Degree of Master in Applied Textile Management The Swedish School of Textiles

NEW PRODUCT FORECASTING WITH STRUCTURED ANALOGY METHOD IN THE FASHION INDUSTRY

-Case Studies with the Fashion Footwear Products

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**Abstract**

Fashion and the contemporary environment as a whole, is a complex environment that requires retailers and wholesalers to adapt to the changes that constantly occurring. This adaptation is in a bid to ensure that more profits than loses are realized by the company. For this reason, companies have to use various methods to determine the best ways to improve their products. Companies resolve to introduction of new product to the market but the acceptance of new products to the fashion industry is not an assured factor but rather a gamble. This is mainly because of the industry’s characteristics.

The main aim of this thesis is to analyze the methods that may be used to improve the accuracy of new products. The fashion industry has characteristics that may be considered as challenges because for instance, when a product is launched, one has to determine whether it is by a reputable designer or whether it is a trend, and with the fashion industry, trends are mainly turned into such by celebrities who introduce a certain design to the world for adoption. These challenges or characteristics are carefully analyzed and examined with the necessity of the introduction of new products analyzed.

Data collection, being the main backbone of this thesis and multiple-case study method, is used to answer the research question as “How can structured analogy method be used to improve the forecast accuracy for the footwear products in the fashion industry “. Samples for case study have been chosen from footwear category. Structured analogy method is used to determine the accuracy of the information gathered from literature review.

**Keywords**: The Fashion Industry, New Product Forecasting, Structured analogy method, Forecasting, Footwear.
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1. Introduction

Known by everyone around the world, fashion is something that changes from time to time. In the recent years, the fashion industry which consists of apparel, footwear and accessories products, has started to undergo a change rapidly due to many factors. In order to catch this fast transition, companies need to reduce their costs to gain a competitive advantage. Apparel, footwear and accessory companies have started to move their production to developing nations as Egypt, Turkey, China etc. which has lower labor and raw material costs. As a result of that, the term of globalization came up to the fashion world, and consequently lead time increased with sourcing products and materials from Far Eastern. Successful competitors must be able to rapidly deliver product to market, meet customer needs, keep costs under control and facilitate global collaboration (Plm Siemens 2014).

On the other hand, customer buying behaviors became more of an issue in the fashion apparel, footwear and accessories. Because, customer needs are varying and companies need to meet customer satisfactions and demands to have a competitive advantage. Gattorna (2010) also defined that one size fits all approach is no longer viable in a fast changing world, if the companies are sensitive to customer needs and buying preferences, they will be successful.

Technology is also another factor that impacts the fashion industry. Due to the impacts of technology, customers can get information about new trends and brands thus customer requirements can suddenly increase accordingly. Moreover, technology developed to capability of retailer, wholesaler and manufacturer to communicate each other and share information between them. (Maria Elena Nenni 2013)

These changes in trends and life cycles are what results in the fashion industry becoming difficult, complex and competitive. This competition makes the fashion industry to be more diverse in designs but companies need to be able to tell when certain trends and life cycles are not over. In the attempt to tell when a new trend will be in or the acceptance of certain designs, companies and designers have attempted new product forecast (NPF) method or demand forecasting. This has been attempted so as to create a balance in the demand and supply chain in the markets, but there have been challenges to this:
• Entirely new types of products.

• New markets for existing products (such as expanding a regional brand nationwide or globally).

• Refinements of existing products (such as “new and improved” versions or packaging changes).

These instances were covered by (C. Jain 2008) when she said that although 47% of company revenue comes from new products, there was a large disparity due to the forecasting error that was caused; 44% for new to the company and world products, 41% for line extension products, 37% for market extension products and 31% for product improvement products. To combat these errors, there are various NPF methods that can be used:

• Executive opinion – top management provides the forecast.

• Sales roll-up–a bottom-up poll of the sales force

• Delphi method – a structured formal process for anonymously gathering forecasts and building a consensus.

• Prediction market – anonymous wagering used to gather group opinion.

• Structured Analogy – expecting a new product to behave like similar products from the past.

This paper shall use the structured analogy method that requires the identification of real situations from the past that resemble the situation about which a forecast is required. This method provides real information about the real human behavior in situations that are similar to the situation at hand.

The structured analogy method consists of six steps below. According to these six steps Figure 1, new products and existing products that have similar attributes are analyzed.
The science behind is that the data is from random people having different approaches to fashion, and that group of people is selected from a particular group of shoppers depending on their trend-likings. The structured analogy method that includes statistical and judgmental methods is used to see how the footwear category in fashion industry has used it to be able to forecast their fashion. The use of personal judgment is useful in the prediction of the trends that will be seen in sales. Judgment compensates for the lack of historical information in case of an introduction of new product. Judgment also compensates for lack of future information – it may be too difficult or costly to conduct market research tests or to quantify such things as the direction of fads and fashion trends.

In this research, especially the footwear category of the fashion industry was analyzed with empirical research. However the fashion industry was generally examined in literature review because of it consists footwear, apparel and accessory products.

Bearing this in mind, the study shall be focused on three distinct methods of analysis. The main problem being discussed and analyzed by this study will be introduced and why the particular problem is the choice of the study. The next will be the literature review. This review will give one in-depth information about the study with existing studies and information being analyzed to give a proper understanding of the topic. Thirdly, the methodology used for the collection of information in the paper will be detailed, and it introduces accurate information based on the fashion industry. Finally, empirical research will be prepared and presented with quantitative method with the limitations encountered during the study detailed. A conclusion based on the collected information will be presented giving possible results and solutions to the question of product forecasting.
1.1. Problem Discussion

Demand forecasting is one of the bigger challenges for retailers, wholesalers and manufacturer who sell fashion apparel and footwear (McGinn 2013). Demand forecasting has an important role in basic Operations Management as an input for planning activities. Incorrect forecasting leads to excessive inventory, stocks out, low service level, rush orders, obsolescence, inefficient resource utilization and bullwhip propagating through the upstream supply chain. Overly optimistic forecasts lead to overstocks. This situation also causes markdowns and reduction in profit and revenue (McGinn 2013). Regarding to mentioned results, demand forecasting is very important for companies that wants to be leader in the industry. The challenge of demand forecasting, changes according to company and industry. As it will be mentioned in the literature review; in the fashion industry, products have long replenishments lead times, short selling seasons and nearly in accurate forecasts (Maria Elena Nenni 2013).

According to Jain’s Survey (2008), line extension products are composed of 30% of new product sales with highest number in all industries. Kahn (2002) shows that accuracy of line extension new product forecasting is 63% according to previous implemented forecasting techniques. These show that previous quantitative and qualitative methods as customer/market research, jury of executive opinion, sales force composite method, analogy method (looks-like analysis), trend line analysis, moving average, and scenario analysis are unavailable for the fashion products that have a complex structure. Analogy method which is one of the previous implemented methods is available for products having short life cycle. This method is also especially popular technique for new items which are line extensions (K. B. Kahn, Foundations of Applied New Product Forecasting 2006). However, as other methods it is not giving an accurate result. Because of that, author researched all of these methods and decided to use structured analogy method which is a statistical analysis that incorporates human judgments.

1.1.1. Research Question and Purpose

The main purpose of this study is to study the accuracy of structured analogy forecasting technique for new product forecasting of the footwear products in the fashion industry. At the same time, this study will provide more understanding of the characteristics of the contemporary fashion industry. In the light of this information, it will try to reduce forecast error that is
happening because of these characteristics. This topic is chosen because in a competitive environment, companies have to introduce the newest products to compete with other companies, however; the accuracy of methods that are used in new product forecasting is not accurate because of that lack of historical data, uncertainty of demand etc. Structured analogy forecasting technique includes both quantitative and qualitative methods.

The research questions of this paper are defined as “How can structured analogy method be used to improve the forecast accuracy for the footwear products in the fashion industry“. Research samples were chosen from footwear products to answer the research question of this paper. Because footwear is subject to cyclical variations, consolidation, contraction, and closings as well as fashion trends, rapid changes in consumer preferences, the effects of weather, general economic conditions and other factors affecting demand. These factors make it difficult to forecast consumer (Crocs, Inc. 2012).

In the literature review, some knowledge will be examined about forecasting, characteristics of fashion industry, impacts of forecasting to supply chain management, new product forecasting (NPF) and challenges of NPF. Empirical research will be implemented with quantitative methods. In quantitative method; structured analogy method will be implemented for three products from footwear category.

1.1.2. Delimitation

This research focused on the implementation of structured analogy method for new product forecasting in footwear category of the fashion industry. Hence, limitation area of this research is the Turkish market, because products are chosen from one company that provides service and products to Turkish market. Moreover, structured analogy method is used for just line extension type new products.

2. Literature Review

Literature review part provided necessary information to connect with empirical research. The connection between the literature review and empirical research will generate the substructure of this thesis and present a more comprehensible research paper. Relationship between literature
review parts helps us to find answers to the research question “How can structured analogy method be used to improve the forecast accuracy for the footwear products in the fashion industry?”

2.1. Forecasting

Forecasting is a process of operation management that provides matching supply to demand. This process can be used in a different area to throw light on future. To define how much capacity or supply will be needed to meet demand, forecasting is essential (Stevenson 2012). A good forecasting system provides a chance for companies in avoiding problems like inventory shortages and excess, missed due dates, plant shutdowns, lost sales and customers, expensive expediting and missed strategic opportunities (Frank, et al. 2003). Very few companies had the forecasting process about 20-25 years ago. However; now most of the retail companies that want to be successful in their area and market, are using the forecasting system. (C. L. Jain 2007).

The first purpose of forecasting is to provide defining the booking quantity for production capacity (Heden and McAndrew 2010). In these days, the complexity of production planning and ordering increases accordingly so the products produced in South East Asia have long lead time for coming to Western Retailers (Mostard, Koster and Teunter 2010). According to seasonal calendar for a retailer, lead time is a minimum of six months so forecasters have to consider the long term period for the fashion industry. The second purpose of forecasting is to provide purchasing of long lead time materials that must be placed. Materials lead times for production last eight weeks. This lead time is very important to put the products on the stores in exact time (Heden and McAndrew 2010). The third purpose of forecasting is to analyze the best and the worst seller products to choose the next season products. According to this analysis, products in collection are become definite and the company starts to negotiate about risky materials with the manufacturer. The fourth purpose is to calculate the total gross profit, mark up for a whole season (Heden and McAndrew 2010). These calculations show whether the company achieved their sales target or not.

2.2. Fashion Industry Characteristics

Apparel and footwear industry has shortening life cycles, increasing product variety, and globalization of sourcing and manufacturing. The products in this industry are characterized by
high demand uncertainty, high stock out costs and a high risk of obsolesce (Mostard, Koster and Teunter 2010). Lee (2002) defines that situation of “Fashion Industry” in Figure 2. According to this table, Fashion apparel products are “High Demand Uncertainty” and “Low Supply Uncertainty” and basic apparel products are “Low demand uncertainty” and “Low Supply Uncertainty”

Figure 2-Demand and Supply Uncertainty Matrix with Examples of Products (Lee, 2002)

On the other hand, fashion industry includes the following characteristics: short life cycle, high volatility, low predictability, and high impulse purchasing.

**Short Life Cycle:** In the fashion industry, products are often ephemeral and most of the time their sales time is very short like seasonal or one period product (Christopher, Lowson and Peck 2004). Each season, trend can change and hereby demand can change. Ninety-five percent of SKUs (Stock Keeping Units) change every selling season. Hence historical demand data is absent for demand forecasting (Mostard, Koster and Teunter 2010).

**High Volatility:** Demand can be affected by different variables like weather, films, footballers, pop stars (Christopher, Lowson and Peck 2004). For example, after chocolate film, demand increased towards different kinds of chocolate products also popularity of chocolate color increased as trends.

**Low Predictability:** Because of the volatility of demand, it is extremely difficult to forecast with any accuracy even total demand within a period, let alone week by week or item by item demand.
**High Impulse Purchasing:** Many buying decisions by consumers for these products are made at the point of purchase. In other words, the shopper when confronted with the product is stimulated to buy it; hence, the critical need for availability of sizes and colors.

**2.3. Demand Forecasting in Fashion Industry**

Fashion industry has lots of complex processes and have long lead time from fiber to distribute stores as Figure 3. Hence, if one of these processes is failed, the others also can be affected as bullwhip effect.

![Figure 3-Steps that Impact Lead Times of Fashion Industry](image)

Due to the competitive environment and unpredictability of consumer demand in fashion industry, companies have to meet the customer' demands and needs in the shortest time and with the best price. On the other hand to offering the best price to the customers, companies have to decrease the production cost, so they produce their products in countries that have the low cost manufacturing process as Asia or South America. However, in this situation, product lead time gets longer and this situation leads to some problems as delaying, out of stock, unsold and not keeping right inventory level (Thomasey 2010). On the other hand, forecasting system has to consider some specialty of clothing industry as follows.

**Horizon of forecasting:** To sales forecasting, a short time and a long time horizon is required. Whereas in a long time horizon, planner could forecasts for orders before one year and in a short time horizon, they forecast could just before 3-4 weeks. Short time horizon generally is used for replenishment for orders which is just sent to local stores.
**Life cycle of items**: The life cycle of items define the evolution of the sales from introduction to the end of the product distribution. The life cycle is divided into four stages as introduction, growth, maturity and decline that are showed in Figure 4.

However, in fashion industry, life cycle of items can be different because of those kinds of products. For example, basic items are sold in whole year or each year whereas fashion items state short time in stores because of trend.

![Figure 4-Product Life Cycle](image)

**Aggregation of sales**: Fashion Products have different level, size and color. In forecasting, the smallest part of collection is called as SKU and planners forecast on SKU level to find more accurate results. This variability of SKU complicates the forecasting.

**Seasonality**: Fashion industry has seasonal fluctuation according to time of the year. Some of the fashion products are produced according to the season. For example, wool sweater sell in fall and winter season whereas swimwear products sell in spring or summer. Therefore, seasonality needs to be integrated into forecasting system.

In addition, fashion industry has some explanatory variables like weather data, calendar data, marketing strategy, political, features of items, macro-economic and trend data (Thomasssey 2010). Some of them will be defined in 2.7.section.

**2.4. The Impacts of Forecasting in Supply Chain Management**

The aim of the supply chain management (SCM) is to ensure that supply meets the demand. Also SCM contains all the activities that coordinate and manage whole organizations to bring a
product to market, including procuring raw material, producing products, transporting and distributing products and finally selling process. Because of these processes, demand forecasting has a very complex structure (Matilla, King and Ojala 2002). In addition, as explained in “Characteristics of Fashion Industry” section, volatility of demand and short life cycle make this structure even more complex. To provide more accurate forecasting in products have short life cycle, lead time needs to be shorter. Shorter lead time means forecasting horizon is shorter. Christopher et al. (2004) mentioned that organizations that seek to compete successfully in fashion market, must manage three critical lead times as following.

Time to market: Companies which are slow to market have loss of sales in two ways. First of them, they will miss the sales opportunity and they will not be able to replenish. Second of them, when products come to the market place, demand will start to fall away. Hence, companies will focus on the flexibility and reduce time to market.

Time to serve: In fashion industry, companies have to place order to supplier before many months from sales season. According to typical lead time, nine months are normal. Hence, lead times are very long. However, lead time is not only about manufacturing and delivery time but also about an order process and documentation which take time like them.

Time to react: In the fashion industry, it is important to be more responsive towards changes in demand. The fundamental problem of companies is the time that takes for sourcing material and distribution of products. Most of the time, this lead time is longer than the time that customer waited for product. This difference between logistic pipeline and the customers’ order cycle is called lead–time gap by Christopher et al. (2004). This gap could fill with a forecast based inventory.

The accuracy of forecasting is very important for SCM because accurate forecasts provide efficiency to SCM whereas inaccurate forecasts lead to excess of materials or shortages of materials. Shortages of materials can lead to delay of products and any delay in the SCM can affect the other processes as is in bullwhip effect (Stevenson 2012). At the same time, shortages of products in stores can lead to out of stock so to the loss of sales. However, excesses of materials also lead to inventory cost, logistic cost and markdown through high unsold (Matilla, King and Ojala 2002)
On the other hand, Mendes (2011) gives some examples about demand management process and impacts of forecasting.

- Having the right product on the shelves will increase sales and customer loyalty.
- Improved forecasting can reduce raw material and finished goods inventories.
- Smoother operational execution will reduce logistics cost and improve asset utilization.

Thomassey (2010) mentioned that advanced forecasting technique provided following benefits:

- Reduction of the bullwhip effect
- Reduction of lost sales, markdowns and consequently increase profit margin.
- Possibility for the supplier to smooth out production, to optimize its recourse, to decrease costs and to improve the effectiveness of retailer’s sourcing strategy.

2.5. New Product Forecasting

New product forecasting is a recurrent challenge for consumer goods manufacturers and retailers (Gilliland and Guseman 2010). According to Jain’s survey (2008), 47% of company sales come from new products in apparel and footwear industries. Along with the product improvement, line and market extension and development for a new market, companies introduce new products or services. On the other hand, Jain (2008) mentioned that new product introductions are necessary for companies to compete with other companies. In the fashion industry, there are new product strategies to increase company revenue and meet the customer’s wants and needs.

2.5.1. New Product Strategies in Fashion Industry

As mentioned in Figure 5, “Product-Market Matrix”, matrix separate four parts as Product development, Diversification, Market development, Market penetration. These parts help companies to decide how to improve sales, existing products or services or develop new products or services and market opportunities.

In product development, products are new but the market exists. In this way, while companies are getting to have the more diverse product line, they can reduce the risk in markets and also
fend off competitors. In **market development**, products exist but the markets are new. New uses and new market products are the characteristic of a market development strategy. In **diversification**, markets and products are new so the products that are introduced to the world and new categories entries are diversification strategy. In **market penetration**, markets are new but the products exist. The aim of this strategy is to increase the market shares with existing products. Furthermore cost and product improvements are market penetration strategies (Mendes 2011).

Moreover, Mendes (2011) described new products as seven types. These are new products focused on cost reductions, product improvement, line extensions, new market products, new uses, new category entries and new to the world products. According to Jain’s Survey (2008), when all industries were analyzed, new product sales as a percentage of total new product type are that:

**Line extension** products are 30%,

**Product improvement** products are 20%,

**New To Company & World** products are 18%,
Market extension products are 15%.

Others are 17%.

In new product introductions, success factors such as internal and external are defined as follows by Simon:

Internal factors: Fit the company, patent protection, proactive vs. reactive stance, commitment to growth and innovation, organization, financial requirements.

External Factors: Market size, customer needs, distribution channels, competition, government regulations.

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**Figure 6** - New Product Sales as a Percentage of Total New Product Types (Jain, Chaman L. 2008)

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2.6. Challenging New Product Forecasting

Companies are fully aware of the benefits of new product introductions as well, and most of the companies are dissatisfied with their new product forecasting results and process, since error rate for new products can be as twice high according to existing product (Simon 2010).
Kahn (2002) defined that total average of forecast accuracy of new product forecasting is 58%. As seen below Figure 7, accuracy as per category is:

**Cost improvement forecast is 72%**,  
*Product improvement forecast is 65%*,  
*Line extension forecast is 63%*,  
*Market extension forecast is 54%*,  
*New category entry forecast is 47%*,  
*New to the world product forecast is 40%*.

![Figure 7 - Percent of Accuracy in New Product Types (Kahn KB, 2002)](image)

The reasons that decrease the accuracy of new products forecasting are as below; (Simon 2010)

- Limited historical data
- Operational problems
- Using of judgment
- Optimistic bias of the new product development team
- Long planning horizon
2.7. Variables

There are some variables that impact the forecast quality. These impacts also affect the forecast result of the structured analogy method. In forecasting, some variables are able to be calculated in order to improve forecasting.

**Price:** In the retail industry, price is an important thing to gain customers. Companies can use the price as a weapon to increase the sales. At the same time, the amount of unit sales depends on the price. Generally, when prices decrease, unit sales are supposed to increase. However, to find how sales increase or decrease with impact of price, the item’s elasticity needs to be determined.

**Store:** Demand shows the variation according to store location. Some products have higher demand in specific area and regions. For example, snow shovels have higher demand in Northern Ontario than in Vancouver (Stevenson 2012). At the same time, according to customer demographics, the regions in which young and old population live show different buying behavior and different demands.

**Seasonality:** Some products in the fashion industry have high seasonality characteristics. For summer and winter season, companies make different collections and merchandise categories occur during one single season.

**Promotions &Discounts:** The type of promotions and the degrees of discount are important impacts that increase the unit sales of an item. Promotional techniques include weekly circulars, store signage, end caps and other special product displays, manufacturer coupons and rebates (Stevenson 2012).

**Product Placement:** The capacity of the shelf, as well as location of product on the shelf, impacts the increase or decrease of sales. A diagram that shows how and where specific products should be placed on the shelves, called a planogram, is created to help maximize sales (Stevenson 2012).

Moreover; weather, unusual events, competitor price, product life cycle, religion, product availabilities are variables that affect forecast results.
2.8. New Product Forecasting Methods

There are two general approaches to forecasting; namely quantitative and qualitative. Quantitative methods consider historical demand data and are analyzed by different technique. Quantitative techniques avoid some personal and optimistic bias whereas qualitative technique allows some human bias and opinions. Kahn (2002) mentioned in the Figure 7 that most, popular new product forecasting methods are customer/market research, jury of executive opinion, sales force composite method, looks-like analysis (analogy method), trend line analysis, moving average, and scenario analysis. Gilliland et al. (2010) also mentioned common new product forecasting methods as executive opinion, sales roll-up, Delphi method, prediction market, analogy. Whereas Kahn kept analogy method under the quantitative method heading, Gilliland kept it under the qualitative method. On the other hand Gilliland et al. (2010) presented the structured analogy method that includes judgment and statistical analysis. Hence Structured analogy method will be examined as combination of quantitative and qualitative methods.

Most common methods are briefly explained as below to understand forecasting methods that were used previously and shed light on structured analogy method.
Figure 8-Accuracy of New Product Forecasting Technique in New Product Type

2.8.1. Qualitative Methods

Customer –Market Research

In this approach, data about the customers and the market is collected. Marketing research usually involves constructing a questionnaire that covers economic, marketing, personal information etc. (Mentzer and Moon 2005). Researchers collect data from shops, retail outlets where customers have been and tasted, felt and smelt the products. This technique categorizes as following (Mendes 2011):

- Concept testing
- Product use testing
- Market Testing
- Premarket Testing
**Jury of Executive Opinion**

This technique is often used for long term planning and new product development. Advantage of this approach is its simplicity of use. Furthermore, it brings together the talents of various managers. This group meets and develops a forecast (Stevenson 2012). On the other hand, this approach has some disadvantages. People who have strong leadership in a group impose their opinions on the others. Also high cohesiveness and insulation of the group are the other disadvantages (Mentzer and Moon 2005).

**Sales Force Opinion**

Sales staffs or customer service staffs are the closest people to the customers. Moreover, they could observe customer' buying behavior and provide information to planners and buyers for the future use. However, these people are sometimes influenced by recent experiences. Hence, if sales are low, they may tend to become pessimistic or if this is an exact opposite, they may tend to be too optimistic (Stevenson 2012).

**Scenario Analysis**

In this method, scenario is developed to predict the future. There are two types of general scenario analysis. First, “Seed trends” are used to help describing current market trends and characteristics. According to this, future states are defined. The other type is a normative approach. Forecasters leap to the future with or without consideration for current trends (K. B. Kahn 2006, 41-42).

**Delphi Method**

This method helps predict mid to long term horizon company sales levels or long term industry sales. In this technique, participants who has defined their bias, don’t meet face to face and their opinion and answers are kept nameless. This situation eliminates the disadvantages of group thinking. Disadvantage of this technique is to have low reliability and it is very time consuming and expensive too (Mentzer and Moon 2005).

**2.8.2. Quantitative Methods**

**Time Series Techniques**
Trend Line Analysis

Aim of this method is to analyze sales data either graphically or mathematically. According to trend of sales, future sales are assumed to have the same trend (Mendes 2011).

Moving Average

This technique uses some of the more recent sales data in calculation of a forecast. Shorter moving averages adjust better than longer ones because they are more quick to change in level. However; the disadvantage of moving averages is that they put some weight to all past periods of data in determining the forecast (Mentzer and Moon 2005).

Exponential Smoothing Techniques

The aim of the exponential smoothing technique is to put greater weight on the more recent periods than the older periods. The use and understanding of this approach is easy. This technique doesn’t consider trend and seasonality. One assumes that any fluctuations and general increase or decrease will not be in the future. The value of $\alpha$ in the forecast defines how to react against to changing in level. High value is quicker to react, and because of that forecast gives more weight to recent periods (Mentzer and Moon 2005). Furthermore, although exponential smoothing doesn’t consider trend and seasonality, trend and seasonality could be calculated with a formula that includes trend and seasonality.

Regression Analysis

Regression analysis is used in the analysis relationship between dependent and one or more independent variables. Mendes (2011) defines four regression analysis techniques as following;

- Linear Regression
- Event Modeling
- Nonlinear Regression
- Logistic Regression
2.8.3. Combination of Quantitative and Qualitative Methods

Structured Analogy Method

Looks like analysis technique is also called “Analogy”. The aim of this technique is to analyze historical data patterns and define new product’s sales patterns (K. B. Kahn 2006, 85-86). Forecasting by analogy method is a common practice. Moreover, for products that have short life cycles in the same range, this method provides efficiency to plan (Szozda 2010).

Analogy means concepts that have complex and new structures and are made clear by similar characteristics of known concepts. Analogous data express similar market conditions, similar product characteristics and level of innovation also these data offer the sales pattern from existing product that has similar characteristics for new products (K. B. Kahn 2006, 86). In the sales patterns of existing products, sales should be divided according to months in time horizon. Percentage of sales will provide a view of the ratio of whole sales that were achieved in the whole time frame. The result of this, forecasters could find future sales for new products with this sales ratio. Forecasting is made by pulling historical data of past new product introductions and aligning profiles of their introductory phase sales (Gilliland and Guseman 2010).

According to the new product types, to forecast product improvement and cost improvement, new product types are used respective to a product’s historical demand data. Moreover, forecast of line extension, new use, new market, new category entries and new to the world products are used (K. B. Kahn 2006, 85-86)

Analogies are used in different areas to forecast the future for new things that have the lack of historical data. For example, software development projects to predict the cost of new project, real estate agents to define selling price, Vietnam War to make the decision earlier (Armstrong and Green 2007).

The use of judgment helps to compensate the lack of historical information for new products that have no historical data. At the same time, to forecast some products, forecasting methods could be expensive and difficult. For example, even the best software program can’t tell us fashion trends. Green or orange can be the trendy color for this year or you can see textile products with punch-ins everywhere. For these forecasts, you have to use judgment. However, sometimes to
use judgment could lead to wrong results with optimistic bias. For example, if people who want to sell new products or develop this new product could have some optimistic bias and they could believe that this new product will be the best seller. Hence, people who will forecast new product sales have to behave honestly as they are forecasting (Gilliland and Guseman 2010).

Moreover, Armstrong et al. (2007) mentioned that structured judgmental process made more effective use of the information that people possess. Furthermore, he defined that structured analogy forecasting is more accurate than unstructured analogy forecasting.

Gilliland et al. (2010) defined that structured analogy method has some characteristics that show differences from analogy:

1) It uses statistical analysis that incorporates human judgment.

2) It attempts to remove judgmental bias by providing a historical context for each decision.

3) It attempts to test and validate decisions.

4) It provides a statistically driven process to select the analogy.

By these characteristics, bias that isn’t based on enough information and reality could be eliminated and improved for more accurate forecast results.

Armstrong also indicated five steps to find accurate forecasts with structured analogy method. These are as following:

1) Describe the target situation

2) Selects experts

3) Identify and describe analogies

4) Rate similarity

5) Derives Forecasts

However, whereas Armstrong et al. (2007) defined the above steps, Gilliland et al. (2010) indicated the following six steps:
1) Query to find products that have similar characteristics

2) Filter to remove unsuitable

3) Cluster to divide candidate products according to the sales pattern

4) Model to implement the most suitable statistical method.

5) Forecast with chosen statistically method

6) Override to amend with manual to statistical forecast result.

2.9. Accuracy

Accuracy of forecasting could affect a lot of things from the manufacturer process to distribution process. Kahn (2003) divided these effects to over forecast and under forecast. Whereas over forecasting leads to excess inventory, inventory holding cost, transshipment cost, obsolescence, reduced margin; under forecasting leads to order expediting cost, higher product cost, lost sales cost, lost companion product sales and reduced customer satisfaction.

Companies could lose a lot of revenue due to inaccurate results. Hence they have to use performance metric systems to measure the forecasting results. According to this accuracy, they have to try to reduce the forecasting error rate. To measure forecast quality, the following methods are used;

Mean Error: This shows how one’s forecast is close to sales or not. However, this technique could not give an exact result. Since positive and negative errors can neutralize each other and this gives unreal results.

Mean Absolute Error: This method eliminates problems in mean error method by simply looking at the absolute value of each value. However, still there is a problem because that error is not weighed according to larger errors and smaller errors.

Sum of Squared Errors: This calculation provides numbers as positive and magnifies the larger errors. However, again this doesn’t provide more intuitive measure of absolute error than SSE.
Mean Absolute Percent Error: This method shows what average percent the forecast has been off at any point in time. However it doesn’t give how forecasting has been in the recent past.

Percent Error: This gives us strong intuitive appeal and tells us by what percent the forecast was off in a given month. However, this doesn’t provide performance over a number of periods (Mentzer and Moon 2005).

3. Methodology

In this section, methodology of the research paper was explained and offered to readers for evaluation of the thesis. In the empirical research, quantitative method was used as case study which was chosen as the main research strategy, as explained on section 3.1.

3.1. Research Design

Yin (2003) defines that the case study research method as a research tool that investigates a contemporary phenomenon within its real life context; when the boundaries between phenomenon and context are not readily identifiable.

According to Glasser & Strauss (1967), a case study strategy provides data for building theory that contributes to existing knowledge, by examine from another perspective using the self as a research instrument.

For this study, author decided to implement multiple-case study. Multiple case study is generally regarded as more persuasive than single case study. Consequently this makes the study more robust (Herriott and Firestone 1983). On the other hand, Yin (2003) mentioned multiple case studies allow better generalization of the research result. Multiple case studies also provides the potential for generalizability of findings (Miles and Huberman 1994). A case study provides new knowledge for future studies and has complex structure that needs to good research.

All of the above reasons provide justification and clarification why author have chosen case study research method with structured analogy method. This method helps to answer research question and fulfill the purpose of the thesis.
3.2. Data Collection and Data Analysis Method

Data collection method is critical task of the research methodology since it is the tool which is used to discover answers to the research question (Kaperi 2011).

In this section, the quantitative method is used and implemented structured analogy method on three samples which are chosen from the footwear category.

For this research, structured analogy method and its processes are analyzed with literature review. Steps of case study are assigned according to steps in study of Gilliland & Gusseman as mentioned in literature review. Gilliland and Gusseman implemented this method to forecast DVD sales and in this research, this method will be tried to adapt the footwear category of fashion industry. Due to the differences between DVD industry and the fashion industry, some steps are adapted according to these differences. Also whereas Gilliland and Gusseman are using SAS program, Ms excel is used in these case studies. According to result, structured analogy method will be examined whether the fashion industry is suitable for this approach or not.

After that, category was chosen for implementation. While analyzing these existing products, the company’s data collection system was used. With this system, sales, stocks and prices were examined daily, weekly and monthly.

The products that used in the case study is chosen from the footwear category due to the working area of the author. For this study, author chose three products from different seasons and genres. To analyze first new product, existing products were chosen between products that sold in Turkey 2012 spring summer (SS) to forecast new product in 2013 spring summer (SS). The other second and third products were from same season and same genre, so existing products are chosen between products that sold in Turkey 2012 autumn winter (AW) to forecast new products in 2013 autumn winter (AW).

However; there were some differences between new and old seasons as store quantity, sales people, store place, holiday dates, weather, fashion trend etc. In 2012 SS season whereas store quantity was 88, in 2013 SS season was 140. In the same time, in 2012 AW season whereas store quantity was 133, in 2013 AW season was 170. Moreover all of the sales people who work in this company didn’t stay same, some of them changed. Moreover in 2013 and 2012, religious
festival dates were different and this situation affected sales differently. Some of the stores closed and opened in another place. As we mentioned in literature review, all of these changes are a challenging part of new product forecasting in the fashion industry and make difficult to forecast.

After a chosen category and existing products, existing products were looked at and divided according to their characteristics, sales, stocks, price, and season etc. Secondly, for new products, each existing product was graphed and found to similar characteristics of both existing and new product. According to graph and similar characteristics, some existing products were eliminated after some practices and the best fit product was found. Results of these processes, statistical methods were implemented with the help of excel.

In this method, out of mentioned above changes, there are some limitations. Due to the fact that time is limited; just three categories have been examined for this research and sales should be followed for one more year. On the other hand, used products for case studies were sold in the Turkey market.

3.3. Trustworthiness of the Study

Trustworthiness and credibility are important to ensure quality of the study (R. Yin 2009). Yin (2009) presents four criteria upon the quality of a case study can be assessed and judged. These are construct validity, internal validity, external validity and reliability.

Construct validity

Construct validity has to do with identifying suitable operational measures for the concepts being studied (Yin, 2009). Case study research can achieve construct validity by developing its constructs through literature review, use of multiple sources of evidence, establishing a chain of evidence, and having key external informants review draft case study reports.

Construct validity test has been met by having realized sales of the product samples that has been taken from a fashion company in Turkey. The evaluation measures are the examination of the case studies' comparisons with the previous studies in mentioned literature review. This ensured by following the six steps of structured analogy method constructed based on the literature review.
**Internal validity**

To achieve internal validity, it is important to establish causal relationships, through which given conditions lead to other conditions (Yin, 2009). This has particular importance in the phase of data analysis. In this research the main purpose of this study is to study the accuracy of structured analogy forecasting technique for new product forecasting of the footwear products in the fashion industry. Case studies were structured in such a manner that results of the structured analogy method would be able to provide answer about the accuracy of the footwear products in fashion industry. The literature review provides evidence for the implementation of the structured analogy method, variables and challenges of the fashion industry. These issues help to establish internal validity for this study.

**External validity**

External validity is to which degree the thesis’ findings can be generalized (Yin, 2009). This is a giant challenge in case studies where the findings are analytical instead of statistical. Critics claim that generalization in a single case study is not always possible. In this research, multiple case study is implemented which increases the external validity of this research. The conclusions from this research can be generalized because multiple products have been analyzed and external validity has been established.

**Reliability**

If the operations of a study, in this case primarily the data collection procedures, can be repeated with the same result, the reliability is high (Yin, 2009). The most important step to undertake in order to increase reliability is to document all the procedures undertaken in the study. Reliability of this study has been established by providing real company sales data. However in this case the author, who has experience about footwear fashion products as a planner, took an active part and influenced judgment part of the forecasting process. Because of that, the result is as well subjective much as be numerical. As mentioned literature review, forecasting is very dynamic process and it can be constantly changing. This situation can affect reliability of this study and this challenge of forecasting in the fashion industry cannot be controlled. This method is applicable on fashion products however; it cannot give exact result because of the uniqueness of products and variables of the fashion industry.
4. Empirical Research

Literature review section has provided necessary information for background of empirical research. This section will provide the details of the empirical findings. As mentioned in the methodology section, empirical research will continue according to six steps (Query, filter, cluster, model, forecast, override) in study of Gilliland & Gusesman.

The empirical research of this paper is constituted of three case studies: The implementation of structured analogy on three shoes samples. The aim of the implementation of the structured analogy method is to show how to use this method to improve the accuracy of forecasting.

4.1. First Product

To analyze the said new product and forecast its profitability, the company takes into consideration the different shoe types that already exist, and try and match their attributes to the new product. This relation will aid the company to value their product and its relevance to the targeted market. With diversity in shoe type and shoe fabric, the analysis must be as close to the product as possible so as to make the most accurate forecast.

**New Product Attributes**

**Product Type:** Shoes

**Genre:** Flat

**Fabric:** Woven-Canvas

**Color:** Ecru-Flower printed

**Gender:** Woman

**Size:** 36-40

**Season:** 2013 spring and summer

**Manufactured in:** China

**Price:** 39,99TL
Store Quantity: 140

Query Step

To analyze first new product, existing products were chosen between products that sold in Turkey 2012 spring summer (SS) to forecast new product in 2013 spring summer (SS).

This analysis of the shoe ‘genre’ would give the company a slight forecast that their new product might be accepted due to the sales percentage of flats(24%), but this is just the beginning to the analysis. The positive aspect of one attribute in relation to a new product is not a conclusive aspect but rather a tilt of sales in a company’s favor.

<table>
<thead>
<tr>
<th>Genres</th>
<th>Option</th>
<th>Total Sales Quantity</th>
<th>Total Sales Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flats</td>
<td>25</td>
<td>16.297</td>
<td>24%</td>
</tr>
<tr>
<td>High Heeled Shoes</td>
<td>4</td>
<td>577</td>
<td>1%</td>
</tr>
<tr>
<td>Moccasin</td>
<td>6</td>
<td>4.667</td>
<td>7%</td>
</tr>
<tr>
<td>Peep Toe Shoes</td>
<td>2</td>
<td>1.679</td>
<td>3%</td>
</tr>
<tr>
<td>Platform Shoes</td>
<td>2</td>
<td>1.838</td>
<td>3%</td>
</tr>
<tr>
<td>Sport Shoes</td>
<td>17</td>
<td>37.395</td>
<td>56%</td>
</tr>
<tr>
<td>Wedge Heeled Shoes</td>
<td>4</td>
<td>4.943</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
<td><strong>67.398</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Figure 10-Ratio of Sales According to Genres

After the analysis of the shoe ‘genre’, an analysis that pertains to the fabric of the shoe was carried out to determine whether the new shoe’s fabric was as popular as the company would like to believe. After flats were analyzed, woven flats were examined. Result of this, rate of sales of woven flats was 41% and option quantity was six.
<table>
<thead>
<tr>
<th>Fabrics</th>
<th>Option</th>
<th>Total Sales Quantity</th>
<th>Total Sales Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lace</td>
<td>2</td>
<td>1611</td>
<td>10%</td>
</tr>
<tr>
<td>Polyurethane</td>
<td>11</td>
<td>7253</td>
<td>45%</td>
</tr>
<tr>
<td>Sued</td>
<td>6</td>
<td>736</td>
<td>5%</td>
</tr>
<tr>
<td>Woven</td>
<td>6</td>
<td>6697</td>
<td>41%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25</strong></td>
<td><strong>16297</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Figure 11-Ratio of Sales According to Fabric Types

With the chosen fabric not being a major seller but being second, the company can forecast that with the popularity of the shoe type and the fabric, it may be profitable with the introduction of their new product. To improve the company’s forecasting, existing flats were examined and their sales trends were determined. The companies may use these trends as stepping stones in the forecasting of their product sales. Moreover, existing flats were examined in Figure 12 with sales trend and pictures. Each code was examined and sales trend line of these products was graphed.

In Figure 12, “LINE” shows basically sales trends of the existing products that sold in Turkey 2012 spring summer (SS) during this term.
<table>
<thead>
<tr>
<th>CODE</th>
<th>LINE</th>
<th>PICTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B4410AZ</td>
<td><img src="image1" alt="Trend Line" /></td>
<td><img src="image2" alt="Picture" /></td>
</tr>
<tr>
<td>B4422AZ</td>
<td><img src="image3" alt="Trend Line" /></td>
<td><img src="image4" alt="Picture" /></td>
</tr>
<tr>
<td>B4435AZ</td>
<td><img src="image5" alt="Trend Line" /></td>
<td><img src="image6" alt="Picture" /></td>
</tr>
<tr>
<td>B6027AZ</td>
<td><img src="image7" alt="Trend Line" /></td>
<td><img src="image8" alt="Picture" /></td>
</tr>
<tr>
<td>B6028AZ</td>
<td><img src="image9" alt="Trend Line" /></td>
<td><img src="image10" alt="Picture" /></td>
</tr>
<tr>
<td>B6029AZ</td>
<td><img src="image11" alt="Trend Line" /></td>
<td><img src="image12" alt="Picture" /></td>
</tr>
<tr>
<td>B6030AZ</td>
<td><img src="image13" alt="Trend Line" /></td>
<td><img src="image14" alt="Picture" /></td>
</tr>
<tr>
<td>B6861AZ</td>
<td><img src="image15" alt="Trend Line" /></td>
<td><img src="image16" alt="Picture" /></td>
</tr>
<tr>
<td>B6888AZ</td>
<td><img src="image17" alt="Trend Line" /></td>
<td><img src="image18" alt="Picture" /></td>
</tr>
<tr>
<td>B7789AZ</td>
<td><img src="image19" alt="Trend Line" /></td>
<td><img src="image20" alt="Picture" /></td>
</tr>
</tbody>
</table>

Figure 12-Existing Products with Trend Line and Codes for First New Product
Filter Step

It was noticed that during the launch of the shoes, majority of the designs began with a lot of steam and sold well but as they began to saturate the market, their demand and purchase began to fall. The only rise that was experienced was during the launch of the shoe type under the code B6030AZ that was new to the market. It maintained a plateau state in sales as it launched but peaked when most similar products were falling in sales. The designs may seem similar but have a small twist that attracted many buyers; a fact that a company must take into consideration. In the entrance into a field that is already dominated, a company must not lift or copy other products exactly, but rather, attempt to maintain a sense of originality that will attract buyers and customers. On examination it is obvious that the life cycle of similar products is between 10-14 weeks but with the product lead times being as long as 6 to 8 months, companies that wish to make big profits must be able to forecast and come up with the best products that will be popular and trending during the launch period. The structured analogy method helps here because similar products and their life cycles are examined and their profitability or hold in the market is determined. The findings related as closely as possible to the new product so as to come up with an accurate forecasting. The application of the structured analogy method will curb if not reduce the difficulty that is encountered with the short planning time.

Figure 13-Sales Graphic of Existing Products for First New Product
Cluster Step

On separation, the cluster step was enacted where the best products that were the most similar to the new product were separated and examined individually with all the aspects that affected its sales. Candidate products were clustered according to their sales pattern and used judgment to select appropriate product.

For this case study, the shoe under the code B6028AZ, was taken into consideration because of shared attributes. Its sales figures and ratios were examined and tabulated to discover the period when the product was on high demand resulting in a high number in sales.

![Graph of Existing Products After Inappropriate Products are Eliminated](image1.png)

Figure 14-Graphic of Existing Products After Inappropriate Products are Eliminated

**Base Product**

**Base Existing Product Attributes**

**Product Type:** Shoes

**Genre:** Flat

**Season:** 2012 spring and summer

**Price:** 35,99TL

**Gender:** Woman

![Base Product for First New Product](image2.png)
Store Quantity: 88

Production Place: China

Size: 36-40

Color: Ecru-Flower printed

![Graph of Sales](image)

Figure 16-Sales Graphic of Base Product for First New Product

**Model Step**

After the tabulation and examination, it had been concluded that the product had great sales figures at the beginning of spring and continued to hold on to the numbers as the seasons moved and dropped as Summer was going away. Despite the decrease, it was discovered that the product experienced an increased demand during the 2013 summer and spring seasons. This resulted in increased prices that consequently would have higher revenues for the company. Owing to the increased interest in the specific shoe, it would be safe to forecast that if a company was to come up with close to similar designs and the life cycle of the ballerina shoes continued on, it would be safe to assume that the company would have great profits provided the shoe remains within the trending fashion designs.

To forecast new product, launch profile model was chosen. Sales of product were divided according to weeks and for each period, sales percentage was found. Therefore, baseline launch profile was examined.
<table>
<thead>
<tr>
<th>Weeks</th>
<th>Sales (B6028AZ)</th>
<th>Ratio (B6028AZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>0</td>
<td>0,00%</td>
</tr>
<tr>
<td>12</td>
<td>0</td>
<td>0,00%</td>
</tr>
<tr>
<td>13</td>
<td>0</td>
<td>0,00%</td>
</tr>
<tr>
<td>14</td>
<td>0</td>
<td>0,00%</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0,00%</td>
</tr>
<tr>
<td>16</td>
<td>2</td>
<td>0,22%</td>
</tr>
<tr>
<td>17</td>
<td>99</td>
<td>11,04%</td>
</tr>
<tr>
<td>18</td>
<td>159</td>
<td>17,73%</td>
</tr>
<tr>
<td>19</td>
<td>134</td>
<td>14,94%</td>
</tr>
<tr>
<td>20</td>
<td>124</td>
<td>13,82%</td>
</tr>
<tr>
<td>21</td>
<td>52</td>
<td>5,80%</td>
</tr>
<tr>
<td>22</td>
<td>38</td>
<td>4,24%</td>
</tr>
<tr>
<td>23</td>
<td>33</td>
<td>3,68%</td>
</tr>
<tr>
<td>24</td>
<td>33</td>
<td>3,68%</td>
</tr>
<tr>
<td>25</td>
<td>29</td>
<td>3,23%</td>
</tr>
<tr>
<td>26</td>
<td>27</td>
<td>3,01%</td>
</tr>
<tr>
<td>27</td>
<td>27</td>
<td>3,01%</td>
</tr>
<tr>
<td>28</td>
<td>17</td>
<td>1,90%</td>
</tr>
<tr>
<td>29</td>
<td>19</td>
<td>2,12%</td>
</tr>
<tr>
<td>30</td>
<td>10</td>
<td>1,11%</td>
</tr>
<tr>
<td>31</td>
<td>21</td>
<td>2,34%</td>
</tr>
<tr>
<td>32</td>
<td>18</td>
<td>2,01%</td>
</tr>
<tr>
<td>33</td>
<td>13</td>
<td>1,45%</td>
</tr>
<tr>
<td>34</td>
<td>27</td>
<td>3,01%</td>
</tr>
<tr>
<td>35</td>
<td>0</td>
<td>0,00%</td>
</tr>
<tr>
<td>36</td>
<td>5</td>
<td>0,56%</td>
</tr>
<tr>
<td>37</td>
<td>4</td>
<td>0,45%</td>
</tr>
<tr>
<td>38</td>
<td>3</td>
<td>0,33%</td>
</tr>
</tbody>
</table>

Figure 17-Ratios of Sales for Base Product
Forecast Step

After ratio of base existing product was found, author adapted this base line ratio to new product as below Figure 18. Model B6028AZ was offered to sale in week 17\(^1\) of 2012 spring/summer season in 88 stores in Turkey.

According to last year, store quantity and price increased in 2013 spring/summer. Whereas in 2012, store quantity was 88, in 2013 it is 140. At the same time, B6028AZ’ price was 35,99TL, new product price is 39,99TL. Moreover B6028AZ was offered to sale in week 17; new product was offered to sale in week 13\(^2\).

In the light of this information that will able to affect forecasting result, new product sales were forecasted. Firstly, rate of sales of B6028AZ was adapted to new product in the manner that launch time would be week 13. Secondly, for B6028AZ, units per store per week were found and this number was adapted to new product with new store quantity. However, while adapting new store quantity to base line; author accepted that new stores had the same customer group and the same sales level.

![Figure 18-Adaptation of Data of Base Existing Product for New Product](image)

Override step

\(^1\) Because of that sales of 17. week are small, author didn’t consider this week and didn’t accept as launch week.

\(^2\) Because of those sales of 11.and 12. weeks are small, author didn’t consider these weeks and didn’t accept as launch week.
After the forecast step, manual adjustment was made to the forecast model. In the final steps, to determine a product’s sales trend, the actual sales figures were examined to determine the accuracy of the predictions that were made.

| Weeks | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | Total |
|-------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Sales (C6028AZ) | 0 | 0 | 1 | 0 | 0 | 2 | 9 | 159 | 134 | 124 | 52 | 38 | 33 | 33 | 29 | 27 | 27 | 17 | 19 | 10 | 21 | 18 | 13 | 27 | 0 | 5 | 4 | 3 | 89 |
| Ratio (C6028AZ) | 0% | 0% | 0% | 0% | 0% | 11% | 18% | 15% | 14% | 6% | 4% | 4% | 4% | 3% | 3% | 5% | 2% | 2% | 1% | 2% | 2% | 1% | 1% | 0% | 1% | 0% | 0% | 0% |
| Ratio (New Product) | 0% | 0% | 11% | 18% | 15% | 14% | 6% | 4% | 4% | 3% | 3% | 3% | 2% | 2% | 1% | 2% | 2% | 1% | 3% | 0% | 1% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| Unit sales per store per week | 0.00 | 0.00 | 1.11 | 1.79 | 1.51 | 1.40 | 0.59 | 0.43 | 0.37 | 0.37 | 0.33 | 0.30 | 0.30 | 0.19 | 0.21 | 0.11 | 0.24 | 0.20 | 0.15 | 0.30 | 0.00 | 0.06 |
| Forecast Sales Quantity | 156 | 251 | 211 | 195 | 82 | 60 | 52 | 52 | 46 | 43 | 43 | 27 | 30 | 16 | 33 | 28 | 20 | 43 | 0 | 8 |
| Sold Quantity | 138 | 255 | 226 | 141 | 120 | 117 | 69 | 55 | 41 | 40 | 35 | 18 | 14 | 17 |
| Error | 18 | -4 | -15 | 54 | -38 | -57 | -17 | -3 | 5 | 3 | 8 | 9 | 16 | -1 |
| Error Percentage | 13% | -2% | -7% | 39% | -32% | -49% | -25% | -5% | 11% | 6% | 22% | 49% | 114% | -7% |
| Absolute Error | 13% | 2% | 7% | 39% | 32% | 49% | 25% | 5% | 11% | 6% | 22% | 49% | 114% | 7% |
| MAPE | 13% | 7% | 7% | 15% | 18% | 23% | 24% | 21% | 20% | 19% | 19% | 22% | 29% | 27% |

Figure 19-New Product Forecasting for First New Product
4.2. Second and Third Products

Second New Product Attributes

Product Type: Shoes

Genre: Sports Shoes

Fabric: Polyurethane

Color: Navy

Gender: Woman

Size: 36-40

Season: 2013 Autumn winter

Manufactured in: China

Price: 39.99TL

Store Quantity: 170

Third New Product Attributes

Product Type: Shoes

Genre: Sports Shoes

Fabric: Polyurethane

Color: Brown

Gender: Woman

Size: 36-40

Season: 2014 Autumn winter

Manufactured in: China
Price: 39,99TL

Store Quantity: 170

Query Step

The second and third products were from same season and same genre, so existing products were chosen between products that sold in Turkey 2012 autumn winter (AW) to forecast new products in 2013 autumn winter (AW).

This analysis of the shoe ‘genre’ would give the company a slight forecast that their new product might be accepted due to the sales percentage of sport shoes (52,06%), but this is just the beginning to the analysis. The positive aspect of one attribute in relation to a new product is not a conclusive aspect but rather a tilt of sales in a company’s favor.

<table>
<thead>
<tr>
<th>Genres</th>
<th>Option</th>
<th>Total Sales Quantity</th>
<th>Total Sales Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flats</td>
<td>4</td>
<td>2.020</td>
<td>3,37%</td>
</tr>
<tr>
<td>Boots</td>
<td>18</td>
<td>13.105</td>
<td>21,85%</td>
</tr>
<tr>
<td>Casual Shoes</td>
<td>6</td>
<td>3.918</td>
<td>6,53%</td>
</tr>
<tr>
<td>Top Boots</td>
<td>11</td>
<td>5.217</td>
<td>8,70%</td>
</tr>
<tr>
<td>Sport Shoes</td>
<td>13</td>
<td>31.217</td>
<td>52,06%</td>
</tr>
<tr>
<td>High Heeled Shoes</td>
<td>10</td>
<td>4.488</td>
<td>7,48%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>62</td>
<td>59.965</td>
<td>100,00%</td>
</tr>
</tbody>
</table>

Figure 22-Ratio of Sales According to Genres of 2013 Autumn Winter Season

After the analysis of the shoe ‘genre’, an analysis that pertains to the fabric of the shoe was carried out to determine whether the new shoe’s fabric was as popular as the company would like
to believe. After sport shoes were analyzed, polyurethane sport shoes were examined. Result of this, rate of sales of polyurethane sport shoes was 45% and option quantity was 5.

<table>
<thead>
<tr>
<th>Fabrics</th>
<th>Option</th>
<th>Total Sales Quantity</th>
<th>Total Sales Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane</td>
<td>5</td>
<td>6101</td>
<td>45%</td>
</tr>
<tr>
<td>Sued</td>
<td>2</td>
<td>2056</td>
<td>5%</td>
</tr>
<tr>
<td>Woven</td>
<td>6</td>
<td>22961</td>
<td>73%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
<td><strong>31118</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Figure 23-Ratio of Sales According to Fabric Types of 2013 Autumn Winter Season which used on Sport Shoes

With the chosen fabric, not being a major seller but being second, the company can forecast that with the popularity of the shoe type and the fabric, it may be profitable with the introduction of their new product. To improve the company’s forecasting, existing sport shoes were examined and their sales trends were determined. The companies may use these trends as stepping stones in the forecasting of their product sales. Moreover, existing sport shoes were examined in Figure 24 with sales trend and pictures. Each code was examined and sales trend line of these products was graphed.

In Figure 24, “LINE” shows basically sales trends of the existing products that sold in Turkey 2012 autumn winter (AW) during this term.
<table>
<thead>
<tr>
<th>CODE</th>
<th>LINE</th>
<th>PICTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>B7365AZBROWN</td>
<td><img src="image1.png" alt="Trend Line" /></td>
<td><img src="image2.png" alt="Picture" /></td>
</tr>
<tr>
<td>B7365AZGREY</td>
<td><img src="image3.png" alt="Trend Line" /></td>
<td><img src="image4.png" alt="Picture" /></td>
</tr>
<tr>
<td>B7366AZSAND</td>
<td><img src="image5.png" alt="Trend Line" /></td>
<td><img src="image6.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0077AZLT.PINK</td>
<td><img src="image7.png" alt="Trend Line" /></td>
<td><img src="image8.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0077AZROYAL</td>
<td><img src="image9.png" alt="Trend Line" /></td>
<td><img src="image10.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0080AZTABA</td>
<td><img src="image11.png" alt="Trend Line" /></td>
<td><img src="image12.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0481AZNAVY</td>
<td><img src="image13.png" alt="Trend Line" /></td>
<td><img src="image14.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0481AZPETROL</td>
<td><img src="image15.png" alt="Trend Line" /></td>
<td><img src="image16.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0481AZRED</td>
<td><img src="image17.png" alt="Trend Line" /></td>
<td><img src="image18.png" alt="Picture" /></td>
</tr>
<tr>
<td>C0481AZROYAL</td>
<td><img src="image19.png" alt="Trend Line" /></td>
<td><img src="image20.png" alt="Picture" /></td>
</tr>
</tbody>
</table>

Figure 24-Existing Products with Trend Line and Codes for Second and Third New Products
Filter Step

In this step, unsuitable existing products were removed by judgment according to their peaks and declines.

![Figure 25-Sales Graphic of Existing Products for Second and Third New Products](image)

Cluster Step

On separation, the cluster step was enacted where the best products that were the most similar to the new product were separated and examined individually with all the aspects that affected its sales. Candidate products were clustered according to their sales pattern and used judgment to select appropriate product.
For this case study the shoe under the code B7365AZ, was taken into consideration because of shared attributes. Its sales figures and ratios were examined and tabulated to discover the period when the product was on high demand resulting in a high number in sales.

**Base Existing Product Attributes**

**Product Type:** Shoes

**Genre:** Sport Shoes

**Season:** 2012 Autumn Winter

**Price:** 39,99 TL

**Gender:** Woman

**Store Quantity:** 133

**Production Place:** China

**Size:** 36-40

**Color:** Brown
Model Step

For second and third new products, model step was implemented as first new product. To forecast new product, launch profile model was chosen. Sales of product were divided according to weeks and for each period, sales percentage was found. Therefore, baseline launch profile were examined. Ratio of sales for base product was determined below Figure 29.
<table>
<thead>
<tr>
<th>Weeks</th>
<th>Sales(B7365AZ)</th>
<th>Ratio(B7365AZ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>33</td>
<td>1</td>
<td>0,09%</td>
</tr>
<tr>
<td>34</td>
<td>70</td>
<td>6,11%</td>
</tr>
<tr>
<td>35</td>
<td>50</td>
<td>4,36%</td>
</tr>
<tr>
<td>36</td>
<td>48</td>
<td>4,19%</td>
</tr>
<tr>
<td>37</td>
<td>66</td>
<td>5,76%</td>
</tr>
<tr>
<td>38</td>
<td>116</td>
<td>10,12%</td>
</tr>
<tr>
<td>39</td>
<td>125</td>
<td>10,91%</td>
</tr>
<tr>
<td>40</td>
<td>87</td>
<td>7,59%</td>
</tr>
<tr>
<td>41</td>
<td>82</td>
<td>7,16%</td>
</tr>
<tr>
<td>42</td>
<td>94</td>
<td>8,20%</td>
</tr>
<tr>
<td>43</td>
<td>84</td>
<td>7,33%</td>
</tr>
<tr>
<td>44</td>
<td>88</td>
<td>7,68%</td>
</tr>
<tr>
<td>45</td>
<td>42</td>
<td>3,66%</td>
</tr>
<tr>
<td>46</td>
<td>36</td>
<td>3,14%</td>
</tr>
<tr>
<td>47</td>
<td>16</td>
<td>1,40%</td>
</tr>
<tr>
<td>48</td>
<td>25</td>
<td>2,18%</td>
</tr>
<tr>
<td>49</td>
<td>19</td>
<td>1,66%</td>
</tr>
<tr>
<td>50</td>
<td>16</td>
<td>1,40%</td>
</tr>
<tr>
<td>51</td>
<td>30</td>
<td>2,62%</td>
</tr>
<tr>
<td>52</td>
<td>28</td>
<td>2,44%</td>
</tr>
<tr>
<td>53</td>
<td>23</td>
<td>2,01%</td>
</tr>
<tr>
<td>Total</td>
<td>1146</td>
<td>100%</td>
</tr>
</tbody>
</table>

Figure 29–Ratios of Sales for Base Product (B7365AZ)
Forecast Step

**Second new product (B7373AZ)**

After ratio of base existing product was found, author adapted this base line ratio to new product as below Figure 30. Model B7365AZ was offered to sale in week 34 of 2012 autumn/winter season in 133 stores.

According to last year, store quantity increased in 2013 autumn/winter. Whereas in 2012, store quantity was 133, in 2013 it is 170. At the same time, price were not changed so price of existing products and new products were 39,99 TL. Moreover B7365AZ was offered to sale in week 34; new product was offered to sale in week 38.

In the light of this information that will able to affect forecasting result, new product sales were forecasted. Firstly, rate of sales of B7365AZ was adapted to new product in the manner that launch time would be week 38. Secondly, for B7365AZ, units per store per week were found and this number was adapted to new product with new store quantity. However, while adapting new store quantity to base line; author accepted that new stores had the same customer group and the same sales level.

![Figure 30-Adaptation of Data of Base Existing Product for Second New Product (B7373AZ)](image)
Third new product (C5070AZ)

After ratio of base existing product was found, author adapted this base line ratio to new product as below Figure 31. Model B7365AZ was offered to sale in week 34\(^3\) of 2012 autumn/winter season in 133 stores.

According to last year, store quantity increased in 2013 autumn/winter. Whereas in 2012, store quantity was 133, in 2013 it is 170. At the same time, price was not changed so price of existing products and new products were 39,99 TL. Moreover, B7365AZ was offered to sale in week 34; new product was offered to sale in week 35.

In the light of this information that will able to affect forecasting result, new product sales were forecasted. Firstly, rate of sales of B7365AZ was adapted to new product in the manner that launch time will be week 35. Secondly, for B7365AZ, units per store per week were found and this number was adapted to new product with new store quantity. However, while adapting new store quantity to base line; author accepted that new stores had the same customer group and the same sales level.

Figure 31-Adaptation of data of base existing product for third new product (C5070AZ)

\(^3\) In the week 34 of 2012, Eid Mubarek is started in Turkey so sales was high. Author didn’t consider this week to forecast new products.
Override step

After the forecast step, manual adjustment was made to the forecast model. In the final steps, to determine a product’s sales trend, the actual sales figures were examined to determine the accuracy of the predictions that were made.

**Second New Product (B7373AZ)**

| Weeks | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48  | 49  | 50  | Total |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Sales(B7365AZ) | 1   | 70  | 50  | 48  | 66  | 116 | 125 | 87  | 82  | 94  | 84  | 88  | 42  | 36  | 16  | 25  | 19  | 16  | 105  |
| Ratio(B7365AZ) | 0%  | 6%  | 4%  | 4%  | 6%  | 10% | 11% | 8%  | 7%  | 8%  | 7%  | 8%  | 4%  | 3%  | 1%  | 2%  | 1%  | 1%  | 95%  |
| Ratio (New Product) | 4%  | 4%  | 4%  | 6%  | 10% | 11% | 8%  | 7%  | 8%  | 7%  | 8%  | 4%  | 3%  | 1%  | 1%  | 1%  | 1%  | 1%  | 1%  | 1%  |
| Unit sales per store per week | 0.4 | 0.4 | 0.3 | 0.9 | 0.9 | 0.7 | 0.6 | 0.7 | 0.6 | 0.7 | 0.3 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Forecast Sales Quantity | 64  | 61  | 84  | 148 | 160 | 111 | 105 | 120 | 107 | 112 | 54  | 46  | 20  | 20  | 20  | 20  | 20  | 20  | 20  |
| Sold Quantity | 83  | 121 | 170 | 239 | 198 | 97  | 92  | 88  | 117 | 79  | 88  | 43  | 19  | 19  | 19  | 19  | 19  | 19  | 19  |
| Error | -19 | -60 | -86 | -91 | -38 | 14  | 13  | 32  | -10 | 33  | -34 | 3   | 1   | 1   | 1   | 1   | 1   | 1   | 1   |
| Error Percentage | -23% | -49% | -50% | -38% | -19% | 15% | 14% | 57% | -8% | 42% | -39% | 7% | 8% | 8% | 8% | 8% | 8% | 8% | 8% | 8% |
| Absolute | 23% | 49% | 50% | 38% | 19% | 15% | 14% | 57% | 8% | 42% | 59% | 7% | 8% | 8% | 8% | 8% | 8% | 8% | 8% | 8% |
| MAPE | 23% | 36% | 41% | 40% | 36% | 32% | 30% | 31% | 28% | 30% | 30% | 28% | 27% | 27% | 27% | 27% | 27% | 27% | 27% |

Figure 32-New Product Forecasting for Second New Product (B7373AZ)
## Third New Product (C5070AZ)

<table>
<thead>
<tr>
<th>Weeks</th>
<th>33</th>
<th>34</th>
<th>35</th>
<th>36</th>
<th>37</th>
<th>38</th>
<th>39</th>
<th>40</th>
<th>41</th>
<th>42</th>
<th>43</th>
<th>44</th>
<th>45</th>
<th>46</th>
<th>47</th>
<th>48</th>
<th>49</th>
<th>50</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales (B7365AZ)</td>
<td>1</td>
<td>70</td>
<td>50</td>
<td>48</td>
<td>66</td>
<td>116</td>
<td>125</td>
<td>87</td>
<td>82</td>
<td>94</td>
<td>84</td>
<td>88</td>
<td>42</td>
<td>36</td>
<td>16</td>
<td>25</td>
<td>19</td>
<td>16</td>
<td>1065</td>
</tr>
<tr>
<td>Ratio (B7365AZ)</td>
<td>0%</td>
<td>4%</td>
<td>4%</td>
<td>6%</td>
<td>10%</td>
<td>11%</td>
<td>8%</td>
<td>7%</td>
<td>8%</td>
<td>7%</td>
<td>8%</td>
<td>4%</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Ratio (New Product)</td>
<td>4%</td>
<td>4%</td>
<td>6%</td>
<td>10%</td>
<td>11%</td>
<td>8%</td>
<td>7%</td>
<td>8%</td>
<td>7%</td>
<td>8%</td>
<td>4%</td>
<td>3%</td>
<td>1%</td>
<td>2%</td>
<td>2%</td>
<td>1%</td>
<td>95%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit sales per store per week</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
<td>0.9</td>
<td>0.9</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>0.3</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forecast Sales Quantity</td>
<td>64</td>
<td>61</td>
<td>84</td>
<td>148</td>
<td>160</td>
<td>111</td>
<td>105</td>
<td>120</td>
<td>107</td>
<td>112</td>
<td>54</td>
<td>46</td>
<td>20</td>
<td>32</td>
<td>24</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sold Quantity</td>
<td>100</td>
<td>105</td>
<td>120</td>
<td>180</td>
<td>137</td>
<td>120</td>
<td>158</td>
<td>110</td>
<td>60</td>
<td>71</td>
<td>45</td>
<td>45</td>
<td>25</td>
<td>30</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>-36</td>
<td>-44</td>
<td>-36</td>
<td>-32</td>
<td>23</td>
<td>-9</td>
<td>-53</td>
<td>10</td>
<td>47</td>
<td>41</td>
<td>9</td>
<td>7</td>
<td>-25</td>
<td>7</td>
<td>-6</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error Percentage</td>
<td>-36%</td>
<td>-42%</td>
<td>-30%</td>
<td>-18%</td>
<td>17%</td>
<td>-7%</td>
<td>-34%</td>
<td>9%</td>
<td>99%</td>
<td>58%</td>
<td>19%</td>
<td>18%</td>
<td>-55%</td>
<td>28%</td>
<td>-19%</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute</td>
<td>36%</td>
<td>42%</td>
<td>30%</td>
<td>18%</td>
<td>17%</td>
<td>7%</td>
<td>34%</td>
<td>9%</td>
<td>99%</td>
<td>58%</td>
<td>19%</td>
<td>18%</td>
<td>55%</td>
<td>28%</td>
<td>19%</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAPE</td>
<td>36%</td>
<td>39%</td>
<td>36%</td>
<td>31%</td>
<td>28%</td>
<td>25%</td>
<td>26%</td>
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<td>30%</td>
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<td>32%</td>
<td>31%</td>
<td>32%</td>
<td>31%</td>
<td>30%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 33-New Product Forecasting for Third New Product (C5070AZ)
5. Results

First new product (C2062AZ)

After examination, it had been discovered that there was a mean absolute percentage error of 27% which when looked further into, the difference was one of 80 units, which although may not seem like a lot, was more than one would like to admit. 27% in error is a large margin that may result in either the poor outcome of a product or dominance in the market. When graphically portrayed, the data seems more clear.

Second new product (B7373AZ)

After examination, it had discovered that there was a mean absolute percentage error of 27% which when looked further into, the difference was one of 240 units, and although it may not seem like a lot, it was more than one would like to admit. 27% in error is a large margin that may result in either the poor outcome of a product or dominance in the market. When graphically portrayed, the data seems more clear.
Third new product (C5070AZ)

After examination, it had been discovered that there was a mean absolute percentage error of 30% which when looked further into, the difference was one of 92 units, and although it may not seem like a lot, it was more than one would like to admit. 30% in error is a large margin that may result in either the poor outcome of a product or dominance in the market. When graphically portrayed, the data seems more clear.
6. Analysis

In the research of sales forecasting, the characteristics of the fashion industry through structured analogy method has been analyzed. The use of the sales figures of previous products can be used in the prediction of sales. The conclusion structured in this research is based on the two titles as “Forecasting and New Product Forecasting” and “Structured Analogy Method and Its Accuracy”.

Forecasting and New Product Forecasting

Forecasting in the fashion industry can be used in the prediction of the sales of a company. Companies and industrial groups that would like to find out their future in a particular industry require the use of product forecasting. The use of forecasting can be the best way to improve the one’s revenue, to decrease the cost and still be able to satisfy the customer’s needs and wants. Forecasting, however, is flooded with errors that may affect the accuracy of the figures used. In the process of forecasting, companies need to be able to come up with the best figures and company policies accurately that may be used in charting the way forward for a particular company. In the constant changing of the fashion industry’s characteristics, a company needs to be able to adapt these changes and overcome them so as to improve their own forecast quality. Thus forecasting is a fundamental structure in the business of a company that wishes to continue in popularity and profitability.

In light of the literature review, companies which have resulted in 47% revenue from new products, it is evident that forecasting of not only any product but of new ones is profitable if carried out in the best manner. Although this process may have a complex structure due to the constant change in the industry, companies must be aware of the revenue that is generated from the new products that are launched depending on the forecasting. Fortunately or unfortunately, companies that use forecasting do not necessarily use statistical methods. The constant use of judgment, rather than the statistical methods, is because there may not be statistics for new products. It is, however, noticeable that companies that have made more revenues in their industries have been companies that have not only used judgment but have also applied some form of statistical data.
Structured Analogy Method and Its Accuracy

In order to discover if the implementation of a structured analogy method would be advantageous and successful for the footwear products in the fashion industry, quantitative research methodology was employed. The quantitative research was performed by using the structured analogy method and its processes.

The structured analogy method was performed according to the Gilliland and Guseman method following the steps: query, filter, cluster, model, forecast and override. The research results showed differences for each new product sample. Whereas first new product was chosen as a flat, other second and third new products was chosen as sport shoes. Analysis will be examined separately for each new product.

First New Product

When forecasting quality result was examined for the first product, author realized that encouraging with a MAPE forecast quality result of 27% when the indicated forecast error is 37 % in previous studies and the sales quantity error was a mere 80 at units.

Second New Product

After the examination, it is discovered that second new product had a mean absolute percentage error of 27% which when looked further into, the difference is one of 240 units. Result of this forecasting shows that implemented method improved forecast quality with MAPE forecast quality result of %27 according to forecast quality results that was mentioned in literature review.

Third New Product

After the examination, it is discovered that third new product had a mean absolute percentage error of 30% which when looked further into, the difference is one of 92 units. When compared with the results of first and second new products, this result is not good and forecast error is higher. However, this result is not worse than accuracy result of before studies that different forecasting methods were implemented.
The research showed that this method gave good results when compared with the previous NPF studies. Moreover, structured analogy method is a useful approach for the fashion industry. While forecast accuracy of previous studies couldn’t pass 63% for new products, results of this study gave between 70% - 77% of forecast accuracy.

This method includes human judgments as well as quantitative data. Hence, experience of the planner or forecaster is very important. This method is most likely a reliable forecast if the people making the educated guesses in management are doing their job correctly.

Forecast error is still high for new product forecasting, but Gilliland and Guseman (2010) put a small disclosure on this method when they tell potential structured analogy method users, "expectations for the accuracy of new product forecasts should be modest, and acknowledgement of this uncertainty should be at the forefront"(p. 15).

In the introduction of a new product to the market, companies that do not have any previous marketing or experience in the sake of these products must be able to forecast the trend of their product based on those of others in the same industry. In the use of the structured analogy method, the results of the previous items that have had the same attributes are used as references to the new product. This method is as well implemented in the fashion industry and its effects are seen to date with it being the biggest fashion hub. This method uses both qualitative and quantitative data to come up with the best way to introduce a product or whether to introduce the product at all. This method gives good results because the data produced is based on different trends and weather patterns that may affect this sale. The forecast may not be 100% accurate but it is close to perfection. During the method of determination in the structured analogy method not only previous data is used but also personal experiences or accounts from the relevant authorities are taken into consideration.

New product forecasting, forecasting as a whole are all trying tasks that companies find difficult. This is due to the lack of historical data and this will also affect the accuracy of the prediction. Fortunately, this is a difficulty that companies have been aware of and have tried to reduce in the predictions by not just going over the figures used, but also by considering the season’s sales. SKUs are used in the measurement of accuracy.
7. Conclusion and Future research

7.1. Conclusion

The objective of the research has been to examine the accuracy of structured analogy forecasting technique for new product forecasting in the fashion industry.

The overall purpose presented above has been further concretized in a research question:

How can structured analogy method be used to improve the forecast accuracy for the footwear products in the fashion industry?

The author conclusions are as follows:

- Structured analogy method can be used to improve on human judgments alone by automating the historical data processing and involving statistical analysis that improve the forecast accuracy in the fashion industry.
- The results of the empirical research showed that structured analogy method improved the accuracy respectively as MAPE of 27%, 27%, and 30% in the fashion industry according to previous studies.
- It would be advisable for companies that have not had any experience in the sale of a particular product to not only turn to structured analogy method but also to use all the applicable methods so as to get the correct predictions. This method is the best for it not only encompasses qualitative and quantitative factors but also has the judgmental and statistical factors found in the research method.
- If the planner knows variables that affect the forecasting and considers these variables, structured analogy method provides more accurate results.
- Judgmental part is more dominate than statistical part of structured analogy method that is used in fashion industry because of that characteristic of the fashion industry and variables that affect forecasting result.
7.2. Future Research

Though the research gained substantial evidence, for future researches, it would be best that the scope of the research is expounded to more regions and the samples used increased so as to back the data that is collected.

On the other hand, as mentioned previously, judgment is very important for this method. In this research, author (she has three years of experience about forecasting in the fashion industry especially footwear category) implemented this method herself for all the case studies. Author used her judgment on the steps of these methods. For future research, author suggests that this method could be implemented by different forecaster with different categories also different region.
References


Crocs, Inc. 02 23, 2012. 


Mendes, P. "Key Components of Demand Driven Supply Chain." In *Demand Driven Supply Chain*, 43. Berlin Heidelberg, 2011.


## Appendix-1

### Merchandising Calendar

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