Role of Sales Forecasting in the Modelisation of Decision Making Process, Case of MANTAL Textile Corporation of Tlemcen

Phd. Safa LAREDJ MEDJAHED
Laboratory of Evaluation of the Politics Economics of Algeria, Abou Bekr Belkaid University, Tlemcen, Algeria
safalm2010@live.fr

Dr. Omar BENATEK*
Laboratory of Evaluation of the Politics Economics of Algeria, Abou bekr Belkaid University, Tlemcen, Algeria
omar.benatek@univ-tlemcen.dz

Dr. Salim Badreddine BENLOULOU
Laboratory of Public Gouvernance and Social Economics, Abou Bekr Belkaid University, Tlemcen, Algeria
salimbadraddin.benloulou@univ-tlemcen.dz

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Abstract:
In this **paper**, we will try to show the effective role played by the forecast methods of sales in economical modeling of decision making process in the Textile Corporation MANTAL for the period 2013-2019. In order to reflect this subject we have relied on the analytical and inductive descriptive approach in relation to the theoretical aspect of the subject and as for the practical aspect of the study we have relied on the integrated approach in applied research (experimental approach), by using one of the most prominent methods which is represented by Box-Jenkins method, as well as is the most compatible with the specifics of the research, by making monthly forecasts on a set of designs produced by the MANTAL corporation for the three months of the current year, which we found in demand from its customers since the last crisis till now then we modeled one of its objectives concerning maximizing the sales revenue**.**
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* Corresponding author: Omar Benatek (omar.benatek@univ-tlemcen.dz)

Introduction:

Market study is associated with the study of the enterprise, the latter of which is related to the sales forecast process, which is based on a set of statistical methods that seek to reduce uncertainty about future conditions. This is what made researchers in this field devote special attention to each of the productive and industrial enterprises, by explaining how to manage them efficiently and effectively, in order to collect a profit that guarantees their survival in the market on the one hand, and enhances their sales on the other hand.

Therefore, the main goal of the sales forecast process remains to help organizations anticipate demand for their products or services. Forecast isn't sufficient unless it is combined with identifying the problem and then proposing alternatives and then making the optimal decision, and the most important purpose of all of this is to follow a standard and quantitative method in analyzing and interpreting the results.

Enterprises in general and the Textile Corporation MANTAL s.p.a (Tlemcen) in particular are supposed to be concerned with forecasting their sales figure and using the latest methods and models as they avoid risks and provide a competitive advantage if applied carefully. Based on the above, the following problem can be raised: **How can sales forecasting activate and make decisions at the Textile Corporation MANTAL s.p.a (Tlemcen)?**

Study hypotheses: Algerian enterprises adopt modern management methods (quantitative methods);

Sales forecast data can be used in decision making and in mathematical modeling of various functions of an organization.

Study objectives: This study aims to:

- Knowing the extent of applying quantitative methods in Algerian enterprises;
- Explain the importance of the sales forecast process and its role in making enterprise decisions;
- Facilitate the application of forecast process in any enterprise.

Importance of the study : The topic is of great importance in terms of scientific and practical benefit. It enables us to develop a mathematical model for forecasting sales for the enterprise MANTAL s.p.a (Tlemcen), through which the amount of sales required is determined on the basis of which the enterprise's need to expand or embrace other new projects is evident.

Study methodology: To materialize this topic of our research, we relied on the experimental approach, which depends on the field study and documents and statistics in order to define and measure the factors affecting sales and then forecast them for the enterprise under study.

I. General concepts related to the subject:

1. Sales Forecasting:

Sales forecasting is an attempt to estimate the level of future sales through the use of previous and current information available about the phenomenon under study (sales). It is an attempt by the company to know the future based on past and present. Definitely; this does not lead to a precise calculation predicting the future but it helps to estimate the future through using technical and scientific methods.

The forecast is a series of calculations used to estimate future; it combines art, science and individual contributions for the study and determination of the assumptions on which the forecast is made. This is so important knowing that the forecasting is a key behavioral indicator of business administration once making future plans.

2. Entreprises and decision-making:

The term decision plays an important role in front of various activities and institutional tasks, defined as "the best alternative to solving the problem or is the solution. This assumes the ability to identify the solution and generate different

alternatives. Also, this assumes the ability to distinguish between alternatives to identify the best."

The decision is defined "in management literature as synonymous with the concept of the problem posed or a specific challenge of a productive or service nature ... and in general the decision is made by a material or legal person"

It is also known as "a conscious choice between the alternatives available in a particular situation, or the process of choosing between alternative solutions to face a specific problem".

Decision making is "choosing the procedure to take, that is, choosing one of the possible alternatives ... the chosen decision may be rational, emotional or political."

According to Herbert Simon: (Decision-making in the face of a problem means looking at all possible physical measures, in order to determine the results of each and evaluate them to determine which one will be more satisfactory. So that the chosen procedure is the best solution only in certain circumstances).

The decision-making process is also considered "the nerve of the entire human existence, with its individuals, famines and organizations. It plays a fundamental and pivotal role in the efficiency and effectiveness of organizations, as it represents the starting and end points of every movement in the organization, whether it comes to individuals, machines, equipment, materials and everything related to it. Changes or developments that need to be decided.

The decision-making process is used to "address existing problems, to face certain potential situations or situations or to achieve set goals".

In general we can say that the decision-making process "is activities that are followed to define the problem, alternatives to solution, evaluate alternatives, and choose the appropriate alternative to solve the problem, and the most important step that refers to decision-making and the selection of the appropriate alternative. Some prefer to add the term decision-making as it indicates to the integrated system of activities or those processes related to identifying the problem, and the appropriate alternatives. That is, that the system followed, procedures, steps, or mental processes that the manager is going through are only an operation or industry that the individual performs for the decision. ”

From it, the decision-making process is a selection of the best alternative among several alternatives in order to achieve a goal, and these decisions contain a set of elements that can be classified into the following:

• **The goal**: is the final result that must be reached by implementing some procedures on the variables entering and affecting the problem such as the goal is to obtain the highest benefit (profit) from the production of some materials, or to obtain the lowest cost in producing or distributing materials.

• **Variables**: It is the group of elements that impose certain restrictions on the solution, such as the raw materials involved in the production of a particular material. These materials may impose restrictions on the solution, through their prices, the amount of availability, and how they participate in the production of the material.

Among the factors that influence the decision-making process, we mention the following:

- the behavior and personality of the decision maker;
- The level of rationality;
- The structure and culture of the enterprise;
- The nature of the decision;
- The strategic focus of the enterprise ;
- The environment ;
- Performance goals.

3. The role of sales forecasting in the decision-making process in the industrial enterprise:

The role of sales forecasting is highlighted in that it depends on it in the various production and marketing decisions, as it plays "sales forecasting in planning and controlling production clearly, because it allows planning the initial resources used, work, working times of equipment and machinery and other requirements of the production process. Also determining the quantity and type of products that he will display on the market ... It is also to predict sales a role in the sales activity that will determine and distribute sales shares and expenses at the level of salesmen or sales areas ... "

From this standpoint, it is necessary to forecast sales, in order to ensure the effective functioning of the organization due to the complexity and diversity of its activities. Among the importance of forecasting sales, we mention the following:

- helps assess the expected return;
- Sales forecasting helps define and select business policies, and build strategies that maintain an organization's market position.
- Draws project dimensions in the target market, and works to determine the locations and locations of facilities required for the project's product marketing process;
- Assists in the production planning process and production scale scheduling, as well as inventory management and control;
- It is considered one of the main capabilities that direct the organization to the right direction and put it on the right path;
- It helps control production capacity, and increase or decrease it.
- Contributes to determining the need for the quantity and type of labor that must take place on the production line starting with the handling of raw materials from the warehouse, and ending with the product being put on the market;
- Contributes to determining the market needs for the goods or services that the small business intends to produce;
- Helps to direct the advertisement to the target markets and areas with the product distribution process.

It can also be said that forecasting sales "makes an important and sometimes decisive contribution to decision-making mechanisms, and this despite the

ambition that we seek to achieve to achieve a unique relationship between economic forecasts and decision-making may seem unrealistic, and this even if decision-makers are limited to economic pillars remain suspicion and disagreement "It is based on forecasts and this is due to the difference in the importance given to the multiple goals of forecasters. Therefore, decision makers must adhere to one principle in light of the available information, where the leader is authorized to take the necessary measures according to the desired goals."

Despite the importance of the role that "sales forecasting contributes to planning the marketing strategy, the effectiveness of this process is determined by the economic conditions that will likely dominate the market in the future, in addition to the data that technological progress can produce to help raise the adequacy of information processing systems where the degree of accuracy envisaged in operations increases Forecasting.

If the instability in economic conditions affects the forecasting process negatively, then technological developments in the field of computers and its uses have had an important role in improving accuracy levels of information obtained by planners. "

Consequently, sales forecast is a way not target that helps in taking the appropriate decision in order to achieve the goals of the organization. Good guessing of the sales number leads to effective decision-making, and therefore it is clear what must be done and what should not be done in order to reach the desired goal, then that a bad guess leads to He made a decision based on the wrong information that came from him, and he got a wrong decision.

II. Method and tools:

1. Presentation of Mantal's enterprise:

The textile factory for heavy materials or as it is commonly referred to as (MANTAL spa), this institution was established in the city of Tlemcen in 1920, this institution is located in the eastern side of the city of Tlemcen, as it occupies an area of 3 hectares distributed over three units represented in the administration of the enterprise and two units for the operation Productivity (spinning and textile).

The MANTAL enterprise is one of the largest factories in the production of blankets (covers) in the Algerian West, consisting of 281 workers (during the year 2019), including 30 frames, the number of workers of the Foundation is distributed over the three units as follows: 20 workers in the management of the institution, 73 a worker in the spinning lab, 143 textile workers, and 15 contractors with the establishment. It is one of the state-owned public institutions, existing with a social capital estimated at 5,000,000 5,000 dinars Algerian, whose capital may increase to expand, based on its desire to undertake a new project (this is what it plans to do recently to promote its products and do weaving carpets, and guessing to produce other materials in the future). This opened her the opportunity to diversify the designs under different names and different dimensions, and this is due to the customer’s desire and preferences. In this research we will limit the study specimen to presenting and analyzing a sales chain for each of the blankets (blankets) of the

first type of designs: Al-Alia, Souad, Lala Siti, Tagrarat, Traras and traras babies. As shown in Table (1).

The variables used in the study can be classified as follows:

- The independent variable is time (months);
- The dependent variable is sales (each type separately).

We note from Table (1) that all sales of the study need as a base raw material 75% acrylic (at a price of 307.96 DZD / kg), and 25% of polyester, except that the latter that is used in the production of the Traras type is of a polyester thread type (at a price of 840.5 DZD). / Kg), while the rest of the products depend on polyester fibers (at a price of 252.96 DZD / kg).

2. Display method of analysis:

In order to analyze the time series, it is necessary to study its shape and also to know its fundamental changes, which are:

- The general trend;
- seasonal changes;
- Time Series Format.

In our analysis, we relied on the BOX-JENKINS methodology, the latter of which proved its efficacy through the results obtained. This method allows isolating all unwanted information from the chains such as the general trend and seasonal and random variables. And we were able to estimate in the short term much better than Other methods because they depend on the autobiography of each series, based on its previous values and random error, in addition to this methodology can be applied in all cases and does not require much information compared to other methods.

Box – Jenkins models: Box and Jenkins (1976) proposed a prediction technique for unvaried series based on the notion of ARIMA process. This technique has three steps: identification, estimation and verification. This method is used to obtain a model explaining the fluctuations of a series based solely on the past conduct and then extrapolate the values of the variable. If the series suggests a pattern that repeats fairly regularly, the choice of this method makes sense (Eric Dor 2004) [10].

- The first step is to identify the ARIMA (p, d, q) which could cause the series. The series should be transformed first to make it stationary and then identify the ARMA (p, d)

- The second step is to estimate the ARIMA model using a nonlinear method (nonlinear least squares or maximum likelihood).

- The third step is to check whether the estimated model reproduces the model that generated the data..

2.1. Al-Alia's sales forecast:

We noticed through the chart of the time series of high sales that it contains fluctuations, and this may be an indication of the presence of seasonal changes or random changes and this is what we will try to detect by analyzing the autocorrelation curve and the use of statistical tests.

a. Create autocorrelation statement: By indicating the autocorrelation, the autocorrelation coefficient for the delay time K = 1 differs markedly from zero, meaning that the Al-Alia's sales chain is seasonal and cannot be calculated given that we have zero values.

b. Stability study: To do this, we will use the Phillips-Perron test, by using Eviews 10 to make calculations easier and shorten time, automatically setting the number of delays to 3, which lowers the Akaike and Schwarz standard.

In order to perform this test, we estimate the three (1,2,3) models of Dickey-Fuller, which are as follows:

$$AL_t = \Phi_1 AL_{t-1} + B_t + C + \varepsilon_t$$

$$AL_t = \Phi_1 AL_{t-1} + C + \varepsilon_t$$

$$AL_t = \Phi_1 AL_{t-1} + \varepsilon_t$$

After our estimation of the third model, it was found that the general trend coefficient was insignificant, so we estimated the second model, (the estimation results are shown in Table (2)). From the estimation results, we found that the calculated statistical value of Phillips-Perron is smaller than the value set at 1%, 5% and 10%.

So we reject the null hypothesis of unit roots, so the time series of Al-Alia's sales is stable.

c. Identify the model: In order to identify the model, we draw auto and partial correlation statement for the first differences in the series of sales of this product, from the autocorrelation statement for the first differences we noticed that the first delay factor is greater than zero, and the delay coefficients after the first delay are close to zero, so the appropriate form according to the autocorrelation statement Partial and simple, and Akaike , Schwars and Hannan Quinn standards are AR(1), shown in the following formula:

$$\Delta AL_t = \Phi_1 \Delta AL_{t-1} + \varepsilon_t$$

d. Estimate the model: We use Eviews 10 to estimate this model and get the following results:

$$\Delta AL_t = 0.543 \Delta AL_{t-1} + \varepsilon_t$$

We note that the Al-Alia's sales chain is affected by its previous value.

d. Test the accuracy of the model:

We test the importance of transactions using the student test. Note that the first correlation coefficient is fundamentally different from zero (11.49> 1.96).

Are the residues a white mistake?

To answer the question, we draw a statement of the spontaneous correlation of the rest, until we notice through the statement of the autocorrelation of the rest that all boundaries fall in the field of trust, and this means the absence of the self the relationship of the rest. We also note that all the statistical capabilities of Ljung-Box are greater than 5%, and therefore we accept the hypothesis that the residue is a white error (white noise).

Is the white error follows the normal distribution?

To answer this question, we use the residues graph, so it became clear to us through this number that the white error is the same relative to zero, except that using the Jarque-Bera test, we find that:

$$JB=126.720 > X^2_{0.05}(2)=5.99$$

Accordingly, the white error isn't subject to normal distribution, but the model remains statistically acceptable.

e. Forecasting:

After the model quality has been accepted, We use it in the process of Al-Alia's sales forecasting for the three months of the year 2019, which are shown in Table (3).

"And with the same first steps, we apply it to other products (Souad, Lala Siti, Tagarart, Traras and Traras babies)"

2.2. Souad's sales forecast:

After detecting the fluctuations in Souad's sales chain, which resulted from random changes, it was clear from the stability study that this is a stable time series.And based on the auto-correlation statement of the first differences, we noticed that all coefficients are close to zero and are based on the partial and simple autocorrelation statement and the standards of Akaike, Schwars, and Hannan Quinn are AR (3), as shown in the following equation:

$$\Delta SOU_t= 0.082 \Delta SOU_{t-1} + 0.082 \Delta SOU_{t-2} + 0.782 \Delta SOU_{t-3} + \varepsilon_t$$

After the model quality has been accepted, We use it in the process of Souad's sales forecasting for the three months of 2019, which are shown in Table (4).

2.3. Lala siti's sales forecast:

After detecting the fluctuations in Lala Siti's sales chain, which resulted from random changes, it was clear from the stability study that this is a stable time series and based on the auto-correlation statement of the first differences, we noticed that all coefficients are close to zero and are based on the partial and simple autocorrelation statement and the standards of Akaike, Schwars, and Hannan Quinn are AR (3), as shown in the following equation:

$$\Delta LASE_t= 0.094 \Delta LASE_{t-1} +0.083 \Delta LASE_{t-2} + 0.253 \Delta LASE_{t-3} + \varepsilon_t$$

After the model quality has been accepted, We use it in the process of Lala siti's sales forecasting for the three months of 2019, which are shown in Table (5).

2.4. Tagrart's sales forecast:

After detecting the fluctuations in Tagrart's sales chain, which resulted from random changes, it was clear from the stability study that this is a stable time series and based on the auto-correlation statement of the first differences, we noticed that all coefficients are close to zero and are based on the partial and simple autocorrelation statement and the standards of Akaike, Schwars, and Hannan Quinn are ARMA(1,1), as shown in the following equation:

$$\Delta TAG_t= 0.988 \Delta TAG_{t-1} -0.974 \underline{\theta}_1 \varepsilon_{t-1}+ \varepsilon_t$$

After the model quality has been accepted, We use it in the process of Tagrart's sales forecasting for the three months of 2019, which are shown in Table (6).

2.5. Traras's sales forecast:

After detecting the fluctuations in Traras's sales chain, which resulted from random changes, it was clear from the stability study that this is a stable time series.And based on the auto-correlation statement of the first differences, we noticed that all coefficients are close to zero and are based on the partial and simple autocorrelation statement and the standards of Akaike, Schwars, and Hannan Quinn are ARMA (1,1), as shown in the following equation:

$$\Delta TRA_t = 0.999\ \Delta TRA_{t-1} - 0.997\ \varepsilon_{t-1} + \varepsilon_t$$

After the model quality has been accepted, We use it in the process of Traras's sales forecasting for the three months of 2019, which are shown in Table (7).

2.6. Traras babies's sales forecast:

After detecting the fluctuations in Taras babies' sales chain, which resulted from random changes, it was clear from the stability study that this is a stable time series.And based on the auto-correlation statement of the first differences, we noticed that all coefficients are close to zero and are based on the partial and simple autocorrelation statement and the standards of Akaike, Schwars, and Hannan Quinn are ARMA (1,1), as shown in the following equation:

$$\Delta TRABB_t = 0.999\ \Delta TRABB_{t-1} - 0.999\ \varepsilon_{t-1} + \varepsilon_t$$

After the model quality has been accepted, We use it in the process of Traras babies' sales forecasting for the three months of 2019, shown in Table (8).

3. Building the model:

After we have studied the time series of MANTAL's sales and forecast that the enterprise can sell for the first three months of 2019, we will now try to model the goal of maximizing the sales number and the associated restrictions in the form of mathematical equations and inequalities that can be solved by relying on one of several appropriate criteria .

3.1. Economical formulation of a model:

Among the goals that the enterprise seeks to achieve is to maximize its business number (quantity x price), as we have already provided prices for each product, and accordingly, this goal can be translated mathematically as follows:

$$Z_{max}=1650{,}76.(X_{11}+X_{12}+X_{13})+1463{,}70.(X_{21}+X_{22}+X_{23})+1101{,}81.(X_{31}+X_{32}+X_{33})+$$
$$2086{,}25.(X_{41}+X_{42}+X_{43})+2870{,}28.(X_{51}+X_{52}+X_{53})+711{,}62.(X_{61}+X_{62}+X_{63})$$

In which:

X_{11}: the quantity produced from the Al-Alia product during the first month;

X_{12}: the quantity produced from the Al-Alia product during the second month;

X_{13}: the quantity produced from the Al-Alia product during the third month;

X_{21}: the quantity produced from the Souad product during the first month;

X_{22}: the quantity produced from the Souad product during the second month;

X_{23}: the quantity produced from the Souad product during the third month;

X_{31}: the quantity produced from the Lala Siti product during the first month;
X_{32}: the quantity produced from the Lala Siti product during the second month;
X_{33}: the quantity produced from the Lala Siti product during the third month;
X_{41}: the quantity produced from the Tagrart product during the first month;
X_{42}: the quantity produced from the Tagrart product during the second month;
X_{43}: the quantity produced from the Tagrart product during the third month;
X_{51}: the quantity produced from the Traras product during the first month;
X_{52}: the quantity produced from the Traras product during the second month;
X_{53}: the quantity produced from the Traras product during the third month;
X_{61}: the quantity produced from the Traras babies product during the first month;
X_{62}: the quantity produced from the Traras babies product during the second month;
X_{63}: the quantity produced from the Traras babies product during the third month

Achieving this goal is limited by a set of objective conditions:

a. Constraints related with stock for the three-month forecast: This restriction searches for the stored quantities of products (Al-Alia, Souad, Lala siti, Tragerat, Tararas and Tararas babies) depending on the stock of the beginning of

The period and the produced quantity and the quantity forecasted to be sold from the previously mentioned types.

$$I_{ij}=I_{i0}+ X_{ij} -D_{ij} / I_{ij}\geq 0$$
$$i=\{1,2,3,4,5,6\} \ , j=\{1,2,3\}$$

This constraint can be formulated in the following equations:

Al-Alia's Stock
$$\begin{cases} I_{11}=I_{10}+ X_{11} -D_{11} \\ I_{12}= I_{11}+ X_{12} - D_{12} \\ I_{13}= I_{12}+ X_{13} - D_{13} \end{cases}$$

Souad's Stock
$$\begin{cases} I_{21}=I_{20}+ X_{21} -D_{21} \\ I_{22}= I_{21}+ X_{22} -D_{22} \\ I_{23}= I_{22}+ X_{23} -D_{23} \end{cases}$$

Lala Siti's Stock
$$\begin{cases} I_{31}=I_{30}+ X_{31} -D_{31} \\ I_{32}= I_{31}+ X_{32} -D_{32} \\ I_{33}= I_{32}+ X_{33} -D_{3} \end{cases}$$

Tagrart's Stock
$$\begin{cases} I_{41}=I_{40}+ X_{41} -D_{41} \\ I_{42}= I_{41}+ X_{42} -D_{42} \\ I_{43}= I_{42}+ X_{43} -D_{43} \end{cases}$$

Traras's Stock
$$\begin{cases} I_{51}=I_{50}+ X_{51} -D_{51} \\ I_{52}= I_{5}+ X_{52} -D_{52} \\ I_{53}= I_{52}+ X_{53} -D_{53} \end{cases}$$

Traras babies's Stock
$$\begin{cases} I_{61}=I_{60}+ X_{61} -D_{6} \\ I_{62}= I_{61}+ X_{62} -D_{6} \\ I_{63}= I_{62}+ X_{63} -D_{63} \end{cases}$$

In which:

I_{ij}: the quantity stocked from the product i during the month j;
I_{i0}: the quantity of stocked in beginning period;
X_{jj}: the quantity produced from the product i during the month j;
D_{ij}: the quantity forecasted from the product I during the month j.

b. Constraints related to raw materials used in production: This constrain is related to the quantity of the basic raw materials used (from acrylic a1, polyester fibers a2 and polyester threads a3) and the amount of stock of these raw materials for three months. This constrain can be formulated with the following inequalities:

first month

$$\begin{cases} a_1 X_{11} + a_1 X_{21} + a_1 X_{31} + a_1 X_{41} + a_1 X_{51} + a_1 X_{61} \leq 7000 \\ a_2 X_{11} + a_1 X_{21} + a_1 X_{31} + a_1 X_{41} \leq 2000 \\ a_3 X_{51} + a_3 X_{61} \leq 2000 \end{cases}$$

second month

$$\begin{cases} a_1 X_{12} + a_1 X_{22} + a_1 X_{32} + a_1 X_{42} + a_1 X_{52} + a_1 X_{62} \leq 14000 \\ a_2 X_{12} + a_1 X_{22} + a_1 X_{32} + a_1 X_{42} \leq 2500 \\ a_3 X_{52} + a_3 X_{62} \leq 6000 \end{cases}$$

third month

$$\begin{cases} a_1 X_{13} + a_1 X_{23} + a_1 X_{33} + a_1 X_{43} + a_1 X_{53} + a_1 X_{63} \leq 7000 \\ a_2 X_{13} + a_1 X_{23} + a_1 X_{33} + a_1 X_{43} \leq 2500 \\ a_3 X_{53} + a_3 X_{63} \leq 8000 \end{cases}$$

c. Constraints related to production capacity: This constraint is important in that it determines the limited capabilities of the enterprise in terms of machinery and warehouses and its relation to the production process. The production capacity of the enterprise for a period of three months is estimated at 375,000 kg, equivalent to 225,000 linear meters. The constraint can be formulated with the following inequality:

$$X_{11}+X_{12}+X_{13}+X_{21}+X_{22}+X_{23}+X_{31}+X_{32}+X_{33}+X_{41}+X_{42}+X_{43}+X_{51}+X_{52}+X_{53}+X_{61}+X_{62}+X_{63} \leq 375000$$

III. Results and discussion:

After we solved the model by using linear programming and using the LINGO 17.0 program, we obtained the following results:

Z_{max}=29478169.79		
X_{11}	11	That means that the enterprise produces 11 units of this type in the first month and abandons the production of this type in the following month, and only one unit is produced in the third month.
X_{12}	00	
X_{13}	01	
X_{21}	48	That means that the enterprise produces 48 units of this type in the first month and abandons the production of this type in the following two months.
X_{22}	00	
X_{23}	00	
X_{31}	19	That means that the enterprise produces 19 units of this type in the first month and abandons the production of this type in the following two months.
X_{32}	00	
X_{33}	00	
X_{41}	324	That means that the enterprise produces 324 units of this type in the first month and abandons the production of this type in the following two months.
X_{42}	00	
X_{43}	00	
X_{51}	2217	That means that the enterprise produces 2217 units of this type in the first month, 5185 units in the second months and 2590 in the third month.
X_{52}	5185	
X_{53}	2590	
X_{61}	16	That means that the enterprise produces 16 units of this type in the first month and abandons the production of this type in the following month, and 04 unit is produced in the third month.
X_{61}	00	
X_{63}	04	

This is in order to achieve the greatest sales figure, estimated at 29478169.79 DZD, so that the results obtained are logical, which are based on the production of the maximum quantities of the product that achieves the greatest

possible profit, then the production of the next product in terms of profit value and so on.

Conclusion:

Sales forecasting is the expectation and estimation of future sales of a particular product, and its success requires sufficient experience and skill for those responsible for it. This process requires continuous monitoring with a view to knowing deviations and thus taking the necessary measures for that, as time plays an important role on the other, so whenever the period foreseen by a short period gives more accurate results In contrast, the longer the period, the less reliable the results obtained. And all of this in order to achieve the ruler goals that it seeks to achieve and ensure its survival in the market, and this is provided that they agree with the management philosophy so that they are close to the truth and reality.

The most important results that we come out with through the study:

- The enterprise under study doesn't rely on the application of quantitative methods in forecasting sales and this negates the validity of the first hypothesis, which says that Algerian institutions adopt modern management methods (i.e. quantitative methods);
- Mathematical modeling as a tool that allows future vision through studying the past from the point of view of the present, and this confirms the validity of the second hypothesis, which says that sales forecast data can be used in decision-making, and in mathematical modeling of various functions of the enterprise;
- Box Box-Jenkins method and quantitative methods in general remain an aid in the decision-making process, it must be accompanied by the experience and experiment of managers;
- Box Box-Jenkins method is the best suited to sales forecasting for the Textile Corporation MANTAL s.p.a (Tlemcen);
- The application of the Box-Jenkins method depends on a set of mathematical steps and foundations, in addition to the need for the researcher's expertise (identifying differences, identifying the model ...).

Through its findings, this study recommends the following:

- drawing the future image of the enterprise;
- The necessity Forecasting methods and techniques must be developed as the means for of adopting statistical methods in view of the accurate results in forecasting calculation;
- Allocating special bodies for research and future expectations, and adopting the use of modern programs within the enterprise in order to improve its performance.

Finally, he finds a reference to the possibility of developing the results of this study in future research by expanding the topic further, and taking into account other factors that were not included in this study.

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Appendices

Table (1): The study specimen

Name	dimension	The primary material		Prises (DZD)	The period
		%Polyester	Acrylic%		
Al-Alia	2,00x2,40	25%	75%	1650.76	2013-2019
Souad	1,60x2,40	25%	75%	1463.70	2013-2019
Lala Siti	2,00x2,20	25%	75%	1101.81	2013-2019
Tagrart	2,20x2,40	25%	75%	2086.25	2013-2019
Traras	2,10x2,40	25%	75%	2870.28	2013-2019
Traras babies	1,00x1,20	25%	75%	711.62	2013-2019

Source: Prepared by the researchers based on information provided by the commercial department.

Table (2): Phillips-Perron Tested for Al-Alia's Sales Series

Variable	pp_{cal}	pp_{tab}		
Al-Aia's Sales	-5.712	1%	5%	10%
		-4.086	-3.471	-3.162

Source: Prepared by the researchers based on Eviews10

Table (3) :Al-Alia's Sales forecast quantity

Months	Sales Figure	Forecast Quantity
April	2680,791457	1
Mai	2678,110665	1
June	2675,432554	1

Source: Prepared by the researchers based on Eviews10

Table (4) :Souad's Sales forecast quantity

Months	Sales Figure	Forecast Quantity
April	33193 ,7886	23
Mai	21678,1106	15
June	12675,4325	9

Source: Prepared by the researchers based on Eviews10

Table (5) :Lala siti's Sales forecast quantity

Months	Sales Figure	Forecast Quantity
Mai	5747,01138	5
June	14786,072	13
July	3134,73578	3

Source: Prepared by the researchers based on Eviews10

Table (6) :Tagrart's Sales forecast quantity

Months	Sales Figure	Forecast Quantity
April	2680,791457	1
Mai	2678,110665	1
June	2675,432554	1

Source: Prepared by the researchers based on Eviews10

Table(7) :Traras's Sales forecast quantity

Months	Sales Figure	Forecast Quantity
Mai	2683,474932	4
June	2680,791457	4
July	2678,110665	4

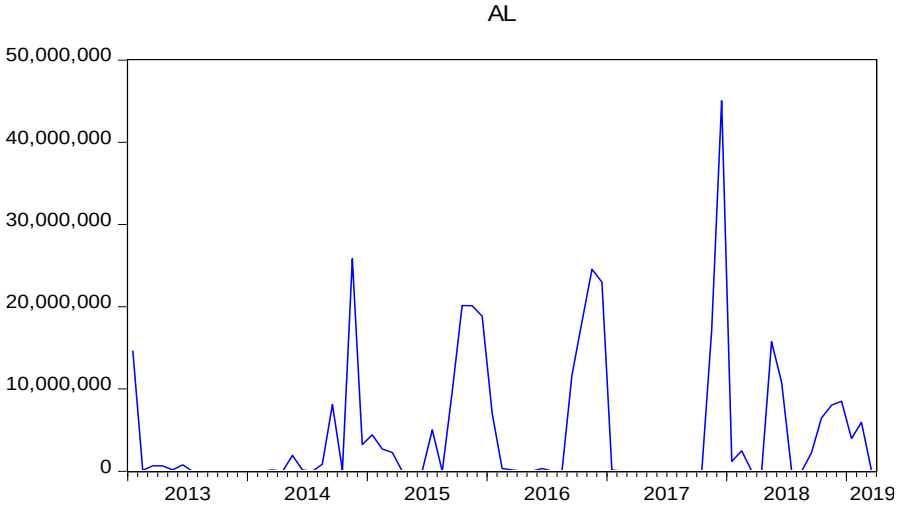
Source: Prepared by the researchers based on Eviews10

Table(8) :Traras Babies's Sales forecast quantity

Months	Sales Figure	Forecast Quantity
Mai	21726,13764	8
June	21704,4115	8
July	21682,70709	8

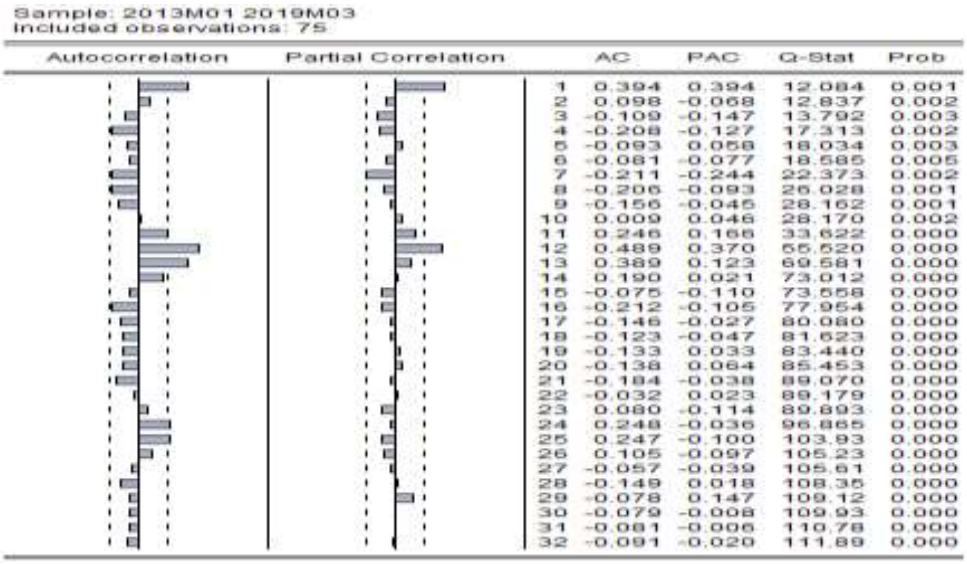
Source: Prepared by the researchers based on Eviews10

Figure(1) : Monthly Sales Curve for Al-Alia's Sales



Source: Prepared by the researchers based on Eviews10

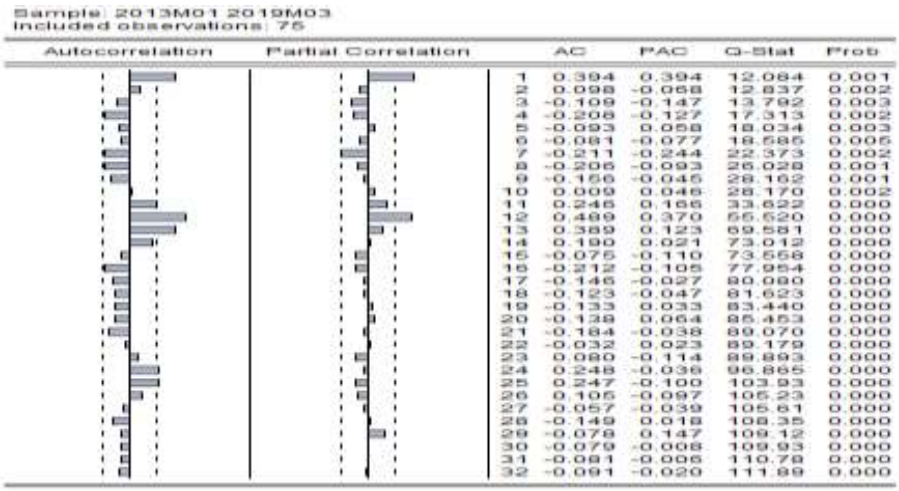
Figure(2) : The graph of the autocorrelation function of Al-Alia's sales series


Sample: 2013M01 2019M03
Included observations: 75

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.394	0.394	12.084	0.001
		2	0.098	-0.068	12.837	0.002
		3	-0.109	-0.147	13.792	0.003
		4	-0.208	-0.127	17.313	0.002
		5	-0.093	0.058	18.034	0.003
		6	-0.081	-0.077	18.585	0.005
		7	-0.211	-0.244	22.373	0.002
		8	-0.206	-0.093	26.028	0.001
		9	-0.156	-0.045	28.162	0.001
		10	0.009	0.046	28.170	0.002
		11	0.246	0.166	33.622	0.000
		12	0.489	0.370	55.620	0.000
		13	0.389	0.123	69.581	0.000
		14	0.190	0.021	73.012	0.000
		15	-0.075	-0.110	73.558	0.000
		16	-0.212	-0.105	77.954	0.000
		17	-0.146	-0.027	80.080	0.000
		18	-0.123	-0.047	81.623	0.000
		19	-0.133	0.033	83.440	0.000
		20	-0.138	0.064	85.453	0.000
		21	-0.184	-0.038	89.070	0.000
		22	-0.032	0.023	89.179	0.000
		23	0.080	-0.114	89.893	0.000
		24	0.248	-0.036	96.865	0.000
		25	0.247	-0.100	103.93	0.000
		26	0.105	-0.097	105.23	0.000
		27	-0.057	-0.039	105.61	0.000
		28	-0.149	0.018	108.35	0.000
		29	-0.078	0.147	109.12	0.000
		30	-0.079	-0.008	109.93	0.000
		31	-0.081	-0.006	110.78	0.000
		32	-0.091	-0.020	111.89	0.000

Source: Prepared by the researchers based on Eviews10

Figure(3) : Autocorrelation statement for the first differences in the Al-Alia's sales chain


Sample: 2013M01 2019M03
Included observations: 75

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.394	0.394	12.084	0.001
		2	0.098	-0.068	12.837	0.002
		3	-0.109	-0.147	13.792	0.003
		4	-0.208	-0.127	17.313	0.002
		5	-0.093	0.058	18.034	0.003
		6	-0.081	-0.077	18.585	0.005
		7	-0.211	-0.244	22.373	0.002
		8	-0.206	-0.093	26.028	0.001
		9	-0.156	-0.045	28.162	0.001
		10	0.009	0.046	28.170	0.002
		11	0.246	0.166	33.622	0.000
		12	0.489	0.370	55.620	0.000
		13	0.389	0.123	69.581	0.000
		14	0.190	0.021	73.012	0.000
		15	-0.075	-0.110	73.558	0.000
		16	-0.212	-0.105	77.954	0.000
		17	-0.146	-0.027	80.080	0.000
		18	-0.123	-0.047	81.623	0.000
		19	-0.133	0.033	83.440	0.000
		20	-0.138	0.064	85.453	0.000
		21	-0.184	-0.038	89.070	0.000
		22	-0.032	0.023	89.179	0.000
		23	0.080	-0.114	89.893	0.000
		24	0.248	-0.036	96.865	0.000
		25	0.247	-0.100	103.93	0.000
		26	0.105	-0.097	105.23	0.000
		27	-0.057	-0.039	105.61	0.000
		28	-0.149	0.018	108.35	0.000
		29	-0.078	0.147	109.12	0.000
		30	-0.079	-0.008	109.93	0.000
		31	-0.081	-0.006	110.78	0.000
		32	-0.091	-0.020	111.89	0.000

Source: Prepared by the researchers based on Eviews10

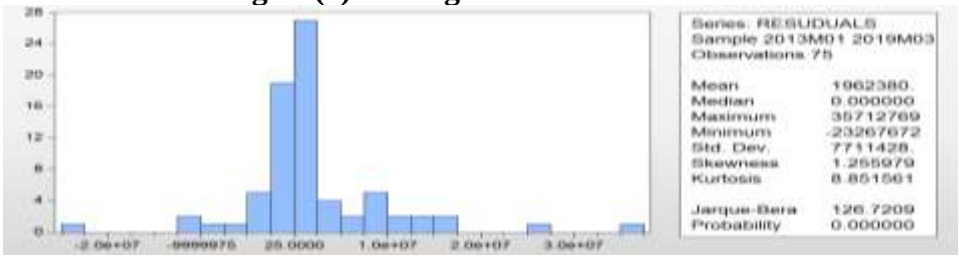
Figure(4) : Residuals autocorrelation

Sample: 2013M01 2019M03
Included observations: 75

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.072	-0.072	0.4024	0.526
		2	-0.030	-0.035	0.4725	0.790
		3	-0.093	-0.094	1.1081	0.775
		4	-0.182	-0.200	3.8169	0.431
		5	0.045	0.006	3.9867	0.551
		6	0.077	0.060	4.4797	0.612
		7	-0.133	-0.165	5.9747	0.543
		8	-0.072	-0.135	6.4178	0.601
		9	-0.101	-0.117	7.3137	0.604
		10	-0.037	-0.084	7.4338	0.684
		11	0.055	-0.061	7.7100	0.739
		12	0.349	0.313	19.809	0.093
		13	0.167	0.261	21.412	0.066
		14	0.097	0.208	22.298	0.073
		15	-0.079	0.074	22.892	0.086
		16	-0.199	-0.070	26.783	0.044
		17	-0.008	-0.032	26.790	0.061
		18	-0.002	-0.077	26.791	0.083
		19	-0.030	-0.031	26.882	0.107
		20	-0.022	0.032	26.932	0.137
		21	-0.153	-0.019	29.421	0.104
		22	-0.045	-0.007	29.640	0.127
		23	0.021	-0.060	29.685	0.159
		24	0.179	-0.018	32.943	0.105
		25	0.169	-0.047	35.855	0.074
		26	0.044	-0.110	36.079	0.090
		27	-0.039	-0.076	36.262	0.110
		28	-0.138	-0.077	38.615	0.087
		29	0.026	0.090	38.701	0.108
		30	-0.032	0.026	38.833	0.130
		31	-0.005	0.035	38.839	0.157
		32	-0.058	-0.038	39.290	0.176

Source: Prepared by the researchers based on Eviews10

Figure(5): Histogram of the residuals



Source: Prepared by the researchers based on Eviews10