5

CONCLUSIONS

5.1 INTRODUCTION

The general aim of this study was to calculate the 2023 sales forecast for the top 10 sold products during the past 3.5 years of a manufacturing company in Mexico.

The research carried out for this study is relevant not only for the company but also for other companies and business that not seen the potential of sales forecast.

A conclusion is presented in this chapter, along with a comparison with the pre-existing literature, recommendations, errors and limitations, and suggestions for future research.

5.2 GENERAL CONCLUSIONS

The researcher is about sales analytics and forecasting, and one needs to remember that "an important component of making critical decisions is the ability to accurately predict future performance" (Hoyle, Dingus and Wilson, 2020), and this is what the researcher is looking to achieve through sales analytics and sales forecasting.

Accurately predicting future performance is not only key for the sales functions of a business but also for the business in general. Hence, data analysis based on quantitative data should be used to build projections.

The researcher has learned that the first step towards a good analytical process is process of gathering the data. Data shaping should be based on the business objective, along with collecting relevant data for the problem one wants to solve (Thomas, 2020).

One then has to assess and discover the data, which means that one needs to understand the data one is working with so that one can clean and transform the data before analysing it; even though it might seem like a lot of work, all of this will allows one to find information not useful for the purposes of the analysis or to recognize mistakes in the data set that

can translate into fixing errors quickly, producing top quality data and make better business decisions at the end of the process. One also has to understand if transformation and enrichment of data is necessary to have a more complete data set for the analysis.

A statistical test was useful to justify the selection of only 10 products to understand the general performance and fluctuations of the sales during the past years by providing a mechanism for making quantitative decisions based on the evidence to reject the null hypothesis.

5.3 RESEARCH QUESTIONS CONCLUSIONS

This study set a series of questions that would help the researcher reach her objectives and, therefore, the aim of this research. The research was divided in four objectives and six questions. The research was carried out by processing primary quantitative data from the company in question and by analysing the resulted data.

5.3.1 Objective 1

The first objective was to find the 10 products with the highest sales during the past 3.5 years and the researchers was trying to achieve this objective by answering two questions.

Question 1.1: What are the top 10 sold products on the past 3.5 years?

Answer to question 1.1: The products with the top 10 sales are T45020, EMS042, BZE060, BTWS150, BZE040, ETGE01000, T45180, EMS041, EMS043, and BTWS040.

Question 1.2: Which are the families with the highest sales during the studied period?

Answer to question 1.2: The families with products on the top 10 list are *Bottles*, *Lids,* and *Labels.*

The answers to these questions make sense for different reasons, for example that when the researcher started analysis, the researcher graph the total sales per family and these were the families that have the highest sales, it only makes sense that the part numbers belong to these families. Also, that *bottles* is the family with more part numbers in the top

10 because it is the family with the highest amount of part numbers in general and that it will make sense for *Lids* to be part of the top sellers because one *lid* can fit more than one *bottle*, and the same applies to *label*, one *label* can be used for more than one *bottle*.

5.3.2 Objective 2

The second objective was to understand if the top 10 products have a significant impact on the total sales, and the research supported this objective by answering one question.

Question 2.1: How do these 10 products affect the total sales?

Answer to question 2.1: Yes, the top 10 products have a significant impact on the total pieces sold because the products listed as the top 10 represent more than 50% for the years 2019–2021 and a little less than this for the 7 months of 2022 under the study.

5.3.3 Objective 3

For the third objective, the researcher had to analyse the sales fluctuations for the top 10 products during the past 3.5 years and the researcher had one question to support the process.

Question 3.1: How has the demand from the top 10 sale products changes during the past 3.5 years?

Answer to question 3.1: This answer could basically be divided into 10 answers, but to summarize a little, the researcher will give only a conclusion by family starting by *bottles*. As mentioned before, this is the family with the highest amount of products on the top 10 list, it has part numbers with sales all the way up to almost 3 million pieces on a quarter and part number which highest sales on a quarter was around 720 thousand pieces, and has the highest fluctuations on the third quarter year by year. Now, for the *Lids* family, with only three products is the family with the highest fluctuations between part numbers, with 8.27 million pieces difference between the highest sales on a quarter of one part number and the highest sale on a quarter of another part number. And finally, the *label* family only has one part number as part of the top 10 products and it had a drastic drop from 2019 to 2020 and finally to 2021 and is starting to recover in the first semester of 2022.

5.3.4 Objective 4

The fourth objective was to forecast the sales of the top 10 products for 2023 based on historical data, and the researcher formulated two questions to help achieve this objective.

Question 4.1: How have sales behaved for the current year compared to the predictions?

Answer to question 4.1: Out of the 10 products, 6 part numbers had months out of the confidence bounds (1 part number had 2 months), which means that there is a confidence level of 90%. This might not be in the level that the researcher would like to, but more accurate predictions can be models by having bigger data records.

Question 4.2: What are the expected sales of the top 10 products for the next year?

Answer to question 4.2: The part number that is expected to have the highest sale during 2023 is the lid T45020 in June 2023, selling 3.1 million pieces. The researcher has two part numbers which forecast cannot be trusted 100% due to low sales in 2020 and 2021 as a result of quality rejections and customers returns. As discussed on objective 3, the highest sales occurred during the second quarter and the forecast indicates the same for 2023.

5.4 RECOMMENDATIONS

Based on this research paper and the analysis performed on the data shared by the company, there are several recommendations for the company.

- Ensure the correct classification of part numbers by family. During familiarization with the data, the researcher encountered with some part numbers whose description could suggest that they belong to another family.
- Properly identify credit documents that do not affect inventory so that these entries are not taken into consideration for future analysis.
- Perform forecast analysis on all the products at least on an annual basis for better planning.

- Update forecast on a monthly basis for products that are having a specific marketing or quality campaign to have a better prediction of requirements.
- Perform a similar analysis based on total sales (income) to understand if and how the fluctuations in demand are affecting finance sales.

All these recommendations do not require a significant investment. Some recommendations such as the correct classification of products in families and the identification of invoices are tasks that should only be done once and when new products are available. The rest of the recommendations may suggest the need for a full-time person in charge of these analyses, but the benefit that would be obtained from these analyses would justify the hiring.

5.5 ERROR AND LIMITATIONS

Errors and limitations are part of a research project; the first error that the researcher encounter was on the data, the first data shared by the company was incomplete and not making sense. For this reason, the company downloaded the data again and made sure that it was complete before sharing it.

With the second data set, some of the variables were not correctly categorize so it made it difficult for us to perform more analysis based on different variables.

As mentioned in the recommendations, the researcher faced a problem with the credit notes entries because although not all credit notes affect inventory, since the researcher did not had knowledge of the documents that did affect inventory, the researcher had to assume that all credit notes affect inventory, which can lead to overstocking.

Now speaking of the analysis process itself, all the error were encountered during the forecast process and solved. The errors were encounter when trying to find the best model to work with.

For the topic of limitations, the researcher already talked a little about it but let us review the discussed. The main limitation the researcher encountered was the time frame of the data, having more data normally translates into a more precise analysis, and in this case specifically, it could have help to have a more accurate result, because the time the researcher was analysing is the same period where all markets were affected by the COVID-19 pandemic.

5.6 RECOMMENDATIONS FOR FURTHER STUDY

Some recommendations for further studies are as follows:

- The top products per family can be analysed to find the impact that these have over the total sales.
- A comparison between different forecasting models can be useful to find the most accurate model when working with manufacturing companies as the one in this study.
- Further studies based on relationship between the price and the pieces sold for sales predictions could help the company take better decisions regarding sale prices and sales objectives.