

Sustainable Business Practices from Old Tires

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2-SP16-11-242

Publication date: October 2, 2024

Last review: October 2, 2024

CONTEXT

In 2023, the tire industry presented more technology and new products, features that boosted the market's development. In contrast, the number of old, unused tires was increasing, and with them risks of health and environmental damage. Manufacturers and importers launched several initiatives to solve this problem, outlined in the Tire Industry Project (World Business Council for Sustainable Development, 2005). This work had the participation of 11 leaders of the main tire companies in the world. Solutions were developed around sustainability topics such as management, technology, and trends.

One of the management challenges is the waste disposal places which have been classified into three categories: sanitary landfills, controlled sites, and open dumpsites. In open dumpsites, particularly, there is no control or waste treatment, they are sources of infection, damaging health due to the proliferation of insects and rodents. Additionally, in these sites there is higher risk of uncontrollable fires that emit toxic gases and deteriorate the environment (US Environmental Protection Agency, 2012).

Mexico portrayed an alarming picture with the existence of over 40 million old tires, scattered in the over 1,200 open dumpsters located around the country (INEGI, 2024). *Semarnat*, the Environment and Natural Resources Ministry, together with the US Environmental Protection Agency listed a series of recommendations to ensure optimal treatment pursuant to a sustainable answer for old tires (US Environmental Protection Agency, 2012).

The following questions arise from this context. Are there sustainable business opportunities from old tires? Which can be an optimal operation of an old tires collection center? Which market trends are there for the use of scrap tires? It is clear that a study that can give answers to these questions needs to be conducted.

Image. Freepik, 2024.



NEW USES FOR WASTE TIRES

Different countries have explored the correct management, environmentally wise, of tires at the end of their useful life. Those that are complete have been used to produce energy in cement furnaces, and they are transported either whole or cut. And if grounded, there is potential market in civil engineering works (Association of Responsible Management of Used Tires, 2016).

An analyst has been hired, and he has been requested to analyze the installation of a regulated collection center with two by-products: whole tires and cut tires. The new collection center can receive economic support, provided it has enough capacity to store 500 tires or more. It has been agreed that at least 30 tires will have

to be cut for technology testing that is necessary for research and the development of new materials. An employee workforce is required to carry out the activities that are necessary.

The cutting process enables to obtain three pieces per tire. It is intended to maximize the by-products revenue, which comes to \$58 pesos (MXN) per whole tire, and \$136 pesos (MXN) per cut tire. The storage process for a whole tire is one hour/day, while the cut tire process is 2 hours/day. By hiring a 5-people workforce, 800 hours per month will be available.

How should production be programmed to maximize revenues considering these restrictions?

The uses given to those waste tires are recycling, civil engineering work, or energy assessment. To learn more, check the Signus page. [HERE](#).

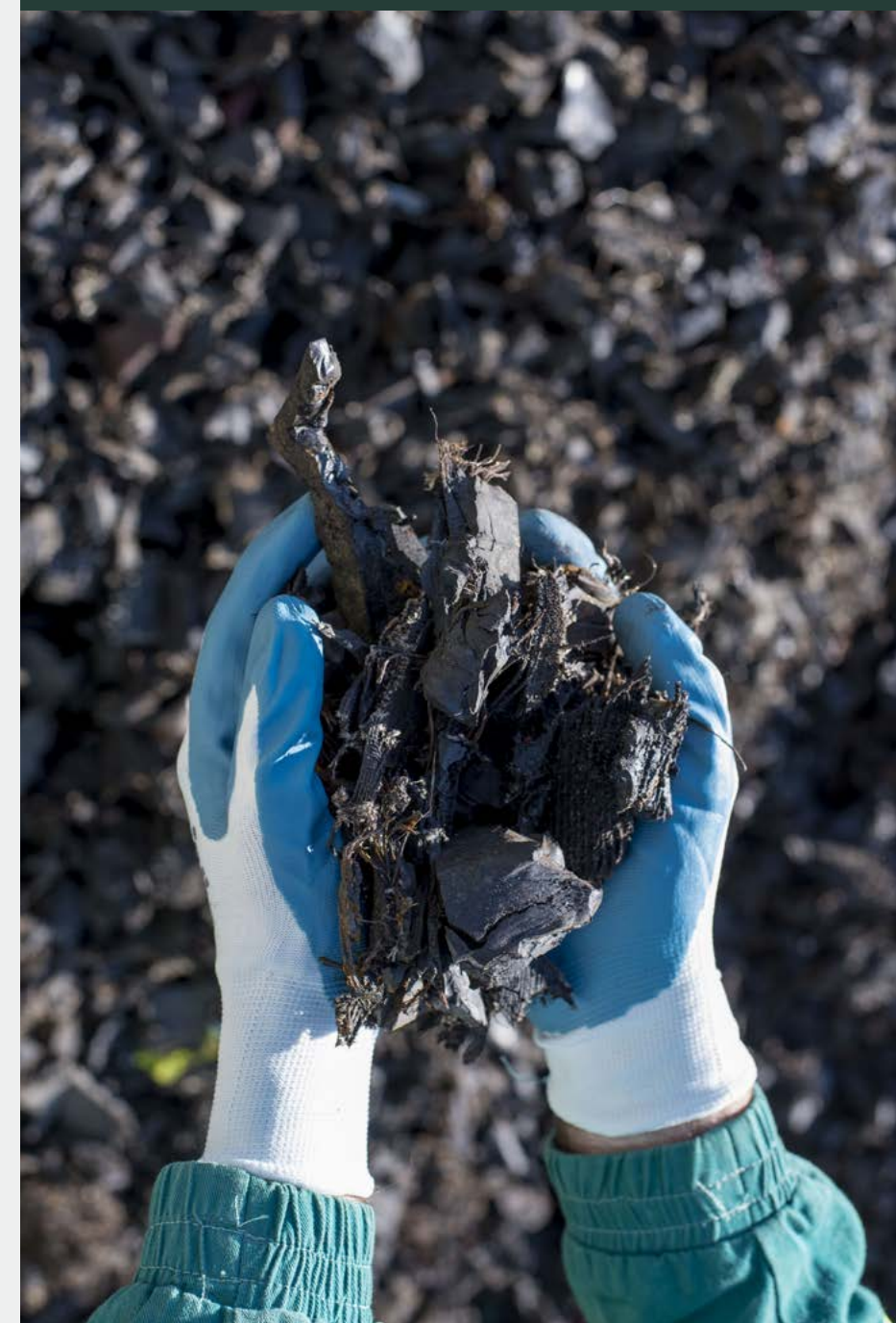


Image. Wirestock in Freepik, 2024.

THE CONSULTANTS

To reach decisions, two consultants were contacted. The first of them must design a mathematical model of the situation and obtain the solution for the production plan with the graphical method. The second consultant must make predictions to calculate the trends of the recycling market.

The first consultant needs to show different scenarios through the sensitivity analysis and explain what happens to the production plan if there are changes in the revenues of the products. He also needs to interpret the indicators of the “shadow price” and “permissible limits”, additional to increasing/reducing those where there may be restriction changes.

Images: NeXore88 in Flaticon, 2024.

Considering four by-products (whole tires, cut tires, ground A, and ground B) and the same restrictions of the previous problem, the consultant must propose an optimal production plan and consider the following data for the new products:



For ground tire A, the process requires 2.5 hours, and the revenue is \$280 pesos (MXN)



Ground tire B requires three hours, and the revenue is \$300 pesos (MXN).

SUSTAINABILITY PARTNERSHIPS

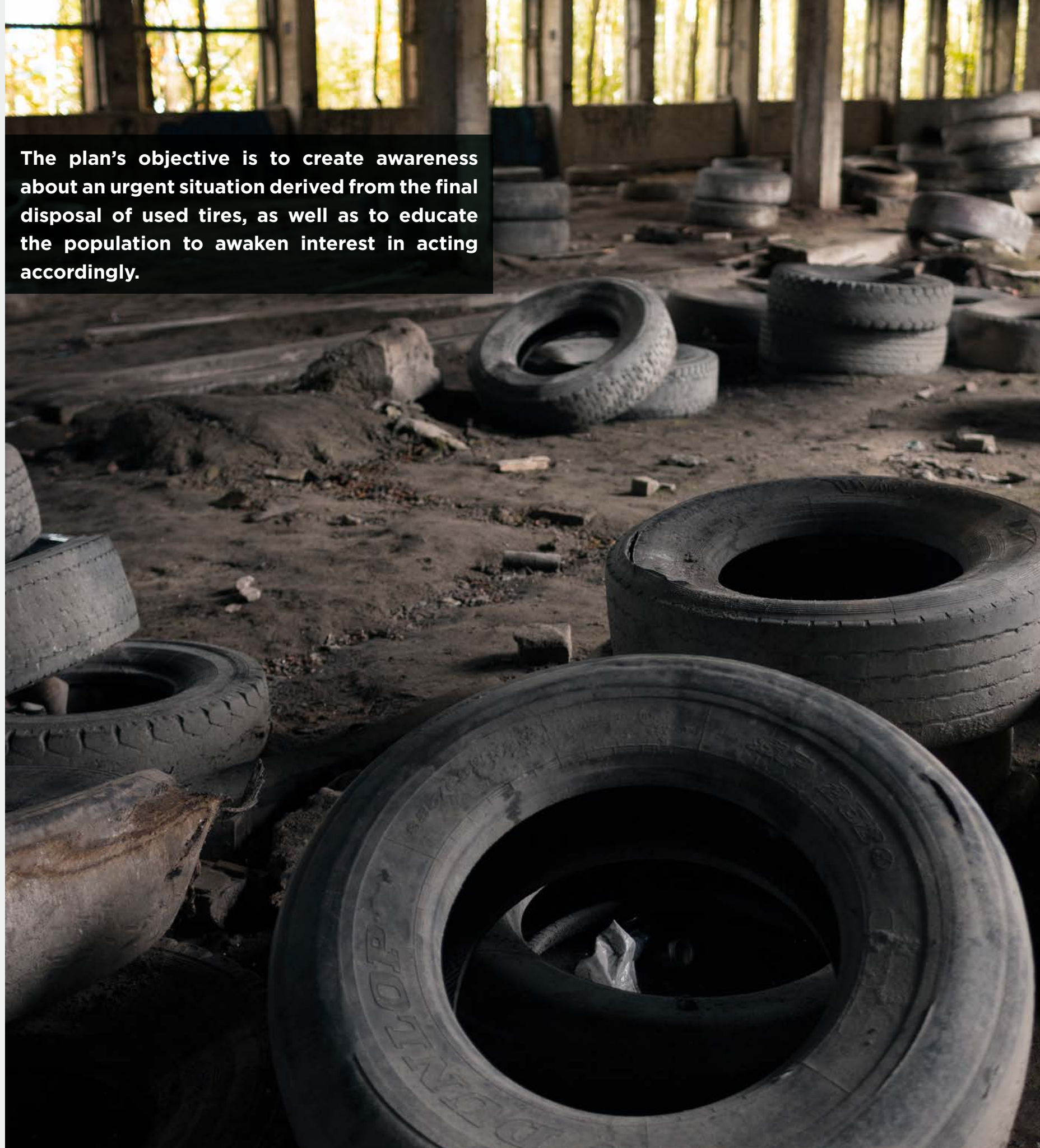
In 2023, the old tire management process was nascent. It was still necessary to learn its behavior trends and calculate projections for the upcoming years.

One of the ideas for the business is to encourage cooperation with vehicle repair and maintenance centers that offer any type of tire service. They are thinking about creating collection centers with them and working on a massive publicity campaign to create awareness with final users and vehicle owners. The goal is for them to take discarded tires to these places.

It is common knowledge that in the months when the population pursues purchasing vehicles, there is a natural trend to look up information. Thus, programming publicity throughout the year with greater coverage in the months with increased vehicle sales has been considered.

Image. Freepik, 2024.

The plan's objective is to create awareness about an urgent situation derived from the final disposal of used tires, as well as to educate the population to awaken interest in acting accordingly.



THE DECISIONS

The second consultant has been appointed with the mission of answering the following: Which dynamics are observed over the years in the recycling business in Mexico according to the market size? Which projections are calculated for next year? To achieve this, a graphic visual analysis of trends and historical behavior must be carried out, as well as calculate a projection using time series (at least two different methods) to obtain a model with the lowest prediction error possible.

See more tire sustainable business data. [HERE](#)

Which months are most convenient to launch the awareness campaign? It is necessary to identify seasonality of light vehicle sales through a decomposition analysis.

The consultant must also prepare a projection of the light vehicle sales for the following four months with the Winter method. Finally, he must analyze the kind of vehicle (automobile, passenger bus, cargo truck, motorcycle) that is having the highest influence on the operation of repair and

maintenance centers. For this analysis he must build a multiple regression model and obtain the precision indicators.

Both consultants must generate an integrated report that guides the business decisions for the customers. The document must include conclusions and recommendations for the business, the results of the applied models and of primary and/or secondary sources of the context.

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