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SUPPLY CHAIN MANAGEMENT: CHOOSING A ROBUST DEMAND FORECASTING TECHNIQUE AND A POINT-OF-SALE APPLICATION

Jameel DAHO

MSc. Thesis

Supervisor

Tekelioğlu, Mehmet Gürel

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The thesis titled "SUPPLY CHAIN MANAGEMENT: CHOOSING A ROBUST DEMAND FORECASTING TECHNIQUE AND A POINT-OF-SALE APPLICATION'' prepared and presented by Jameel DAHO was accepted as a Master of Science thesis in Business Administration.

Asst.Prof. Mehmet Gürel Tekelioğlu

Supervisor

Thesis Defense Committee Members:

Ass.Prof.Dr. Mehmet Gürel Tekelioğlu	Department, University	Int. Logistic Management Altınbaş Universtiy
Asst.Prof.Dr. Arzu Girişken	Department, University	Business Department Altınbaş University
Ass.Prof.Dr. Gonca Reyhan Akkartal	Department, University	Logistic Management Istanbul Medipol University

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science

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Jameel Daho

Signature

DEDICATION

I would like to dedicate this study to my mother and father whom I love dearly. They have been understanding, patient and supportive. I also would like to thank to my supervisor Mehmet Gürel Tekelioğlu for his understanding and necessary advises.

ABSTRACT

SUPPLY CHAIN MANAGEMENT: CHOOSING A ROBUST DEMAND FORECASTING TECHNIQUE AND A POINT-OF-SALE APPLICATION

Daho, Jameel

M.Sc., Business Administration, Altınbaş University,
Supervisor: Asst. Prof. Mehmet Gürel TEKELİOĞLU

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An efficient and effective supply chain management is the topic of many studies in the literature. The most common performance tool efficiency and productivity measured is the level of waste in integrated supply chains for most sectors. Retail sector is one of these sectors. Products with the cheaper prices become more attractive because of the increases on price and decreasing purchasing power. Therefore, the retail sector needs to know the profile and the needs of the customers in order to ensure customer satisfaction with the goods and services they offer to the public. It leads to a waste of product if the supply is more than demand. On the other hand, producing less products than demand leads to customer dissatisfaction. Thus, it is very important to produce right amount of product by supply chain partners. The aim of this thesis is to forecast daily demand of a folk-bread point of sale with different demand forecasting methods and to determine a robust forecasting technique for the supply chain since folk bread is such a commodity that is very attractive to many people. The contribution of the study is to fill the gap about demand forecasting for folk bread. The other contribution is that the study is an example for local managers about demand forecasting for different commodities.

Keywords: Supply Chain Management, Demand Forecasting, Customer Satisfaction, Inventory Management.

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ABBREVIATIONS

SCM : Supply Chain Management

ES : Exponential Smoothing

MA : Moving Average

IT : Information Technology

ARMA : Autoregressive Moving Average

MAD : Mean Absolute Deviation

1. INTRODUCTION

In the last decade, the decline in purchasing power as a result of the experienced economic developments has led most people to buy the cheapest in order to meet their needs. Therefore, products with cheaper prices become more attractive. Especially in the convenience goods market, customers generally prefer to meet their needs from stores that sell cheaper, and higher quality products and they want that the stores locate closer to their residences. Thus, while meeting their needs, they also contribute to the family budget. One of the most important commodities in convenience is food in retail industry, which has a high purchase frequency.

According to the literature, the impact of the coronavirus pandemic on the food supply chain is examined by Barman et al. (2021). The pandemic affecting the whole world and people also effects the food supply chain. However, since food is one of our basic needs, the impact of this sector from the pandemic should be minimized. In their study, a food supply chain company whose activities were affected by the pandemic is examined. The purpose of the study is to discuss the impact of the coronavirus pandemic on the agriculture and food industry. At the same time, it aims to reveal the socioeconomic effects of this for different segments of the society. As a result of the study, a public distribution system is proposed. According to this, it includes cleanness of production facilities, health and safety of employees, changing working conditions, and proper pricing. It is also underlined that the market forecast is correct. For the future developments, they recommend expanding with different components of supply chains by adding numerical and statistical studies. In the study of Azhagan et al. (2020), the determinants of service quality for grocery stores are analyzed using the Servqual model. It should be known what the customers in the retail sector expect and perceive from the grocery stores. Service quality in this sector depends on how well customer requests are met. Considering the competitive environment, the most important strategy that separates retailers from each other is service quality. Measurement of this intangible indicator is difficult due to the presence of physical products in the sector. The purpose of this study is to evaluate the gap between the customer perceived service quality and the service quality offered by the retailer. In addition, it is measured with firms in India to find the factors affecting the organized and unorganized retail sector, to analyze the reliability, assurance, tangibility, empathy, and

responsiveness factors and how the services offered by the retailers affect the service quality. In addition, it is emphasized that the right product packaging and correct pricing are two important activity for companies in the sector. Moreover, they recommend that receipts should be given even for small purchases in order to create and sustain customer loyalty.

In order to survive, businesses should know how well the supply chain management is done and the areas where it is lacking. For this reason, Tyagi et al. (2014) develop a hybrid model using AHP and TOPSIS to measure supply chain performance. The aim of the study is to choose the best among the alternatives in the field of supply chain management in the Delhi region of India. There are 8 criteria and 5 alternatives in the study. The criteria included in the research are decrease customer response time, on time delivery, increase order information sharing, increase employee's skills, improve production efficiency, enhance transportation tool utilization, identify market innovative opportunities and expand accessibility of information. Alternatives used in the study are investment in web-based technologies, investment in advanced manufacturing technologies, role of top management, role of supplier and supply chain integration. It is noticed that the criteria improvement in production efficiency and on time delivery achieved higher priority weights 0.2203 and 0.1758, respectively, which gives an indication about their importance for effective supply chain management of an organization. According to the results of the alternatives, the study concludes that proper investment in web-based technologies and higher level of supply chain integration are the most crucial factors to improve the SCM performance of an organization.

Chen et al. (2019) analyzes the relationships between its suppliers for JD, one of the largest e-retailers in China. The deep survey method is used in the study, and as a result, it is revealed that the success of the supplier companies is due to the good overall supply chain management, integration and coordination. Main enabling variables are financial technology and bargaining power, which affect the iterative process of supply chain finance adoption. Improving financial technology affects capitalization and digitization, while bargaining power affects product development. JD also develops supply chain finance products to control the necessary processes with its suppliers and customers and to support its suppliers. This study examines how JD provides a competitive advantage by using information technologies. The most important feature underlined in this success is the resource-based view. This view considers not only the resources available, but also the new resources that will be needed. It creates new sources, new products, new

customers, and new databases. The continuity of this cycle provides a competitive advantage for companies in the supply chain and especially for the company in the JD position. The features that give JD a competitive advantage is not only being its own customer and database, but also having the resources to create its own payment system. Another important feature that provides JD's competitive advantage in the study is the cooperation with the suppliers. However, one of the limitations of the study is the lack of generalizability. The study may give different results for companies of different sizes and different characteristics. In addition, this study is carried out for a private profit-making company, the same work should be done for non-profit (local administrators and public institutions, etc.) organizations.

Food waste is a sustainability problem that must be solved urgently until 2030 as the United Nations Reports examined. Although it has been studied extensively by researchers in the literature due to its environmental, economic, and social effects, very few studies have investigated the main causes of food waste and waste reduction practices. For this reason, Moraes et al. (2019) systematically reveals the causes of food waste and its reduction practices. Ishikawa diagrams are created using Qualitative Data Analysis by analyzing content in 54 articles they reviewed. In this created diagram, 34 reasons for food-waste and 32 waste reduction practices emerged. Causes include lack of information sharing, lack of operational control, lack of coordination, and storage-related problems, while collaboration, better IT systems, better packaging and waste-reduction oriented operations systems are some of the food-waste reduction practices. The most important information emerging as a result of the research is that food waste is carried out by different institutions and organizations. In addition, individual waste also takes an important place. The best way to reduce this waste is possible with the coordination of all agents (such as individual consumption, collective consumption at home, workplace, NGO's). The contribution of the research to the literature is the systematic diagram in which the reasons and waste reduction practices are combined with different agents and the relationships between them are explained. The two limitations of the study are that it is being theoretical study and it is only made according to the relations in the retail sector.

On the other hand, for another performance evaluation study, the literature study that compiles the studies of Buendina et al. (2021) on lean supply chain management and its effect on performance can be cited. The results of their analysis have allowed us to see the deficiency in other studies on this subject so far. The study shows examples to both academics and practitioners by filling the

gap in the results of lean supply chain management and the interrelationships of performance in the literature. The study also reveals that organizations that adopt lean principles in supply chain management will positively contribute to their performance. However, in the systematic literature review conducted as the limitations of the study, it is shown that only studies in the English language are included and the issue of sustainability is not addressed. However, it has is explained that these restrictions are essential for a successful literature research.

Finally, one of the issues that continue to be studied in the field of supply chain is sustainable closed loop network design. The work of Tao et al. (2020) focuses on mathematical model design for sustainable closed loop network design under demand uncertainty. In the study, demand uncertainty and carbon emission decisions are modeled with a two-stage stochastic model and solved with an L-shaped algorithm based on the branch bound algorithm. With the required numerical tests and sensitivity analysis, the environmental impact of the closed loop supply chain is minimized while dealing with demand uncertainty.

Consistent with the literature we understand and state meeting the demands of the customers without capacity planning and inventory control results in waste. To be able to control the inventory and plan the capacity integrated supply chain management is a necessity. The first step of having a good supply chain is to have a robust demand forecasting mechanism. For the retail industry, we need a robust forecasting demand mechanism for commodities to be able to decrease the waste accumulated in the supply chain. One of the most important commodities in convenience is bread, which is a consumption item with high purchase frequency. Bread production is a fundamental issue that is concerned by the general public. In this respect, it is important that hygienic (healthy, sanitary), quality and cheap production become the standards in bread production.

Local governments are non-profit organizations in their activities. Except for infrastructure services, local governments offer some basic needs to the market without profit, at a quality and affordable price, thus creating a balance by preventing excessive price increases in the market. In this context, bread, which is the most important food item, is produced by local governments under the name of “folk-bread” and offered to the public. The phenomenon of folk bread expands rapidly in recent years because of the price increases. Local governments in Turkey are interested in the production of folk-bread day by day. Especially big cities such as Istanbul and Ankara and Izmir, the public bakery establishments make cheap, high quality and hygienic large-volume production

by using the latest technologies in bread production.

Public bakeries differ significantly from other bread production establishments in terms of customer, product, and product variety. It is known that the customer base of these businesses is generally composed of low-income consumers. However, local governments need to know the profile and the needs of the customers in order to ensure customer satisfaction with the goods and services they offer to the public. It is important for bakeries to know the profile, purchasing preferences and consumption habits of their customers. Especially they should know the daily bread demand of the customers.

According to the 2017 report of the Turkish Grain Board and the data of the Turkish Bread Producers Federation 2017; 123 million bread is produced per day, an average of 332 grams of bread per person is consumed per day, accordingly, 121 kg of bread per year is consumed by each individual in Turkey. 4.9% of the total bread produced is wasted, per capita bread waste is 20 grams per day. 2.5 million bread produced per day is wasted in the production process and every day more than 6 million of bread is wasted. It is reported that wasted bread caused the impoverishment of approximately $ 700 million each year. Turkey is third country in the top list of most food-waster countries (Turkish Waste Prevention Foundation, 2018).

1.1. THE AIM AND CONTRIBUTION OF THE STUDY

It leads to a waste of bread if a folk bread bakery offers more bread than demand. On the other hand, producing less bread than demand leads to customer dissatisfaction. As a result of the examinations of the administrators, the demand for folk-bread is uncertain because it depends not only on the population of the region but also on many other characteristics. It even shows serious variations between days in the same area. Thus, it is very important to produce right amount of bread by municipality bakeries. Therefore, the aim of this thesis is to forecast daily demand of a folk-bread point of sale with different demand forecasting methods. Although, there are lots of studies about demand forecasting in the literature, there is not any study about demand forecasting for a folk-bread bakery. The contribution of the study is to fill the gap about demand forecasting for folk bread. The other contribution is that the study is an example for local managers about demand forecasting for folk-bread.

1.2. THE SCOPE OF THE STUDY

This study includes five parts; introduction, literature review, methodology and its application with an illustrative example, results and discussion; and conclusion and recommendation.

In the literature review, demand forecasting and its importance will be defined firstly. After that, it will continue with the the brief definitions of different demand forecasting methods that are used in the other studies of literature. In addition, different distributions will be examined with their formulas. Random number generation methods will be included. Lastly, the waste of food in Turkey and the world is examined in the literature part of the thesis.

In the methodology part, last three years demand data of a folk-bread point of sale is examined first. Then, the proper distributions of past demand data are found for all days of the week with the Simulation program Arena. First demand forecasting for days is made by random number generations with Matlab Online 2020b. The other demand forecasts are made by using different demand forecasting methods. The demand forecasting methods that are used in this thesis are Moving- Average (MA) method, Exponential Smoothing method, and ARMA method.

The results of the illustrative data and its comment will be analyzed in the results and discussion part. Moreover, best demand forecast methods for all days are selected in this part with the help of indicators of the good demand forecasts.

At the end, conclusion and recommendation part will contain some critical points to give beneficial information for further studies.

2. LITERATURE REVIEW

2.1. SUPPLY CHAIN MANAGEMENT

In light of the turbulent and complex business environment, the strategic options for companies and business organizations are narrow and few, where competitiveness is high, and customers' desires and requirements are increasing. Therefore, companies must provide large organizational and administrative capabilities to provide the best products and services that provide a competitive advantage for these companies after a period of time. Supply Chain Management (SCM) is one of the most important departments that enable companies to increase their profitability and achieve success, as this department achieves integration between suppliers, customers, and all partners to achieve common goals.

The concept of supply chain management is one of the essential administrative concepts in the management of production and operations as well as logistics management, as the supply chain is defined as a network of organizations and processes linked to each other as these different organizations (suppliers, manufacturers, distributors, and retailers) cooperate along the entire value chain to obtain raw materials, To convert these raw materials into specified final products, and to deliver these final products to customers (Ivanov et al., 2017).

As for the supply chain management, it is defined according to Ho et al., (2002), as "a management philosophy that includes adding value to customers and stakeholders in the company through managing and integrating a set of operations and commercial activities to reach the end consumer through the original suppliers. This process provides products and services with the same a value to others through the cooperative efforts of members of the supply chain, and given the previous definition, supply chain management can be described as that department that can meet customers' requirements and desires through cooperation with all members of the supply chain.

As for Li (2007), he defines supply chain management as "a set of concurrent decisions and activities used to integrate suppliers, manufacturers, warehouses, transporters, retailers and customers efficiently so that the right product or service is distributed in the right quantities, the

right locations, the right prices and the right situation with the right information and at the right time to reduce System-wide costs while meeting customer service level requirements. This definition sees supply chain management as one of the activities that create competitive advantages for companies as providing products and services and adding the high value to customers creates a competitive advantage (Al-Hawajreh and Attiany, 2014).

Handfield (2020) believes that supply chain management can be defined as "that active management that maximizes customer value and achieves a sustainable competitive advantage through many activities from product development, identifying production sources and ending with logistical services, as well as using the information systems necessary to coordinate work." Throughout this definition, the researcher's focus is that supply chain management is closely related to all activities that create sustainable competitive advantage and customer satisfaction.

On the other hand, Romero (2018) defines SCM as a group of different companies and organizations that work in a coordinated and interdependent manner together to achieve maximum competitive advantage and consist of many members such as suppliers of raw materials, raw material processing and manufacturing, and retailers who sell the product. According to the previous definition, the final customers, supply chain management's success requires highly efficient coordination between all companies and organizations operating within a single supply chain to achieve sustainable competitive advantage.

From an organizational point of view, supply chain management is intended, according to Cox and Perkins, (2008) that is "the alignment of internal business processes to respond to the information received from the customer and supplier interface, and to provide accurate information to decision-makers, in order to coordinate the reliable and timely supply of goods and services to members. Supply Chain and notes from this concept his focus on the harmonization of operations and internal business activities lead to achieving competitive advantage through improved supply chain management.

According to Avilés-González et al. (2017), supply chain management is defined as "managing a network of relationships within a company and between affiliated organizations and business units consisting of suppliers of materials, procurement, production facilities, logistics, marketing, and related systems that facilitate flow". Front and back of materials, services, financing and

information from the first product to the end customer with the advantages of adding value, increasing profitability through efficiencies and achieving customer satisfaction.

From a strategic management point of view, supply chain management can be viewed as “the systematic and strategic coordination of routine business functions across business functions within a particular organization and across business within the supply chain, for the purposes of improving the long-term performance of individual firms and the supply chain as a whole” (Mentzer et al., 2001). It is noted from this definition that supply chain management from a strategic point of view through which the organization can achieve competitive advantage, profit and improve the organizational performance of the organization.

Through the previous definitions, this study has defined the supply chain management as "that department responsible for managing a network of relationships within the company and between interconnected organizations and business units consisting of all members of the supply chain with a high coordination between these organizations and this leads to creating value for customers and increasing their satisfaction."

The success of supply chain management requires the existence of infrastructure for organizations through which these organizations can achieve success and integration to achieve success in supply chain management Talib et al., (2015), where there are many engines, factors and elements that lead to building a robust supply chain that achieves the goals of the organization efficiently. Effectively, these drivers are called critical success factors in the application of supply chain management, which is defined as those factors, characteristics, or conditions that can have a significant impact on the company's success in a particular industry when it is adequately maintained or managed (Talib et al.2015). According to Talib and Hamed, (2014), the most important of these factors support for senior management, human resources, information technology, and cooperative partnership.

The support of top management is one of the most critical success factors in applying supply chain management, as the higher management develops strategic plans for the organization and draws general policies and the future direction of the organization. Therefore, higher management plays an exact role in managing supply chains and coordinating integration between departments within the organization and other organizations in the same supply chain. Therefore, having high levels of senior management support for supply chain management initiatives will enhance and improve

the implementation of supply chain management (Lee and Joo, 2020). However, human behavior may play a role in the relationship between supporting top management and implementing supply chain management, as the personal characteristics of managers may play a positive or negative role in this.

The success of supply chain management depends on employees' success and their interaction with each other within the organization. Therefore, human resources management plays a pivotal role in the success of implementing supply chain management, as human resource practices are directed towards the success of supply chain management by training employees and teaching them skills. New knowledge, motivating employees and rewarding them through fair and appropriate evaluation, as well as the organizational culture that is oriented towards workers and oriented towards quality which plays a pivotal role in the success of supply chain management (Netland, 2016).

Several studies and recent trends in supply chain management have emphasized the importance of cooperation and integration between all business units, which leads to improving supply chain capabilities towards flexibility and adaptation, reducing costs and maximizing profitability (Lengnick-Hall et al., 2013).

Information technology is one of the determinants and the essential factors in the success of any business organization, as information technology plays a vital role in improving the activities and tasks of the organization, thus reducing costs, reducing time-wasting, and improving the response to customers and the internal and external environments (Muhammedrisaevna et al., 2020). Many researchers such as Dehgani and Navimipour, (2019) study the impact of information technology on supply chain management, as these studies have shown that information technology has a positive effect on supply chain management, and since supply chain management deals with three types of flows, which are financial flows and Information and material flows (Yücesan, 2007). Information technology (IT) plays a fundamental role in improving the transfer of information between members of the supply chain, thus responding to the market's needs and desires and the main customers. This leads to creating a strong supply chain network that enables the organization and its partners to achieve profit and create a sustainable competitive advantage.

One of the essential features shown by social media and the information and communication revolution is the convergence of distances between people and the increase in cooperation through

the so-called cooperative economy (Laurell and Sandström, 2017), and since the participatory and cooperative has confirmed its positive effects at work through the Increasing organizational performance of companies (Shin et al., 2019) The collaborative partnership has a strong engine for the success of supply chain management and its fulfilment of the requirements desired by companies and organizations and thus achieving sustainable competitive advantages (Nelson, 2017). Participatory activities are defined as "that strategic process that aims to coordinate efforts and work in the business activity where organizational structures are aligned, communication channels are standardized, risk sharing and resources are also pooled in order to provide them to all members of the supply chain (Wankmüller and Reiner, 2020).

With the importance of cooperative partnership in enhancing access to information for all supply chain members and quickly responding to environmental changes (Huang et al., 2020), many challenges face supply chain management in sharing materials and information among members. Many conflicts of relations and interests, especially in cost and profit (Constantinescu, 2017). These problems can be eliminated by setting conditions between all parties that are fair and guarantee all members' benefit.

2.2 DEMAND FORECASTING AND ITS METHODS

Demand planning is used by many departments of the enterprises such as purchasing, production management, inventory management, maintenance, and distribution in almost every business field. The fact that demand planning management is used in such a large area enables more effective work within the enterprise. Thanks to successful demand planning management, businesses can take a step ahead of their competitors as they will increase the efficiency of their operations (Seyedan and Mafakheri, 2020).

As a result of technological developments, macroeconomic variables and constantly changing global balances, the needs and consumptions of the society may also show great uncertainties. In uncertain environments with many variables, businesses may have difficulty in balancing supply and demand between consumers and businesses. Demand planning can be a major success factor in overcoming these problems. No matter how good demand planning works, it may not always be able to accurately estimate the needs and demands of the consumer. Although the predictions do

not give definite results, it should be remembered that they are only predictions. The methods used in forecasting demand may vary according to the purpose of the forecast, forecasting period and type of data. Estimation methods can be examined under two headings as qualitative and quantitative methods (Vereecke et al., 2018).

2.2.1 Qualitative Methods

They are subjective methods in which the data to be collected are based on observation or perception. These methods are based on converting human judgments and non-numerical data into numerical data using various scales (Hall and Toma, 2017).

2.2.1.1 Delphi Method:

The implementation of the Delphi technique consists of a series of steps aimed at eliciting, examining and analyzing the approaches and perspectives of the experts or the target group's representatives on the problem situation What makes this technique important is that individuals do not influence each other's views during interviews held at different locations. In other words, it tries to produce optimal results by evaluating different points of view and minimizing errors (Rotwell and Kazansas, 1999).

2.2.1.2 The market research:

Analyzing the current market situation is a crucial criterion for demand forecasting. A sensitive assessment is made by looking at the import and export rates. The situation of competing firms should also be examined. The tax rates imposed by the government on the products to be sold and any changes in customer demand to this situation should also be taken into consideration (Sarstedt and Mooi, 2014).

2.2.1.3 Panel data:

Panel data analysis is called collecting data from different units at different times in a given sample. According to this definition, panel data can be said to be the most suitable method for collecting data from multiple sections. Therefore, demand forecasts made with panel data may give more comprehensive results but are not suitable for all situations because they are not quantitative

(Hsiao, 2014).

2.2.2 Quantitative Methods

Time series methods are one of the quantitative methods, which are based on statistical data. In order to apply time series methods, it is necessary to have chronological data from previous years. These methods are suitable for use in stable situations where there is no visible trend of the variable. However, the accuracy of the forecast can be questioned if special circumstances such as seasonal changes occur. Some of the quantitative methods are given below.

2.2.2.1 Moving Average:

Moving Average is a method based on estimating the new period by averaging the actual data. The point that separates the moving averages from the simple arithmetic mean is making the prediction for each future period, taking into account the newest and subtracting the oldest from the period. That is, the old values are omitted from the estimate. The mathematical formula of moving averages method is given below.

$$\mathbf{Ft = (At\text{-}1 + At\text{-}2 + \ldots. + At\text{-}n)/n}$$

In this formula (Chase, 1997), Ft represents the demand forecast for the next t period, n represents the time period at which the forecast is made, and At represents the actual values. In the estimations made by moving averages method, if the used data shows an increasing trend, the estimation value may be very low, and if the historical data shows a decreasing trend, the minimum value of the data may be very high (Sengar and Liu, 2020).

2.2.2.2 Weighted Moving Averages

In weighted moving averages method, which is an advanced method of moving averages, the prediction is based on real-life observations. While making the calculations, the oldest data is given the lowest and the closest data is given the highest weight (Chase et al., 1998). The formula for the weighted moving averages are given below.

$$\mathbf{Ft = (W1 * At\text{-}1 + W2 * At\text{-}2 + \ldots\ldots + Wn * At\text{-}n)}$$

2.2.2.3 Exponential Smoothing

It is a customized technique of weighted moving averages. The main purpose of the exponential smoothing (ES) method is to eliminate the effect of periodic fluctuations in the trend. Therefore, weights are used instead of smoothing parameters. When determining these parameters, it is necessary to select the ones that make the error rates the smallest. Exponential smoothing, first and second degree can be done. The first-order exponential smoothing method provides a narrower solution since a fixed smoothing parameter is used (Smyl, 2020). The general formula is as follows.

$$\mathbf{Ft = Ft\text{-}1 + \alpha(At\text{-}1 - Ft\text{-}1)}$$

In this formula, α is a smoothing constant and takes a value between 0 and 1. (At-1-Ft-1) is the prediction error. Second-order exponential smoothing methods are used with one or more parameters of different values and provide a better solution. These are known as Brown's exponential smoothing methods of Holt and Winter. In Brown's second-order exponential smoothing method, historical data is weighted with different values in the estimate. In Holt's method, two smoothing parameters, α and β, are applied. In Winters' seasons exponential smoothing method, the smoothing constant (α) of the model is used for the trend smoothing constant (β).

2.2.2.4 Box-Jenkins Method

Auto-regression and moving averages are two methods. The Box-Jenkins method may be seasonally applicable or non-seasonal.

2.2.2.5 Causal (Relational) Methods

Causal methods fall into the group of quantitative, statistical methods. The causal methods that take historical data and calculate the effect of multiple factors provide a more detailed examination. They work very well for long-term forecasts. Causal methods reveal the causal relationship between independent variables, and hypothesis testing can be performed on them. The following lists the most common causal methods.

Simple Linear Regression: They are the methods that determine the functional relationship between the dependent variable demand forecast and the independent variable time. Simple linear regression aims to minimize deviations from the trend line and provides both descriptive and inferential statistics (Field, 2005).

Linear function to be used in simple linear regression;

$$Y = a + b * x$$

In this formula a is the axes of the trend line indicate the intersection and b is the trend slope. The logic in simple linear regression is similar to the exponential smoothing methods described in time series methods, but to draw a line closer to the actual demand data (Chase et al.,1998).

Multiple Regression Modeling: In multiple regression modeling, unlike simple linear regression, there are multiple independent variables. Therefore, the regression function can be expressed in the form.

$$Y= a1 + b1 * x1 + b2 * x2 + \ldots\ldots + bn * xn$$

Regression modeling can be easily solved with SPSS or many programs. According to SPSS results, the solution of the problem can be interpreted in many ways. Demand forecasting with multiple regression modeling shows a more appropriate distribution to the fluctuations of actual demand. Therefore, it can be said that multiple regression modeling gives more realistic results compared to simple linear regression considering the proximity to real demand (Chapman, 2006).

2.3 THE IMPORTANCE OF CUSTOMER SATISFACTION

The interest of organizations and companies in customer satisfaction will improve customer retention and thus increase the market share, as customer satisfaction has a very important role in improving the company's reputation and creating a competitive advantage.

Increasing customer satisfaction leads to improving the competitive advantage. The company's relationship with its customers is significant, as customers are considered one of the strategic resources through which profitability and a good reputation can be achieved (El-Garaihy et al., 2014).

Increasing customer satisfaction leads to increase the company's market share. The higher the level

of customer satisfaction with the products and services provided, this will lead to improving the company's reputation and thus retaining customers and increasing their numbers, and this leads to an improvement in the market share of the company. (Edeling and Himme, 2018)

Increasing customer satisfaction leads positive impact of customer satisfaction on the profitability of the company. According to Drosos et al., (2019), the profitability of the company may be affected due to customer satisfaction through customer loyalty, which will increase through satisfaction and also through the market share that will be positively affected by that.

Increasing customer satisfaction leads to improving the reputation of the company in general. The company's reputation is closely related to the extent to which customers feel the company's interest in them and provide them with distinctive products and services. Therefore, customer satisfaction makes customers feel that they are an important part of this company, and therefore, customers will praise this company, which will improve the company's reputation in front of the public.

Several empirical studies confirmed the existence of a relationship between supply chain management and customer satisfaction, such as the studies El Shoghari and Abdallah, (2016) and Omoruyi and Mafini, (2016), where these studies confirmed that integration in the supply chain and effective management of the supply chain improves the efficiency of operations and also It speeds up the company’s response to customers’ requirements and thus delivers products and services in a more effective manner. This leads to increased customer satisfaction and thus creates loyalty to the company and thus improves profitability. Thus, supply chain management has a positive and statistically significant impact on customer satisfaction, as confirmed by previous studies on the subject.

It is evident from the above that having a highly effective and efficient supply chain management in the company has positive affect on the internal and external activities of companies and thus improves customer satisfaction.

3.METHODOLOGY

3.1 DATA

The aim of this thesis is to forecast daily demand of a folk-bread point of sale with different demand forecasting methods. Demand forecasts are made for all days of the week. The illustrative example is applied for a folk-bread point-of-sale. Past three years (2018, 2019 and 2020) demand according to days are given below on the Figure 3.1 to Figure 3.7 In the figures, while y axes show the demand amount, x axes are the days in last three years. Since, there are almost 151 days for each day in three years, the study is made with 151 data for each day.

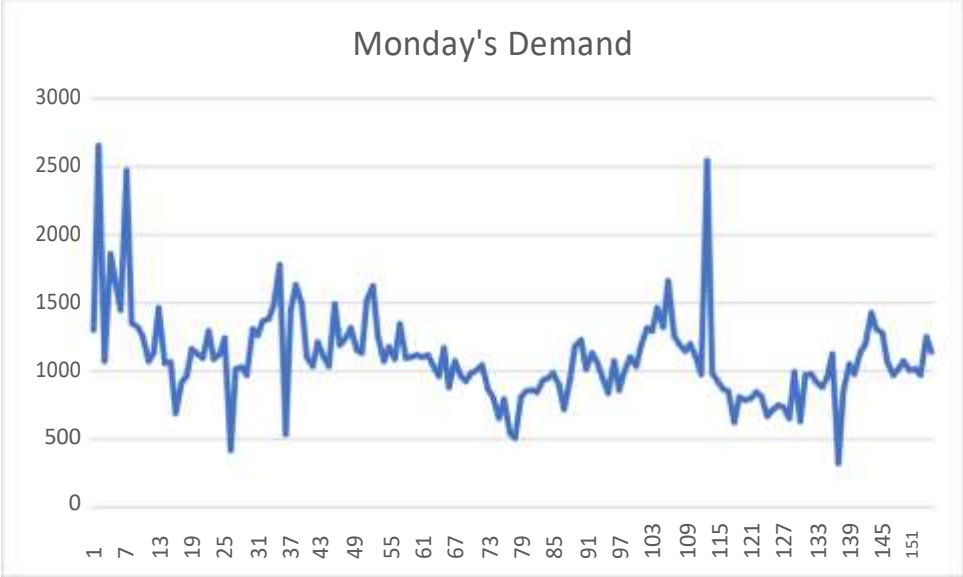

Figure 3.1: Monday's Folk-bread demand in the last three years.

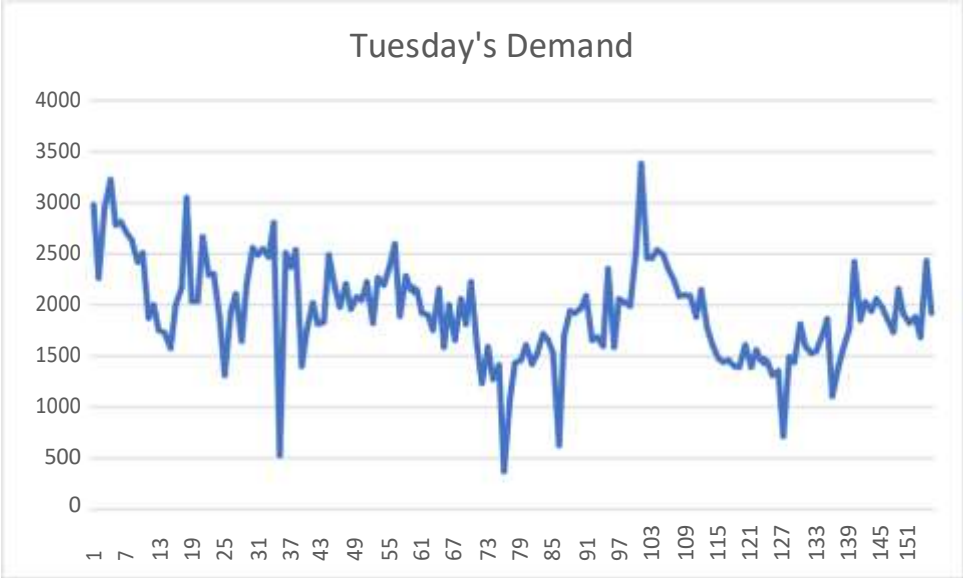

Figure 3.2: Tuesday's Folk-bread demand in the last three years.

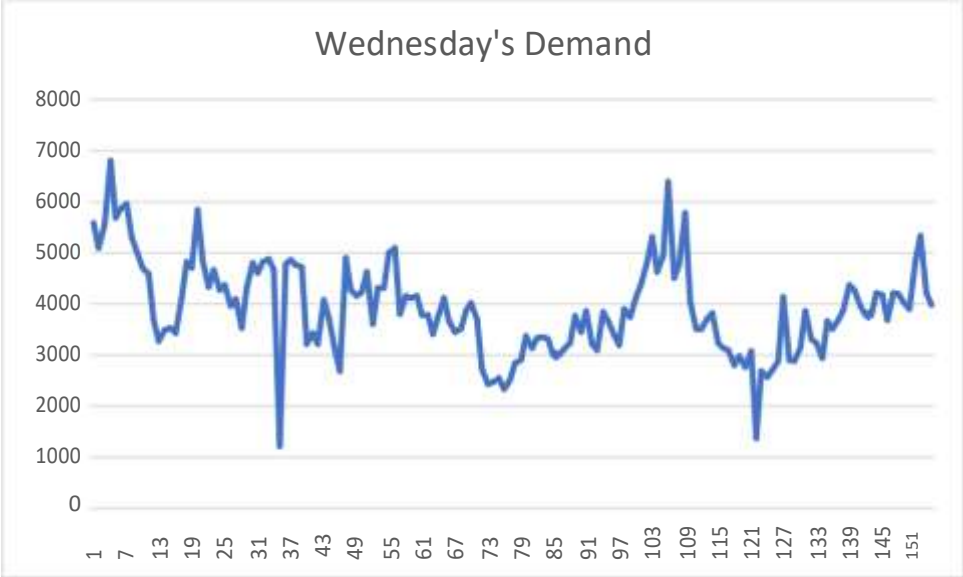

Figure 3.3: Wednesday's Folk-bread demand in the last three years.

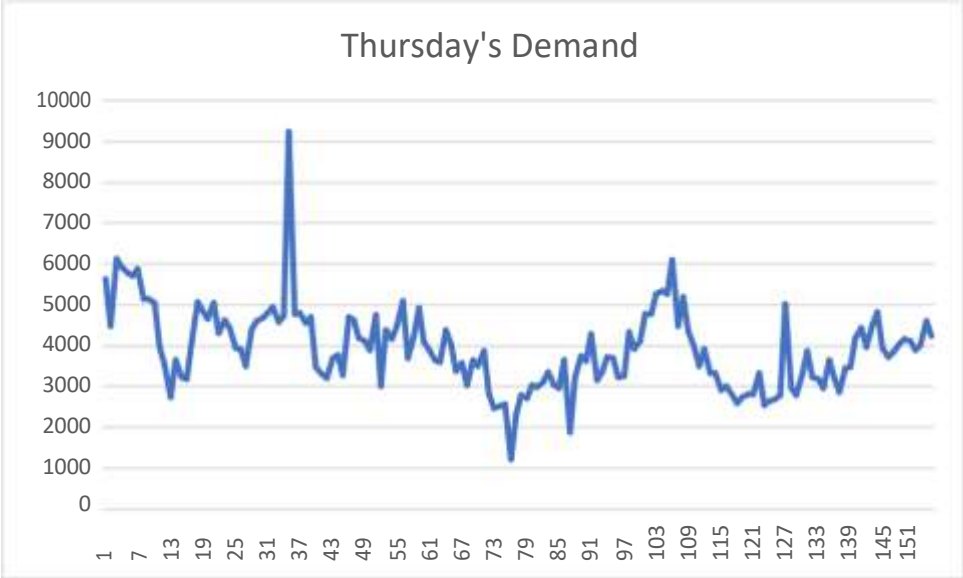

Figure 3.4: Thursday's Folk-bread demand in the last three years.

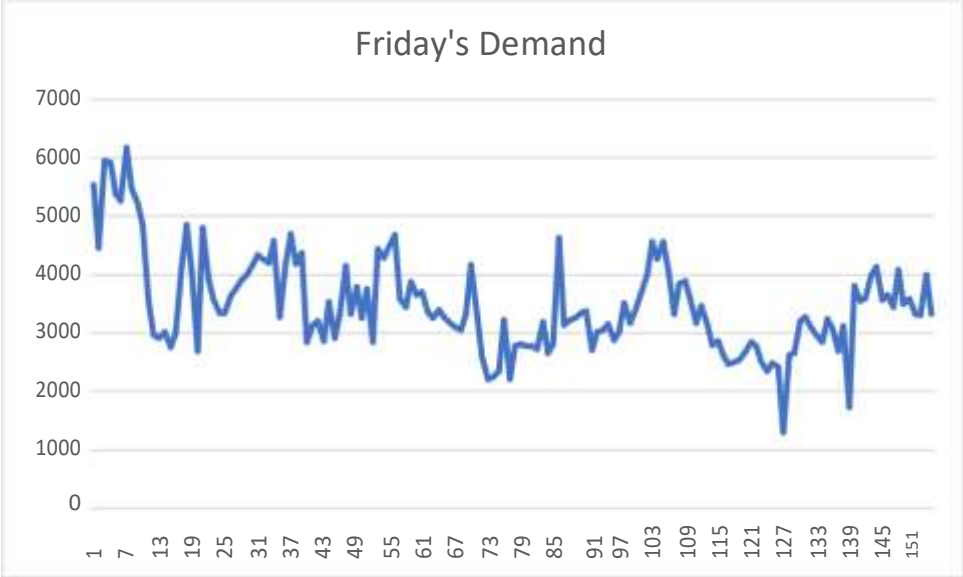

Figure 3.5: Friday's Folk-bread demand in the last three years.

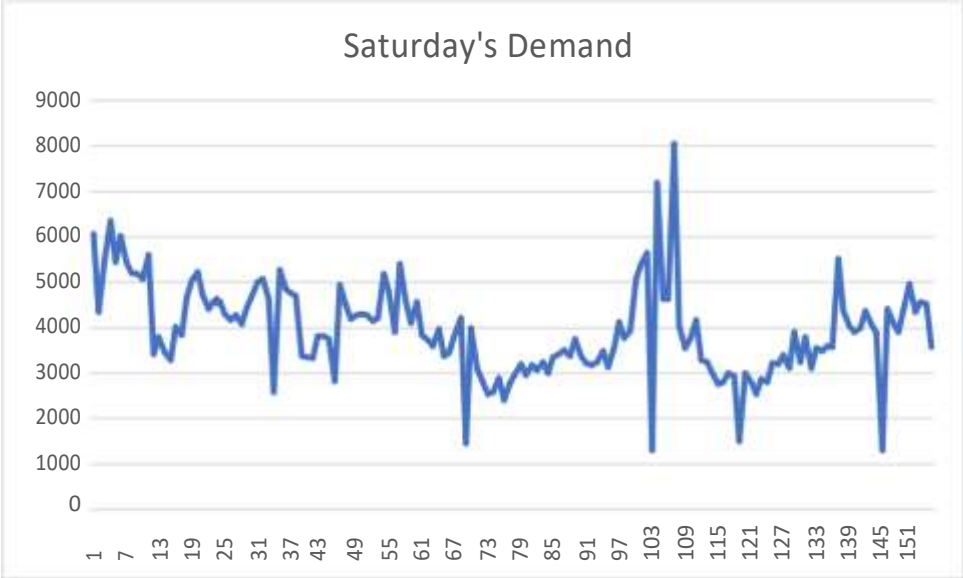

Figure 3.6: Saturday's Folk-bread demand in the last three years.

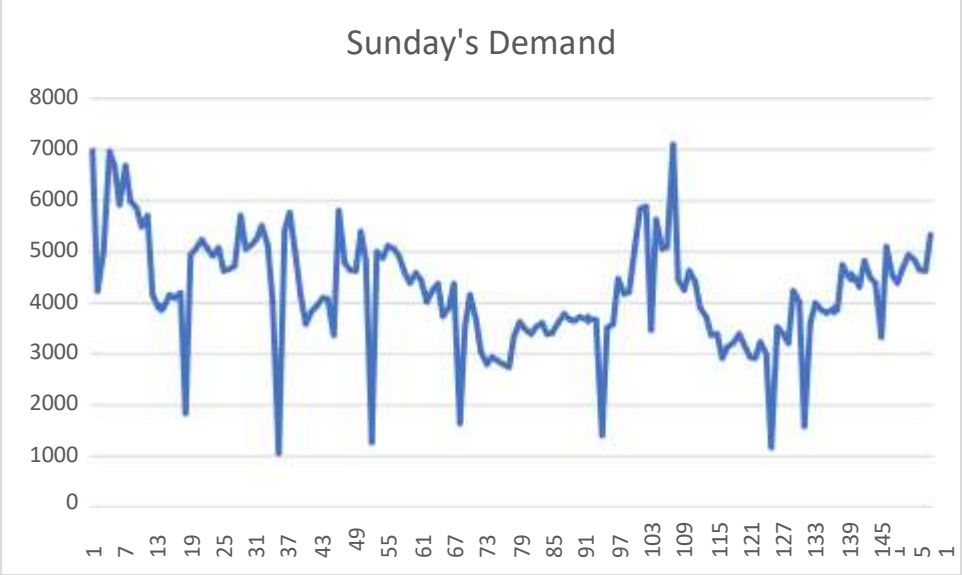

Figure 3.7: Sunday's Folk-bread demand in the last three years.

Before forecasting demands for every day, first proper distributions of days' demand for past three years data are found by Input Analyzer module Arena Simulation Program. Figure 3.8 to Figure 3.14 show the results of Arena Program outputs.

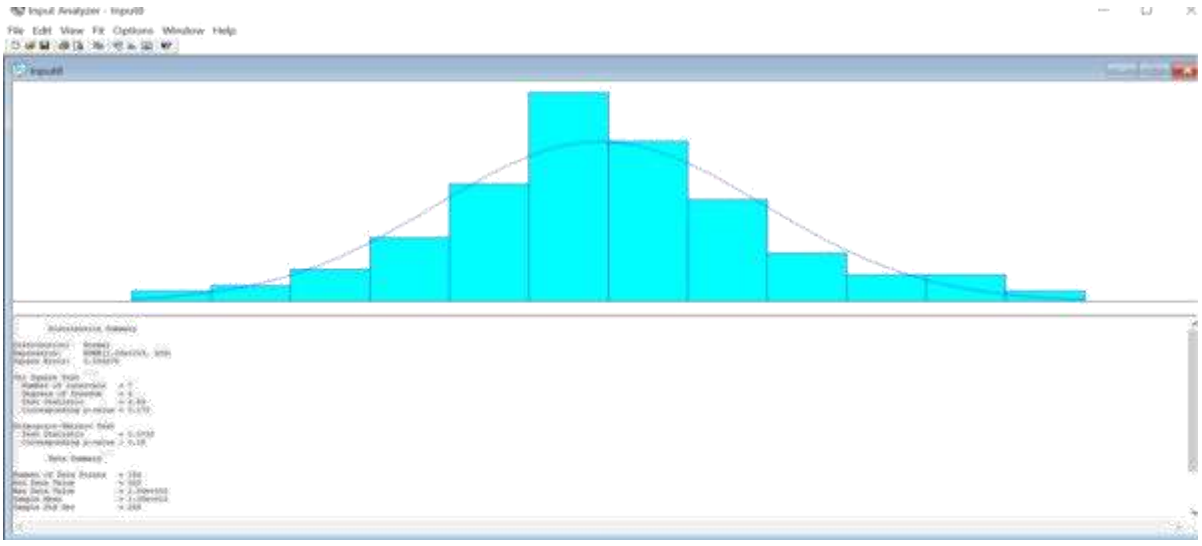

Figure 3.8: Output of Arena Program for Monday demand.

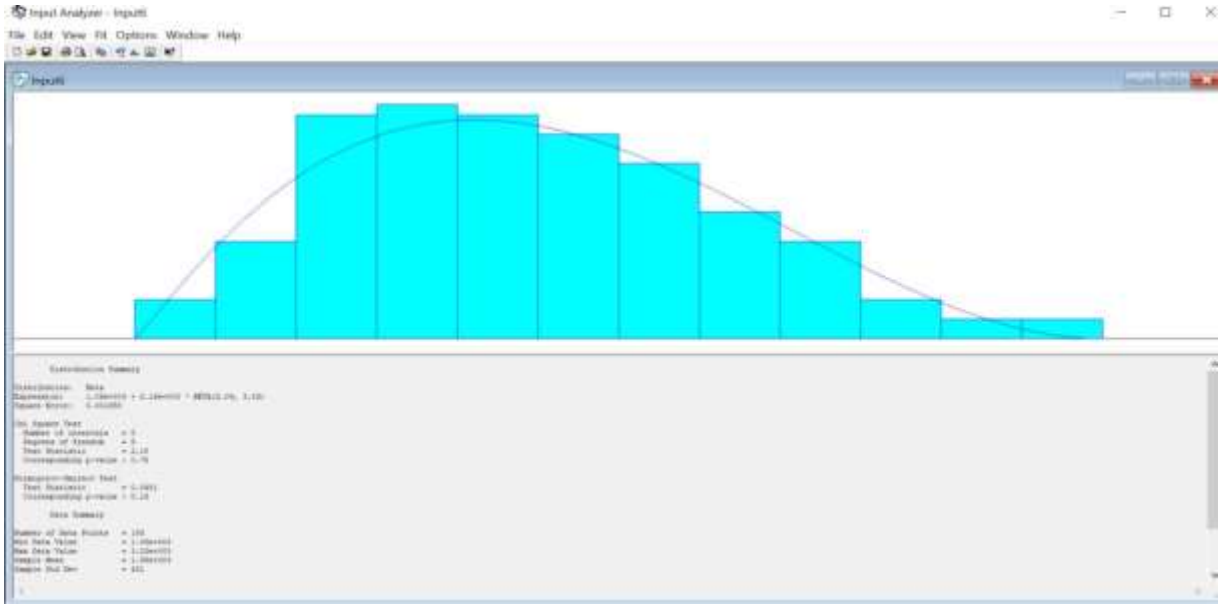

Figure 3.9: Output of Arena Program for Tuesday demand.

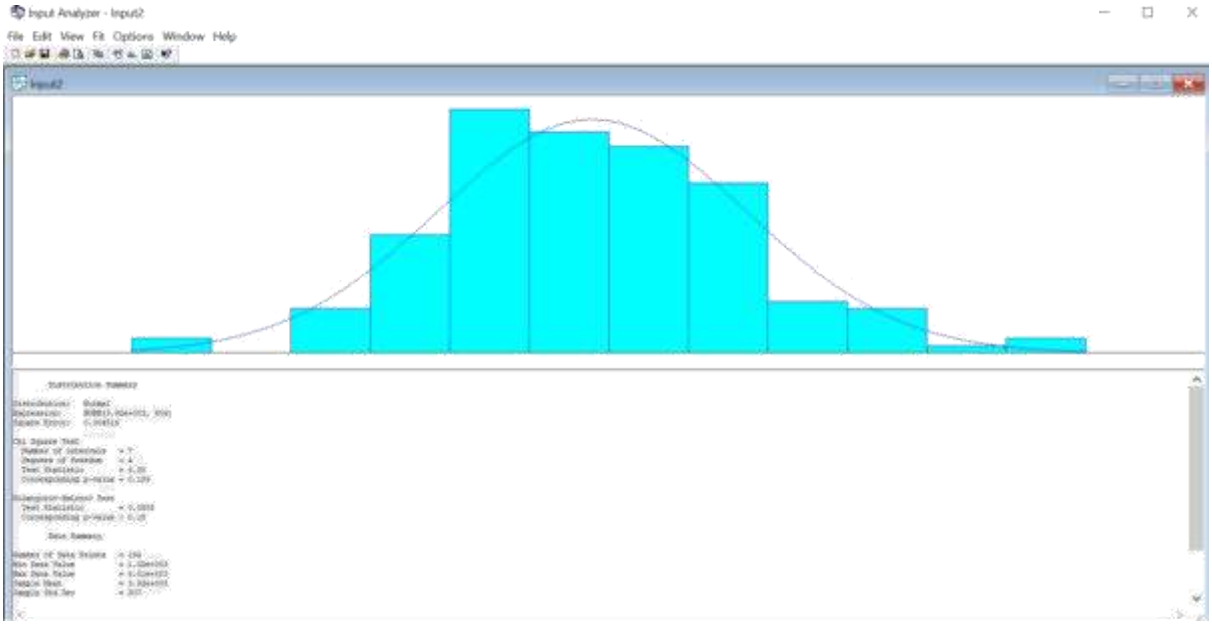

Figure 3.10: Output of Arena Program for Wednesday demand.

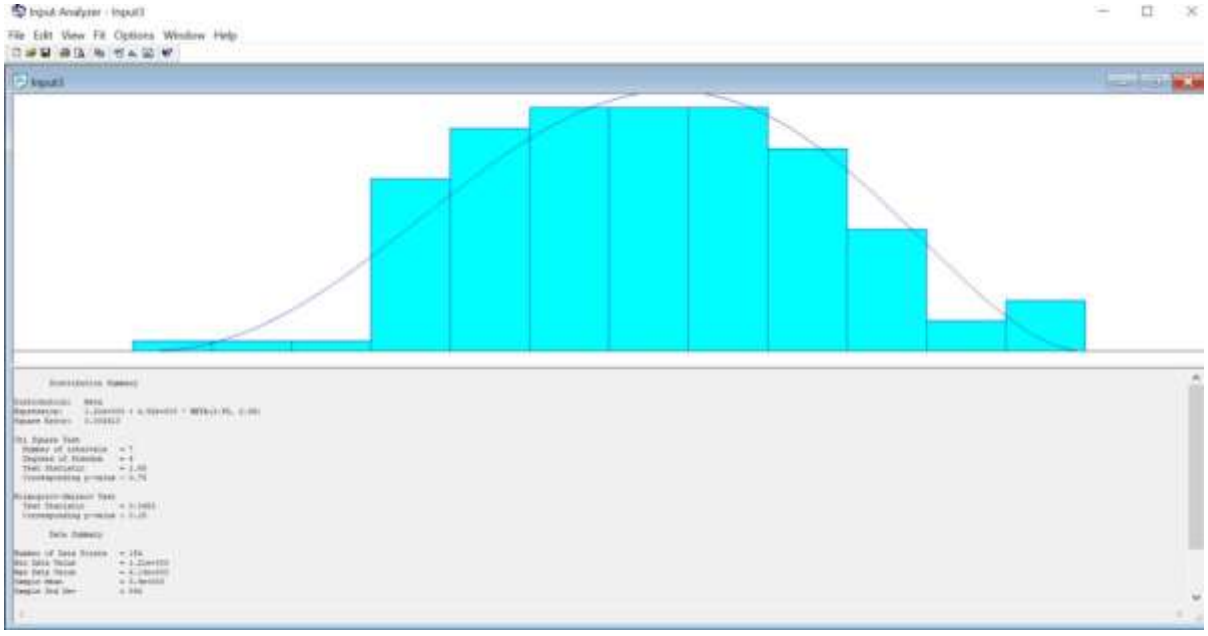

Figure 3.11: Output of Arena Program for Thursday demand.

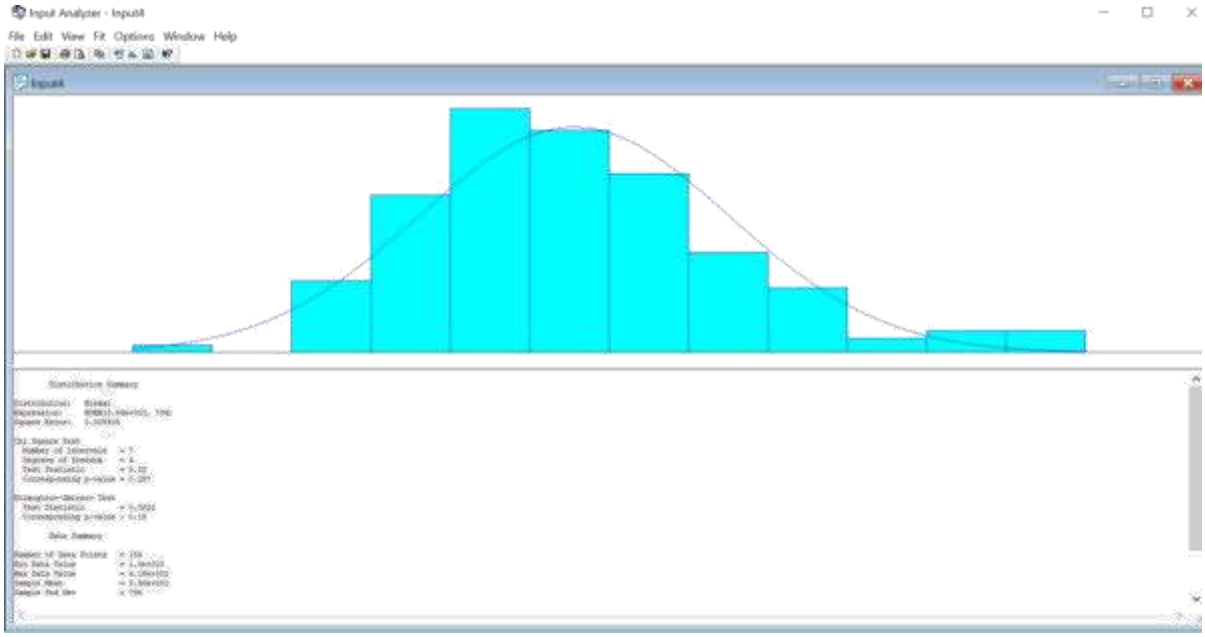

Figure 3.12: Output of Arena Program for Friday demand.

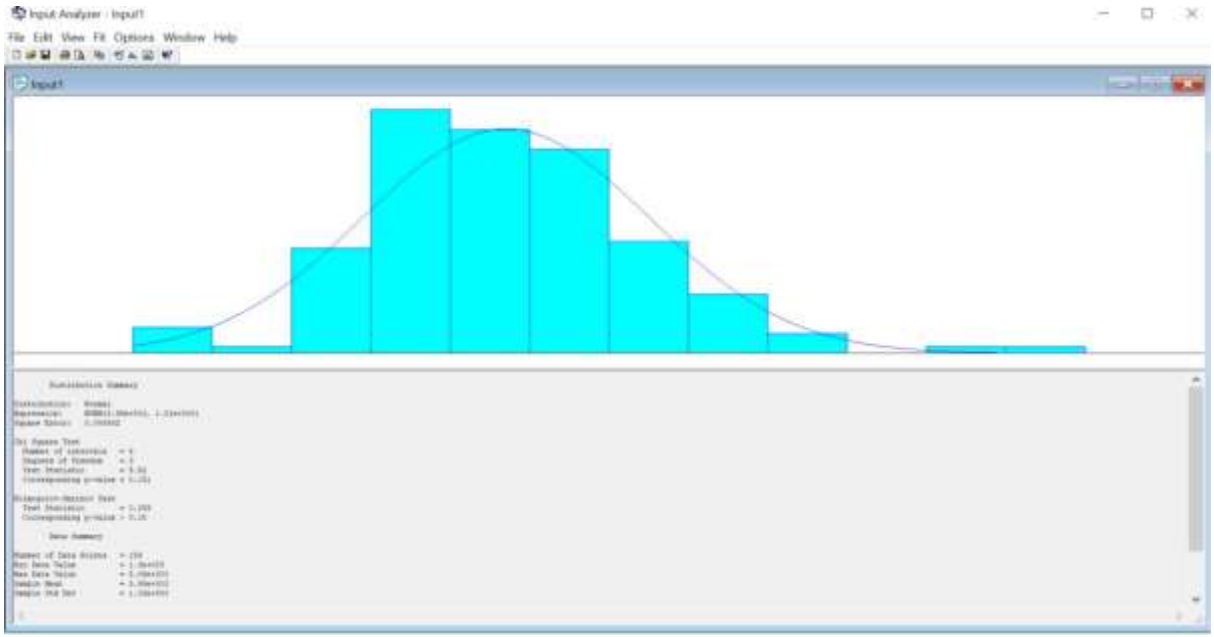

Figure 3.13: Output of Arena Program for Saturday demand.

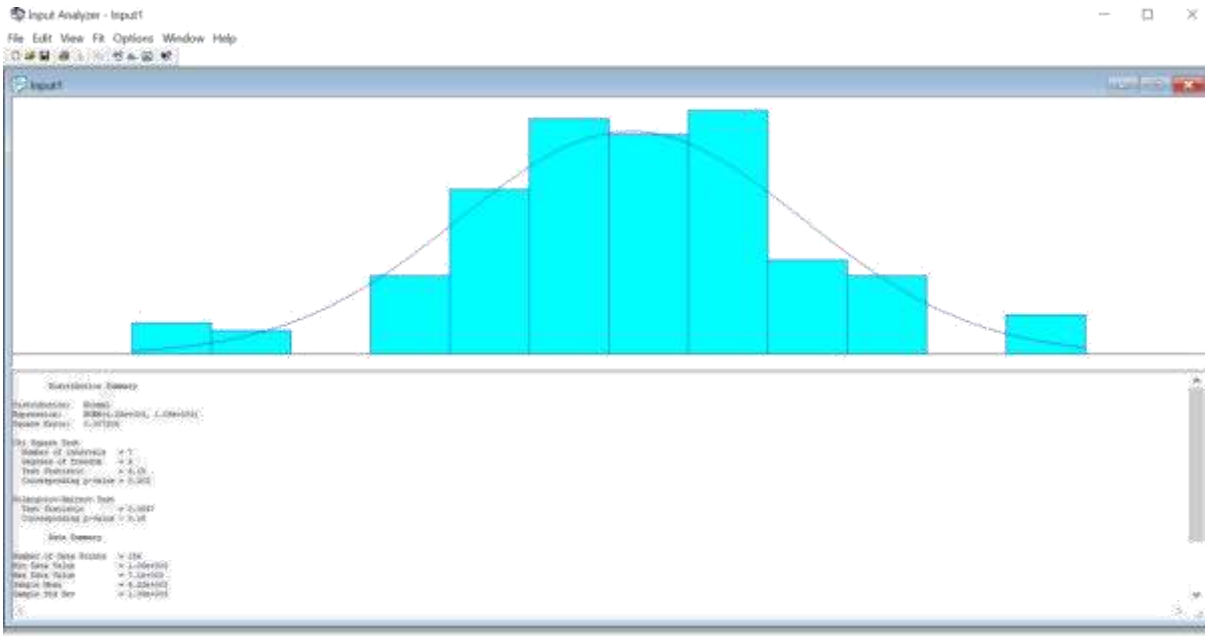

Figure 3.14: Output of Arena Program for Sunday demand.

According to results of Input Analyzer module of Arena Program, the distributions are found as Normal Distribution and Beta Distribution. Before, writing their parameters and equations; the general information about these distributions is examined below.

3.2 NORMAL DISTRIBUTION

In statistics theory, the normal distributions are called as Gauss or Gaussian distribution which is one of the kinds of continuous probability distribution for a real-valued random variable. While there are many distributions such as t distribution, Cauchy distribution are bell shaped; Gaussian (Normal) distribution is also bell-shaped. Normal distributions are expressed as the formula below.

$$P(x) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(x-\mu)^2/(2\sigma^2)}$$

In the formula above, the parameter μ stands for mean or expected value of distribution, while the parameter σ stands for standard deviation, where the variance of the distribution is σ^2. A random variable with a Normal distribution is said to be normally distributed and is called a normal deviate. Normal distributions are crucial in statistics thanks to easily convertibility into standard normal distribution. Therefore, it is often used in many areas including medicine, natural and social

sciences and also engineering sciences. The other property of Normal distribution which increases its importance is due to the central limit theorem. It indicates that, under some conditions, the average of many samples of a random variable with finite mean and variance is itself a random variable, the distribution of the sample means will be approximately normally distributed under some conditions. Thus, many real-life observations can be expressed as Normal distribution as the number of observations in the sample are increasing.

Besides, Normal distribution has some unique properties that are rewarding in analytic studies. For example, any linear combination of a fixed collection of normal deviates is a normal deviate. Many methods and results like least squares parameter fitting and propagation of uncertainty may be derived analytically in explicit form if the used variables are normally distributed.

3.3 BETA DISTRIBUTION

The beta distribution has an important place in the family of absolute continuous distribution functions. The beta function, which is first introduced by Karl Pearson in 1895, and the properties of this function are analyzed statistically by some researchers in the following years and arranged in the form of a distribution function. The density function of the random variable X with the beta distribution can be written with the help of the beta function as follows:

$$f(x;\alpha,\beta) = \frac{1}{B(\alpha,\beta)} b(x,\alpha-1,\beta-1)$$

In the formula above, X should be between 0 and 1 and α and β are bigger than 0, which are the shape parameters of the distribution. Beta distribution can be used in many fields, especially in industrial engineering and operations research. It is also used for modeling practical problems such as the occurrence of events limited to a certain minimum value and a certain maximum value range, and in the CPM type project management and control theory, it is also used for estimating the lengths that show probabilistic activity.

3.4 FINDING PROPER DISTRIBUTIONS FOR DEMANDS

Table 3.1 shows the proper distributions for every day. The table also includes notations of distributions. Indeed, last two columns are the p-values of the χ^2 and Kolmogorov Smirnov tests. As, our zero hypothesis are that the data is proper to the mentioned distributions and alternative hypothesis are vice versa; if the p-values are bigger than 0,05; than zero hypothesis should be accepted and the data fits with the mentioned distributions.

Table 3.1: Proper distributions by days and its tests 'results.

Day	Distribution	Notation	χ^2	Kolmogorov-Simirnov
Monday	Normal	Norm(1098,264)	0.178	≥0.15
Tuesday	Beta	372+2651*Beta(2.09,3.02)	≥0.75	≥0.15
Wednesday	Normal	Norm(3916,904)	0.189	≥0.15
Thursday	Beta	1214+5517*Beta(3.55,2.96)	≥0.75	≥0.15
Friday	Normal	Norm(3492,794)	0.257	≥0.15
Saturday	Normal	Norm(3915,1015)	0.151	≥0.15
Sunday	Normal	Norm(4218,1092)	0.202	≥0.15

3.5 DEMAND FORECASTING BY RANDOM NUMBER GENERATION

After the finding proper distributions with Input Analyzer module of Arena Program, then we use Matlab Online 2020b version to generate random numbers for 14 of each day (14 weeks) demand forecasts. Since, there are two types of distributions, random number generation codes according to a known distribution are below.

Normal Random Number Generation code:

a=mean

b=sigma

sz1=1

sz2=14

y= normrnd (a, b,sz1,sz2)

where; sz1 and sz2 are the number of rows and columns of the generated normal random numbers.

Beta Random Number Generation code:

a=first shape parameter

b=second shape parameter

sz1=1

sz2=14

y=betarnd (a, b,sz1,sz2)

where; sz1 and sz2 are the number of rows and columns of the generated beta random numbers. Table 3.2 shows the results of random number generations (first demand forecast results) of Matlab 2020b Program.

3.6 DEMAND FORECASTING WITH OTHER METHODS

The other demand forecasting methods in the study used are 3 months Moving Average, 6 months Moving Averages, Exponential Smoothing (with α=0,9) and Autoregressive Model (ARMA). Table 3.3 to Table 3.9 show the demand forecasts for days Monday to Sunday, respectively.

Table 3.2: Forecasts by Random Number Generations on Matlab.

Day	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	1240	2540	3596	2954	3485	3930	3131
2	1583	1495	3171	3211	3663	4348	5119
3	502	2307	2490	4370	3780	3780	6292
4	1326	1642	4375	3305	3861	3614	3553
5	754	2090	4171	3012	5092	1929	3139
6	985	2698	3946	4086	4111	3345	5140
7	1189	2549	2710	4028	3749	4240	3969
8	2043	1781	4935	2696	3120	4331	3003
9	1830	1815	4232	3340	3008	5216	4002
10	742	1724	3645	5228	4045	2954	3806
11	1900	2914	3936	4102	4562	4376	3064
12	1290	2077	3679	2714	3781	4547	4409
13	1082	1266	2333	4083	3622	5276	4835
14	1183	1822	3657	1871	2850	4405	2609

Table 3.3: The other demand forecasts for Monday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
1142	914	1008	1108	1042
1201	926	1094	1194	1069
1427	1110	1187	1317	1135
1311	1186	1271	1271	1220
1279	1223	1305	1289	1252
1062	1237	1270	1170	1208
971	1209	1156	1056	1134
1016	1178	1082	1022	1043
1076	1120	1032	1032	1030
1005	1069	1017	1017	1061
1013	1024	1028	1018	1057
968	1009	1016	1016	1039
1249	1055	1059	1169	1028
1140	1076	1093	1193	1099

Table 3.4: The other demand forecasts for Tuesday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
1857	1689	1907	1907	2060
2028	1842	2019	2016	2057
1946	1934	2064	1953	1941
2061	2014	1973	2051	1964
1969	2048	2001	1978	1981
1864	1955	1960	1876	1983
1731	1934	1907	1746	1915
2157	1955	1931	2116	1831
1915	1950	1917	1936	1949
1827	1911	1908	1838	1993
1884	1897	1946	1880	1884
1683	1867	1828	1703	1877
2434	1984	1957	2361	1820
1920	1944	1981	1965	2038

Table 3.5: The other demand forecasts for Wednesday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
3953	3948	4123	3986	4189
3784	3993	4097	3805	3998
3784	4010	3948	3787	3842
4207	4063	3932	4165	3806
4175	4029	3988	4174	4032
3675	3930	3961	3725	4104
4213	3973	4068	4165	3830
4190	4041	4064	4188	4012
4038	4083	4029	4053	4113
3900	4032	4086	3916	4027
4837	4143	4242	4745	3921
5337	4420	4528	5278	4392
4224	4421	4575	4330	4855
3968	4384	4592	4005	4366

Table 3.6: The other demand forecasts for Thursday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
4440	3606	3886	4407	3902
3969	3732	4018	4013	4230
4514	4005	4276	4464	4095
4819	4234	4436	4784	4201
3948	4312	4313	4032	4503
3722	4236	4251	3753	4199
3846	4137	4084	3837	3834
4033	4147	3888	4014	3823
4164	4089	3942	4149	3945
4125	3973	4042	4128	4061
3902	3966	4056	3925	4083
4008	4013	4050	4000	3970
4605	4140	4160	4545	3951
4242	4175	4190	4273	4254

Table 3.7: The other demand forecasts for Friday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
3552	3001	3055	3559	3164
3594	3086	3174	3591	3599
3989	3301	3738	3950	3548
4132	3470	3817	4114	3761
3565	3775	3820	3620	3941
3653	3748	3835	3650	3692
3439	3729	3698	3461	3582
4084	3811	3686	4022	3497
3494	3728	3668	3547	3767
3584	3637	3651	3581	3643
3334	3598	3624	3359	3527
3305	3540	3430	3311	3424
4000	3634	3556	3932	3341
3324	3507	3491	3385	3687

Table 3.8: The other demand forecasts for Saturday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
3996	4230	4072	3989	3950
4378	4365	4077	4340	3932
4085	4125	4091	4111	4070
3885	4046	4086	3908	4121
1300	3591	3412	1561	3965
4406	3675	3419	4122	3179
4091	3691	3421	4095	3145
3911	3613	3427	3930	4133
4397	3665	4202	4351	3974
4958	3844	4340	4898	4046
4351	4353	4405	4406	4370
4564	4379	4568	4549	4396
4511	4449	4596	4515	4245
3571	4392	4250	3666	4304

Table 3.9: The other demand forecasts for Sunday.

Actual Demand	6 months MA	3 months MA	ES	ARMA
4312	4301	4520	4332	4390
4829	4462	4540	4780	4307
4483	4566	4533	4513	4490
4392	4506	4504	4405	4440
3338	4311	4261	3445	4336
5085	4407	4325	4921	4872
4525	4442	4335	4565	4417
4394	4370	4336	4412	4505
4668	4401	4668	4643	4345
4936	4491	4631	4907	4437
4851	4744	4713	4857	4602
4644	4670	4775	4666	4616
4629	4687	4765	4633	4512
5339	4845	4866	5269	4467

4.RESULTS AND DISCUSSION

The control of the accuracy of the demand forecasts and the comparison with each other or the selection of the best demand forecasting method are made with various scales. Among these, the most used indicators are mean absolute deviation and mean square error indicators. The mean absolute deviation (MAD) of a data set is the average distance between each data point and the mean. The mean absolute deviation gives us an idea of the variability of a data set. The following steps are used to calculate mean absolute deviation.

Step 1: Calculating the mean.

Step 2: Using positive distances, calculate how far each data point is from the mean. These are called absolute deviations.

Step 3: Adding these deviations.

Step 4: Dividing the sum by the number of data points.

Its formula can be found as follows.

$$MAD = 1/n \sum |xi - \bar{x}|$$

Table 4.1: Choosing the best forecasting method.

Day	Minimum MAD	Forecasting Method
Monday	91	Exponential Smoothing
Tuesday	44	3-months Moving Average
Wednesday	163	6-months Moving Average
Thursday	146	3-months Moving Average
Friday	196	ARMA
Saturday	248	ARMA
Sunday	161	3-months Moving Average

According to Table 4.1; exponential smoothing is best demand forecasting method for Monday; while the other matches are 3-monhts Moving averages method for Tuesday, Thursday, and

Sunday; ARMA for Friday and Saturday. MAD values are between 91 and 248. If we are looking the actual demands these MAD values are acceptable for forecasting. These methods can be used to forecast folk-bread demand.

5.CONCLUSION AND FUTURE DIRECTIONS

There are many articles in the literature about supply chain management in terms of literature reviews, mathematical models, policy making articles. The topics studied about supply chain are green supply chain management, sustainable supply chain management, supply chain network design, closed loop supply chains and lean principles of supply chains. The main topics of the last articles are measurement of performance with the application of sustainable, closed loop and lean supply chains. Most of the current articles measure the chain performance before and after the application of the proposed methods and principles.

Some of the articles use mapping strategies of the supply chain as “as” and “is” options. For example, value stream mapping and data envelopment analysis are used to compare the before and after systems and they state the possible solutions to increase efficiency and performance of the supply chains. Most of the numerical studies is about mathematical modelling with the usage of Linear Programming, Integer Programming, Mixed Integer Programming, Heuristics and Meta-Heuristics methods for the optimal or near optimal solutions of sustainable, green or closed loop supply chains. For example, they used for logistics problems, vehicle routing problems and network design problems.

By the way, last of the studies continue to come about multi criteria decision making topic with the AHP, ANP, TOPSIS, ELECTRE and hybrid of these methods to evaluate alternatives and to prioritize the weight of the criteria about the managerial decision-making problems such as location selection and performance measurement of the supply chains.

The first step of having a good supply chain is to have a robust demand forecasting mechanism. All of the other study areas which are mentioned above come after the demand forecasting. Moreover, demand forecasting is very important for both profit oriented and non-profit oriented organizations.

In this thesis, we have tried to present the importance of forecasting for capacity planning and inventory control to reduce the waste accumulated during supply chain of commodities in retail sector. We focused on one of the most common commodities, bread, since it is one of the most consumed products by the society. Public bread production and sale; and local governments as well as major cities in Turkey is gaining more importance day by day by consumers. The importance

here is not only based on the ingredients of the bread, but also on having it in the right place at the right amount and in the right amount. the aim of this thesis is to forecast daily demand of a folk-bread point of sale with different demand forecasting methods. Although, there are lots of studies about demand forecasting in the literature, there is not any study about demand forecasting for a folk-bread bakery. The contribution of the study is to fill the gap about demand forecasting for folk bread. The other contribution is that the study is an example for local managers about demand forecasting for other commodities in retail sector.

In the literature review part, Supply Chain Management, Demand Forecasting and its methods and Customer Satisfaction are examined. In the application part of the thesis, we use last three years daily demand data to forecast upcoming 14 days demand. We compose a lot of demand forecasting methods, including 3-months Moving Averages, 6-months Moving Averages, Exponential Smoothing, ARMA and Random Number Generations Method. Random number generation is not the best method for any day; while 3-months Moving Averages, 6-moonths Moving Averages, Exponential Smoothing and Autoregressive Moving Averages methods. There are some indicators to select best forecasting method with the logic of comparing actual demand and forecasted demand. We use Mean Absolute Deviation to select best method. According to mean absolute deviation values, the used methods can be used to forecast folk-bread demand.

For the future studies, we recommend that the study can be applied not only for one point-of-sale, but also all sales points in a city. Moreover, the study can be made for other cities in Turkey, which produce and sell folk-bread to the public. The last but not least, the forecasts can be made by using Artificial Intelligence based demand forecasting methods such as Artificial Neural Networks and Long-Short Term Memory method.

REFERENCES

Abdallah, A. B., Obeidat, B. Y., & Aqqad, N. O. (2014). The impact of supply chain management practices on supply chain performance in Jordan: The moderating effect of competitive intensity. International Business Research, 7(3), 13.

Al-Hawajreh, K. M., & Attiany, M. S. (2014). The effect of supply chain responsiveness on competitive advantage: a field study of manufacturing companies in Jordan. European Journal of Business and Management, 6(13), 151-162.

Barber, K. D., Garza-Reyes, J. A., Kumar, V., & Abdi, M. R. (2017). The effect of supply chain management practices on supply chain and manufacturing firms' performance. Journal of Manufacturing Technology Management.

Beausang, C., Hall, C., & Toma, L. (2017). Food waste and losses in primary production: Qualitative insights from horticulture. Resources, Conservation and Recycling, 126, 177-185.

Celep, E., Zerenler, M., & Şahin, E. (2013). Customer Relationship Management as a tool for sustainable competitive advantage and exemplar companies with worldwide success. Mediterranean Journal of Social Sciences, 4(10), 731.

Chapman, S. N. (2006). The fundamentals of production planning and control. Upper Saddle River, NJ: Pearson/Prentice Hall.

Ellinger, A., Shin, H., Northington, W. M., Adams, F. G., Hofman, D., & O'Marah, K. (2012). The influence of supply chain management competency on customer satisfaction and shareholder value. Supply Chain Management: An International Journal.

Hsiao, C. (2014). Analysis of panel data (No. 54). Cambridge university press.

Kumar, V., Chibuzo, E. N., Garza-Reyes, J. A., Kumari, A., Rocha-Lona, L., & Lopez-Torres, G. C. (2017). The impact of supply chain integration on performance: Evidence from the UK food sector. Procedia Manufacturing, 11, 814-821.

Naqvi, M. H., Asim, D. M., & Manzoor, S. (2020). Analysing The Impact Of Supply Chain Agility On Customer Satisfaction Through Responsiveness And Innovation. Cenraps Journal of Social Sciences, 2(1), 26-40.

Rothwell, W. J., & Kazanas, H. C. (1999). Building in-house leadership and management development programs: Their creation, management, and continuous improvement. Greenwood Publishing Group.

Sarstedt, M., & Mooi, E. (2014). A concise guide to market research. The Process, Data.

Seyedan, M., & Mafakheri, F. (2020). Predictive big data analytics for supply chain demand forecasting: methods, applications, and research opportunities. Journal of Big Data, 7(1), 1-22.

Sengar, S., & Liu, X. (2020). An efficient load forecasting in predictive control strategy using hybrid neural network. Journal of Circuits, Systems and Computers, 29(01), 2050010.

Shafiee, M. M., Tabaeeian, R. A., & Mehri, M. (2020). Performance excellence through spirituality, emotional labour and customer orientation in insurance industry. International Journal of Business Excellence, 21(4), 513-529.

Smyl, S. (2020). A hybrid method of exponential smoothing and recurrent neural networks for time series forecasting. International Journal of Forecasting, 36(1), 75-85.

Stock, J. R., & Boyer, S. L. (2009). Developing a consensus definition of supply chain management: a qualitative study. International Journal of Physical Distribution & Logistics Management.

Vereecke, A., Vanderheyden, K., Baecke, P., & Van Steendam, T. (2018). Mind the gap–Assessing maturity of demand planning, a cornerstone of S&OP. International Journal of Operations & Production Management.

Yu, W., Jacobs, M. A., Salisbury, W. D., & Enns, H. (2013). The effects of supply chain integration on customer satisfaction and financial performance: An organizational learning perspective. International Journal of Production Economics, 146(1), 346-358.

Tao, Y., Wu, J., Lai, X., Wang, F. (2020) Netwrok planning and operation of sustainable closed-loop supply chains in emerging markets : Retail market configurations and carbon policies. Transportation Research Part E 144(2020) 102131 Garcia-Buendia, N., Moyano-Fuentes, J. Maqueira-Marín, J.M. (2021) Lean supply chain
management and performance relationships: what has been done and what is left to do. CIRP Journal of Manufacturing Science and Technology, Volume 32, 2021, Pages 405-423,

Lagorio, A., Pinto, R. (2020). Food and grocery retail logistics issues: A systematic literature review. Research in Transportation Economics, 2020, 100841, ISSN 0739-8859,

Colombo de Moraes, C., Henrique de Oliveira Costa, F., Pereira, C.R., Lago da Silva, A., Delai, I. (2020). Retail food waste: mapping causes and reduction practices, Journal of Cleaner Production, Volume 256, 2020, 120124

Chen, X., Liu, C., Li, S. (2019). The role of supply chain finance in improving the competitive advantage of online retailing enterprises, Electronic Commerce Research and Applications, Volume 33, 2019, 100821, ISSN 1567-4223,

Azhagan, C.T., Gangadharan, S., Madhanrajan, U. (2021), Computational analysis for service quality determinants in retail sectors using SERVQUAL model, Materials Today: Proceedings, 2021, ISSN 2214-7853,

Barman, A., Das, R., Kanti De, P. (2021). Impact of COVID-19 in food supply chain: Disruptions and recovery strategy, Current Research in Behavioral Sciences, Volume 2, 2021, 100017, ISSN 2666-5182,