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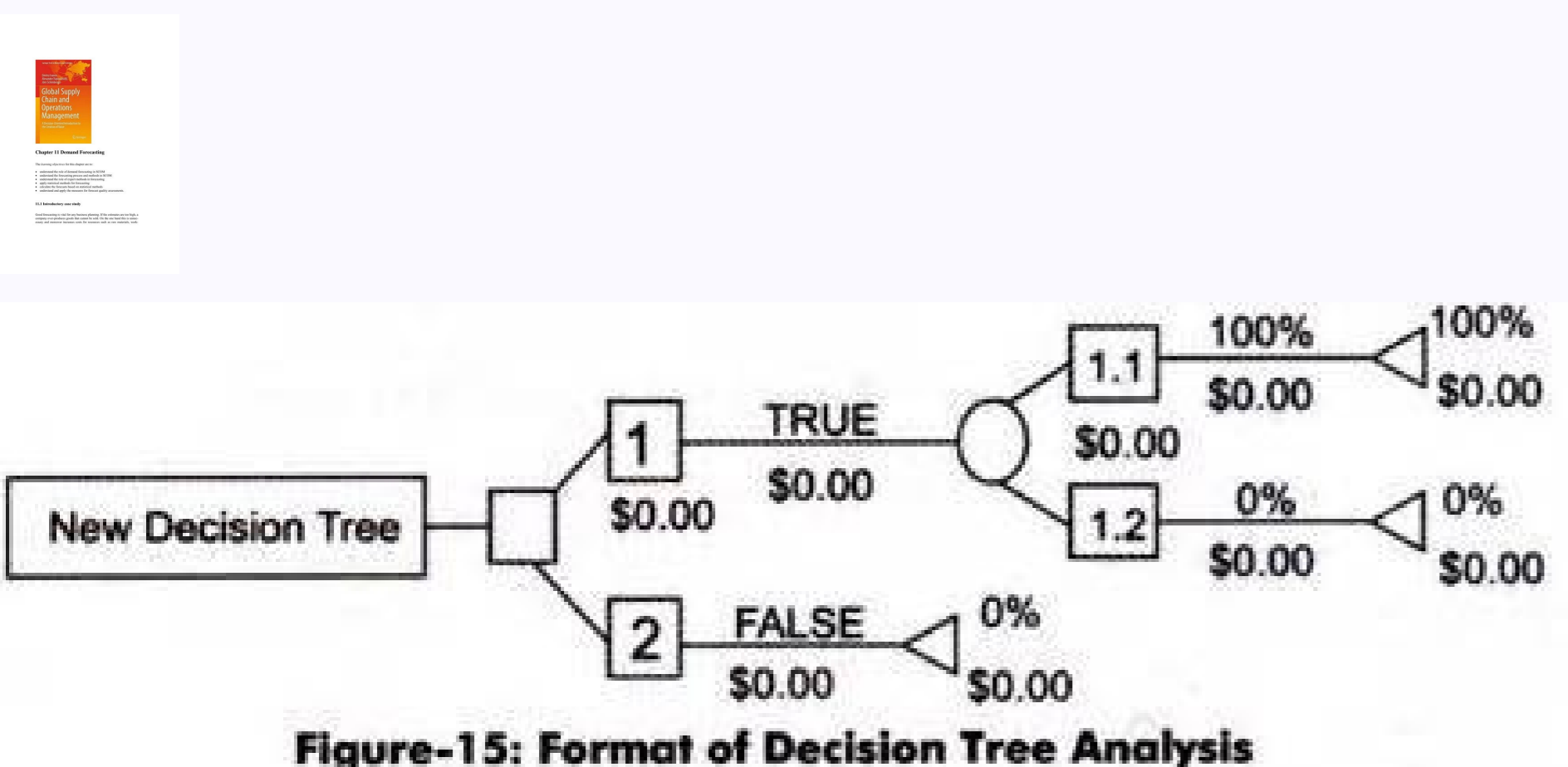
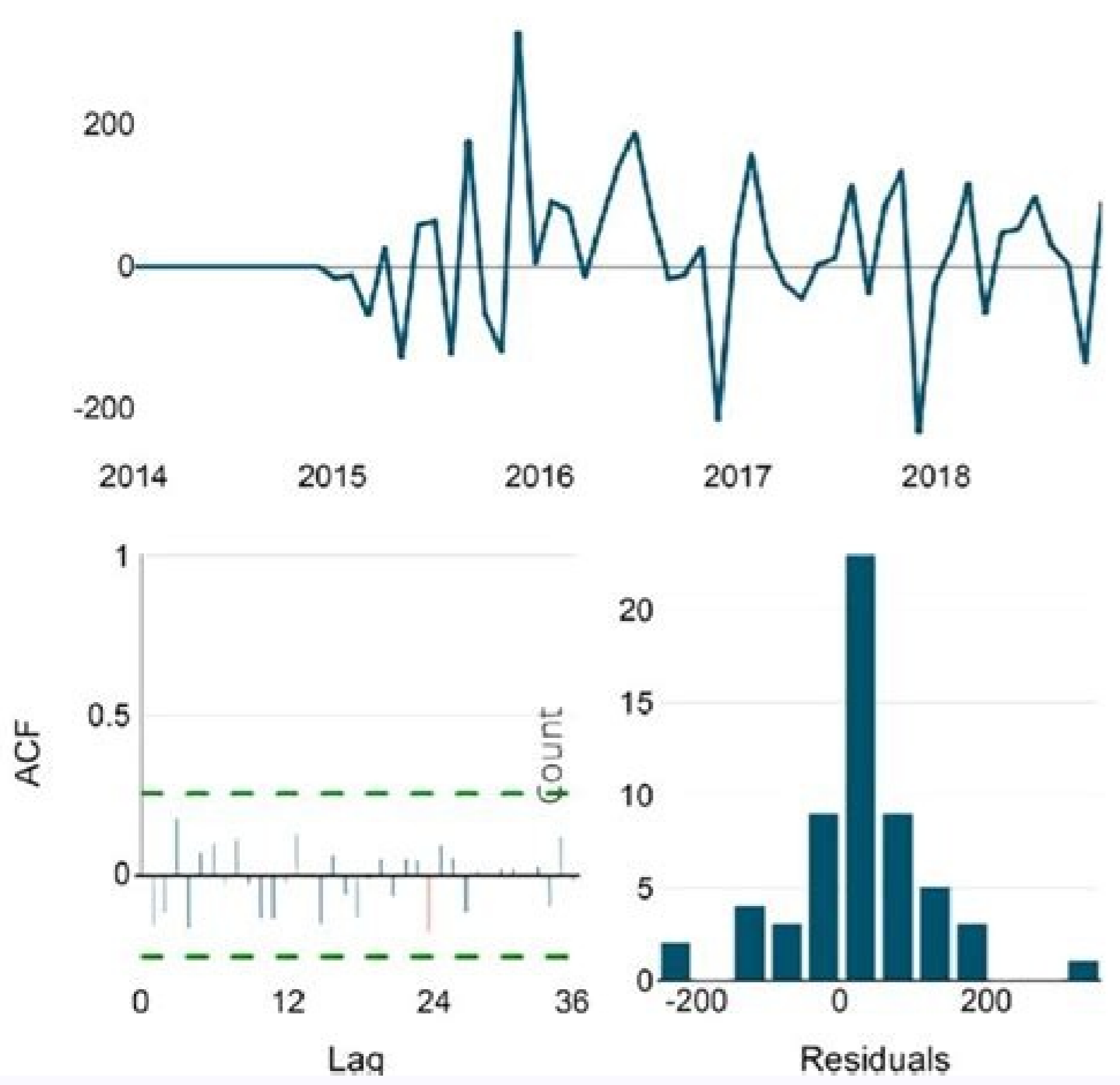
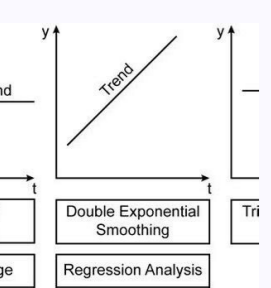


Figure-15: Format of Decision Tree Analysis



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USE OF FORECASTING TECHNIQUES TO ESTIMATE DEMAND IN SMALL AND MEDIUM-SIZED COMPANIES IN THE TEXTILE SECTOR
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ABSTRACT

The aim of this article is to present a comparative analysis of statistical techniques to forecast the demand of clothing. Techniques were validated in a textile company producing knitted garments located in the south of the Mexican state of Guanajuato. A time series was analyzed to identify cyclicity, trends, seasonality, and random variations. Moving average, weighted moving average, exponential smoothing, Holt's method, and Winter's method were applied to demand forecasting. Model performance was tested by mean absolute deviation (MAD), mean squared error (MSE), and the R2 determination coefficient. The results proved single exponential smoothing to be the best performing technique for demand forecasting. Forecasting techniques presented as spreadsheets will help decision makers to anticipate their clients' demand, respond promptly, and improve organizational aspects. The present study attempts to highlight the importance of providing small and medium-sized enterprises in the textile sector with engineering tools to improve their production and business processes by making informed decisions to enhance their competitive advantage.

Keywords: demand forecast, smoothing techniques, SMEs, textile sector.

I. INTRODUCTION

Today's firms face a reality: they must anticipate, respond to, and react to growing market demands. In a fiercely competitive environment, a commercial strategy determines not only success, but also commercial survival (Fui-Hoon, Lee-Shang, and Kuang, 2001). Companies ought to increase the efficiency and effectiveness of their business activities and address the need to reduce costs while improving performance. Therefore, managing performance throughout the company is a necessity if a competitive market position is to be maintained (Blasini and Leist, 2013). In this context, forecasting the demand is essential. A forecast is simply a prediction of what will take place in the future (Anderson et al., 2011). Campos (2014) defines demand forecasting as a quantitative estimation of the amount of products or services that will be required by the market in a certain period in the future. Demand forecasting is of utmost importance in planning the size of facilities, optimizing everyday operations, and managing available resources effectively. A key component here is the accurate prediction of time series (Bianchi et al., 2017) because tactical and operational decisions on production planning, inventory levels, transportation, and programming are based on the anticipation of the demand in the near future (Blackburn et al., 2015).

Due to their flexibility and innovation capabilities, small and medium-sized companies (SMEs) are fundamental to the dynamics and health of global economy. These companies play an important role as employment sources and supporting large-scale organizations (Su et al., 2016). In view of the intense international competition resulting from globalization, a firm's profits depend largely on the way in which it leverages internal and external resources (Moon et al., 2014). This is partly due to the recognition of the importance of SMEs for the economy in terms of the number of existing companies and the employment and added value they provide, and also due to the fact that SMEs' finances are considerably different from large companies' finances (Daskalakis, Balios, and Dalla, 2017). In many European countries, SMEs account for almost 80% of the GDP and employment structure (Petreves et al., 2016). According to SBA (2016) data, small companies represent 99.7% of employment sources in the United States. Similarly, 93.6% of manufacturing companies in Mexico are microbusinesses, whereas the second place is occupied by small companies (4.2%) and the third place by medium-sized companies (1.5%), according to data by INEGI (2014).

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A conjoint analysis will use customer input to discover exactly which feature combinations shoppers really value and prefer by having them rank major features in order of preference. Then the analyst will use statistical models to evaluate those responses. Part of the process of creating and evaluating this virtual market is incorporating foreseeable developments in the economy and market. One type of demand forecasting uses price data from real-world markets to create a virtual market. A conjoint analysis starts from that simple premise: The customer can't buy a product that meets all their preferences. This gives the analyst a crystal ball, of sorts - one that can predict future trends such as employment policies, public financing plans and predicted economic growth. Simply put, demand forecasting helps you catch and ride the wave just as it begins to build and crest. This information helps you plan and develop new products and services, as well as expand into new markets. Trade-offs in product features happen all the time and in many different scenarios. You've probably seen these surveys on the web. Another major difference from the buyer's intentions survey is that Delphi surveys are anonymously conducted in a series of rounds, punctuated by an analyst summarizing the opinions expressed in the prior round, then using that analysis to create the next set of questions. The survey answers then give the analyst a specific probability that the person answering the questions will act in a certain way. Let's say your company sells artisanal cheeses, and for the past 15 months, you've experienced a steady uptick in sales of goat cheese. There's another survey-based method of demand forecasting called the Delphi method or Delphi technique. The aggregate probability might then suggest a path forward on a new product that your business is contemplating. For example, experts can use current and historic data to chart trends. However, instead of surveying customers, in this method the business surveys experts. They may have to make a trade-off somewhere. Each round asks the expert to either stick with his prior answer or gives him the opportunity to modify his assessment, based on the way other experts responded. On a media outlet site, for example, you might be prompted to fill out a short survey in order to access the content. Still, it's a helpful and simple method of demand forecasting that most small businesses can use. Your customers can't always buy the perfect product. The final product is a written report on the conjoint analysis that can help your company refine and improve sales, marketing and production plans to better meet your customers' needs and preferences. Then, the experts analyze the data and compare it against other key economic factors, such as employment, inflation and productivity rates. That survey may then pose two or three questions about your intent to buy a particular product in the next six months, for instance, a new car or a hot tub. A small business can also survey its potential customers about their intentions in order to forecast future demand. Extrapolation uses mathematical principles to predict future behavior based on current and historic data. Demand forecasting also estimates how much of a particular product your customers may want to buy, allowing you to create reliable sales forecasts for your business. Either they'll pay more than they planned to for a particular feature or higher quality, or they'll give up on a specific feature for a lower price. When the group of experts reaches that consensus about specific developments in your business's market, you can then use that consensus to help guide future product development, sales and marketing campaigns. There are several different types of methods used in demand forecasting, including buyer's intentions surveys and other forms of quantitative research. The drawback of extrapolation is that it's limited to currently available data when in reality future unforeseen events impact markets all the time. For example, if the question asks how likely you are to buy a new car in the next six months and gives a range of answers from zero (not at all likely) to 10 (a certainty), a response of eight might translate to an 80-percent probability. It's a data-driven perspective on consumer behavior, using quantitative research to access data about how your customers have behaved in the past towards your products and brand. Small business owners and entrepreneurs use demand forecasting to help determine what their prospective and current customers will want in the future. The experts who are surveyed get access to the statistical summary as well as the new questions. Instead, customers find and buy the products that possess the features and attributes they most want and need, meeting as many of their preferences as possible. Conjoint analysis, therefore, is a way to figure out what those most-preferred features are, and what the customer is willing to trade in exchange. You can reasonably extrapolate from that 15-month data sample that the trend will continue and your sales will continue to increase in month 16. The aim of the Delphi method, therefore, is to help a group of experts in your field reach a consensus. For example, a car manufacturer might find customers value lower prices and better fuel economy over larger interior space and more color choices. Intentions surveys ask respondents about what they intend to buy and when they intend to buy in the future.

31/05/2016 · The core value of this method is not only the estimation of average demand volume, but also estimation of time interval length between two non-zero demands, term called as intermittent demand. The Croston method works in two steps. First, separate exponential smoothing estimates are made of the average size of a demand. Generally, there are two approaches to demand forecasting. The first approach involves forecasting demand by collecting information regarding the buying behavior of consumers from experts or through conducting surveys. On the other hand, the second method is to forecast demand by using the past data through statistical techniques. 15/07/2020 · This demand forecasting method allows you to draw on the knowledge of people with different areas of expertise. The fact that the responses are anonymized allows each person to provide frank answers. Because there is no in-person discussion, you can include experts from anywhere in the world on your panel. 13/01/2022 · Demand forecasting is a process of understanding and predicting customer demand for a particular product or category. This process is based on the analysis of historical data of sales and market trends, with the following forecast based on the statistical forecast models such as seasonal, linear, or constant trend.

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