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DEMAND, DEMAND FORECASTING, AND SUPPLY

Case Company X

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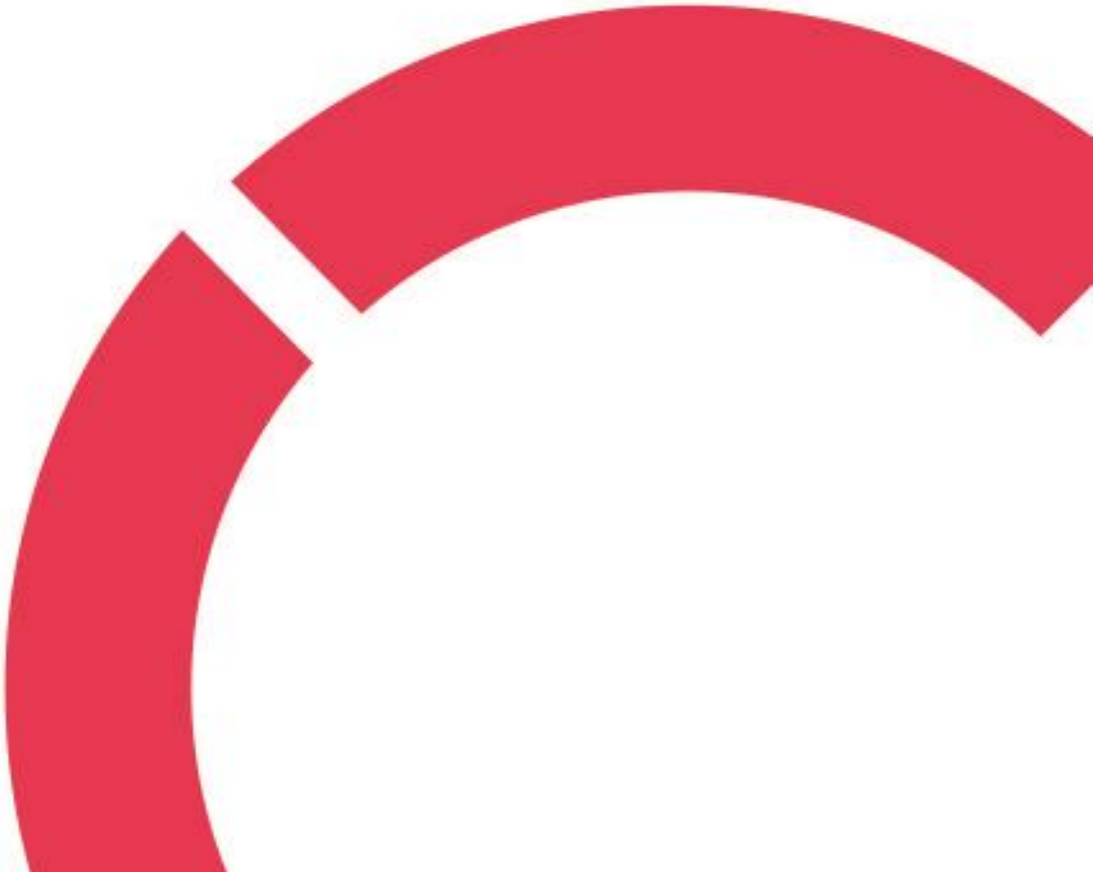

ABSTRACT

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The fundamental purpose of the thesis is to find a suitable demand forecasting technique for the case company. The goal is to collect, analyze, and present data that helps an organization make decisive tactical decisions in production planning, marketing, and forecasting product demand. A qualitative research method is used for study. Demand refers to a consumer's willingness to purchase products and be able to pay a specific price for them. Demand forecasting is the process of estimating the number of products that customers will demand over time. In contrast, the total amount of a given product or service provided to consumers at a stated price over time is known as supply.

The commissioner of this thesis, company 'X', is a food factory with a wealth of experience in the food industry. The interviews conducted with the employees from sales and product forecasts in February and March 2024 aimed to understand the process and methods involved in demand forecasting, the challenges and opportunities faced, and the relationship between demand and supply of the products. The research also highlights the significant role of various factors in affecting demand forecasting, a testament to the company's expertise and understanding of the industry.

Different reading materials related to demand, demand forecasting, and supply are meticulously studied for conceptual evaluations. Interviews are conducted to collect comprehensive answers and data. The collected data are then meticulously analysed and summarized. Lastly, opportunities and challenges the forecasters face during the demand forecasting process are deeply explored, and a thorough comparison of various demand forecasting techniques with different business situations is carried out to provide them with suitable demand forecasting techniques and more suggestions to improve the process for better accuracy.

Key words
Demand, Demand Forecasting, Supply.

CONCEPT DEFINITIONS

B2B	Business to Business
B2C	Business to Customer
AI	Artificial Intelligence
KPIs	Key Performance Indicators
R&D	Research and Development
P. LTD	Private Limited

1 INTRODUCTION

The commissioner of this thesis is Company X, a food factory located in Finland. With its extensive experience in the food industry and deep understanding of demand, demand forecasting, and supply, the company was chosen for its proven success in the Finnish food market. The author, having worked in the production department of Company X for over a year and previous studies in similar fields, got inspired to write this thesis.

The demand and supply are the number of goods or services consumers desire to buy, and producers want to sell at different prices. The price of a product and demand have an inverse relationship, as any increase in price will cause a decrease in demand and vice-versa. Multiple components, such as income and consumer preference, affect the market demand. However, the cost of a product and supply have a direct relationship, as the higher the price, the higher the producer wants to supply. Multiple components, such as the cost of labour and the production technology, affect the market supply.

The thesis intends to find a suitable demand forecasting technique for company X. The thesis also focuses on showing the relationship between demand, demand forecasting, and supply of the products. Multiple components that affect the demand and supply of the product were considered during the study. The thesis aims to gather data, analyse, and hand over what helps an organization make crucial strategic decisions on demand forecasting, production planning, and marketing strategies. A qualitative research method was followed to study the demand, suitable demand forecasting technique, and supply situation of the business. Moreover, opportunities and challenges the forecasters face during the demand forecasting process are deeply analyzed, and a comparison of various demand forecasting techniques with different business situations is carried out to provide them with suitable demand forecasting techniques and more suggestions to improve the process for better accuracy in demand forecasting.

In the exploration section, a qualitative study method is followed. The processes involved in qualitative research are determining what to research, identifying how to research, getting buy-in and alignment from others, preparing tests, executing testing, integrating and understanding perception, generating test results, and handing out findings. Qualitative procedures are applied to examine the business's demand, demand forecasting, and supply situation. The study collects data through interviews, analysis, and presentation to help the company make strategic decisions in meeting the market's demand and forecasting the upcoming order for the product over time. The data collected are non-numerical in qualitative

research; thus, thematic analysis is carried out to test the hypothesis with the test findings. The discussions were conducted with two sales employees using a virtual medium and one from the product forecast department through in-person interviews. The interview includes basic questions regarding the process and methods followed for demand forecasting, opportunities and challenges faced during predicting, and the company's order estimation prospects. In the end, results and findings are discussed, and by comparing theoretical analysis with the findings and nature of business, various development ideas, including suitable demand forecasting techniques, are provided.

This thesis comprises four parts: conceptual evaluation, facts and technique, results and development ideas, and conclusions and discussion. The conceptual review comprises an introduction, order types, demand forecasting, components impacting demand, supply, and factors affecting supply. Different reading materials associated with demand, demand forecasting, and supply are meticulously studied for conceptual evaluations. In chapter 2, introduction to demand, various types of demand and factors affecting market demand are discussed. Chapter 3 discusses the introduction to demand forecasting, the process, multiple types, and demand estimating techniques. In chapter 4, introduction to supply, various types of supply and factors affecting supply are discussed. In the research section, the method used for data collection is described, and the data are presented well-structured. Moreover, the results of the study are examined and explored. In the end, development ideas for the company and a conclusion are provided.

2 DEMAND

The demand is the number of goods or services consumers wish and the ability to purchase at different prices. The price of a product and demand have an inverse relationship, as any increase in price will cause a decrease in demand and vice-versa. Multiple components, such as income, number of consumers and consumer preference, affect the market demand. Market demand refers to the total number of orders consumers place in a market. Producers want to boost yield, whereas consumers want to settle for the lowest price. If businesses set their product's price higher, demand decreases, which affects the yield. However, if businesses set low product prices, they may be unable to regain production costs. (Taylor 2001, 39.)

Desire is the wish to have something, whereas demand is the number of products consumers are prepared to buy. More than desire is needed to purchase, as consumers should be able to buy the product. Demand means the readiness and capacity of the consumers to buy the commodity at different prices over a given time. Therefore, demand has various components, such as desire for the commodity, willingness to pay, ability to pay, price, period, and quantity. (Adhikari, Lamichhane, Acharya & Gyawali 2022, 38-39.)

2.1 Types of demand

Understanding the various types of demand is vital for a business's success. To achieve operational efficiency, cost minimization, and meet customer expectations, companies must anticipate, adapt to, and manage these various types of demand effectively. In the supply chain, businesses should continue to evolve in demand management to achieve sustainable growth and competitiveness in the global market. Moreover, companies must be flexible enough to adapt to unexpected changes in demand. Thus, regular review, formulation of strategic decisions, and continuous development are crucial to achieving the business's goals and objectives. (Gillespie 2016, 62.)

The demand can be of various types depending upon the category of the product utilization, quantity of consumers, and suppliers. Although there are several varieties of demand, based on the nature of the operation of the case company and the categories of the product produced by them, demand can be categorized into various types such as direct demand, indirect or derived demand, joint demand, composite demand and competitive demand which are explained below. (Krugman & Wells 2013, 65-67.)

2.1.1 Direct demand

The demand for the final product that directly satisfies human wants is called direct demand. Food and clothing are examples of direct demand. Direct demand can also be categorized into price, income, and cross-demand. The number of products or services customers are ready to buy at different prices over a given span is called price demand. There will be a higher demand for the commodity at lower prices and reciprocally. Income level, consumer taste and preference, and related product cost differ. On the contrary, income demand means the various goods and services consumers are ready to purchase at multiple income levels over a given period. (Adhikari et al. 2022, 39-40.)

On the contrary, the number of goods that will be obtained, concerning the fluctuation in the cost of other corresponding goods, is called cross-demand. Understanding direct demand and cross-demand helps businesses segment different products and formulate marketing strategies to target possible consumers. Moreover, businesses also need to consider multiple factors that affect demand for the product and take necessary action to tackle problems. (Adhikari et al. 2022, 39-40.)

2.1.2 Indirect and derived demand

Indirect or derived demand is the demand for the products used to produce the final result to satisfy the consumer's needs. The kind of demand for a commodity depends on the demand for supplement products. For instance, an order for milk, rice, and water will demand rice pudding. In this case, the demand for these ingredients depends on the demand for rice pudding. Although it is similar to joint demand as it is interdependent to supplement goods, it differs from joint demand as it depends on the ultimate commodity to create the requirement for the intermediate product. (Gillespie 2016, 62.)

Understanding derived demand is essential for any business that operates in a B2B model. Here, demand for a good directly influences the market for another product. Moreover, a series of interconnected companies work together in the supply chain to bring a final product. Similarly, derived demand plays a vital role in the pricing of products and services. Derived demand also dramatically impacts the company's marketing strategies. (Adhikari et all. 2022, 39-40.)

2.1.3 Joint demand

Joint demand means multiple products are required for a common purpose, which is to satisfy the consumer's needs. Moreover, the requirement for reciprocal products is called joint demand. These products can be products that are ingredients for supplementary products. For instance, the demand for milk, water, and rice is a joint demand to prepare rice pudding as they are all needed for a final product to meet the customer's satisfaction. Thus, the requirement for one product affects the requirement for two or more interrelated goods, which is called joint demand. (Gillespie 2016, 63.)

Joint demand provides business insights into customer behaviour and market dynamics. It helps businesses make intelligent pricing decisions, investment decisions across market segments, and risk management through hedging. It also contributes to economic growth through interdependence among various industries in the B2B environment. Demand for multiple materials like salmon, pasta, wheat flour, crushed tomato, onion, corn-potato starch, rapeseed oil, iodised salt, and many more are needed to produce salmon pasta. Here, various products demanded to produce salmon pasta are known as joint demand. (Adhikari et al. 2022, 39-40.)

2.1.4 Composite demand

Composite demand refers to the order for one good that has several uses. For instance, electricity demand is composite because it has multiple uses like lighting, heating, etc. Increasing any of these goods may lead to a scarcity of others, eventually increasing the price. Composite demand is the demand for a particular good to produce more than one product type. Therefore, the primary product is essential to provide other products to satisfy the customers' needs over the given period. (Adhikari et all. 2022, 39-40.)

Several factors affect composite demand. Material cost is one of the essential components of composite demand. Any increase in the cost of a particular material rises, impacting the final product's overall cost, resulting in a decline. Likewise, the distance between the supplier of raw materials and the producer also affects the market for the product, as the longer the distance, the higher the transportation cost of raw materials, which involves the pricing of the product and overall demand for it. (Gillespie 2016, 63.)

2.1.5 Competitive demand

Competitive demand refers to the close substitute products where a fluctuation in the cost of one product will fluctuate the market for another. Any rise in the price of one product increases, the order for another substitute goods rises, and vice-versa. Here, the cost of the primary good is conversely related to its request. As the price increases, demand falls, whereas the cost of the primary good is directly related to the request for a substitute good. As the price of a primary product goes up, demand for a substitute product also rises. When the price of the primary product decreases, demand for an alternative product also declines. (Adhikari et al. 2022, 39-40.)

Competitive demand helps create a fair price and higher quality of products or services. It also encourages innovation for competitive advantage through the development of new products and improvement in operating processes or operating models, which benefit both producers and consumers. Another benefit of competitive demand is better working conditions for workers and the elimination of market monopoly. Some of the functions of an excellent competitive demand are low barriers to entry, multiple suppliers, incentive for efficiency, responsiveness to change, fair competition, sufficient profit margins, and consumer benefits. However, some factors affect competitive demand, such as the number of suppliers in the market, technology, and accessibility of alternatives. (Gillespie 2016, 63-64.)

2.2 Determinants of factors affecting market demand

Market demand is the willingness and ability of all the consumers in a particular market to purchase at a given price over a specific period. Only the desire of the consumer to buy a good or service does not create market demand. The combination of consumers' willingness and ability makes a market order for goods or services. Businesses can improve their operation, strategies, and effectiveness by understanding the market demand and various factors affecting it. The companies must monitor the market and multiple factors that affect market demand and be ready to adapt to any necessary changes. (McEachern 2012, 65-66.)

The determinants are those components that play a vital part in determining something. Multiple factors influence the demand for a product or service over a period. Determinants of demand are those factors that positively or negatively affect the request for the commodity or service in the market. Some of the

critical determinants and factors influencing market demand are the commodity's price, consumer income, and taste and preference, which are explained below. (Krugman & Wells 2013, 68-70.)

2.2.1 Price of the commodity

Price is one of the significant determinants of demand as it has an indirect connection between cost and the number of orders by the consumer over the period. The demand for the goods declines with the cost rise. If the cost decreases, the order increases. For instance, if the cost of the rice pudding rises, the order for rice pudding decreases. Some goods are more affected by cost than others; if the cost of food increases, order for food declines only a little as it is a necessary product, whereas if the cost of coffee increases, order for tea increases because consumers try to find cheaper substitutes. (Adhikari et al. 2022, 40.)

One of the most critical decisions businesses must consider is the product's pricing. If the business prices a product too high, it might lose market share as customers tend to find cheaper alternatives, whereas if the product price is too low, the business loses its profit margin. The industry needs to analyse the price effect in the market demand and find a balanced price that benefits the business and the customers. Companies should aim for a larger market share on various products rather than a more significant profit in just one product. Thus, the relationship between demand and price is crucial. (McEachern 2012, 65-66.)

2.2.2 Income of consumer

Demand for a good fluctuates with the change in consumer income. The greater the consumer's income, the greater the market for the product. In the case of standard products, when the consumer's income increases, demand for the commodity also rises and vice-versa. However, in the case of inferior commodities, the order for the good declines with the increase in consumer income and the other way around. Therefore, there is a direct connection linking the consumer's income and order for the standard commodity and an indirect connection linking the consumer's income and order for second-fiddle goods. (McEachern 2012, 65-66.)

The purchase decision of the consumers depends upon various factors. One of the most important factors is the income of the customers. A good understanding of the income effect helps businesses identify market trends and opportunities, allowing companies to create market segments for different products based on the customers' income distribution and purchasing capacity. Demand for food is affected slightly due to the change in the consumer's income; however, orders for second-fiddle commodities such as cars, mobile phones, and televisions are affected significantly. (Krugman & Wells 2013, 68-70.)

2.2.3 Taste and preference of the consumer

Taste and fondness are the critical determinants of demand. The fluctuation in customers' tastes and preferences causes a product order shift. If the product has a favourable taste and choice for the consumer, the order for the goods rises and the other way around. Consumer flavour and fondness often change due to changes in fashion, the introduction of new technology, and branding, which cause changes in the demand for the commodity. Consumers seek better commodities in terms of quality, packaging, and branding. When some goods are out of fashion, or consumers' tastes and preferences no longer remain favourable, demand for those commodities decreases, assuming the price remains the same. (Taylor 2001, 42.)

Understanding consumer flavour and fondness is not just important; it is a strategic advantage for businesses. It paves the way for achieving predetermined goals and objectives, aids in market segmentation based on specific preferences, and fuels product development and innovations. It helps in brand positioning, helping businesses stand out from competitors. Most importantly, it empowers companies to formulate effective marketing strategies. (McEachern 2012, 65-66.)

3 DEMAND FORECASTING

Forecasting is the method of generating projections by examining past and present statistics. Businesses use forecasting for many purposes, such as anticipating future sales, demand for the product, future expenses, future changes in the cost of raw materials, future need of budget allocation, need for technology, human resources, and many more. Forecasting doesn't necessarily eliminate future losses but is done to minimize the risk of loss by making decisions based on statistics rather than speculations. It is the process of predicting future events or conditions best by analysing and researching past and present events and statistics. Management decisions are pivotal for the positive result and achievement of the company's goals. Forecasting helps management with planning and decision-making. In today's competitive economy, forecasting has become a must for organisations. (Kolassa & Siemsen 2016, 3.)

Demand forecasting is anticipating future orders for a commodity by analysing past and present events and data. Forecasting helps the company determine what is pleasing to manufacture more, make more, reduce production, determine the amount of consumer demand for the product, and many more. Demand forecasting can be numerical and non-numerical. Non-numeric forecasting is carried out through experience and information. In contrast, numerical forecasting is carried out through actual data, techniques based on cause-and-effect relationships, and methods based on time series analysis. Demand functions are helpful as they help to predict what will happen to demand if one of the determinants changes. Businesses will need to invest more, increase their storage capacity, and hire more personnel if the order for the goods is rising; however, it will be a massive mistake if they invest more if demand for the product is not growing in the future. Therefore, companies need more than just 'If…. then' questions. Thus, to conduct better demand forecasting, companies use various scientific techniques. (Rivera 2013, 1-4.)

3.1 Forecasting process

A good forecasting process must ensure better results for the company. In forecasting, companies should remember that forecasts are sometimes flawed as they are just predictions of future events, analysing past data and events. Moreover, projections are more explicit for larger samples than for single components. Usually, forecasts are more accurate for shorter time horizons than longer ones. Companies need to update their projections regularly to minimize possible forecast errors. Thus, companies should look for the best possible result rather than getting frustrated due to a lack of perfect forecasts. To ensure

credibility and reliability, basic forecasting steps need to be followed, which are explained below with the help of Figure 1. (Sanders 2015, 17-20.)

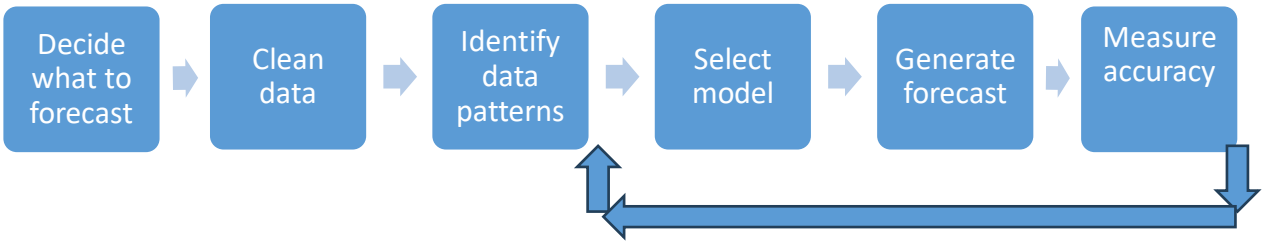

Figure 1. The forecasting processes. (Adapted from Sanders, 2015, 20.)

The first and most crucial step in forecasting is deciding what to forecast. Businesses need to figure out what they want, for instance, a sales or demand forecast. This step focuses on addressing the real problem, and the company needs to consider the period to be covered, whether a forecast is required for a short period or a more extended period. Moreover, it is also necessary to consider when to gather new statistics and decide units of measures like sales volume, total revenue, and total demand. The next step in the forecasting activity is to use clean data since the forecast result is based on the data used. The credible data need to be selected from the available data. The data must be cleaned, and only accurate data must be used for forecasting. Sometimes, data are not recorded or lost for various reasons. Thus, businesses need to replace these data with some value using an average estimate of past data; otherwise, the software may consider it zero for missing data, which altogether provides misleading results. Therefore, the better the data collected or utilized, the better the forecast outcome. (Sanders, 2015, 21-25.)

The following step in the forecasting activity is to identify the statistical pattern. The pattern of the data can be horizontal, which is a simple pattern and easy to predict; trend shows an increase or decrease of demand or supply over the period seasonality, which shows the pattern for different seasons such as winter or summer, and cycles which are affected by economic fluctuations like inflation, recessions or

life cycle of the product which are one of the most difficult to predict. Therefore, understanding the pattern helps businesses estimate or forecast future events. After identifying the data pattern, the following step in the forecasting activity is to select a suitable framework. There are many models, and one may only fit in some situations. Each model has its importance and limitations. It is essential to analyse different frameworks and select the most suitable model for the business depending on the essence of the statistics available and the company's problem. Generally, the model can be classified into qualitative and quantitative forecasting models. The qualitative model uses no historical statistics, and the human factor is used as experts. In contrast, the quantitative model is used when sufficient data is available where the human factor can be removed. (Sanders, 2015, 21-25.)

After the selection of the model, a forecast is conducted. It is the easiest part of the forecasting process involving various softwares and providing the actual numerical value to help businesses understand the forecast result. Although this step is easy, pressing a computer button is needed. However, the type of data and model used plays a vital role. Measure accuracy is the last but one of the most critical steps in the forecasting activity. After the forecast is made, evaluating the performance to identify any forecast errors is essential. This helps to improve forecasting quality by rectifying the mistake of predicting through reanalysing the process, data, and model. Suppose the monitoring of forecast accuracy suggests that the particular model is unsuitable for generating an appropriate or accurate result. In that case, there may be the need to move back to the third step, where data patterns are reanalysed, followed by other steps. (Sanders, 2015, 21-25.)

3.2 Types of demand forecasting

Different categories of demand anticipation are based on the various forecasting models used. Companies use various forecasting types to predict future demand accurately and precisely for their products and services. Companies use multiple types to minimise the difference in predicting future demand. The degree of detailing, period allocated, and market extent are essential in classifying demand forecasting. Some varieties of demand anticipation are active demand forecasting, passive demand forecasting, short-term demand forecasting, long-term demand forecasting, external macro forecasting, and internal business forecasting. (Rivera 2013, 1-4.)

One of the critical managerial roles is to select the type of order projection based on the nature of the business, goals, and objectives. A good understanding of various types of demand forecasting helps businesses with effective operations and cost minimisation. Companies can use multiple types of forecasting at different time frames as needed. The models and tools used by the company to forecast are essential for better accuracy. Thus, businesses need to regularly monitor the internal business and external market situation to identify the need for change to achieve their pre-determined goals and objectives. (Rivera 2013, 1-4.)

3.2.1 Active and passive demand forecasting

Active demand projection is the kind of demand projection generally used by start-up companies. The active approach considers aggressive growth plans such as product development, economic outlook, market growth projection, market analysis, and research. Active demand forecasting uses external data for the estimations as they have less historical data for analysis and projection. This type of demand forecasting helps companies scale and diversify their business. Hence, it is a good option for a company that is growing or starting its business. (Kolassa & Siemsen 2016, 3.)

On the contrary, passive demand projection is the most fundamental kind. Generally, well-established companies use this type of forecasting and have a vast number of past statistics and market experience to project future demand. Companies mainly use this model for solidity rather than extension. Companies with seasonal fluctuations should use statistics from identical conditions to forecast future trading and differentiate actual seasonal demand. This approach considers the company's yearly sales to be the same as last year. (Kolassa & Siemsen 2016, 3.)

3.2.2 Short-term and long-term demand forecasting

Short-term demand projection anticipates the demand for the product or services for the next three to twelve months. It helps the company quickly address changes in customer demand and market behaviour. It helps to plan the short-term goals of the company. For instance, demand for Christmas, summer sales, and winter sales. This is the type of forecasting which uses real-time sales data. This is useful for companies with different product lines where they can manage just-in-time supply chains. (Sheela 2000, 81-82.)

Long-term demand projection is carried out for a more extended span, usually one to four years. Companies use this type of forecasting for long-term organizational strategies such as marketing, capital investment, and supply chain management. This forecasting type helps businesses focus on the road map for business growth and achieve more significant goals and objectives. Generally, established or more prominent organizations use this type of demand forecasting. (Sheela 2000, 82.)

3.2.3 External macro forecasting and internal business forecasting

External macro projection considers broader external forces such as economic conditions, market competition, availability of raw materials, customer buying trends, financial challenges, and more. Although the company may focus on stability rather than growth, it can consider external market forces that could impact its supply chain. No company can command the changes in external factors. However, it may prepare well to tackle the upcoming challenges external macro changes may cause. (Rivera 2013, 1-4.)

On the contrary, internal business forecasting helps identify limitations and strengths and make realistic future predictions. It is challenging for any company even if demand for the product doubles due to a lack of capacity to expand operations, cash on hand, and personnel. With this forecasting, the company can identify all its limitations to meet future market demand and act accordingly to make necessary changes to business goals, operations, or investments. Thus, internal business demand projection is one of the essential tools for creating a swot analysis of the company and making realistic forecasting as well as driving toward where the company needs to consider to meet more significant goals. (Rivera 2013, 1-4.)

3.3 Demand forecasting techniques

Demand projection techniques or methods can be categorized into different types depending upon their level of difficulty, nature of conducting, use of data and information, and personnel. Most demand forecasting techniques fall into the judgemental or survey and mathematical or statistical methods. Market research, sales force opinion, and the Delphi method fall into the survey method, whereas trend projection, barometric forecasting method, and econometric forecasting technique fall into the statistical or mathematical method. (Sloman & Jones 2020, 67-70.)

Depending upon the nature of the business and situation, the company can use different demand forecasting techniques. This allows firms to plan more accurately, schedule their workforce, and decide on the number of products to produce in various operational cycles. Choosing the proper forecasting technique is critical to business success. Thus, businesses must identify the appropriate forecasting technique to achieve their goals and objectives. Demand forecasting techniques or methods are presented and explained below with the help of Figure 2.

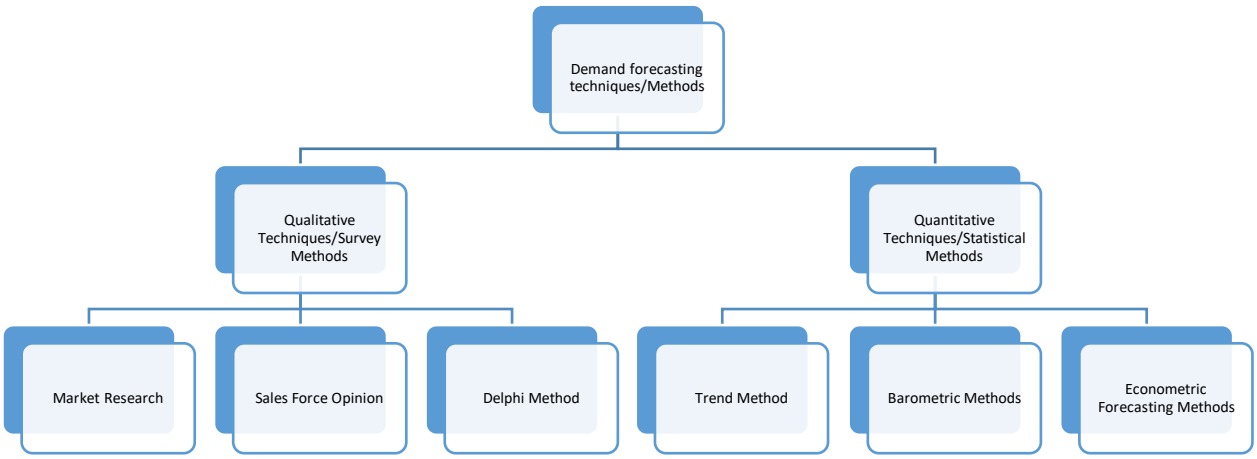

Figure 2. Demand forecasting techniques/methods. (Adapted from Sloman & Jones 2020, 68.)

3.3.1 Market research

Market research demand forecasting techniques are also known as the customer survey method. This technique is based on the customer survey, where survey forms are sent to customers to gather superior statistics about types of consumers and population data, which helps organizations aim at future markets with better strategies and planning. Recently, companies have also conducted internet surveys, making

it easier to target their customers, and survey software helps speed up the analysis of the gathered information for better conclusions. Sales and marketing teams conduct sample surveys from which they learn about the buying behaviours of a small sample of potential customers. They also conduct complete enumeration surveys to survey as many potential customers as possible to gather more significant amounts of data and end-user research where they ask other businesses to know customers' desires. (Sheela 2000, 83-84.)

This demand forecasting technique benefits young companies that need to gain more knowledge about their customers. With the increase in the use of the web and social sites, companies now can ignore going door to door for surveys; instead, they can survey online with the help of social sites, which reduces the time for a study and the cost of market research. Market research is an essential tool for every business as it helps to understand customers and their needs and allows companies to act accordingly to meet market demand. (Sheela 2000, 83-84.)

3.3.2 Sales force opinion

In this method, the sales team is in the driver's seat as they have the closest contact with the customers. They gather important information on customer needs, behaviour, feedback, and competition in the market. However, the company should keep in mind that some variables like product price, marketing campaigns, customer affluence, and competition vary from one place to another. This technique allows the sales team, managers, and executives to predict future sales by analysing the data and information the sales team collects. The more active the sales team is, the more they gather customer and market competition data and information. This helps the company observe a clear picture to forecast demand and formulate better ideas and approaches to meet customers. (Sheela 2000, 83-84.)

Companies usually use this technique for short-term forecasting, for particular seasons, quarters, or special occasions like Christmas. It uses detailed information and employee knowledge about the customer and market situation. Various factors need to be considered to establish the precision of the forecasting, such as details on the overall market situation, changes in government policies, changes in competitors, and sales in previous quarters or years. This method helps the sales team segment products and expected sales by place, product, or period. Thus, this technique is helpful for those companies who need data and information to forecast demand for a specific month, quarter, year, or area. (Sheela 200, 83-84.)

3.3.3 Delphi method

Delphi's method or technique is one of the qualitative techniques of demand projection as it relies on expert opinions on the market forecast. The company hires external experts to predict future market demand using this method. Each expert forecasts using their market knowledge and anonymously shares information with the specialist. After this phase, they analyse each other's data and forecast repetitively to find a conclusion. In this method, a team of subject-matter specialists is brought together. A questionnaire is given to every expert. They summarise the results, question their forecasts, and find a conclusive and typical result through repetitive rounds. (Sanders 2015, 72.)

Generally, the Delphi method is helpful in problematic situations where enough data or evidence is unavailable, uncertain, or incomplete. Human experts' judgments are better than any individual opinion in this situation. Some advantages of this method are concrete knowledge from experts, honest answers, and a strong group consensus. In contrast, disadvantages are slow response time, costly process, and preventing a live discussion from occurring. Thus, this technique is helpful to companies in unusual problematic situations or planning for entirely different practices in the market or within the company where complete data, information, experience, or expertise is missing. (Sanders 2015, 72.)

3.3.4 Trend method

Trend projection demand forecasting techniques are companies' most ordinary and straightforward methods. This technique uses past sales figures to anticipate the company's future orders. In this technique, companies use sufficient past order figures to better forecast future orders by gathering data from the past 18 to 24 months. The gathered statistics are sorted in sequential order to form a time series. These techniques help the company predict and adjust its plans, strategies, and supply chain to meet future demand, assuming other uncertain things remain the same. Here, uncertain things could be war, inflation, natural calamities, a rise in the customer's income level, a change in flavour and fondness, the cost of related products, and many more. (Sloman & Jones 2020, 69-70.)

Trend forecasting uses quantitative and time-series data, including numerical data over different periods. Long-term projection and short-term projection are two primary categories of trend forecasting techniques. Long-term projection, known as macro trends, focuses on and predicts more significant societal

changes that influence market demand and consumer behaviour. In contrast, short-term forecasting focuses on micro trends, including consumer buying behaviour in a specific period for the next six months to one year. Trend forecasting can be used by identifying past trends, studying the patterns in the data, including linear patterns, exponential patterns, and constant patterns, assessing the difference between past forecasts and actual consumer behaviour, determining the hypothesis, and creating a forecasting model that suits the company's goals. (Sloman & Jones 2020, 69-70.)

3.3.5 Barometric forecasting method

Barometric forecasting techniques is a method of forecasting demand based on past or present events. In this technique, forecasting is done by analysing statistical and financial indicators like savings, investments, and income. Meteorologists use the barometric forecasting method by studying the movement of mercury in a barometer. Economists use economic indicators as a barometer to anticipate overall movement in business schemes. Hence, this method does not necessarily forecast the actual quantity demanded in the future. In some cases, this method can also be implemented without past statistics. (Sloman & Jones 2020, 70.)

The barometric forecasting method includes three main economic indexes: the leading index, the coincidental index, and the lagging index. Leading indexes are those used to anticipate upcoming events or demands using statistics from previous events or demands. Here, already happened demand or event acts as a leading indicator. The coincidental index fluctuates up and down simultaneously with the change in the degree of financial scheme—for instance, the unemployment rate. However, lagging indicators are those indicators that show the trend of change following the economic cycle and the way to future events. For instance, inflation and unemployment help to understand financial performance. (Sloman & Jones 2020, 70-71.)

3.3.6 Econometric forecasting technique

The econometric forecasting technique is a quantitative or statistical method of forecasting. This method creates a mathematical formula by integrating past sales statistics with the factors influencing the demand to anticipate upcoming orders. This method helps to estimate the relationship between various economic variables, like demand, price, supply, and purchasing. It also helps to examine the effects of

monetary policies. Economists forecast economic trends and predict and explain economic behaviour using this model. This model is one of the most challenging forecasting models, as a change in one variable can completely change the result of forecasting demand. Generally, there are two categories of order functions: single variable order function, where one factor affects the demand, and multiple variable demand function, where various factors affect the demand. (Sanders 2015, 75-78.)

This technique is one of the most complex techniques used for forecasting. It comprises two methods: the regression method and the simultaneous equations model. The regression method combines economic theory with statistical tools. Moreover, it forms a demand function through economic theory. If the demand for various commodities is affected by a single variable, then the order function is known as a single-changing order function. If multiple changes simulate the market for the product, the demand function is called a multi-variable demand function. The simultaneous equation model helps forecasters examine the connection between the dependent and independent variables. (Sanders 2015, 75-78.)

4 SUPPLY

Supply means the quantities of goods or commodities the producer or supplier is prepared to sell at a stated price over a specific period. Just like demand is the consumer's readiness and capacity to purchase a commodity, supply is the producer's willingness and ability to deliver the commodity and goods. Generally, the supply and demand of the good would be equal. The principle of supply indicates higher demand for the product, which provides a positive indicator of increasing the supply. Generally, supply consists of three essential aspects: supply is always referred to in terms of cost as the cost of a commodity at which the producer is supplying differs from one location to another; supply deals within regard to time, as it is the amount of product that supplier is willing to offer at a specific period and supply consider inventory and cost of goods. (Taylor 2001, 44-46.)

The price and supply have a positive relationship as the manufacturer produces more products when the cost and orders are higher. In contrast, they reduce production when the cost and order for the goods are lower. The order for the product may vary in various seasons or quarters of the year, and the producer adjusts their supply accordingly to ignore the loss. Companies conduct various surveys and market research to identify market demand for the product and how much money consumers are willing to spend on the product, which helps them adjust their production and supply of the commodity. Producers always want to maximize their profit by producing and supplying more products at lower prices; however, buyers want to trade the products at lower prices to minimize expenses. (McEachern 2012, 67-68.)

4.1 Types of supply

Understanding the various types of supply in the distribution channel is vital for a business’s success. To achieve operational efficiency, cost minimization, and meet customer expectations, companies need to anticipate, adapt to, and manage various types of supply effectively. In the distribution channel, businesses should continue to evolve distribution channel management to achieve sustainable growth and competitiveness in the global market. Moreover, companies need to be flexible enough to adapt to unexpected changes in supply. Thus, regular review, formulation of strategic decisions, and continuous development are crucial to achieving a business’s goals and objectives. (Gillespie 2016, 62.)

The supply categories rely on the business's character, the product's character, product utilization, the number of customers, and producers. Businesses change their supply according to the change in demand. It needs to adapt to the fluctuation in market order and make necessary exchanges in operation processes, production, and inventory. Although there are different types of supply, some significant types are joint or complementary, short-term, long-term, and market, which are explained below. (Krugman & Wells 2013, 65-67.)

4.1.1 Joint or complementary supply

Joint or complementary supply refers to those goods or commodities producers produce or supply jointly. There is one main product and another by-product. The by-product is usually an automatic outcome when the main product is made. These two products are produced together but sold separately. For instance, mutton and wool are obtained automatically when sheep are slaughtered for mutton. Here, mutton is the main product, wool is the by-product, and the joint product is produced from sheep. (Gillespie 2014, 90.)

Businesses increase their revenues through joint supply by creating multiple income streams from a single production process. It also helps firms reduce costs as they can produce various products simultaneously, sharing the cost of production on materials, labour, equipment, and energy. Moreover, businesses can enjoy flexibility in product offerings and pricing as companies can sell one product at higher prices. Although businesses cannot compete with competitors' prices in that particular product, they can gain overall profit from multiple products and compete with other competitors. (Bullen, Day, Champa, Hiken & Grant 2015, 1-5.)

4.1.2 Short-term and long-term supply

Short-term supply is a type of supply where suppliers cannot meet the consumers' expectations; instead, consumers have to adjust according to the goods available in the market. Thus, consumers can buy up to the quantity of goods the producer can offer during a period. This is the result of changes in demand in the market for the product, which suppliers still need to adjust to meet the changed demand. In this case, a supplier may lose profits on production costs if the price drops significantly and may miss an

opportunity to earn more by selling more products due to the inability to produce more products fast enough to meet the high demand in the market. (Gillespie 2014, 92.)

On the other hand, long-term supply is the type of supply where the supplier has enough time to adjust to changing orders in the market. Suppliers can raise or decline production based on the buyer's behaviour and market demand. It helps companies reduce production costs and adjust inventory and supply chains. For instance, if there is any new trend in the market and products are sold steadily, producers have enough time to figure out and adjust their production when the trend continues. Generally, this is a safer supply type as companies can gather information, analyse the situation and plan for necessary changes to meet market demand. (Gillespie 2014, 92.)

4.1.3 Market supply

The market supply is the sum of a good a supplier is ready and can offer at different prices over a specific span. It is also called everyday supply, which means the capacity of producers to supply products in the market daily. In a highly competitive market, many producers will supply particular commodities. In this case, there will be many substitutes in the market for the customers who can choose the best to satisfy their needs. Any fluctuation in price will affect the supply. Adding new producers to the market will shift the supply curve upward. For instance, if five producers produce 100 units of product each, then the total market supply would be 500 units. (McEachern 2012, 69.)

To understand the need to produce a specific good, businesses calculate the market supply of the product. The first step businesses take is to outline the type of market they are affiliated with, followed by several producers existing in the market and the amount of supply from each producer. After collecting these data, businesses calculate the total market supply of the products. By comparing it to the total market order for the good, companies understand the need for production and prepare production decisions. Moreover, they examine the market regularly (weekly, monthly, quarterly, or yearly), maintaining a timeline to gather the necessary data and calculate the market supply. (Bullen et al. 2015, 1-5.)

4.2 Determinants of supply

Supply is the readiness and capacity of the producer to produce the product at a given price over a specific period. There are two categories of supply: individual supply and market supply. Individual supply refers to one producer's supply of goods or services. In contrast, market supply refers to the total supply by all the producers in the market over a given period. Supply can be affected by various internal business and external market factors. Companies must understand and react to those factors while planning production, making supply chain decisions, formulating strategies, and marketing. (Krugman & Wells 2013, 68-70.)

Factors that influence the supply of commodities and services positively or negatively are called determinants of supply. The higher the price, the more the supplier wants to supply, as it incentivises the supplier to supply more products in the market over a specific period. The lower the price, the lower the supply the supplier would want to supply to ignore the loss. While consumers want to purchase more at lower costs and less at higher costs. Although many determinants affect the supply of products and services, some are explained below. (Sloman & Jones 2020, 33-34.)

4.2.1 Change in input prices

The cost the supplier has to invest to get a product to supply in the market is called the input price. The supplier has to input various factors into producing products, such as wages, cost of raw materials, production cost, inventory cost, electricity cost, water cost, transportation cost, and many more. Any rise in the cost of input prices will create a decline in the amount supplied at the market over the specific period as a firm cannot provide a more significant amount of product at a higher cost of inputs. When the cost of inputs increases, the firm has to increase its commodity cost, eventually decreasing the offer for the product in the market. On the contrary, if the cost of inputs decreases, the supplier wants to offer more to maximize profit. For instance, the rise in the price of energy for many firms causes a reduction in supply at a higher cost. (Gillespie 2016, 111.)

One of the critical management strategic decisions is to decide the production level at rising input prices. If the supplier continues higher production at a higher input price, it may face a reduction in profit mar-

gin. In comparison, a supplier may lose its customers to its competitors at lower production. Thus, suppliers must decide whether to increase the product's price, change production plans, or look for cheaper raw materials. On the contrary, at lower input prices, suppliers tend to enjoy more profits; however, they have to consider that other competitors may adjust their product prices due to a reduction in input prices. Thus, continuous observation of the market situation, competitors' actions, and adjustments in production planning, depending on the need for time, is a must for the supplier. (Sloman & Jones 2020, 33-34.)

4.2.2 Change in technology

Technology is one of the most important determinants of supply. Technology improvement helps suppliers produce quick and additional units at a lower cost. Any advanced machinery significantly increases the number of goods produced per hour, which will help reduce various expenses such as electricity costs and wages, as improved machinery can make the same quantity in fewer hours. Reducing such costs encourages producers to produce more, resulting in higher profits. Technology and the quantity offered have an uninterrupted connection, as any improvement in technology causes a rise in supply due to a fall in the cost of production and vice-versa. (Taylor 2001, 46.)

Technology advancements help businesses reduce costs and improve quality, develop new products, maintain higher safety, change the production process, improve the supply chain, and reduce defects. It also helps businesses make crucial business decisions as technology helps companies gather necessary data, analyse them, and formulate a strategy for supply and marketing. Companies need to constantly monitor the need for technological change to compete with the competitors. Thus, businesses need to understand the impact of technology on supply. (Gillespie 2016, 111-112.)

4.2.3 Change in the number of producers

The market offer is the sum of the number of commodities offered at each price by all the suppliers. Just as changes in the number of customers affect the order for the goods, fluctuations in the number of producers influence the supply of products. Market supply increases with the rise of suppliers and vice versa. Moreover, any rise in the number of suppliers will raise the total market supply, and any decline in the number of suppliers in the market will decrease the total supply. Thus, there is a straight connection between market supply and the number of sellers in the market. (McEachern 2012, 71.)

The larger the number of competitors on the market, the more significant the impact on the supply of the products or goods. Businesses calculate the market demand and compare it with several suppliers and the quantity they supply to find the gap in demand and supply to fill them with the supply of demanded products. Depending on the supply's need, businesses adjust their strategies, resources, production capacity, and supply chain. (Sloman & Jones 2020, 33-34.)

5 RESEARCH METHODOLOGY

A research methodology is an organized and empirical approach to gathering and clarifying quantitative or qualitative information to answer probing inquiries. Moreover, research methodology provides a framework for how the study is planned, conducted, and analyzed, and it guides researchers in deciding on the most appropriate procedures to use in the study. It allows readers to judge a study's validity and reliability carefully. Research methods are the distinct techniques, strategies, or mechanisms used to gather and clarify statistics. They are selected based on the study question, research design, and the information type needed. Surveys, interviews, experiments, observations, and statistical analysis are examples of research methods. Quantitative, qualitative, and mixed methods are three types of research methods. (Kothari 2004, 1–15.)

The qualitative study gathers and examines non-mathematical facts to recognize concepts, beliefs, or understanding. It focuses on the "why" and "how" questions, which depend on personal experiences. It includes volatile surveys, textual analysis, comprehensive interviews, focus groups, or observations to collect rich data and content. On the contrary, quantitative studies gather and examine mathematical figures to generate results for more expansive areas. The mix of quantitative and qualitative elements to answer the study question is known as mixed methods. To conclude, this study deals with both numerical and non-numerical data. (Punch 2009, 88-89.)

The thesis aimed to identify a suitable demand forecasting technique for a specific case company. The author embarked on a research journey, collecting data through interviews with three of the case company's demand forecasters. These findings were then meticulously analysed, revealing the challenges the forecasters faced during the demand forecasting activity, the applications, and the limitations of various forecasting techniques. This analysis was further enriched by comparing the findings with theoretical analysis and different business situations over some time. This comprehensive analysis identified a suitable demand forecasting technique for the case company, accompanied by some development ideas.

5.1 Research design

Research design is the strategy used to answer the study question using factual statistics. Moreover, it is the programme or structure used to perform a research study. The primary step of the actual examination outline is to determine a specialized plan to conduct the research. The commonly used research designs are quantitative, qualitative, or mixed research methods. Researchers select the best-suited research method depending on the character of the study or study problem. Moreover, the research purpose and questions must be clearly defined in the research design, which has been abstractly mentioned in this thesis paper. Moreover, the conceptual structure within which research is conducted, which constitutes the blueprint for data collection, measurement, and analysis, is called research design. (Kothari 2004, 31–35).

Therefore, the author has chosen a qualitative research method to conduct research. The author chose this research method to understand a case company's process, challenges, opinions, or experiences on demand forecasting. The reason behind choosing it is to acquire in-depth insights into the straight observation of personnel and problems and find the necessary solution. The author aims to find suitable demand forecasting techniques that help minimize the challenges of order anticipation activity and improve the forecasting accuracy of the case company.

5.2 Data collection

Data collection is the scientific process of collecting and measuring data to find answers to research problems, trends, and probabilities. To gather the facts for research, researchers must first select a sample frame from which the data will be collected, also called sampling in research. For this process, the persons who own the knowledge and information related to a particular field are selected to gather information with particular and detailed facts for the study. There are many methods researchers can use to collect the data. Some techniques for collecting data are interviews, questionnaires and surveys, observation, focus group discussions, the Delphi method, case studies, and user-generated data. (Kothari 2004, 95-114.)

The author conducted a semi-structured interview with two personnel from the sales department and one from the demand forecast to gather the data. Due to the nature of their work and availability issues,

conducting group interviews was impossible, so each participant was interviewed separately at a different time in February and March 2024. A pre-established thematic structure was used to gather the information. However, during the discussion, the questioner may determine the order and significance of the questions to the interviewee (Saunders & Lewis 2018, 158-159). Throughout the interviews, notes were collected for further analysis. Due to the request of the interviewees, no recorder was used to make them comfortable during the interview.

5.3 Data analysis

Qualitative statistics collected from discussions mainly include large amounts of unstructured narratives, which take much work to examine. In distinction to quantitative data, which includes numerical data and is easy to present and interpret through the help of bar graphs, pie charts, histograms, and many more, qualitative data analysis needs more organized and simple ways of presenting the information. Due to the more significant amount of data collected through interviews, the data examination can be sensitive as words extracted from interviewees may have multiple meanings. The data gathered may also differ from person to person based on their experience and perception of the research problem. Thus, the standard of a narrative study depends on the quality of the information collected, the researcher's understanding, and the examination. (Saunders, Lewis, & Thornhill 2016, 568.)

The author has used the thematic examination mechanism to analyse the data collected from the interviews. It is one of the most frequent structures of examination in the narrative study, highlighting, recognizing, analysing, and explaining patterns of meaning. Thematic analysis is usually an exploratory process. Usually, the researcher emphasises the quality and depth of the information rather than the amount of information. (Saunders et al. 2016, 579-587.)

5.4 Reliability and validity

Reliability refers to the stability of the examination of various information. If the same result is obtained under the same circumstances using the same method but at different times, the result can be considered reliable. Administrations can access stability under certain circumstances at various points. For example, if the weight of a product is measured multiple times under identical conditions, the scales will show the

matching result constantly. The outcome of the examination can be called reliable. (Punch 2009, 244-246.)

In data collection, validity is vital in deciding how trustworthy the study result is. Usually, validity can be categorized into two types: internal and external validity. Internal validity refers to the manner and accuracy of the study conducted, whereas external validity refers to the result is relevance. Including quality information in the examination helps to find valid results. Thus, the information and structure used to examine the information are vital for better results. (Punch 2009, 246-248.)

5.5 Research implications and limitations

The implication of the research findings suggests how the findings may be necessary for the company for policy-making and other vital areas. The main area of implication can be the demand forecasting process, where forecasters can identify the areas of concern and act accordingly for better forecasting. It also allows forecasters to understand the root cause of the problem and solve it through communication and discussion. Another area of implication is a production planning, where demand forecasters can draw a clear picture of how much the production should be to match the demand for the product, and the production department can make necessary steps to match that demand. Moreover, research findings can also be implicated in policy-making, such as investment decision-making and strategic decisions like using advanced software for demand forecasting, optimisation of the available resources, use of new operating models, and technological advancement.

Although the author has carried out the research carefully, the research has some limitations. One of the fundamental limitations is the time-consuming process where the researcher had to gather data through interviews with various forecasters from different departments of the case company. Qualitative research deals with words rather than numerical values, which makes it challenging to analyse the data. Another limitation of the study is that it is difficult to generalise findings due to small samples and context. The researcher bias is always possible since the author interprets the research data. Thus, it may cause biased results even if the researcher reassures to minimise it. Market conditions, economic conditions, competitors' actions, war, and inflation also affect the participants' perceptions. Despite these limitations, the researcher has achieved the research objectives and purpose.

6 RESULTS AND DEVELOPMENT IDEAS

The study's results will be presented in this section, along with some development ideas for the case company. The research was separated into four main themes that were predetermined (deductive approach) by the research questions. Theme one was about exploring the demand forecasting function where the demand forecasting process and methods followed by the company, their benefits, evaluation of the forecasting process, customer survey, use of data, and data sources were discussed. However, these two discussed opportunities and challenges the forecasters faced during the forecasting process. Theme three discussed forecast errors and accuracy that occurred while forecasting demand and their cause. Theme four addressed the debate on the future of order anticipation, where order anticipation might evolve inside the company.

The interview was carried out following a semi-structured interview. Three interviews were conducted for the research. Two of the interviewees were from the sales department, and one of the interviewees was from the product forecast and production planning department. The interviewee from the product forecast department was interviewed in person. In contrast, two interviewees from the sales department were interviewed virtually due to their inability to meet in the business unit. The details of the participants and chronology are presented in Table 1 below.

TABLE 1. Participant information

Participant	**Company**	**Role/Department**	**Interaction**	**Timeline**
Participant A	Company X	Product forecast and production planning	In-person	February 2024
Participant B	Company X	Sales	Virtually	February 2024
Participant C	Company X	Sales	Virtually	March 2024

Each interview session started with an explanation of the purpose of the interview, followed by warm-up questions to learn about the interviewee's role and responsibilities within the company, current position, and experience in the related field. Each interviewee has enough expertise and knowledge in sales and demand projection. All the interviewees hold vital positions that directly involve the order projection activity. Interviewees emphasised the importance of working together to achieve common goals and objectives. Since the research included participants from different departments, the opinions and data provided were different. Thus, the researcher shares the data obtained from each participant on the themes presented in the interview questions (Appendix 2). The contributors were selected from two divisions to gather all the necessary information on the company's demand forecasting process and methods. The names of the interviewees and company are not displayed due to the confidentiality of the participants and the company established between the researcher and the company through the thesis contract; therefore, it cannot be violated.

TABLE 2. Consolidated thematic codes.

Theme one code categories	**Theme two code categories**	**Theme three code categories**	**Theme four code categories**
Demand forecasting process and methods	External experts for demand forecasting	Demand forecasting accuracy	Evolvement of forecasting.
Benefits	software	Steps taken to improve demand forecasting accuracy	Moving forward with forecasting
Introduction of new product	Challenges faced during demand forecasting and steps taken to overcome	Reasons for forecasting error	
Demand forecasting process evaluation			
Customer survey			
Use of past sales data			
Numerical data and their sources			

The researcher applied a deductive approach since the themes were pre-established to respond to the examination questions with the information to assist in the justification of the hypothesis. The outcome will be handed out after the thematic examination, which ends with the assistance of categorizing the codes. The researcher has categorized these codes into 15 categories: seven belong to theme one, themes two and three consist of 3 codes each, and two belong to theme four, presented in Table 2.

The first code in theme one (Table 2) was the order projection activity and method. According to the interviewees, all of them used the trend method of quantitative technique (Appendix 1), where they gathered past sales data from internal business and business customers (B2B) and analysed them to forecast short-term and long-term future demand. They mentioned using this method is easier and more effective. Moving on to theme one, code two, interviewees mentioned the benefits of demand forecasting to allow more accurate production planning, which helps to reduce excess supply, better delivery capacity, and better ability to interpret the market and develop sales in the right direction. Regarding code three, they mentioned that they use references connecting similar category products, use daily follow-up, collect data on pre-orders from business customers and modify according to the daily change in order, research the sales of similar existing products and market trends for new products, study the sales of the previous Christmas product and consider price change effect on demand of the product.

Regarding code four (Table 2), demand forecasting process evaluation. They mentioned they need a standard process for assessing demand forecasting. Instead, they use their experience and knowledge in the field. Code five was about customer surveys and responses from all of them where they don't conduct customer surveys. Regarding the code 6 theme one, interviewees mentioned they use a lot of data and software for sales recording programs. They also use digital platforms from the company's business customers (B2B), where data can be accessed if necessary. The last code of the theme one was numerical data and their sources. According to interviewees, they use forecasted numbers, sales revenue, sales unit, product loss, number of customers, actual sales, and accuracy. They collect this data from their company's and customers' systems.

In theme two (Table 2), interviewees were asked if they would consider hiring external experts (using the Delphi technique) for demand forecasting and why or why not. Interviewees had mixed opinions; some believed it was unnecessary, and some thought it was better to consider hiring external experts for a larger workforce and a new system to support decision-making. Regarding opportunities, they mentioned higher demand than forecast, which is an excellent opportunity for the company to expand its business with higher quantity sales and profit. However, it comes with a challenge to meet the higher

quantity demanded. Similarly, interviewees mentioned they use many different software, including one forecasting software and a few others to support it. According to interviewees, some of the significant challenges faced during the demand forecasting process were major changes in production, especially during the campaign product, lack of enough information and data on time, competitors' actions, changes in the buying trend of customers, and loss of data due to software updates. So, to tackle this challenge, they react quickly to the changes, learn from different situations, and prevent data loss with backup Excel sheets.

Theme three (Table 2) was about demand forecasting accuracy, steps to improve accuracy, and reasons for forecasting errors. Interviewees were asked if demand forecasting can be accurate. All the participants argue it is impossible to achieve accuracy ultimately because demand varies due to various determinants. Actions taken to improve demand forecasting were to find the root cause of the problem, gather enough information from customers, analyse multiple factors that may have affected demand, attend production meetings and identify what was missing during the forecast. The reasons for forecasting error were lack of enough data, challenges to forecasting new products, frequent changes in market demand, wrong interpretation of the market situation, and nature of forecasting (forecasting for the following week in advance) are the significant reasons for forecasting error.

Theme four (Table 2) was about the future of order projection, which consists of two codes: the evolution of order projection in coming days and moving forward with predicting. Regarding this question, interviewee A argued that AI could be possible. She also argued AI could be the answer to the problem of using too much software. In contrast, interviewee B argued that robotics could be introduced in the future, and interviewee C argued that the development of a new process for demand forecasting and AI could evolve inside the company. Interviewee A argued that updated customer information and direct involvement with customers are critical in response to code two of theme four. Interviewee B argued that using reliable data, analysing market conditions and economic studies, and studying past events and experiences could help in cutting-edge. On the contrary, interviewee C argued that trying a new operating model and continuous improvement on R&D could be game-changing in forecasting.

Based on the theoretical part and research result analysis, the researcher has developed some development ideas for the case company. Since the case company is engaged in B2B (business to business), market research and sales force opinion method, which are two methods of qualitative forecasting method, don't suit this case as business customers of the case company are directly involved with end customer B2C (business to customer). Here, business customers conduct end-customer surveys to gather

information. However, the research result shows the use of external experts (Delphi method), which is the third technique in qualitative forecasting techniques, could be helpful for the company to forecast the demand in problematic situations like during the introduction of a new product and Christmas product where forecasters lack enough past data. Moreover, forecasters can use a mix of Delphi and trend methods in such cases, facilitating a new approach and adding to the existing method of forecasting demand.

Moving on to quantitative demand forecasting techniques, the trend method which the company uses currently seems to be the most suitable option for average product forecasting as it gathers past sales data, allows forecasters to analyse the trend, predict and adjust plans, strategies and supply chain to meet the future demand. The barometric forecasting technique is another technique in quantitative demand forecasting techniques that helps forecast overall economic activities, which is done through statistical and financial indicators like savings, investments, and income. Economists use economic indicators as barometers to predict overall trends in business activities. However, this method only forecasts the actual demand in the future. This technique can be helpful when introducing a new product when enough past data is unavailable. The researcher suggests that the case company considers this method when forecasting new products that need more past data. This method can also help the case company analyse internal and external economic activities. Based on the analysis, formulate long-term plans and policies and make strategic decisions on future investments, changes in the supply chain, and technological advancement. On the contrary, the econometric forecasting technique is a complex quantitative forecasting method. It consolidates past data with multiple factors to estimate future orders. The researcher believes that, with the help of an economist, the case company could also consider this method.

The evaluation of the demand projection activity is essential to identify and eliminate the root cause of the problem in demand forecasting. Thus, the researcher suggests that forecasters measure forecasting accuracy regularly, find out the root cause of forecasting errors, take necessary actions through effective communication, and use KPIs (key performance indicators) to understand how particular departments perform. Good KPIs help to understand whether or not the strategies used are working well to achieve the desired goals. Similarly, the researcher would also like to recommend forecasters gather all the necessary data on time to get enough time to analyse the data and prepare the forecasting. It is also recommended to consider various internal and external factors affecting the product's demand.

The research results show that demand is on the higher side. Thus, the researcher would like to recommend the case company for optimal utilization of the available resources, make necessary changes to the

supply chain, plan for essential investments, expand the production line, and work on technological advancement. Moreover, to minimise the significant challenges faced during demand forecasting, the researcher suggests that forecasters consider various determinants of demand during forecasting, explained earlier in the theoretical part, and constantly monitor internal and external factors. In the last few years, technology has been an indispensable part of any business, improving efficiency, minimising cost, enhancing security, and providing a better customer experience. Thus, the researcher would suggest the company for technological advancement in various business departments. The researcher also suggests that the case company consider using AI in demand projection in the future. Although it might be costly initially, it can be profitable in the long run. Moreover, there is always a competitive advantage for a first mover. Therefore, the company should take the necessary steps in technological advancement before competitors.

7 INTERPRETATION AND SUMMARIZATION OF THE MAIN FINDINGS

To interpret the research data, the interviewees' responses show that forecasting is done before planning. There is a common perception among the respondents about the importance of data collection, as they believe it is the most important part of forecasting. The process and methods the forecasters follow are the same as those explained in theme one code category one. However, there is a difference in the type of demand forecasting between the departments. Generally, the sales department is responsible for long-term forecasting, while the product and planning departments forecast short-term forecasting. Moreover, another common thing from the interviewees' responses is the importance of communication between various departments to achieve the goals.

The use of past sales data, a quantitative forecasting method, is the most common answer from the respondents. They commonly perceive the benefits of demand forecasting, believing it is one of the company's most essential functions. Moreover, the challenges faced during introducing the new or Christmas product are similar due to the need for sufficient information on time and various factors that allow demand to fluctuate from time to time. However, there are some opinions regarding hiring an external expert (Delphi technique) for forecasting. Some believe it is unnecessary, while others believe adding an extra human resource is better. Participants believe forecasting accuracy can be improved but never be achieved totally. The response to the future of demand forecasting is inspiring, as they believe AI (artificial intelligence) can be the future of demand forecasting, opening up new possibilities. However, each respondent has different opinions on reasons for forecasting errors, which include competitor's price, lack of sufficient data on time, various factors fluctuating demand, government policy, economic conditions, significant changes in production, and many more. Moreover, the steps taken to improve accuracy by the various departments differ depending on the nature of forecasting.

The relation between the answers and the participants' roles and departments is visible. For example, participants from product forecasting and planning mentioned the reasons for forecasting errors could be machine breakdown, frequent change in demand, or lack of sufficient data on time, which is related to day-to-day operations and short-term forecasting. In contrast, sales mentioned long-term forecasting and factors affecting demand, like global and national changes in the market and competitors' actions.

To summarize the main findings, the result of the qualitative research suggests that demand forecasting is one of the most critical instruments that remarkably affects various sections of the operations, helping

the company achieve its goals and objectives. Moreover, it helps to build customer relationships. The most important part of forecasting is data gathering and examination, as information allows forecasters to understand the pattern and estimate future demand by considering the multiple components that can play a vital part in demand fluctuation. Moreover, past sales data is the most used data by forecasters. The outcomes suggest that projection is the company's primary task before planning. Based on the forecasting, planning is done to meet the necessary demand for the product. The research also shows that information flow and communication between various departments are essential for planning and decision-making.

The research suggests that numerical data are essential for better demand forecasting. Forecasters use these data, experience, and knowledge in the field to forecast demand. Moreover, research also reflects the benefits of demand forecasting in various areas, such as production planning and sales. The result also demonstrates the importance of communication among different departments for better results. Multiple challenges, such as forecasting errors forecasters face, are reviewed to understand the root cause of the problem, followed by necessary actions to tackle those problems. Although forecasting accuracy has been on the higher side, there are some areas for improvement. The use of AI in the upcoming days of demand projection is an idea in forecasters' minds. Moreover, understanding the competitors' actions, implementing new operating models, and continuous development have emerged as necessary for forecasting.

Moreover, the main findings are based on the intention and motive of the research, and the demand and supply relation, which has been discussed in the theoretical part of the thesis, is backed by the result of the study. The finding has shown supply is a variable where any rise in order leads to a rise in supply and vice-versa. With the help of the research result, the author can conclude a direct relationship between demand and supply where demand for the product plays a vital role in creating a supply of the product. Results also show that forecasters use the trend method of quantitative demand forecasting techniques (Figure 2), using past sales data to analyse past trend patterns and estimate future demand for the product. This method suits the case of a company because forecasters can rely on past sales data on the various product categories, which helps forecasters estimate future demand.

8 CONCLUSIONS AND DISCUSSION

The researcher sought to find a suitable demand forecasting technique and objectives to gather information, examine, and provide to company X, which can help make critical tactical decisions and present the connection between the demand and offering of the product. Moreover, the research was carried out to examine the company's forecasters' challenges and provide possible solutions to the problems. Moreover, the appropriate qualitative study technique (Appendix 1) was chosen for the study as it helps to understand the perceptions, emotions, and experiences of the forecasters on the success and challenges faced during the demand forecasting process.

The interview was crucial in supporting the study's motive. The interview was conducted to understand the demand forecasting method followed by forecasters and the challenges faced during the forecasting process. The online and in-person interviews were conducted with two sales employees, one from product forecasting and planning. A semi-structured method was used for interviews to gain a deeper understanding of the problem. The findings of the research gave a clear picture of the process involved, methods used, opportunities, and challenges faced during forecasting. In the future, researchers can study the impact of AI on demand forecasting. There is a vast area in which to research demand forecasting.

Selecting the proper forecasting methods for the company is one of the most challenging tasks for decision-makers. Different demand forecasting methods can be suitable depending on the business's goals, objectives, and nature. However, various demand forecasting techniques might be ideal for other situations, such as standard and unique products like new products or Christmas products, which were discussed earlier. Thus, making the right decision at the right time is critical to success. Accurate forecasting provides validated insights into future events and trends and allows decision-makers to make the correct decisions to get better outcomes and reduce risk. The need for accurate forecasts is one of the most essential parts of business management. Although the study shows the company has higher forecast accuracy, there are some areas for improvement.

The research has helped forecasters study the various possible demand forecasting techniques for different product types (everyday products and new products/ Christmas products). It has also suggested necessary steps (demand forecasting process evaluation and use of KPIs) that can help identify root cause problems and find solutions to them. The research finding has contributed to a gap of knowledge on different qualitative and quantitative demand forecasting methods discussed earlier in the theoretical

part (Figure 2) and the importance of technological advancement (use of AI). Moreover, the research findings fall within the existing theories or assumptions in the field of research as they are confirmed with the supporting evidence collected from the interviewee, which is discussed in the results section. Some of the examples of those findings are the use of numerical data is critical, quantitative demand forecasting method (especially trend method is best suited for the case company), demand forecasting is beneficial for planning, setting goals and decision-making, the importance of effective communication among various departments, and use of external experts (Delphi method) in a problematic situation where enough past data are not available to analyse the trend and predict future demand.

The demand forecasting process, understanding the reasons for the errors, taking necessary steps to reduce forecasting errors, production planning, and strategic decision-making are practical implications of the research findings discussed in detail in the earlier chapter. On the contrary, research findings also have some limitations, such as a time-consuming process, lack of numerical data to back the hypothesis, and the possibility of biased results due to differences in the perception and opinions of interviewees and researchers.

The trend method from quantitative demand projection techniques, which utilizes earlier sales information, is the most suitable for the case company in average product forecast. However, for a new or Christmas product that needs more past data to analyse trends, forecasters can seek the assistance of external experts in conjunction with the trend method. Furthermore, forecasters can evaluate the demand forecasting process to determine its effectiveness for the company's desired outcome and to measure the performance of forecasters through KPIs. This approach encourages effective communication among the forecasters and analysis of the problem. By doing so, forecasters can enhance the forecasting accuracy and mitigate the risk of forecasting errors. To propose to the case company, continuous R&D on operating models can be beneficial, and technological advancement (Use of AI) in forecasting can be a pivotal step towards more effective and efficient demand forecasting. Although it may be initially costly, it can yield significant benefits in the long run. Thus, the company can gain a competitive advantage as a first mover in this field ahead of competitors.

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APPENDIX 1

Judgmental forecasting Techniques

Strengths	Weaknesses
• Quick to react. • Forecasters ‘‘owns’’ the resulting forecasts. • No historical data required. • Useful for unusual events	• Limited attention span. • Human cognitive limitation. • Possible lack of consistency • Costly and time consuming. • Biased

Statistical forecasting Techniques

Strengths	Weaknesses
• Consistent • Objective • Able to process large amount of information and data at one time. • Replicable by others.	• May be slow to react to changing environment. • Only as good as the model used and the available data. • Might be costly to model ‘‘soft’’ information. • Requires technical understanding (by both forecasters and user). • Not good at capturing feelings.

Judgmental versus statistical methods (Adapted from Sanders, 2015)

APPENDIX 2

Interview Questions

Warming-up

1. Could you please give your introduction and description of your role in the company?
2. How long are you working in this role?
3. Can you please share your knowledge on demand forecasting?

Theme one: Exploring demand forecasting function

1. Can you describe existing demand forecasting process in the company? What methods do you use and why this method?
2. What are the benefits you have found from demand forecasting?
3. What do you do differently to forecast demand during the introduction of new product or special public holiday like Christmas product?
4. How do you evaluate demand forecasting process?
5. Do you conduct customer survey? What platforms do you use for customer survey?
6. How much do you use past sales data or trends in your forecast and from where do you receive it?
7. What are the numerical data and information you use for forecasting demand? And where do you collect them from?

Theme two: Opportunities and challenges

1. Do you consider hiring an external experts for demand forecasting? Why or why not?
2. Do you use any demand forecasting software? Why or why not?
3. What are the major challenges you found during demand projection process?
   a. How have you deal with them?
   b. What have you done to overcome them?

Theme three: Forecast errors and accuracy

1. Can demand projection be accurate or not? Why?
2. What have you done to improve demand forecasting accuracy?
3. What causes the forecast error?

Theme four: The future of demand forecasting

1. How do you see future of demand projection in your company?
2. What should be done to stay ahead of the curve with predicting?

A semi-structured interview was conducted using interview questions as a guide.