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BENI SAF CEMENT COMPANY'S SALES FORECAST FROM 2019 TO 2025

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ABSTRACT:
Sales forecasting is among the most important processes on which a successful strategic planning relay in any economic institutions. For the company to reach positive results, it is important to choose an effective scientific method. This is what we addressed in this research by applying the Box–Jenkins method to forecast Beni saf Cement Company's sales. To achieve the aims of the study, the researchers used real data obtained from January 2019 to December 2024, the data collected revealed the amount of sales' forecast for the first semester of the year 2025.

Keywords: Economic Forecasting, forecast, Sales chain,

I. INTRODUCTION

Sales' forecast is among the scientific methods that proved its efficiency through the results obtained in the economic field, it plays an essential and decisive role in taking the appropriate decisions and reduce damages that the company can face in the future. The purpose of the current research lies in formulating a scientific method that the economic institution can adopt to ameliorate the commercial performance like market research, the future sales' values forecast, it also makes the modern methods for forecast available to the company and emphasizing these methods for accurately assessing the future growth of sales volumes; as well as defining the role of forecasting in the institution's future decision-making process.

Despite the importance of sales' forecast has on the company, we noticed that the sample of the study "Beni Saf Cement Company" still uses traditional and simple methods in promoting its sales. The latter should adopt modern and precise methods to plan for its sales and reach a higher stage of efficiency.

Our study adopts both the descriptive survey and the deductive approach through using general concepts related to planning and sales forecasting and methods employed from

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one side, and from the other side, we have implemented the statistical techniques and apply it to the data of the institution (our sample) in order to obtain empirical results.

In light of the above, the article addresses the problematic focused on the feasibility of cement sales forecasting for the period 2019–2025 at Beni Saf Cement Company and identifying the most appropriate method for achieving accurate forecasts. The study also emphasizes the importance of sales forecasting in promoting sales volume growth within the company.

The main objective of this research is to forecast sales in order to assess the real amount of sales' development in the future within Cement Company at Beni Saf.

In the economic field, forecast has received much attention and thorough studies have been conducted due to the complexity of economic context in the modern era. In addition to the difficulty to manage the huge economic companies from administrative side in relation to its business and from the economic side related to the diversity of its products.

1.1 Definition of Forecast:

We find a variety of definitions of forecast, we will mention some of them:

- Forecasting is defined as "presenting a future value in the present by using historical observations after studying their past behavior" (Mouloud Hachman, 1998, p. 177).
- Salvatore (1993) defines forecasting as *"The estimation of the value of the dependent variable based on the actual or predicted values of the independent variable."(p. 192).*
- Another definition suggested by Nader Ayoub (1993) which considers forecasting as: *"Planning and formulating assumptions about future events through the use of specific techniques over different time periods; therefore, it is the process on which managers or decision-makers rely to develop assumptions about future conditions." (1993, p. 177).*
- In addition to the above-mentioned definitions, Abd El Kader Muhamed Atiya suggests that forecast is the process a process of estimating the future development of the values of economic phenomena based on the current situation and on the factors influencing the evolution of those phenomena and economic indicators at a specific point in time or over a longer period. (2000, p.509).

Overall, we can say that forecasting is a quantitative estimation of the expected values of dependent variables in the near future based on the information available to us about the past and the present. We can therefore state that forecasting is the process of anticipating or predicting the occurrence of a future event based on data and information available at the present time or from the past.

1.2 Types of Forecasting:

1.2.1 A Value Forecasting: It is the forecasting of a single value for the dependent variable in the forecast year or in each upcoming period that is, providing one expected value for the dependent variable.

1.2.2 Interval or Field Forecasting: It consists of forecasting a specific range within which we have the value of the dependent variable whether with a given probability, by determining an upper limit and a lower limit between which the estimated value may lie.

1.3 Stages of Forecasting: there are different steps required for the forecasting process to be carried out, which are as follows:

- **Step one:** Determine the aim of forecasting
- **Step two**: Collecting the necessary data related to the phenomenon to be forecasted.
- **Step three**: Analyzing and selecting the data for use in the forecasting process.
- **Step four:** Choosing the appropriate forecasting model for the phenomenon under study.
- **Step five:** Making the appropriate decision.

1.4 Sales Forecasting

Planning and management processes are considered an essential part of the success of an organization's activities. In this context, estimated budgets for production and sales are prepared so that the organization can operate and produce. Therefore, we can consider sales forecasting as a key element in determining the future of production activities. For this reason, in this section, we will address the fundamental concepts of sales forecasting through definitions, characteristics, and methods.

1.4.1 Short-term Forecasting

This type of forecasting is carried out over short time periods and is characterized by being more accurate than long-term forecasting due to the shorter period it covers and the abundance of information available for forecasting.

1.4.2 Long-term Forecasting

Long-term forecasting usually covers long periods (more than five years) and examines the long-term effects happening due to certain factors. Such forecasts are important for the organization because they are used to determine the level of capitals (funds) transfer and to identify the optimal approach that allows the achievement of objectives based on the organization's circumstances. It is also considered a key element in guiding the organization's strategic decisions.

1.5 Characteristics and Requirements of Sales Forecasting

1.5.1 Characteristics OF Forecasting

For sales forecasting to be accurate and scientific, the following characteristics must be considered (Mohamed Ali Farkous, 1994, pp. 32–33).

- Availability of the necessary information and data to carry out the forecasting process.
- Availability of administrative staff to carry out the forecasting process.
- Abundance of information regarding the use of statistical methods and understanding their indicators.
- Accuracy of the assumed relationships between the factors affecting sales volume.

1.5.2 Forecasting Requirements

- Paying attention to the historical information about the company's sales and records.
- Identifying the factors that affected the organization's sales volume in the past.
- Carefully analyze the current competition and predicting its responses
- Studying the demand for the product and its price flexibility, as well as the extent of the impact of promotion on it.

The factors affecting sales forecasting can be classified into external and internal factors. External factors are those that the company cannot directly control, while internal factors are those that the company can control or directly influence.

1.6 Procedure of Sales Forecasting

The sales forecasting process extends across several stages (Kadri, 2010–2011, p. 118):

1.6.1 Study of the General Environment

This stage is of paramount importance, as it involves examining the effects of economic factors on the market, including purchasing power during periods of recession and expansion, changes in the income of individuals and institutions, and challenges related to unemployment. This analysis requires reference to various local and national studies addressing price developments and levels of supply and demand, in order to ensure accurate forecasting of market behavior and purchasing trends.

1.6.2 Estimating the Level of Established Markets

The level of activity in the sector in which the organization operates is assessed at this stage. This involves an in-depth analysis of the available data and information, including inputs from external sources such as specialized newspapers and expert opinions. This assessment is then compared with previous studies and estimates; if significant changes are identified, plans and strategies are adjusted accordingly to align with the new situation.

Sales Estimation According to the Product

At this stage, analytical methods are adopted to forecast future sales levels based on historical data and current environmental factors. The factors influencing sales trends are analyzed, and forecasts are adjusted in accordance with expected changes in the market.

1.6.3 Evaluation of Sales Balance

This stage consists of making the necessary adjustments to the initial forecasts based on new factors and market developments. It includes estimating the expected quantities and evaluating prices in light of the new conditions, while taking into account changes in inflation, market conditions, and the needs of the company.

II. AN APPLIED STUDY OF THE BOX-JENKINS METHOD FOR FORECASTING CEMENT SALES

The topic of our study in this paper is sales forecasting for the cement product of the Beni Saf Cement Company. To achieve this, it was necessary to collect data on the monthly sales of cement (measured in tons) for the years 2018, 2020, 2022, and 2024, in order to use

the first months of the year 2025 as a basis for comparing the forecasted sales with the actual sales of the unit.

2.1 Data Collection

Table 01: Cement Sales for the Period 2018–2024 /Unit: ton

Month	2018	Year 2020	Year 2022	Year 2024
January	72 617,76	40 378,95	34078,50	36 747,14
February	65 874,89	40 378,95	34 078,50	39 926,99
March	75 116,73	44 653,20	35 284,37	42 802,70
April	69 717,80	35 005,22	19 534,01	24 371,63
May	63 273,05	29 751,56	30 458,57	38 200,11
June	52 197,15	38 840,86	33 034,35	16 328,12
July	62 928,72	38 840,86	33 034,35	19 865,88
August	49 476,03	34 18734	32 262,02	30 983,60
September	62 431,92	34 662,33	33 960,78	30 147,48
October	74 688,39	36 682,69	40 195,11	38 052,15
November	51 026,75	33 185,51	38 152,29	37 286,43
December	30 443,21	34 805,61	38 123,58	37 340,43

Source: Sales Department, Beni Saf Cement Company

In this section, we will collect data on the monthly cement sales from 2019 to the end of 2024, and then analyze this data. The following table shows the monthly cement sales of Beni Saf Cement Company during the aforementioned period.

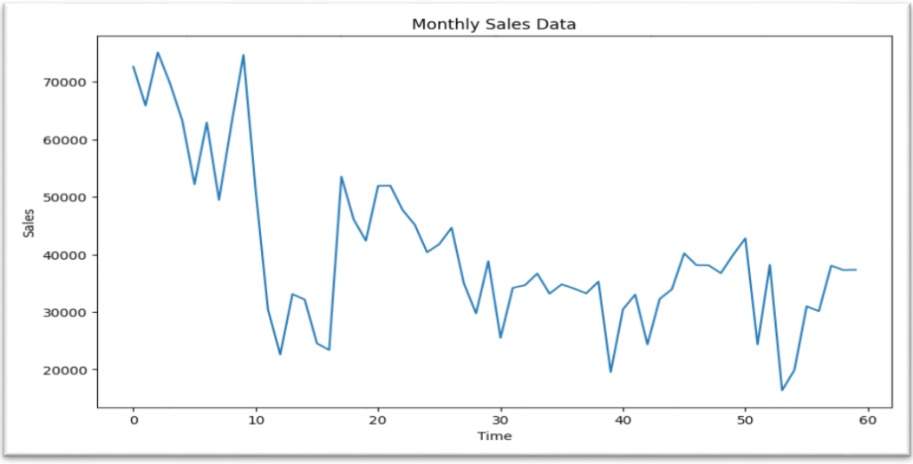
Description of the Time Series Data of Cement Sales

The data in Table No. (01) is a monthly time series consisting of 60 observations and represents the actual monthly cement sales in tons for Beni Saf Cement Company for its various products (5.32 and 5.42). These data were obtained from the company's commercial department for the years 2020, 2022, and 2024, the total sales are estimated at 43,373.13 tons. The minimum value of 12,823.16 tons was recorded in June 2024, while the maximum value of 73,611.75 tons was recorded in March 2018.

Graphical Representation of the Time Series Data of Cement Sales

The previous sales time series is graphically represented in order to identify its main characteristics. As observed in Figure No. (01), the time series of cement sales for Beni Saf Cement Company from 2018 to 2024 shows a downward trend in sales until mid-2020, followed by relative stability with minor fluctuations between 20,000 and 40,000 units. Additionally, there is a slight increase in late 2022 and early 2024. The data show a seasonal pattern with noticeable seasonal lows and highs, along with irregular fluctuations resulting from external factors.

Figure 01: Graphical representation of cement sales according to the data in

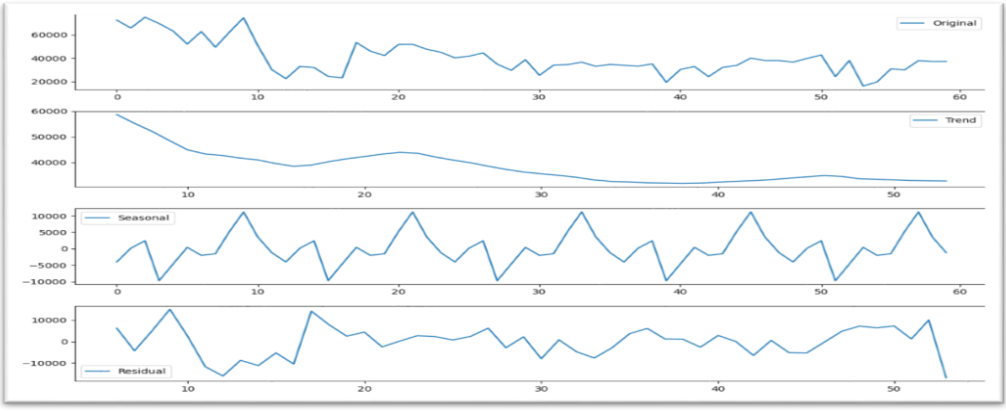


Source: Python outputs

2.2 Checking the Stability of the Time Series

We will attempt to study of the presence of the trend component and the seasonal component. At this stage, we will examine the presence of the trend component and the seasonal component, and remove them if they exist, in order to study the stability of the time series.

Figure 02: Test of the Trend Component and the Seasonal Component



Source: Python outputs

2.2.1 General Trend

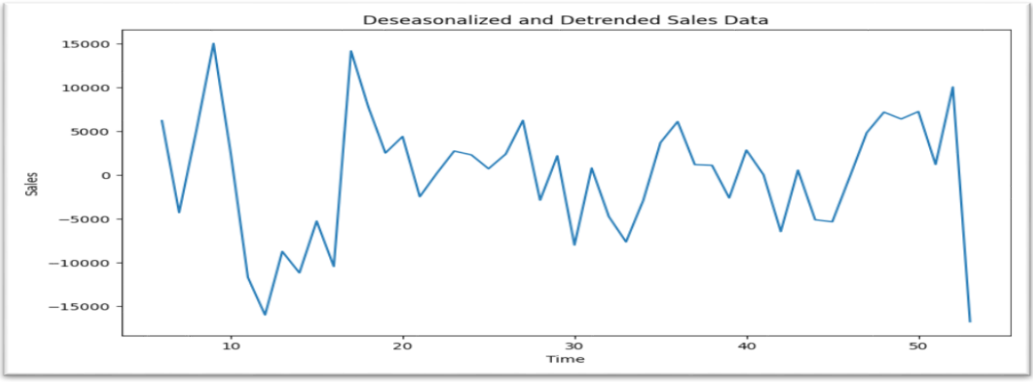
The graph illustrates the general trend of cement sales over the studied period. The trend shows a clear decline at the beginning, with sales gradually decreasing until approximately the middle of the period. After this point, sales appear to stabilize at a certain level without significant changes. This pattern indicates that economic or market factors may have initially had a negative impact on sales, causing the decline, followed by relative stabilization, possibly due to corrective interventions or improvements in market conditions.

2.2.2 Seasonal Component

The seasonal component in the graph reflects the presence of regular periodic fluctuations throughout the year. These fluctuations show a recurring pattern that can be easily identified, with sales rising and falling in a fairly regular cycle over fixed time intervals. This pattern indicates the influence of seasonal factors on sales, such as climatic changes, seasons, and annual holidays, which affect construction activity and, consequently, cement sales.

Now that we have concluded that the cement sales time series has a decreasing trend with a seasonal component, it is necessary to remove these two components. The following figure represents the stage of removing both the seasonal component and the trend component.

Figure 03: Graph of Sales Without the Trend Component and Without the Seasonal Component



Source: Python outputs

The graph illustrates the monthly cement sales time series after removing the seasonal component and the trend component. We can now say that, after removing the seasonal and trend components, the time series appears relatively stable with random fluctuations. To confirm this, we proceed with the Dickey-Fuller test.

2.2.3 Dickey-Fuller Test (ADF)

In time series analysis, the **Augmented Dickey-Fuller (ADF) test** is used to check whether a time series is **stationary** or has a **unit root** (i.e., non-stationary). A stationary series

has a constant mean, variance, and autocorrelation over time, which is important for accurate modeling and forecasting.

Table 02: Dickey–Fuller Test

ADF Statistique	**-4.57 6650**
p-value	**0.000143**

Source: Prepared by the researchers based on Python outputs

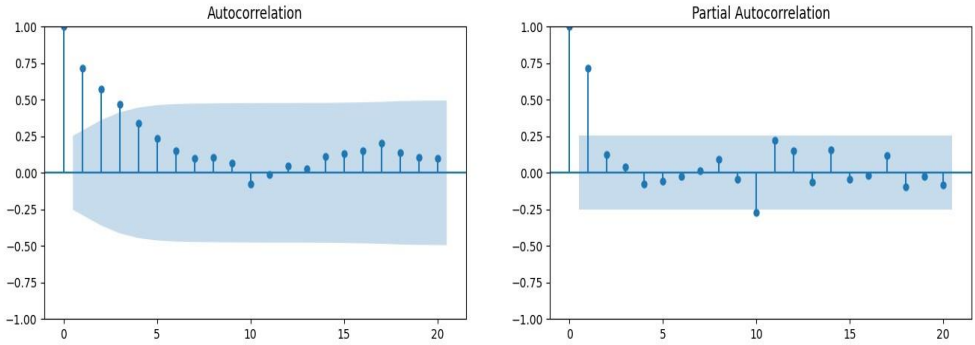
The p-value is 0.000143, which is much lower than the commonly used significance level of 0.05. This means that we reject the null hypothesis stating that the time series is non-stationary. In other words, this p-value supports the alternative hypothesis that the time series is stationary.

Based on the results of the Dickey–Fuller test, we can conclude that the monthly cement sales time series becomes stationary after removing the seasonal and trend components. This indicates that forecasting models such as the ARIMA model can be applied to this data to obtain accurate future forecasts.

2.3 Diagnosis of the Appropriate Forecasting Model

We determine the steps of the ARIMA model using the autocorrelation function (ACF) and the partial autocorrelation function (PACF), as shown in Figure (04). The lag period is set to k=20k = 20k=20 in order to clearly identify the model parameters

Figure 04: Autocorrelation Function (ACF) and Partial Autocorrelation Function (PACF)



Source: Python outputs

From Figure (04), several suitable models can be proposed to represent the behavior of the time series, including ARIMA (0,0,1), ARIMA (0,0,3), and ARIMA (1,1,0). To

compare these models and others, the Akaike Information Criterion (AIC) is used, where the best model is the one with the lowest value of this criterion. Since the Python program tests multiple models, we rely on the results of this test, which are presented as follows:

Table 03: Selection of the appropriate forecasting model

Best ARIMA Order: (3, 1, 3)

SARIMAX Results

Dep. Variable:	Quantités Vendues	No. Observations:	60
Model:	ARIMA(3, 1, 3)	Log Likelihood	-616.146
Date:	Sun, 19 May 2024	AIC	1246.291
Time:	23:03:31	BIC	1260.834
Sample:	0	HQIC	1251.968
	- 60		
Covariance Type:	opg		

Source: Python outputs

From the table above, we note that the program selected the ARIMA (3, 1, 3) model based on the AIC criterion, as it selected the lowest value among all possible models.

2.3.1 Normality Test

Table 04: Normality Test

	coef	std err	z	P>|z|	[0.025	0.975]
ar.L1	-0.3329	0.074	-4.480	0.000	-0.479	-0.187
ar.L2	-0.1127	0.085	-1.324	0.186	-0.280	0.054
ar.L3	0.7645	0.066	11.571	0.000	0.635	0.894
ma.L1	0.0766	5.634	0.014	0.989	-10.965	11.119
ma.L2	-0.0776	5.642	-0.014	0.989	-11.136	10.981
ma.L3	-0.9989	0.130	-7.681	0.000	-1.254	-0.744
sigma2	4.999e+07	2.34e-07	2.14e+14	0.000	5e+07	5e+07

Ljung-Box (L1) (Q):	0.29	Jarque-Bera (JB):	2.66
Prob(Q):	0.59	Prob(JB):	0.26
Heteroskedasticity (H):	0.36	Skew:	-0.21
Prob(H) (two-sided):	0.03	Kurtosis:	3.95

Source: Python outputs

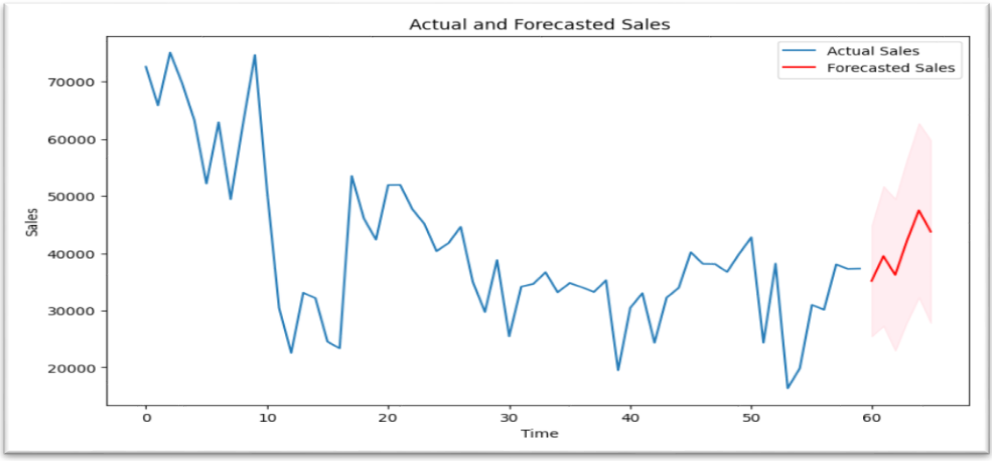
The results of the ARIMA model analysis indicate that the model is well-suited to the studied data.

The Jarque–Bera (JB) test gave a p-value of 0.26, indicating that we do not reject the null hypothesis that the residuals follow a normal distribution. This is a positive indicator that the model fits the data well. Furthermore, the skew coefficient was -0.21, suggesting that the distribution is close to symmetry, which is desirable as symmetry enhances the reliability of forecasts. The kurtosis coefficient was 3.95, which is close to the expected value of 3 for a normal distribution, indicating that the distribution is not abnormally peaked. Based on these tests, we can conclude that the studied model shows good characteristics in terms of the normality of residuals, which strengthens confidence in the accuracy of forecasts derived from this model.

2.3.2 Forecasting the Monthly Sales of Cement

After confirming the validity of the model, we generate future values for a six-month period. Before that, we present the current values, followed by the forecasted values

Figure 05: Graph Of Actual And Forecasted Sales



Source: Python outputs

This graph represents the real sales values (in blue) versus the forecasted values (in red) using the ARIMA model. The graph shows that the forecasted values closely follow the general trend of the actual values, indicating that the ARIMA model is able to capture the main patterns in the data.

Finally, we conclude that, overall, the model demonstrated good performance in forecasting future values, as it follows the general trends of the time series. Although some gaps exist, the forecasted values are reasonably close to the real values.

We now present the forecasted monthly cement sales values for Beni Saf Cement Company for the period from January 2025 to June 2025, with the aim of comparing them with the real values achieved by the company during this period

Table 05: Sales of Cement Forecasted for the Period from January 2025 to June 2025

Months	Actual Values	Forecasted Values
January 2025	36432.22	35157.178631
February 2025	38694.68	39513.726795
March 2025	35113.89	36230.762927
April 2025	40443.11	42227.078385
May 2025	14.40445	47520.413018
June 2025	//	43784.367784

Source: Prepared by the student based on the obtained results

Based on the results obtained from the forecasting process using the Box–Jenkins method, we observe that the forecasted values are very reasonable when compared to the actual values for the year 2024. After comparing the forecasted values with the actual values obtained from the company, we observed that the overall error rate does not exceed 10%. This indicates that the model was well selected and demonstrates the effectiveness of the

Box–Jenkins method, as the results are close to reality. Therefore, we conclude that this method is effective for forecasting cement sales.

Results of the Study

Forecasting is considered one of the fundamental and essential processes within companies. The sales forecasting process begins with studying the nature of the market to determine the level of demand for goods and services. This requires collecting data from market on the variables that influence demand on sales. Subsequently, these data are analyzed in order to obtain indicators that are used in the forecasting process.

To carry out the forecasting process, there are several statistical methods based on time series models, among which the Box–Jenkins method is considered one of the most important. Using this method, we studied the time series of cement sales for Beni Saf Cement Company and obtained forecasted values for the first half of 2025, which were found to be close to the real values. Through this research, we demonstrated that market analysis is a crucial process in planning for economic institutions, as it helps in designing an effective marketing strategy to gain the largest possible market share. In addition, past sales constitute time series composed of several components, which, after being studied and analyzed, allow us to reach reliable forecasted results.

Regarding the study itself, it demonstrated the effectiveness of the Box–Jenkins method for sales forecasting, as the forecasted values closely matched the real values. This was achieved through the application of four main stages: the model identification stage, the estimation stage, the diagnostic checking stage, and the forecasting stage.

By addressing the key aspects of the topic and its various stages, the main results obtained can be briefly summarized as follows:

1- The market consists of a range the elements that influence the sales of a product or the provision of services in general on the activities of an organization. Therefore, the consumer's purchasing decision is affected by the environment (legal, technological, cultural, and economic), as well as by producers and distributors.

2- The purpose of market research is to identify the available opportunities and potential risks facing the organization. Sales forecasting involves estimating the quantity or value of sales that can be achieved for a specific product in a particular market. One of the most widely used scientific methods for this purpose is the Box–Jenkins method, which proceeds through the following stages: model identification, parameter estimation, diagnostic checking, and forecasting. This is carried out over a specific period under a defined marketing plan.

3- Studying and analyzing sales is essential for developing an effective marketing strategy. It also helps establish a sales policy that enables management to assess the efficiency of its resources in achieving set objectives. This can only be accomplished by implementing managerial principles, rules, and techniques, as well as maintaining an advanced information system that provides decision-makers with data about the near, medium, and long-term future. Among these managerial techniques that assist an organization in efficiently managing its resources and achieving strategic planning is the establishment of a forecasting system.

The empirical study conducted at Beni Saf Cement Company showed the following:

1- The company does not rely on scientific methods in the forecasting process, but rather limits itself to simple approaches based on intuitive judgment and the experience of the person responsible for preparing the forecast.
2- The forecasting department prepares estimates without coordination or cooperation with marketing staff, who are considered experts in market changes. Based on the results obtained, we put forward some suggestions to the decision-makers within the company so that they may take the necessary measures:
    - Establishing a sales forecasting department in cooperation with market and marketing experts.
    - Conducting periodic market research and studies
    - Making rational use of the available human and material resources.
    - Organizing training courses to enhance the expertise and professional competence of the company's employees.

REFERENCES

- ✓ **Mouloud**, H. (1998). *Short-term forecasting models*. National Office of University Publications.
- ✓ **Salvador**, D. (1993). *Statistics and econometrics* (2nd ed.). National Office of University Publications
- ✓ **Ayoub**, N. (1997). *Theory of administrative decisions*. Dar Ziran
- ✓ **Atiya**, A. M. (2000). *Econometrics*. Alexandria: Dar Al-Jami'a.
- ✓ **Kadri**, R. (2010/2011). *Sales forecasting methods and techniques: A case study of the National Aluminum Company "ALGAI"* (Master's thesis, Faculty of Economic Sciences and Management, University of Abu Bakr Belkaid, Tlemcen).
- ✓ **Abu Qahaf,** A. A. (2003). *Fundamentals of marketing*. New University Press, Alexandria.
- ✓ **Ahmed**, N. (1986). *Managerial accounting*. Dar Al-Nahda Al-Arabiya, Beirut.
- ✓ **Talaat**, A. A. H. (2000). *Effective sales management: How to manage your sales operations efficiently*. Dar Al-Drama Libraries & Co., Egypt.
- ✓ **Ruba'a,** A., & Dhiyab, F. (1997). *Sales management* (1st ed.). Dar Al-Safa, Jordan.
- ✓ **Farkous**, M. (1994). *Estimated budgets: An effective management tool*. National Office of University Publications, Algeria.