significant impact on the environment are gold, mercury, rhodium, or uranium. Those materials that mainly result from mining extraction and exploitation, especially the post-mining process, are the most complicated and extended after the operations carried out in a mining field [6].

At present, it is identified that there is an increase in demand for some metals since they are used for the design and creation of new technologies related to renewable energies; These materials can be indium, platinum, indium, or selenium. However; also other products with a high environmental impact can be plastics, iron, or steel [7].

Among other materials are those that pollute the atmosphere, evidenced through GHG emissions by the chemicals used for extraction processes such as transporting and/or crushing alluvial material. These turn out to be harmful during the implementation process of a cleaner production project because it seeks to reduce costs and environmental impact and that the processes are more efficient; however, these materials must be appropriately treated if it is not done, it can generate changes in the natural environment which in turn can affect directly in the creation of new processes to try to eliminate them, which prevents prevention strategies from being generated and corrective actions from being chosen [8].

In such a way, it can be mentioned that especially those materials related to extractive industries such as mining and oil are those that generate the most significant impact on the environment and, although environmental care measures or projects that seek sustainability sought, can be complicated since the actions taken for this type of materials as for the action of the environment and its care after this type of Process are only measures that turn out to be minimizing and more not of prevention and protection of the environment as of people.

a. Big Data to generate new proposals for cleaner production

Food waste is a major global problem. Several companies have been created to address it in recent years since it is a crucial sustainability problem since 1,300 million tons are generated worldwide yearly. The Food and Agriculture Organization of the United Nations estimated the total cost to society in 2014 at 2.6 trillion dollars. Many small businesses aim to address this problem by acting at different points in the supply chain, from suppliers to consumers, and at different levels of the food waste hierarchy, from prevention to energy recovery, redistribution, reuse, and recycling.

Big data analysis, using large and complex data sets manipulated by sophisticated computer programs, is increasingly used by companies in various sectors. Therefore, this proposal has analyzed case studies to provide a framework for understanding different food waste reduction business models and how they could benefit from using Big Data [9].

b. Artificial intelligence favors new proposals for cleaner production

Artificial intelligence is a tool that has become a trend today as it reduces costs and improves productivity, but that is not all due to its accuracy and the integration of information that this tool entails. Its results are a cleaner production since greater precision and efficiency represent a lower percentage of waste generated within the processes in addition to having enough flexibility of use and reliability of the Data obtained, making possible a better implementation of continuous improvement projects.

Evolution is inevitable in both people and companies and it is a fact that the digitization of data and processes, that is, the use of the software, is fundamental, and automation is a step forward for companies since it represents greater efficiency in their processes. It should be considered that the data collection took an extended period. There was a percentage of error: data with enough variability. However, using artificial intelligence not only can automate parts of the process of organizations, but it is possible to collect a large amount of data, such as the time it takes such activity. There is a large percentage of reliability in addition to contributing to decision-making.

Artificial intelligence is based on two areas, the software, which contains the programming of the activity to be carried out, and the programming of sensors and actuators, among other parts, necessary for the robot or artificial intelligence to function correctly according to its role and activities. On the other hand, there is the hardware that includes the sensors, the actuators, and the components that will work based on what is requested by programming in the software. Artificial intelligence creates new opportunities for flexible and efficient production, even for complex and increasingly customized products manufactured in small quantities.

In addition, the artificial intelligence market is increasingly demanded by different organizations due to its benefits. Although it represents a significant investment for companies, the results and advantages at a competitive level make it viable and profitable to implement. By 2035, intelligent and digitally networked systems and process chains could represent an additional growth of around 420 billion euros, only in Western Europe. According to a study by PwC, AI can contribute up to US\$15.7 trillion to the global economy by 2030.

c. Idea based on artificial intelligence and Big Data for a cleaner production plan in the industry

Big Data, being a large-scale data analysis tool, represents an opportunity to democratize access to information on environmental issues, helping in the processes of measuring scenarios and baselines for both public and private decision-making.

Artificial Intelligence can also be used to significantly improve different weather forecasts worldwide. This technology allows data to be analyzed in real-time and with a minimum margin of error about meteorological catastrophes. Thus, by using various mathematical models, it is possible to offer different solutions to prevent this type of disaster, creating early warnings and adequately coordinating the management of emergencies.

Artificial intelligence, together with Big Data, allows us to create solutions to society's environmental problems. Thanks to all the technological resources that exist in the world can be used to generate environmental impact and thereby transform industries, for this these systems must guarantee to improve the quality of life relating to the environment, so it is intended to use this technology as a means of monitoring controlling risk areas to predict situations in the future and design action plans with positive results. These technologies are necessary to avoid causing environmental damage because they can automate various activities, including improving weather forecasts [10].

Conclusions

Artificial Intelligence and Big Data tools are part of the new instruments that are part of a new generation and can be decisive in developing any modern project. They are considered necessary for valuing large projects of excellent caliber worldwide. Its use in an ecological project of cleaner production can help the environment in many ways. One of them is performing several simulations of different environmental problems and, thus, together with Big Data calculating the necessary variables to know the effectiveness of the decision taken or the environmental proposal you want to execute.

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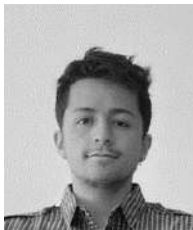
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