# Assessment of Forecasting Management in International Pharmaceutical Companies: A Grounded Theory Study

**RADI HALOUB**

A Thesis Submitted to the University of Huddersfield in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy

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For all friends and relatives, who wrapped me with love and care and supported me *"you make everything worthwhile"*.

*Radi Haloub*

*To my pillars of Strength Mum and Dad*

*To my pillar of Motivation my wife Deema*

*To my pillars of Happiness Ahmad and Ibrahim*

# Abstract

Despite the improvements in mathematical forecasts and the creation of new formulas in forecasting, the increase in the accuracy forecasts is not yet significant, thus, leading to an increase in the size of the gap between academia and practice. Furthermore, applying mathematical forecasting techniques alone is not sufficient in light of the existing lack of knowledge about forecasting, which, thus, gives rise to the importance of judgments and the possible contributions they may add to the forecasting management process. Introducing judgmental adjustments to produced forecasts might increase or decrease the accuracy of these forecasts depending on many factors, which highlights the significance of this research as it evaluates the managerial and psychological forces that inspire or influence the constructors of forecasts (forecasters) and the users of forecasts in ways that can affect their judgments and, consequently, affect the overall accuracy of the produced forecasts. This research was conducted in 2008, to uncover the effects of such forces on the users of forecasts, which have been defined in three main departments including finance, marketing/sales and supply chain. Additionally, this research aimed to generate theory that can be used in forecasting management in international pharmaceutical companies in order to improve the accuracy of forecasts. Accordingly, the research followed a qualitative approach through applying Grounded Theory as the research methodology. Data was collected through eighteen interviews with respondents from eight international pharmaceutical companies, who are involved in the forecasting management process and can have an impact on it. In accordance with the Grounded Theory, the data was initially collected through unstructured interviews that moved on to more structured interviews until the saturation stage was reached. The emergent theory from this research supported that the majority of the constructors and users of forecasts are not experienced in forecasting management. Moreover, the study also showed that the roles of constructors and users of forecasts are not clearly defined in pharmaceutical industry, where the roles of both are often confused. Thus, the users of forecasts commonly get involved in forecasting management, and use their judgments in producing forecasts. However, the different views of users revealed in this study about forecasting have been shown to affect their judgments, and, consequently, contribute to decreasing the forecasting accuracy and increasing the departmental conflicts. Through Grounded analysis of the research findings, the data collected was categorised into six core categories and six central phenomena, based on which the research suggests *"Haloub Forecasting Assessment (HAF) Index"*. This index provides a forecasting assessment matrix by listing sixteen ranks that can be used to assess the forecasting performance in international pharmaceutical companies. These ranks were identified based on four main dimensions, which were labelled in the data analysis, including knowledge of forecasting (level of forecasting ambiguity), knowledge of the market, managers' ability to sell the produced forecasts (managers' celebrity) and interdepartmental communication. Application of this matrix should have important implications for managers as they provide guidance about the forecasting management process and identify areas of development. The findings are specifically relevant to international pharmaceutical companies but may have relevance to other industries.

***Keywords:*** *Strategic Futurology, Forecasting Knowledge, Forecasting Accuracy, Judgmental Integration of Forecasts, Users of Forecasts, Departmental Conflicts, Communication, Celebrity of Managers, Biasness and Heuristics, Grounded Theory.*

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# List of Abbreviations

| | |
|---|---|
| DNDI ..... | Drugs for Neglected Diseases Initiative |
| FA ..... | Forecasting Accuracy |
| FDA ..... | Food and Drug Administration |
| FMCG ..... | Fast Moving Consumers' Goods |
| FP ..... | Forecasting Process |
| HAF Index ..... | Haloub Assessment of Forecasting Index |
| IJF ..... | International Journal of Forecasting |
| IMS ..... | Intercontinental Medical Statistics |
| IPR ..... | Intellectual Property Rights |
| IT ..... | Information Technology |
| MHRA ..... | Medicines & Healthcare Products Regulatory Agency |
| MMV ..... | Medicines for Malaria Venture |
| MOH ..... | Ministry of Health |
| OC ..... | Organisational Conflict |
| OR ..... | Organisational Responses |
| OTC ..... | Over the Counter |
| R&D ..... | Research and Development |
| SDS ..... | Social Decision Scheme |
| SKU ..... | Stock Keeping Unit |
| SKUL ..... | Stock Keeping Unit by Location |

# CHAPTER ONE

# INTRODUCTION

The Introductory Chapter is intended to provide an idea about the nature of the research project, in order to position the research within the literature context and guide the readers through the thesis by presenting the subject outline and moving on to discuss the research topic more specifically. An overview of the introduction chapter is provided in Figure (1.1). This chapter will also conclude with a statement of the contribution, and a summary of the thesis structure.

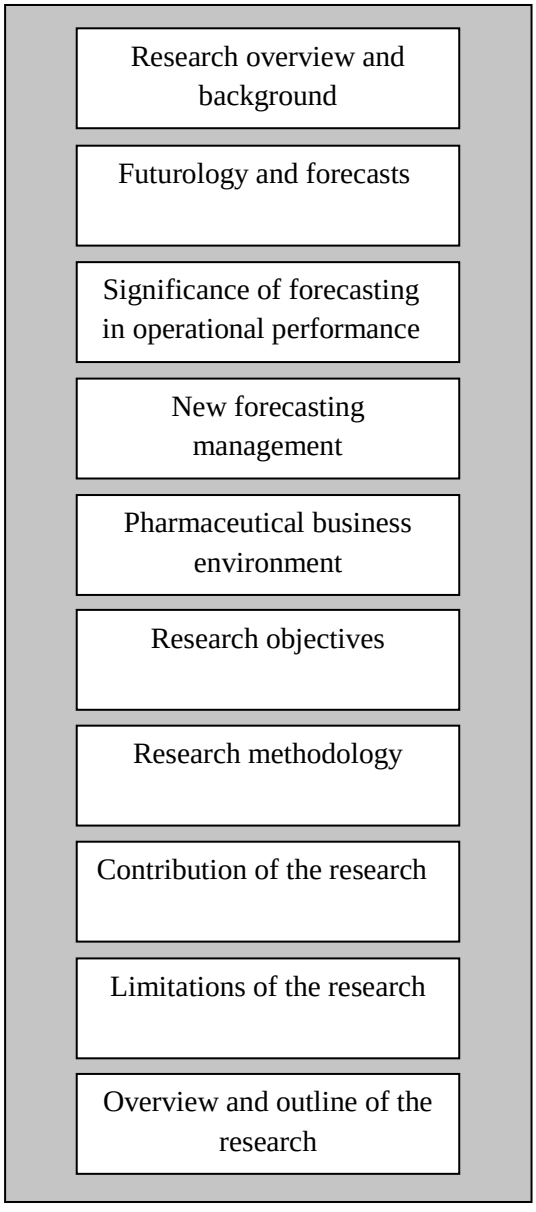



**Figure 1.1: Chapter map of the introduction chapter**

## 1.1 Research Overview and Background

> *"There are four ways economists can lose their reputation. Gambling is the quickest, sex is the most pleasurable and drink the slowest. But forecasting is the surest"* (Walesh, 1993, The Age).

This research is concerned in testing and evaluating the forecasting process within international pharmaceutical companies and explores the effect of users of forecasts, and conflicts initiated in forecasting process and management. These conflicts develop because of the different matters that affect the variations in judgments and perceptions of forecasts. These conflicts are related to psychological pressures by the users and managers of the forecasts, Fildes, *et al.* (2009) suggested studying these pressures in depth in the future researches. This research will fill the gaps in identifying these pressures by the users and managers and its impact on forecasting management process.

This research attempts to contribute to the literature in the area of effective forecasting management that was studied by different scholars such as Armstrong (2001); Fildes, *et al*. (2009) and Lawrence (1999). The majority of published studies related to forecasting focus on technical methods that are used to predict the future. However, there has been surprisingly little literature that considers how forecast users, namely marketing/sales, finance and supply chain departments, may influence the application of forecasts, which is an issue that has led to *"a gap in our understanding of the forecasting-operating performance connection"* (Smith and Mentzer, 2010:159).

Another issue that adds to the complexity of this research is that forecasts change the behaviour and attitudes of the users, thus, leading to an increase in the areas of conflict between the marketing/sales, finance and supply chain departments. Moreover, conflicts in forecasting techniques, unaided judgments and shortage of knowledge about the forecasting techniques will also contribute to widening the gaps and increasing the conflicts between these departments.

This research is therefore an attempt to provide additional insights about the size of conflicts between forecast users. Moreover this research will identify the factors that 'encourage' these conflicts within international pharmaceutical organisations and suggesting a practical process in order to improve the forecasting management.

Variations in departmental goals change people's perceptions and attitudes toward forecasts in each department and, consequently, affect the forecasting management and its accuracy. The results of this research found that there is a major communication breakdown due to differences in each department's definition of forecasting. Moreover, lack of collaboration and coordination between departments lead to gaps in forecasting management and organisational achievements.

The research methodology used is the Grounded Theory and eighteen individual qualitative interviews were carried out in eight international pharmaceutical companies. Eight respondents out of eighteen were in the marketing and sales department, four respondents were from the finance department and six respondents were from the supply chain department. These were covered each at the respondents' place of work over summer 2009 to summer 2010.

This chapter now considers some background about forecasting and international pharmaceutical companies, in addition to a detailed statement of the aims and objectives of the research. This chapter will also present an initial brief concerning the research methodology and the research contribution will also be rehearsed.

### 1.2 Futurology

Thinking about the future and its events has a long history due to the fact that people have always wanted to know what is lying ahead. Everybody forecasts in an unconscious or semiconscious way, for example when estimating the time to reach a certain place to catch up with an appointment, and the more the individuals think and gain experience, the more likely that their forecasts will be right (Gilchrist, 1972). The subjective input, or personal judgements, interfere in evaluating and predicting the future events and, consequently, affect personal definitions of forecasting. This is supported by Grupp and Linstone (1998) and Cuhls (2003), who mentioned that the definitions of forecasting vary from one person to another, but they all talk about the future.

As stated by Makridakis and Wheelwright (1989), it is important to mention that before the 1950s there was no systematic business forecasting, but only some attempts to conduct regression and time series methodologies. In the mid-1950s, the military started using the forecasting technologies, and it slowly spread thereafter into organisations and business management. During the period of 1950s and 1960s, academics started to find a unified

theory of statistical forecasting methods, whereas the qualitative forecasting methods emerged during the period of 1960s and 1970s, as methods to be used when there are no historical data to go through the statistical methods (Makridakis and Wheelwright, 1989).

Despite that the future remains a mystery, some developments can be foreseen and alternatives can be thought of, where setting expectations about the future would contribute to developing polices and shaping decisions. Accurate forecasts affect every aspect of life as it contributes to our life and our economies. One example about the impact of forecasts on daily life is the weather forecast and its relationship with internal tourism in the UK. Mark Smith, head of tourism at Bournemouth council, said *"we suffer from the inaccurate and overcautious weather forecasts, and it's decidedly unhelpful and costs Bournemouth millions of pounds every time they get it wrong, just on Bank Holiday Monday 25th May, 2009) alone, (the) UK lost 25,000 visitors because the weather forecast was so poor"* (Moore, 2009, online: *telegraph.co.uk*).

Forecasting is a part of daily mission for those involved with industrial or business problems, and at the same time it helps managers to improve and give better future decisions during the process of business strategy planning and allocating resources, in order to achieve expectations of sales or marketing activities (Jelena and Vesna, 2006). Moreover, workers in the medical sector make predictions and forecasts which could also be wrong and might lead to disastrous results, for example, there are a lot of factors affecting the treatment of chronic Hypercholesterolemia[1] patients, the doctors might prescribe anti-cholesterol agents based on their judgments through looking into other important factors to decide whether to prescribe these drugs or not. Factors such as the quality of life of the patient and the type of job they do for example, which could also affect the level of cholesterol (Armstrong, 2001).

The importance of forecasting is increasing due to the fact that the amount of uncertainty is increasing as the environment becomes more volatile (Waddell and Sohal, 1994), thus, leading to *"...Companies living in a turbulent environment"* (Toffler, 1985, cited in Waddell and Sohal, 1994:41). Moon and Mentzer (2005) defined forecasting as *"…a projection into the future of expected demand given a stated set of environmental conditions"* (Moon and Mentzer, 2005:38). However, the main question is whether forecasting is a science, or just

[1] Hypercholesterolemia is the increase of cholesterol levels in the blood.

an art of guessing? Baines (1992) said *"(the) forecast is an attempt to place a degree of order and structure on this uncertainty"* (Baines, 1992:6).

From a different point of view, Smith and Mentzer (2010) defined forecasts as the demand projection over a specific time that is expressed by different time horizons including week(s), month(s), quarters(s) or year(s), and with forecasts expressed based on the product whether it is tangible or intangible, i.e. the product-oriented forecasts are unit-based, whereas services forecasts may be expressed in values.

Management needs to deal with an increasing uncertainty of the environmental changes to make critical decisions (Makridakis and Wheelwright, 1989). Good managers are not the ones who could explain the past mistakes, but rather those who are capable of managing future events. In the past, managers estimated the future based on unconscious or semiconscious forecasts because the managers assumed that the future would be just like the recent past (Gilchrist, 1972). Yet, Johnson (2005) commented that such managers are making decisions about the future which are uncertain, and they are always trying to make estimates that are mostly wrong.

Mentzer *et al*. (1999), Winklehofer and Diamantopoulos (2003), Fildes (2006) and Davis and Mentzer (2007) developed different theories that should help in describing the role of management in the forecasting process. Managers who are responsible for implementing forecasts can influence the process of forecasting and how forecasts are employed. They may implement forecasts as received, adjust them before implementation, or completely ignore the received forecasts and apply their own forecasts or projections (Smith and Mentzer, 2010; Berinato, 2001; Fildes and Hastings, 1994).

A number of studies have been conducted to identify the relationship between the forecasting and operating performance, but in real-life, managers do not integrate the forecasts within the organisational system that support the decision making process (Smith and Mentzer, 2010). Since the 1980s, researchers such as Schultz (1992), Lawrence (2000) and Fildes (2006) investigated the connection between the operating performance and forecasting through focusing on factors that play a critical role in the forecast creation and application, such as the influence of management (or organisational) factors and individual (or employees) behaviours for example. Few studies considered the influence of forecast users' perceptions and actions on the application of forecasts in planning and management

activities (e.g. Forslund and Jonsson, 2007), which will lead to a gap in the understanding of forecasting-operating performance connection, taking into considerations that poor forecasting might happen because sometimes managers have too much confidence in their intuition (Armstrong, 2001).

### 1.3 Significance of Forecasting in Operational Performance

> *"The economist is the one who is giving the future forecast and telling you that the last year forecast was wrong"* (Buckley, 2009).

A good manager should find the answers to some questions like, for example, what will be the next month sales? How much should be produced this month? And what is the expected profit? To provide the best answers, managers would need to see the future, but since nobody can see the future, managers would need to be able to forecast the future, and even though forecasts may be wrong, they should be made (Gilchrist, 1972).

Forecasts performance indicators are based on the comparison between the previous forecasts and actual demand, which will provide the accuracy achievement at different levels of the hierarchy, across different time horizons and based on different units of measure.

These will be used to analyse the gaps in the achievements and factors that were not considered during the previous forecasts (Smith and Mentzer, 2010). Forecasts, whether short-term or long-term, are used for different purposes that include production planning, budgeting, sales quota setting and personnel planning (Mentzer & Cox, 1984a; White, 1986). Without short-term forecasting, the operations can respond retroactively in ways that will lead to lost orders, insufficient services and poorly utilized production services; whereas without-long term forecasting, resources will be misallocated in the financial department and wrong decisions will be made (Fildes and Hastings, 1994; Hanke *et al*, 2001).

Lambert and Stock (1993) positioned forecasting as, *"…the driving force behind all forward planning activities within the firm"* (Lambert and Stock, 1993:559). According to Drucker (1973) "*....forecasting is not a respectable human activity and not worthwhile beyond the shortest period*" (pp:124). Improvement of the operating performance depends mainly on the forecasts. Accurate demand forecasting is still a great concern for many practitioners (Armstrong *et al.* 1987) because accurate forecasts enable managers to prepare and plan for the short-term and long-term changes in the marketplace. As the accuracy of forecasts

decrease, decisions that rely on these forecasts will become more likely to be wrong with disastrous outcomes (Gardner, 1990; Fildes and Beard, 1992; Wacker and Lummus, 2002). Over-forecasting may result in excess stocks stored at warehouses for a long period of time, thus, increasing inventory costs and wasting warehouse space. Under-forecasting could lead to insufficient stock supplied at stores to meet the end-customers' demand, not harvesting potential sales revenue and undermining customer service standards (Armstrong, Brodie, and McIntyre, 1987).

The construction of forecasts will be translated in different departments into several criteria such as manufacturing plans, promotional activities, investments, profits, resources allocation and, sometimes, performance appraisal. Forecasts might or might not match with the demand forecasts, which is what the market demands. The researcher will focus on the different approaches and conflicts in the forecasting management in this industry. Since 30 years scholars such as Fildes (2006), Lawrence (2000) and Schultz (1992) showed interest in the factors that affect the application and the creation of forecasting such as the influence of management and the influence of the forecasting users' behaviours.

### 1.4 New Forecasting Management

Forecasting practice and forecasting models have been improved over time due to increased attention to the forecasting knowledge and recognition that the accuracy of forecasting reflects better decision making. The methodical forecasting study might not lead to significantly better forecasts than the old methods *'by guess and by gosh'* (Armstrong, 2001), but such a study will enable managers to give better understanding of their situation, which is likely to improve their control on of future operations. Despite the emergence of new technology and computer programmes, which can analyse data and allow managers to make more accurate forecasts, inaccurate or incomplete data can paralyse the decision making based on these forecasts and, consequently, lead to jeopardizing the main business objectives. Accordingly, Raco (2009) recommends investing in people and technology to sharpen the skills of the sales teams and the forecasters on board, where the forecasters should be able to accurately explain the budget to sales teams in order to set their sales targets.

In the late 1980s, the fashion was for using forecasting software, as pointed out by Barron and Targett (1986), who argued that the focus in forecasting is shifting away from technical

and statistical aspects toward more emphasis on the role of managers in forecasting. This shift is mainly due to the increasing evidence that more sophisticated forecasting techniques have not proven to be effective, especially in light of the expensive and embarrassing mistakes that have been reported to cause costly errors in finance, corporate planning, and production management. Moreover, the ability of managers to provide judgements based on forecasts is related to the combination of certainty or uncertainty in competitive or non-competitive situations by individuals, groups, or markets, where the implications of such forecasts may involve managerial decisions in businesses or governments (Smith and Winterfeldt, 2004).

Currently the constructors of forecasts mix their personal judgments with the produced quantitative forecasts in order to increase the accuracy, which is expected to contribute to increasing the level of accuracy of the produced forecasts by adding personal input related to the professional experience (Maher, 2010). Judgemental adjustment to quantitative forecasts can incorporate some information and personal values to the resulting quantitative forecasts to adjust them. According to Goodwin (2002), these judgemental adjustments involve a voluntary integration of statistical forecasts, taking into considerations that all forecasts require human judgments even in the case of mathematical forecasts, since judgments interfere in the choice of mathematical methods, variables used, data sets and others (Collopy and Armstrong, 1992).

Blattberg and Hoch (1990) explained that judgemental adjustments do not represent average forecasts of a mix of both quantitative and personal forecasts, but rather represent adjustments to the data calculated based on objective methods. The judgemental adjustments can give the opportunity to provide justification to the data that are suitable to be used in the forecasting process, as previous data can be judged. The main concern mentioned by Goodwin (2002) that these judgments are affected by *"the nature and attitude of the personnel involved in producing and using the forecasts"* (p:127). From another point of view, Winter (2011) disagreed with Goodwin (2002) and mentioned that judgmental adjustments do not contribute to increasing accuracy when forecasting in special situations, such as forecasting the GDP during the crises.

Judgemental adjustments appeared to be quicker in reacting to dynamic environmental changes when compared to statistical methods (Hughes, 2001), and this is true when considering the past events that had an effect on the sales performance which might be a

*"laborious process where a large number of forecasts need to be made"* (Goodwin, 2002: 127), and at the same time, the statistical methods might be difficult to consider the future special events (Goodwin and Fildes, 1999).

As will be explained later in the literature review, many empirical studies considered the lack of experts and skilled personnel in statistical methods, and saw that such a matter has obligated most organisations to use judgments rather than considering the use of formal forecasting processes. However, this might reflect the behavioural factors that encourage and support judgements (Fildes and Hastings, 1994; Mady, 2000). Complete dependency on the statistical models reflect an ignorance of the market or product knowledge of the managers who would feel like they are losing control and ownership of forecasts, taking into considerations that decreased knowledge about the forecasting statistical methods and the ambiguity of the complex statistical models might lead to scepticism (Goodwin, 2002).

From another point of view, Bacchetti and Saccani (2012) highlight the gap between the practice and the literature regarding the demand forecasting for stock control and the possibility of using spare parts management to support and improve the managerial and planning decisions based on forecasts. Önkal and Bolger (2004) mentioned the forecaster and user of forecasts and in some cases the forecasters (forecast providers / constructors) might be the users as well in different departments.

### 1.5 Forecasts: Theory vs. Practice

Forecasting experts pay most attention to what they publish between themselves and ignore the main important part of its real application in the market (Flides, 2006). Furthermore, the level of implications of these major findings in forecasting methods is still unknown on the practice and software development (Armstrong, 2005). At the same time, Johnson (2005) argued that statisticians spend much more time on creating new forecasting formulas and models, without paying enough attention to the limitations of these models or the conditions and circumstances in which the formulas can be used.

The resulting forecast represents the future demand of the product or service at different hierarchy levels depending on the intended user of the forecasts and application. For example, while Stock Keeping Unit (SKU) and Stock Keeping Unit by Location (SKUL) forecasts are the greatest interest to logistics managers, marketing managers are more

interested in product category or market level forecasts, while financial managers are interested in divisional or corporate level forecasts.

The forecasting industry, referred to as the '*prediction industry*' by Sherden (1998), sells about $200 billion of forecasts each year that are mostly inaccurate, and sometimes to accomplish a hopeless futurology, for example, the future shock book that was written by the sociologist and futurist Alvin Toffler in 1970 (Sherden, 1998). Improved forecasting accuracy has an effect on the performance of marketing, operations and finance departments to generate more accurate decisions. Many studies published in the *International Journal of Forecasting (IJF)* had the main objective to "*unify the field and to bridge the gap between theory and practice"*, but "*unfortunately, evidence based forecasting meets resistance from academics and practitioners when the findings differ from currently accepted beliefs"* (Flides, 2006:1). This is due to that fact the most researches focused on the mathematical area of forecasting process rather than finding the main issues in the real situation. The more complex mathematical equations in the forecasting process decrease the managers' enthusiasm about these new equations. This research will bridge the gap between the practice and knowledge in terms of evaluating the main issues in the forecasting management in international pharmaceutical companies.

### 1.6 The Pharmaceutical Business Environment

The nature of pharmaceutical business environment is complex and difficult to manage. The pharmaceutical business is also very sensitive because of its responsibility to find and develop new medicines that will support the development of healthcare for the mankind. The complexity of this industry arises because of the huge variations and mixture between innovations in Research and Development (R&D) and managing the outcome of the product manufactured. Recent studies have focused on the effect of informal communication and intra-organisational networks on the managerial and innovation performance of pharmaceutical companies (Guler and Nerkar, 2011). The variation between different departments and the interaction between the scientists and managers is very important to be appraised. The gaps between drug innovation and future forecasts have a huge impact on the drug innovation and the future performance of the pharmaceutical companies.

The success of R&D innovation is determined by achieving the budget and forecasts agreed from the beginning of the R&D projects, and failing to achieve the agreed figures will be

disappointing to the manufacturer and investors as it might affect the future investment decisions in the field of new developments of drugs. Due to differences in the backgrounds of employees working in pharmaceutical companies, the gap has grown larger leading to organisational conflicts. Moreover, the pharmaceutical industry is affected by the laws and regulations of the health authorities, registration status of drugs, political situations, and the number of patients and schools of medicine.

The pharmaceutical industry is divided according to several criteria. The wide range pharmaceuticals include companies that manufacture and market several categories of drugs such as antibiotics, anti-rheumatic and pain killers, which can be prescribed by doctors who represent the decision makers, and over the counter (OTC) medications which can be distributed without prescriptions, where categorisations of OTC medications usually depends on the regulations of countries. The niche pharmaceuticals, on the other hand, focus only on one category such as drugs for diabetes or dermatological agents for example, and usually these drugs are only prescribed and cannot be distributed without prescription.

The central focus of this research is international pharmaceutical companies because the previously discussed gaps are more obvious and noticeable in such companies, which is, thus, expected to provide a clearer picture to the researcher and respondents about this research. Now that these key terms of the research have been explained, the next section will introduce the business problem that motivates this research.

### 1.7 Research Aim and Objectives

This research aims to address real and pressing management conflicts between the marketing/sales, finance and supply chain department's goals and objectives and its impact on the forecasting management. This aim can be achieved through uncovering the organisational practices regarding forecasting management in pharmaceutical companies through examining the interrelationship between the different departments of marketing/sales, finance and supply chain, in managing the forecasts. This research will examine the factors that affect the forecasting management for international pharmaceutical companies. This research will add more clarity to the current forecasting practices and different departmental conflicts and views in the pharmaceutical firms. The research will also describe the gaps in the process of forecasting in the pharmaceutical companies and actions needed to fill these gaps in order to develop overall performance.

The effectiveness of forecasting is a prerequisite for successful management, and this research attempts to build its contribution in the four following areas:

- Identify the level of knowledge about the forecasting techniques by the users and forecasters in pharmaceutical companies.
- Define the factors that affect the understanding and behaviour of each user of the forecasts and their managerial implications in the international pharmaceutical companies.
- Identify the effects of variations in the management approaches on forecasting management, which were introduced earlier by Mentzer and Kahn (1999) in the international pharmaceutical companies.
- Develop an assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.

The research scope is presented in Figure (1.2), and each objective is defined in this framework.

- *Objective one: The knowledge of forecasting techniques by the users and forecasters in pharmaceutical companies.*

***Objective one*** aims to investigate the forecasting knowledge in pharmaceutical companies by the users of forecasts. According to Dilgard (2009), many executives cannot differentiate between forecasts and plans, thus, putting organisations in a confusion stage that might consequently lead to excess inventory, inaccurate business plan and lack of seriousness about improving the forecasts. Many researchers conducted researches about the evaluation of the knowledge of statistical forecasting techniques in practice. Cerullo and Avila (1975) assessed the forecasting practices for 110 companies and found out that 89% of these companies are using the judgemental forecasting or mixed forecasting combining between statistical and judgmental methods. Similar results were found in Rothe (1978) who conducted an empirical research on 52 manufacturers and found that 50 manufacturers are using only the judgemental forecasting methods, which increase the chances of forecasting errors rather than decreasing them. Cerullo and Avila (1975) and Rothe (1978) defined judgements as an opinion of managers rather than a usage of judgements in adjusting the statistical models. The importance of judgments in forecasts was studied by Klein and Linneman (1984), who conducted a research on 500 of the world's largest companies, and

found that statistical techniques in forecasting might have high limitations, and that judgmental interaction might lead to better forecasts. The wide use of judgements was regarded as a part of executive opinion or sales force composite in American companies, where the use of computers and statistical models was seen to reduce errors (Dalrymple, 1987). The judgemental adjustments to econometric models topic were studied by many scholars in the last decade such as; Glendinning (1975), Malley (1975), Turner (1990) and Bunn and Wright (1991). Lawson (1981) mentioned that judgmental adjustments is important to achieve more acceptable forecasts in traffic usage forecasting by using "eyeball" analysis of time series plot, and it could be one-time event like for example extraordinary competitive developments (Soergel, 1983; Jenks, 1983).

Armstrong (2003) justified the use of the judgemental forecasting as a consequence of managers not reading relevant research papers in journals; this was explained further by Armstrong (2003) who said *"by examining results from the forecasting principles project, which was designed to summarise all useful knowledge in forecasting, we found that journals have provided 89 percent of the useful knowledge. However, journal papers relevant to practice are difficult to find because fewer than three percent of papers on forecasting contain useful findings. That turns out to be about one useful paper per month over the last half-century. Once found, the papers are difficult to interpret. Managers need low-cost, easily accessible sources that summarise advice (principles) from research; journals do not meet this need"* (p:91).

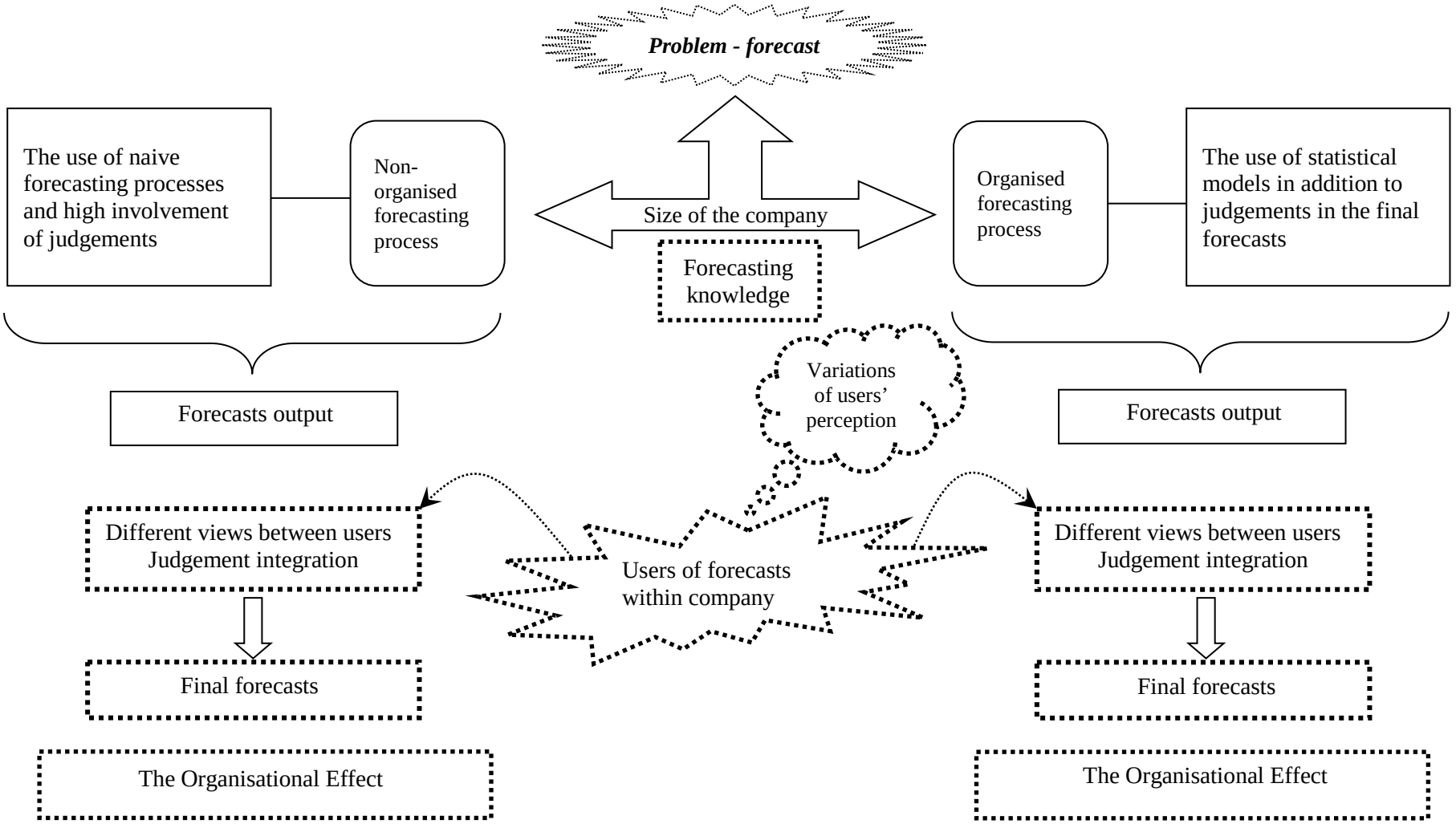



**Figure 1.2: The research scope (Author's work, 2012).**

The research scope explains the impact of the users on the produced forecasts whether it is from a formal forecasting process or a naive judgmental procedure. The broken boxes represent the objectives of the research.

Tyebjee (1987) discussed the biased forecasting for new products, and saw that such bias might be related to managers' reluctance to accept forecasts since they are not experts in forecasting methods. The involvement of personal judgements is not optional in the decision making process, and this was argued by Armstrong and Brodie (1999) who emphasised the importance of forecasting in decision making; however, the unpleasant forecasts are usually ignored by the decision makers. They explained that the involvement of judgments in forecasts is mainly due to the fact that the majority of users of forecasts seldom understand the forecasting methods.

- *Objective two: Factors that affect understanding and behaviour of each user of the forecasts and its managerial implications on the international pharmaceutical companies.*

***Objective two*** aims to identify the influential factors on the produced forecasts by the different users of forecasts. The users of forecasts are usually three departments which are marketing/sales, finance and supply chain (or logistics). This objective will verify the factors that affect the users of forecasts and the influence of these factors on the departmental perceptions and understandings of the produced forecasts in pharmaceutical companies. Forecasting has long been important to marketing practitioners, and it could be a very critical aspect for the company's success (Dalrymple, 1975; 1987).

In an empirical research conducted by Jobber *et al.* (1985) on 353 marketing directors in the UK, he found that forecasting is one of most important issue in marketing department. Marketing people are more involved in projected product changes, product pricing, market size, and the growth of the target market or product category. Figure (1.3) presents the needs for forecasts in marketing activities and the relationships between these activities. The marketing category in Figure (1.3) is determined alongside the strategic issues in an organisation. Marketing teams determine forecasts as well as the actions and reactions of key decision makers such as suppliers, competitors, government, shareholders and top managers. Then, the marketing teams calculate forecasts of the market share and sales, and the financial outcome is determined by forecasting costs and profits (Armstrong and Brodie, 1999). Sales and marketing teams share very similar view of forecasts, but with more attention toward setting goals for the sales force in the case of sales teams. The importance of team work in sales forecasting was studied in an empirical research by Kahn and Mentzer

(1994); they concluded that team work increases the accuracy of forecasts produced, taking into considerations that it should be accompanied with demand capacity of the market.

As in the case of finance, forecasting is more related to economics and future financial management, through calculating the future profitability, purchasing material, capital needs and prediction of stock price. The integration of the budgeting process with forecasts has contributed to producing more accurate forecasts. Logistics and production, on the other hand, are responsible for goods movement, production and inventory. Two different forecasts are needed in logistics including short-term and long-term forecasts, where the short-term forecasts are needed to schedule production plans, while the long-term forecasts are for important for deciding on plant development matters and purchasing of equipment. In this regard, the conflicts between users of forecasts were mentioned by Moon *et al.* (1998) who said "*This lack of trust leads to duplicated forecasting efforts. In one company, the production scheduling department was so distrustful of the forecasts developed by marketing that it completely ignored them and created a whole "black market" forecasting system"* (p:48).

The management influence and individual behaviours and their impact on the forecast application have been studied by many researchers such as Fildes (2006), Armstrong (2001) and Lawrence (2000). Other studies have also looked at different theoretical groundings that emerged to explain the management's role in the development of forecasts, such as the studies by Davis and Mentzer (2007), Winklehofer and Diamantopoulos (2003) and Mentzer *et al*. (1999). From another perspective, Forslund and Jonsson (2007) studied the influence of the users of forecasts and its application in managerial activities and future planning. However, there is a lack of empirical evidence that explains the impact of the users' actions and perceptions on the utilisation of forecasts, which have led to conflicts in finding the relationship between the forecasting and operating performance (Smith and Mentzer, 2010).

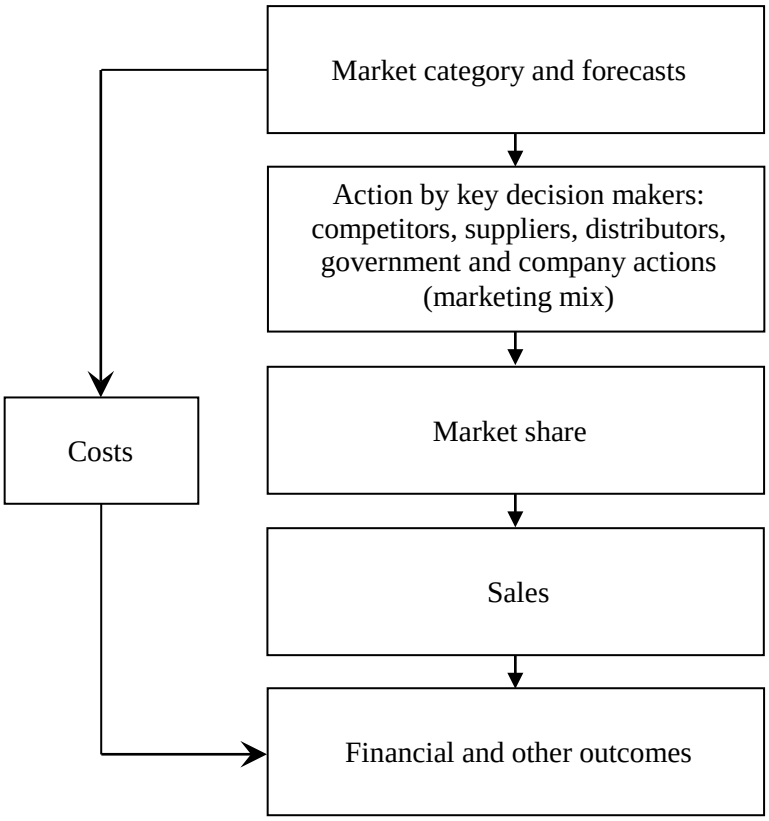



**Figure 1.3: Needs for marketing forecasts (reproduced from Armstrong and Brodie, 1999)**

- *Objective three: Variations in the management approaches on the forecasting management in the international pharmaceutical companies.*

The forecasting management is affected by the management approaches, which were identified by Mentzer *et al*, (1999) and Mentzer and Moon (2005). These four types of managerial approaches were found to have an impact on forecasting management, and include the *independent* approach, *concentrated* approach, *negotiated* approach and *consensus* approach. The differences between these approaches are presented in Figure (1.4). The figure shows how the independent approach applies the least communication across departments, where each departments works on its own to develop its plans. The concentrated approach does not establish sufficient cooperation across departments as well since one department decides the forecasts and disseminates them to other departments. The negotiated and consensus approaches establish more cooperation across departments, where in the first a meeting between all departments is held after each department works on developing its own forecasts, and the latter approach involves a committee of representative members from all departments to discuss forecasts and approve them.

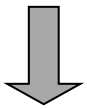
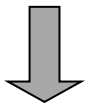
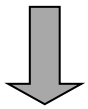
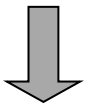
| The independent managerial approach | The concentrated managerial approach | The negotiated managerial approach | The consensus managerial approach |
|---|---|---|---|
|  |  |  |  |
| Each department has its own development process, independency of the forecasting process | One department is responsible to make the forecasts, and all other departments must use the results | Each department makes its own forecasts and then conducts a meeting to discuss the final forecasts | A committee from each department to develop final agreed forecasts, and one person in charge |

**Figure 1.4: the four management approaches the have an impact on the forecasting process (adapted from Mentzer *et al*, (1999) and Mentzer and Moon (2005))**

Mentzer and Kahn (1997) discussed the advantages and disadvantages of each managerial approach and found that the majority of companies use the negotiated and consensus approaches, where the results of these approaches showed an improvement in the companies' forecasting management improved. A research conducted by Moon *et al.* (1998) developed the seven key managerial perspectives to guide forecasting management, by studying the best practices of 20 selected companies that have well acknowledged histories in the market share and financial performance.

The forecasting management performance would start from the standard operating performance of the process of forecasting management such as documentation of the forecasting process. In addition to the four management approaches mentioned in Figure (1.4), there are four dimensions in forecasting management including Functional Integration, Forecasting Approach, Forecasting Systems, and Performance Measurement (Mentzer *et al*, 1999), which can also be used in identifying the practical gaps in the forecasting practices. These four dimensions will be explained in section (2.9) page (65).

- *Objective four: Forecasting assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.*

In this objective the researcher will link the variables found in this research into a forecasting assessment matrix that can help pharmaceutical companies in evaluating the whole forecasting management process within their companies. These variables will be extracted from the interviews conducted in this research. These assessment criteria are anticipated to increase the awareness of forecasting management in practice, and allow

companies to create corrective measures for the future development of the forecasting management.

The researcher will refer to each of the research objectives of this study, and will expand on the level of understanding of each empirical study mentioned in the introduction chapter in order to build on it.

### 1.8 Research Methodology

This study is a Grounded Theory study based on Strauss & Corbin (1998) framework. According to this framework, the researcher starts by preparing interview protocols to potential interviewees; these include a clarification of the research topic and the level of confidentiality of the data collected. Those who approved to take part in the research, were contacted to arrange for semi-structured interviews with them to investigate the research subject. Interviews were audio-recorded and transcribed by the researcher; however, in cases where the interviewees objected to audio recording, the researcher worked on taking notes during the interviews. The focus of interviews was on forecasting management in pharmaceutical industries, and all participants were working in pharmaceutical companies, which are involved in forecasting management. The participants were selected from the three main departments of marketing/sales, supply chain and finance. The researcher ensured that all participants have had previous engagement in forecasting management, and have had experience in the process of forecasting in international pharmaceutical companies. Table (7.2) page (174) in the Data Analysis Chapter (Chapter Seven) provides an overview of the participants in this research. The process of data collection and data analysis were carried out simultaneously to allow a process of constant comparison, as is the typical procedure in Grounded Theory (Strauss & Corbin, 1998). The data were analysed solely by the researcher over three phases of coding including open, axial, and selective coding. Moreover, the data analysis was reviewed by research supervisor after each phase of coding to ensure the trustworthiness of the data. The coding process included notes and on-side words in different colours. The generated codes that were not related to the research literature or research assumptions were continuously tested and checked against their thematic categories in order to ensure they fitted within them.

The data generated were not all handled at the same time, but were rather put aside for some time during the analysis and attended to later for any inconsistencies or irregularities in

setting codes or thematic categories. Accordingly, the researcher double checked the coded transcripts at different times to evaluate the relevancy and suitability of the codes assigned, thus, providing the opportunity for the researcher to modify and adjust the research codes.

As will be described in the methodology chapter Figure (6.8) page (158), the data collection process started with unstructured / semi-structured interviews with time during the process of data collection, through which the researcher collected data while carrying out the process of coding, using Open, Axial and Selective coding, to produce the core categories. The core categorical relationship was presented in two ways including the conditional relationship guide and the reflective coding matrix, which were followed by interpretation and development of the story line. The final product was a theory that was compared repeatedly to the data and other sources of verification.

### 1.9 Contribution of the research

The focus of this research is on international pharmaceutical companies, which represent a very complex industry to understand as mentioned by Pfizer (2011). Nevertheless, the output of this research should, hopefully, support other industries as well, which share with the pharmaceutical industry many of the issues facing the current environmental challenges (Smith, 2008); yet, it is believed that the pharmaceutical companies are not yet prepared to address the future challenges (Smith, 2011).

Within the pharmaceutical companies, the current research tests the forecasting knowledge among the users in international pharmaceutical companies. The research also finds the variations in the definitions of forecasting management, which reflect the level of knowledge about forecasting management. The variations of forecasting knowledge in practice were studies by many researchers (e.g. Johnson, 2005; Armstrong, 2005; Fildes, 2006), but few studies evaluated the forecasting knowledge in pharmaceutical companies in particular.

Moreover, the second contribution of this Grounded research is to find the link between the knowledge of forecasting management and the judgmental interpretations to the produced forecasts. The current research contributes to the literature by identifying the forces that affect each user of the forecasts and their impact on the values of each department within the organisation. These forces explain the users' judgments on the produced forecasts and their impact on the personal satisfactions based on values and priorities of the users of forecasts (Fildes, *et al*, 2009). This research also evaluates the impacts of organisational culture and

structure on shaping the values and priorities of the produced forecasts to match with the companies' objectives.

This research also fills the gap in the literature by suggesting a forecasting assessment matrix called (*Haloub Assessment of Forecasting (HAF) Index*) that will provide an appraisal system to companies based on the variables and assessment forecasting criteria that were found in the research and related to the forecasting management. This matrix can be used in practical inspections of the forecasting management and process within companies, where companies can identify their weaknesses by using this matrix to improve forecasting the future. This is an important contribution in laying the foundations for future quantitative research and practical evaluation of the forecasting management.

The originality of the research and hence the claim to contribution to knowledge is that, unlike the normative approach in improving the forecasting management in the literature, the Grounded Theory analytical approach adopted in the qualitative research phase adopts the conditional relationship guide and reflective coding matrix in the data analysis throughout the coding stage to establish links between the various dimensions found in this empirical research about forecasting management. This method of data analysis offers links between categories of the research.

### 1.10 Overview and Outline of the Research

Figure (1.5) represents a diagram of the whole chapters' outline in this thesis. ***Chapter One*** (this chapter) represents the introduction of this research study, which provides a description related to the research background and overview. A brief review of the forecasting management process was provided to justify the research objectives and context, as well as explain the significance of this research. The research framework was also presented in Figure (1). The research methodology was briefly described, and the methods and the approach for data gathering and analysis were also outlined. The chapter concluded with a summary of the contribution of the research as well.

***Chapters Two, Three, Four and Five*** will provide theoretical conceptions derived from the review of relevant literature. ***Chapter Two*** will discuss three major distinct areas of the research; the first part will examine the various perceptions and definitions of forecast which aim to provide a broad paradigmatic view of the subject to enable the researcher to narrow the judgmental views of the subject, and, accordingly, identify the balanced and

contemporary views to develop the framework that will be adopted in the research. The second part of the literature in Chapter Two is related to the factors that have an impact on the users' values and reflect their views of forecasts. ***Chapter Three*** will discuss the typology of the forecasting methods available in the literature review and used in practice.

***Chapter Four*** will provide an overview of the pharmaceutical companies and the importance of forecasts on the future developments in this industry. Moreover, Chapter Four will introduce the reader to the changes in pharmaceutical business, R&D, pharmaceutical market, pharmaceutical sales forecasting and genericization of pharmaceutical products which is a stage in which innovative product can be copied after expiry of potency.

The literature review reiterates the impact of personal judgments on the forecasts, but few studies illustrate the reasons behind the variations in the judgments between users of forecasts. Further review of the literature reveals that very few links are available in the previous researches that link the judgments to types of users in one specific industry. ***Chapter Five*** is the building and developing the conceptual framework of the research to link the research literature together in one figure (5.1). The gaps in the literature support this research objectives, which aim to identify the variations in users' values and priorities that contribute to judgments in forecasting management.

***Chapter Six*** seeks to establish the linkage between the ontological, epistemological and analytical procedures adopted in the research. This chapter will also present a discussion about the philosophical background of the research and the justification of the methodology used. Historical development of the Grounded Theory will also be presented. The methodology is then reviewed; this will involve a discussion of the in-depth interviews that were utilised as a method for data collection with key respondents, and a review of the issues taken into consideration to enhance the reliability and validity of the research. The process of analysing data through the use of Grounded Theory will also be discussed, alongside a justification of the use of the Grounded Theory in this research.

***Chapters Seven and Eight*** will include the data analysis chapters and the building of a story line of the data collected. ***Chapter Seven*** will begin with the demonstration of the participants who participated in the research; the overview of the participants will help the researcher in developing groupings of participants in order to find the differences between users' values toward forecasts. The second section of Chapter Seven demonstrates the core

categories and subcategories, alongside examples of interviewee quotes from interview transcripts to support the core categories. Each core category will be supported with a conditional relationship matrix and a reflective coding matrix that confirm the saturation level, and, accordingly, support the building of a story line in Chapter Eight. The constant comparison method will be used in the analysis of the interviews in order to develop a unique continuum of the research.

***Chapter Eight*** draws the findings of the research into one big diagram through which the theory can emerge by pulling the analysis results that were mentioned in Chapter Five together. This chapter will provide a discussion of the interrelations between the categories and subcategories that would generate the research propositions, which will be, accordingly, used as assessment criteria in the forecasting management process, thus, supporting the contribution of this research.

***Chapter Nine*** is the discussion chapter in which the researcher will highlight certain parts of the literature in order to place the findings of the research in the wider context of the relevant academic literature. The literature will be used to evaluate the research output in the areas of judgmental interpretation of the forecasts, and the impact of values and priorities on these judgements by the users in pharmaceutical companies.

***Chapters Ten*** are the final chapters of the thesis in which the researcher will present the research output. The chapter will draw the research findings together starting with a summary of the research objectives. ***Chapter Ten*** will discuss the academic and methodological contributions of the research, alongside its implications. Finally, this chapter will also conclude with a presentation of the limitations of this research as well as opportunities for future research.

| Stage | Elements of each stage | Chapter description |
|---|---|---|
| **Analysis of the literature and identifying the gaps** | **Literature review**<br><br>- Defining forecasting<br>- Impact of users' value on judgements<br>- Typology of the forecasting methods<br>- Overview of Pharmaceutical industry<br>- Research objectives | **Chapters 2, 3 and 4**<br><br>Identify the variations in definitions of forecasts, and present gaps in literature regarding the variations between users of forecasts |
| | **Research Conceptual Framework** | **Chapter 5**<br>Draw the research conceptual framework together with the collection of the previous researches |
| | **Methodology**<br><br>- Critical realists' views of the world<br>- Research Design<br>- Selecting cases<br>- Developing rigorous data collection protocol and entering the field | **Chapter 6**<br>Describe the research philosophy, research approach and the |
| **Analysis of data** | **Data analysis**<br><br>- Data Ordering Phase<br>- Analysing data relating to the first case (coding process) | **Chapter 7**<br>Describe the variations in understanding the judgemental interpretations by users of forecasts |
| **Synthesis** | **Building a story line and discussion**<br><br>- Theoretical sampling<br>- Reaching closure / Saturation<br>- Literature Comparison Phase<br>- Compare emergent theory with extant literature | **Chapter 8**<br>Build a story line by linking all core categories together<br><br>**Chapter 9**<br>Discuss the research output and link it to the previous literature review |
| **Contribution** | The impact of value and priorities on the forecasting judgments in pharmaceutical companies. | **Chapters 10**<br>Academic & methodological contribution. The limitations, implications and suggestions for future research are also discussed |

**Figure 1.5: An overview of the thesis outline**

# LITERATURE REVIEW

# CHAPTER TWO TO CHAPTER FIVE

Reviewing the literature review is an important step in research to gain knowledge about the forecasting and its problems and solutions, in addition to find the gaps in literature through reviewing previous authors' work. The researcher will link the literature to the research topic and pharmaceutical industries, through conducting four chapters; forecasting, methods of forecasting, international pharmaceutical companies and the current research conceptual framework. The literature map is presented in Figure (2.1).

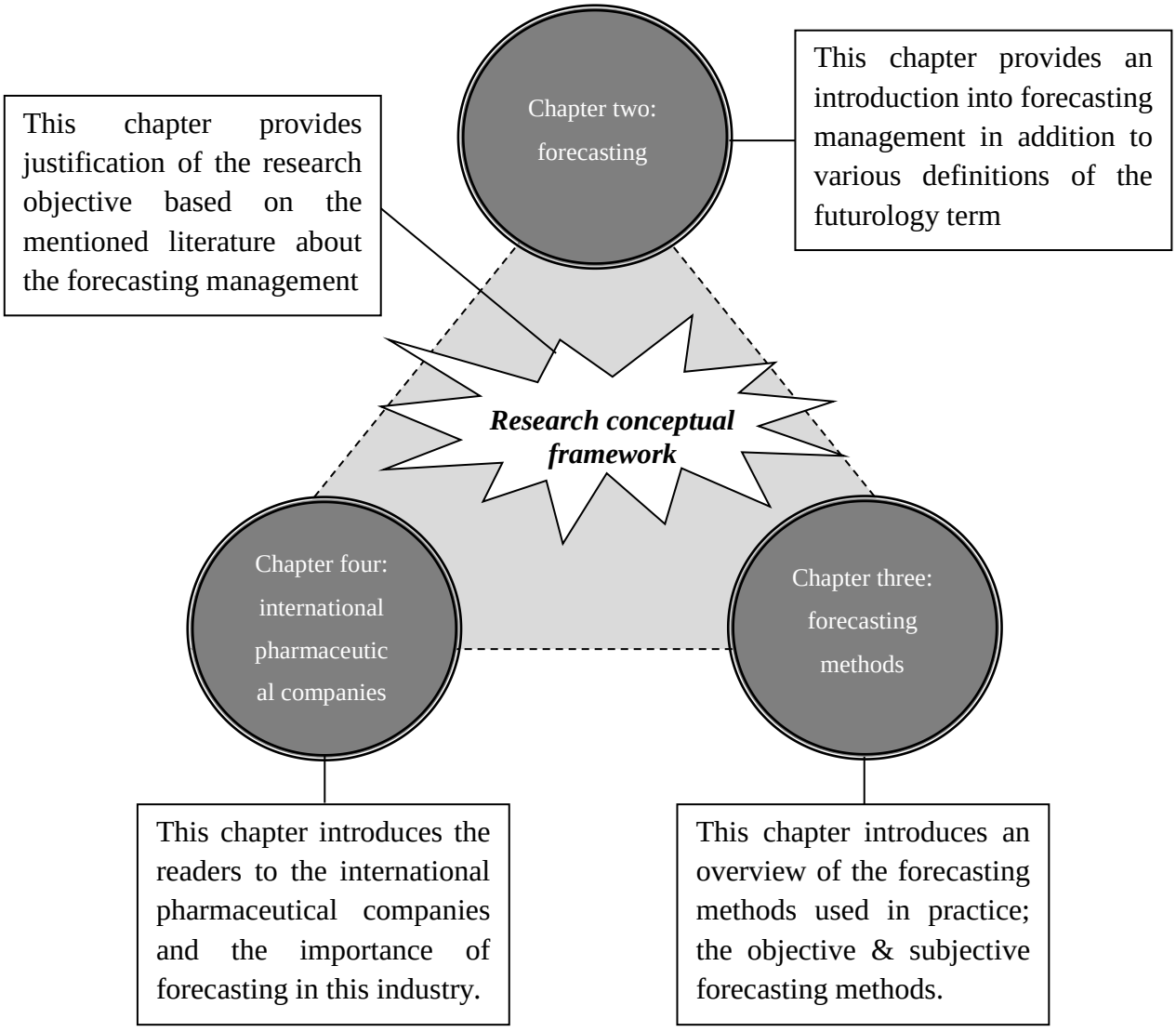



**Figure 2.1: The literature review chapters' map**

# CHAPTER TWO

# FORECASTING

## 2.1 Introduction

> *"Sales forecasting is a crucial issue for companies as several activities and decisions within a firm are based on forecasts. These encompass strategic planning, financial analyses, promotion management or new product launches. As a consequence, during the last decades, many authors have focused their efforts on developing new forecasting methods and techniques with the aim of improving forecast accuracy … For years, in the forecasting field, the primary purpose of researchers and practitioners has been to provide companies with sophisticated quantitative approaches able to reduce forecast errors. As a result, we have witnessed a rush in the development of new forecasting methods"* (Danese and Kalchschmidt, 2011:207).

Forecasting experts pay most attention to what they publish between themselves and ignore the main important part concerning the real application of forecasting in the market (Flides, 2006). Therefore, the levels of implication of the major findings in forecasting methods on the practice and the software developments are still unknown (Armstrong, 2005). At the same time, statisticians spent much more time on creating new forecasting formulas and models with a minimum time on the models limitations or in which condition and circumstances these formulas are used (Johnson, 2005).

The resulting forecast represents the future demand of the product or service at different hierarchy levels depending on the intended user of the forecasts and application. For example, while Stock Keeping Unit (SKU) and Stock Keeping Unit by Location (SKUL) forecasts are the greatest interest to logistics managers, marketing managers are more interested in product category or market level forecasts, while financial managers are interested in divisional or corporate level forecasts. Improved forecasting accuracy has an effect on the performance of marketing, operations and finance departments to generate more accurate decisions taking into considerations that the existing literature lacks harmony between theory and practice (Flides, 2006).

According to the US survey conducted by Wheelwright and Clarke (1976), it has been concluded that the $10 million American firms spent about 2% of their time and efforts on forecasting, whereas $1 billion firms spend much less than that (about 0.1%). Despite the minor spending on forecasting, the forecasts' quality is still the main critical issue (Johnson,

2005). Due to this reason, the *'prediction industry'* sells about $200 billion each year of mostly inaccurate forecasts, sometimes, to accomplish a hopeless futurology (Sherden, 1998).

The aim of this chapter is to create a framework based on the previous literature in order to identify the gaps in literature, and, subsequently, formulate the objectives that this research will address. The literature review is divided into four main chapters; the first chapter will examine the variations in forecasting definitions starting from a wider broad paradigmatic view to a narrower database of forecasting management and users' views of forecasts. A contemporary view of forecasting management will be discussed alongside a judgmental interpretation of the produced forecasts. The impact of management culture and structure will also be discussed at the end of this part of the literature review.

The second part of the literature review will discuss the forecasting methods that are used in academia and practice. This section will reaffirm the forecasting methods that companies might be able or unable to perform in practice. A framework of the research will also be proposed alongside a detailed discussion. The third section will provide an overview about the pharmaceutical industry, and the importance of forecasting management in this industry in order to support the significance of research conducted in this area.

The last section in the literature review will clarify the gaps that have been identified in the literature review, and justify the objectives through presenting the conceptual framework of the current research. Figure (2.2) represents the chapter map for the first chapter on literature review about forecasting.

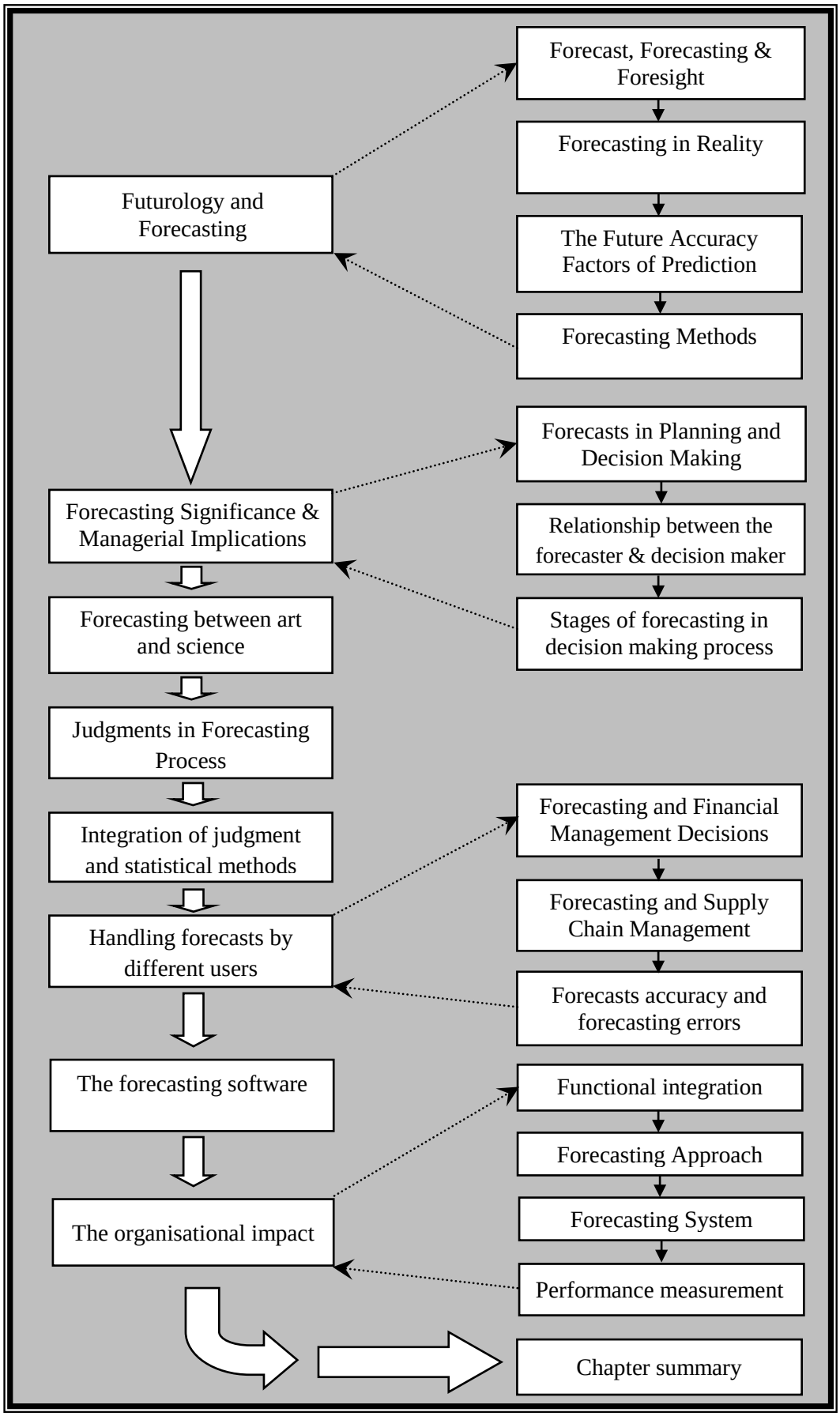



**Figure 2.2: the chapter map – chapter two**

## 2.2 Futurology and Forecasting

Futurology is the prediction of revolutionary changes in the future. Cuhls (2003) said that *"…Future is still open – we will have to see if the new approaches reach their targets"* (Cuhls, 2003:108). In 1736, it was an offence to defraud by charging money for predictions (British Vagrancy Act, 1736), and people were used to view the future as one future (fate) as shown in Figure (2.3) below (Kahn, 1967).


**Figure 2.3: The traditional view of the future**

De Jouvenel (1967) argued the old view of future and considered this traditional view of future as a wrong perception and way of thinking. De Jouvenel said that fate is only applicable for uncontrollable issues because there will always be some things that we can relatively exactly anticipate, and others that will continue to surprise us. There is only one present which will be the past in the future, however, there are several future options, and this is referred to as *Futuribles* as shown in Figure (2.4) (De Jouvenel, 1967).

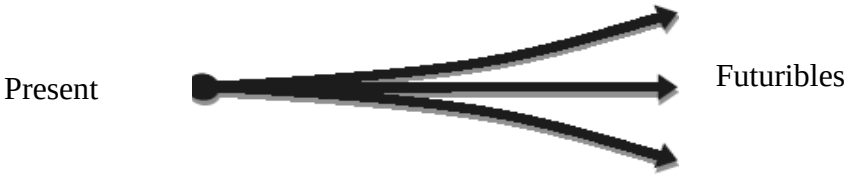



**Figure 2.4: Many options are available in the future**

De Jouvenel argued the perception about the Futuribles to find ways in understanding the science of prediction or the art of forecasting the future. Futuribles are these choices that we made about the future in the present time, which would direct us to accurate decisions and interfere in the future activities (De Jouvenel, 1967). The changes in future views allowed scientists and people to search for future predictions. Forecasting differs from predicting; predicting is more general and represents estimates for any time period before, during or after the current one, however, forecasting only represents the future events.

To differentiate the forecast from prediction, Armstrong (1985) and Martino (1983) characterise the forecast as having four elements which are the time of forecast, the technology being used, a statement of characteristics of the technology and a statement of the

probability associated with forecast. The time of forecasting is important as it represents the time of the year to forecast the future. Forecasting process is also affected by the available technology that is used in forecasts, in addition to the technology characteristics and percentage of errors and probability of uncertainty. Predictions were described by Brown (1963) who said that *"predictions are sometimes used as an input to forecasting"* (p:2) and the Latin origin of the word predict is 'say beforehand'; however, forecast, on the other hand, means 'throw ahead' according to the Saxon origin. Some references argued that prediction is considered as a subjective input or a type of qualitative forecasting, however, the latest references described the qualitative forecasting as a part of mathematical or statistical methods, while prediction is considered an informal or intuitive method (Armstrong, 2001)

Accordingly, the terms that will be used throughout this research will be matching with the terms used by Lancaster and Reynolds (2005), where the qualitative forecasting method will refer to subjective or judgmental forecasting or to predictions, while the quantitative forecasting method will refer to the mathematical or statistical methods or the objective methods.

### 2.2.1 Forecast, Forecasting and Foresight: Definitions

> *"Forecast is the presence of knowing what would have happened if what does happen hadn't"* Ralph Harris.

There are many definitions identified in the literature of forecasting, some of which are more detailed, whereas others provide simple basic definitions such as projection of the future. The forecasting is the process of creating the forecast, which will explain and answer the questions of "what, where, how long and how large" (Kucharavy and De Guio, 2005). The forecasting process should be reliable, flexible, transparent and cost effective. The output of the forecasting process is forecast, or the results, which is related to the terms of accuracy, intelligibility, validity and bias free.

Many definitions of forecasting were argued by many researchers, however, they all agreed that forecasting is the process to know what will happen in the future, in order to plan and manage the future events. The variations in defining forecasting are based on the use of forecast, process of forecasting, or duration of the forecast. Nash and Nash (2001) focused on the process of forecasting and defined it as *"a very broad subject that draws upon all the knowledge, experience, intelligence and imagination of the forecaster"* (p:10). Gaither (1992)

argued that forecasting is used to describe the future for example forecasting the sales demand, cash flow or employment level. Geweke and Whiteman (2004) argued that "*Forecasting involves the use of information at hand – hunches, formal models, data etc. – to make statements about the likely course of future events"* (p:6). Willsmer (1984) said about forecasting *"…it is universally recognised that the sales forecast is the bedrock from which all others stem"*(p:12). Lancaster and Reynolds (2005) agreed with Willsmer (1984) and talked about the managerial application of the forecast saying that *"forecasting is important in most areas of the firm, but forecasting of sales is particularly important since predicted sales are the base on which all company plans are built"* (p:101). Armstrong (2001) mentioned that forecasting is a part of a bigger circle in business and organisations that will organise and contribute to the future of organisational success.

Foresight goes a further step than forecasting as it includes aspects of networking and preparation of decisions concerning the future. Moreover, foresight answers the question of *what does a result of a future study mean for the present*. Foresight differs from planning, as will be explained in section (2.3.1); foresight results would give information about the future and, therefore, it is only one step in the planning to make decisions (Cuhls, 2003).

Coates (1985) formulated the foresight more broadly: *"Foresight is the overall process of creating an understanding and appreciation of information generated by looking ahead. Foresight includes qualitative and quantitative means for monitoring clues and indicators of evolving trends and developments and is best and most useful needs and opportunities for the future… Foresight is, therefore, closely tied to planning. It is not planning – merely a step in planning"* (p:30).

Foresight is conducted in order to gain more knowledge about things to come so that today's decisions can be used solidly on more accessible expertise than before (Cuhls, 2003). Foresight is more than prognosis/ prediction; it holds the assurance to manage uncertainty through intensive interaction between stakeholders (Van Der Meulen *et al.*, 2003) and it goes much further by proposing the tool of *Scenario Management* for strategic foresight activities (Fink *et al*, 2001).

### 2.2.2 Forecasting in Reality

> *"Forecasting in frictionless physical and natural world is perfect"* (Makridakis and Wheelwright, 1989:2).

In the forecasting industry, people and managers should expect that perfection will never be achieved in order to avoid any unpleasant surprises. Despite these limitations of forecasting, the economists are trying hard to reach accurate forecasts in order to develop and maintain appropriate business strategies to face the future uncertainty and deal realistically with these uncertain events.

The realistic approach of forecasting is to answer the question of *"what you can do"* and *"what you will do"*, and it should not be mixed with feelings of the forecaster that would answer the questions of *"what you would like to do"* or *"what you hope to do"*. Rejecting the reality will reflect unrealistic plans and unreliable performance evaluation. Furthermore, forecasting is very important to investors and lenders to take decisions in financial support of the projects, and lack of confidence and accuracy in produced forecasts will make investors and lenders reluctant to commit their funds to the business.

Individuals and organisations have operated for hundreds of years by planning and forecasting in an intuitive manner. Forecasting is a relatively new area of expertise and almost all the significant work and formal approaches in this field have been growing increasingly and becoming popular since the 1950s (Armstrong, 1985). Steiner (1979) was one of the supporters to use the formal forecasting system and structure and he argued that organisations can become more productive by using the formal forecast approaches to forecast their environments, anticipate problems, and develop plans to respond to those problems.

However, organisations did not respond immediately to the formal forecasting methods from the beginning because these methods were very expensive to implement, which raised questions about their superiority over informal planning and forecasting. Furthermore, critics of the formal approach such as Wrapp (1967) claimed that it introduces rigidity and hampers creativity on practical experience. At the same time, the old guessing techniques which were used before the 1950s lead to a lot of confusion about the new forecasting studies (Johnson, 2005). Forecasting is mainly a discipline and it is intended to be useful to managers who are responsible for the future decision making. Forecasting must not be studies in isolation, but in

the context of a policy making process. Useful forecasting, that could be acceptable and credible, involves a mixture of different methods such as interdisciplinary assumptions, and addresses political and environmental factors as well as organisational environments that determine the best forecasting system to be followed (Ascher and Overholt, 1983).

### 2.2.3 The Future Accuracy Factors of Prediction

In each case of forecasting, the forecasters should have the minimum patterns or relationship factors to be able to forecast the future, otherwise, the forecasters will not be able to forecast events. The quantitative forecasting process will not provide accurate forecasts if the number of items or factors involved is very low, because, in statistics, increasing the number of items or factors involved decreases the chances of forecasting errors and vice versa. The involvement of the judgmental forecasting process is usually higher in cases where there are little amounts of data available for the future forecast (Asseng *et al*., 2012). From another point of view, the higher the number of competitors in the market, the more the impact on the accuracy of the forecasts; this is because competitors' activities might change, and thus, characterised as uncertain events (Makridakis and Wheelwright, 1989).

The type of data available also affects the accuracy of the produced forecasts (Makridakis and Wheelwright 1989; Adil *et al.,* 2012), and the homogeneity of demand contributes to producing more accurate forecasts. At the same time, the elasticity of demand affects the accuracy of the forecasts, as inelastic demand contributes to more accurate forecasts. The length of forecasting horizon influences the accuracy of forecasts, as long term forecasts are less accurate than short term ones; this was justified by Johnson (2005), because of capriciousness of human behaviour such as people's attitude, changes in strategy and aims of the companies.

### 2.2.4 Forecasting Methods

Generally the forecasting methods are divided into subjective (qualitative) and objective (quantitative) methods. Choosing the appropriate forecasting method depends on the forecasting situation of whether it is long-term forecasting, or short-term forecasting or whether the forecasts for new or existing products. For example, econometric methods are appropriate for long-term forecasting of the environment or of the market, whereas extrapolation methods are useful for short-term forecasting of the market share, however, role-playing is appropriate when taking decisions by parties who are in conflict (Armstrong,

2001). There are many methods that are available to the forecaster to use. In this chapter, the researcher intends to provide a brief about the available forecasting methods; however, the researcher will expand on these forecasting methods in Chapter Three.

## 2.3 Forecasting Significance and Managerial Implications

> *"... because the general management function is central to the successful operation of the firm, forecasts that can be used as the basis for decision making at this level are perhaps the most critical"* (Makridakis and Wheelwright, 1989:19).

The forecast is needed to be used by three main different organisational units including sales and marketing, finance and accounting, and production and inventory or supply chain. In each unit there are different uses of the forecasts based on the time horizon, as mentioned in Table (2.1). The forecasts can be divided based on time, where the time horizons differ from one researcher to another. Table (2.1) shows that the immediate-term is less than one month, short-term is one to three months, medium-term is up to two years, and more than two years it is considered as a long-term forecast (Kono, 1992; Heizer and Render, 2004).

Each department within an organisation uses forecasts for different missions and activities. For example the marketing department use forecasts to segment sales based on product and geographical location. Moreover, the marketing and sales consider the competition and prices in the market place. For long-term forecasts, the marketing department evaluates the total sales and long-term satisfaction of customers. As for the supply chain, the demand of products should be accurate to avoid any increase in inventory costs or expiries of finished goods. Additionally, forecasts of supply chain involve estimates of the number of labour, warehouse expansion and the use of new technologies for long-term investments (Makridakis and Wheelwright, 1989; Smith and Mentzer, 2010).

The finance department is concerned with the revenue and profits calculation, and, accordingly, the price of the products, the budget allocation for selection of future investments for example, and the purchasing of raw materials. Forecasting is very critical in decision making within organisations, even for human resources in which managers should evaluate the predicted future potential of the business and forecasts, which will help them in employing new people (Makridakis and Wheelwright, 1989).

The users of forecasts within an organisation will help to make more accurate future decisions and extend organisational existence (Heizer and Render, 2004).

| | Immediate term (< one month) | Short term (between 1-3 months) | Medium term (3 months-2 years) | Long term (> 2 years) |
|---|---|---|---|---|
| Marketing | - Sales per product<br>- Sales per area<br>- Competition<br>- Prices<br>- Inventory level | - Total sales<br>- Product groups and categories<br>- Product prices | - Total sales<br>- General economic conditions<br>- Prices | - Total sales<br>- Saturation point<br>- Customers preferences and tastes<br>- Product introduction |
| Supply chain | - Demand / product<br>- Plant capacity<br>- Demand of materials and semi-finished materials<br>- Suppliers or raw materials | - Overall demand<br>- Category demand<br>- Scheduling<br>- Costs<br>- Labour | - Risk of suppliers strikes<br>- Costs<br>- Equipment and machinery ordering<br>- Transportation | - Plant expansion<br>- Ordering heavy machinery<br>- Warehouse expansion<br>- New technologies<br>- Investment in facility |
| Finance and accounting | - Sales revenue<br>- Cost of production<br>- Cost of inventory<br>- Cash inflow and outflows<br>- Purchasing raw materials | - Overall demand<br>- Demand of materials<br>- Lead time for purchasing<br>- Inventory levels.<br>- Short term loans<br>- Price | - Budget allocation<br>- Plan raw materials purchasing | - Investment selection<br>- Allocation of resources<br>- Cash flow<br>- Capital expenditure<br>- Total sales<br>- Long term contracts with suppliers |

**Table 2.1: The use of forecasts within different organisational units (Rhyne, 1986; Makridakis and Wheelwright, 1989; Krajewski & Ritzman, 1993)**

The need for forecasting in setting the marketing plans to conduct different marketing activities such as promotional plans, pricing and future product development. The sales department uses forecasting to motivate sales team to achieve goals and targets, whereas the finance department is responsible for projecting the cost and future profits, and calculate the short and long term loans. Production and logistics are both responsible for production plans whether long or short term production planning, in addition to moving goods based on the product-by-location level (Mentzer *et al*, 1999).

### 2.3.1 Forecasts in Planning and Decision Making

> *"…the links between the forecasting and decision-making function are weak in many organisations, because decision makers and forecasters differ in their priorities"* (Fildes, 2010:6).

Forecasting is important to assist management to plan requirements for marketing efforts, materials, personnel production, services, capital acquisition and construction and finance. Therefore, forecasting is considered as an inherent part of business and industrial activity. At the same time, the importance of forecasting is increasing due to the face that the amount of uncertainty is increasing as the environment is becoming more volatile (Waddell and Sohal, 1994). Accurate forecasting will reduce losses due to unsold/unavailable inventory. The gut feelings of the persons who manage organisations are often the best forecasts available, but the forecasting techniques can be used to supplement the common sense and management ability of decision makers. Forecasting deals with data to produce certain figures that would be translated into business decisions (Gilchrist, 1976; Hanke *et al.*, 2001). The gut feelings contribute to the forecasting process as foresight which can be used in combination with statistical methods in forecasting processes. Cuhls (2003) argued that the future can exist in different scenarios, from which a selection can be made, and then the selection will become a target by putting plans to reach this target after a certain period of time; this is shown in Figure (2.5). The future can have different options and the selection of one option reflects today's action to make decisions.

Looking into the future should not be systematic only but also by identifying the strategic research. *'Picking the Winners'*, is a famous book that include the preparation of the present decisions to plan the future, and it also helps in picking out the losers (Irvine and Martin, 1984). The future can offer different options, where one of which will be chosen, and based upon this selection it becomes a target that affects the today's decision making (Irvine and Martin, 1984; Cuhls, 2003).

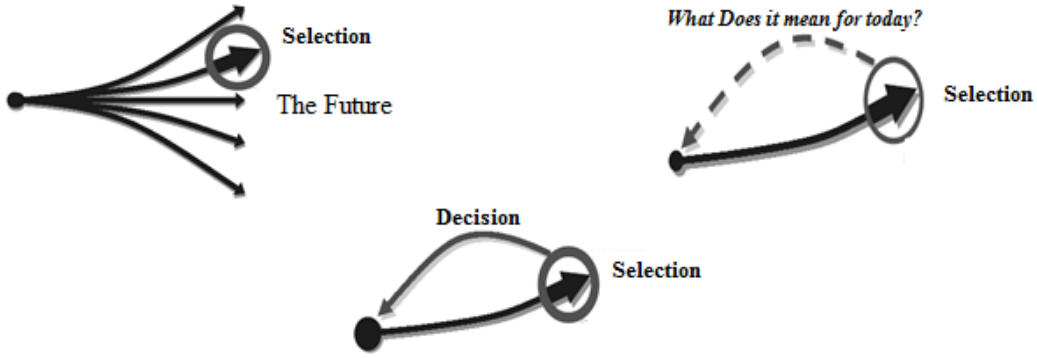



**Figure 2.5: The future can provide different options (Irvine and Martin, 1984; Cuhls, 2003)**

There is inconclusive definition for planning, but all researchers share the same views of planning which is future thinking. Weick (1969) defined planning as management or controlling and shaping the future; whereas Bolan (1974) defined it as the future thinking or imagining of the future. Sawyer (1983) argued planning as a pre-determination of actions. Bea *et al*. (1989) provided a more comprehensive definition of planning as *"a structured process to integrate information and to conceptualize. It fixes those factors which are anticipatively necessary to achieve a target, and the result is a plan"* (p:8). Hayek (1996) defined planning as a complex process that is mixed with decision-making according to the resources available. Armstrong (2001) argued that strategic planning involves creating a vision of the business that companies are in or want to be in, setting the company's goals, determining resource allocation and other actions to pursue these goals.

According to Cuhls (2003), today's planning is not fixed, but once the target is identified and the process of business assessments of chances and risks are completed, a policy is worked out to fix the plan to a certain extent to allocate resources and identify the budget plan. Good forecasting or foresight will lead to a perfect or formal planning, which will help the decision makers to collect knowledge to give accurate decisions (Cuhls, 2003). Waddell and Sohal (1994) defined planning as actions that involves the use of forecasts to help in making current decisions about the most suitable and attractive options to the organisation, tanking into considerations that forecasting is a vital step of companies' planning. On the other hand, Cuhls (2003) argued that planning is the link that connects forecasts to foresight, taking into considerations that the viewpoint in foresight might be up to 30 years or more. Figure (2.6) explains the link between the forecast, the foresight, and decision making, as well as their relationship with the strategic planning in order to specify the future targets of the companies.

The foresight is more qualitative and depends on the experts' opinions in assessing the future of the company. The forecasting is usually quantitative and individual work that can be done by forecaster, who might not be involved in the future decisions. The foresight is more qualitative and involves larger group of people. The combination of foresight and forecast can help in developing the policy and the making of future decisions (Cuhls, 2003).

The current environment is highly changeable and frequently showing to be in a state of flux. So in order to survive and continue to grow in this era of continuous change, companies must able to identify the upcoming opportunities and threats at early stages. This is important to enable companies to address such opportunities and threats in strategic their planning, in order to match the external opportunities with organisational capabilities and assess their impact on the organisational development. Scenario planning is closely associated with the emergence of strategic long-range planning and strategic foresight. The term "scenario" is used for a variety of different approaches, because the future could provide different uncertain options that should be studied carefully through systematic and strategic thinking to come up with different scenarios that support decision making (Fink *et al.,* 2000). The "future projection" is where managers look into the future to identify the possible developments for all internal key factors, and this is the heart of scenario development. This process will help companies not only in identifying opportunities, but also to find alternatives and plausible images to fit in the window of opportunity (Ringland, 2002).

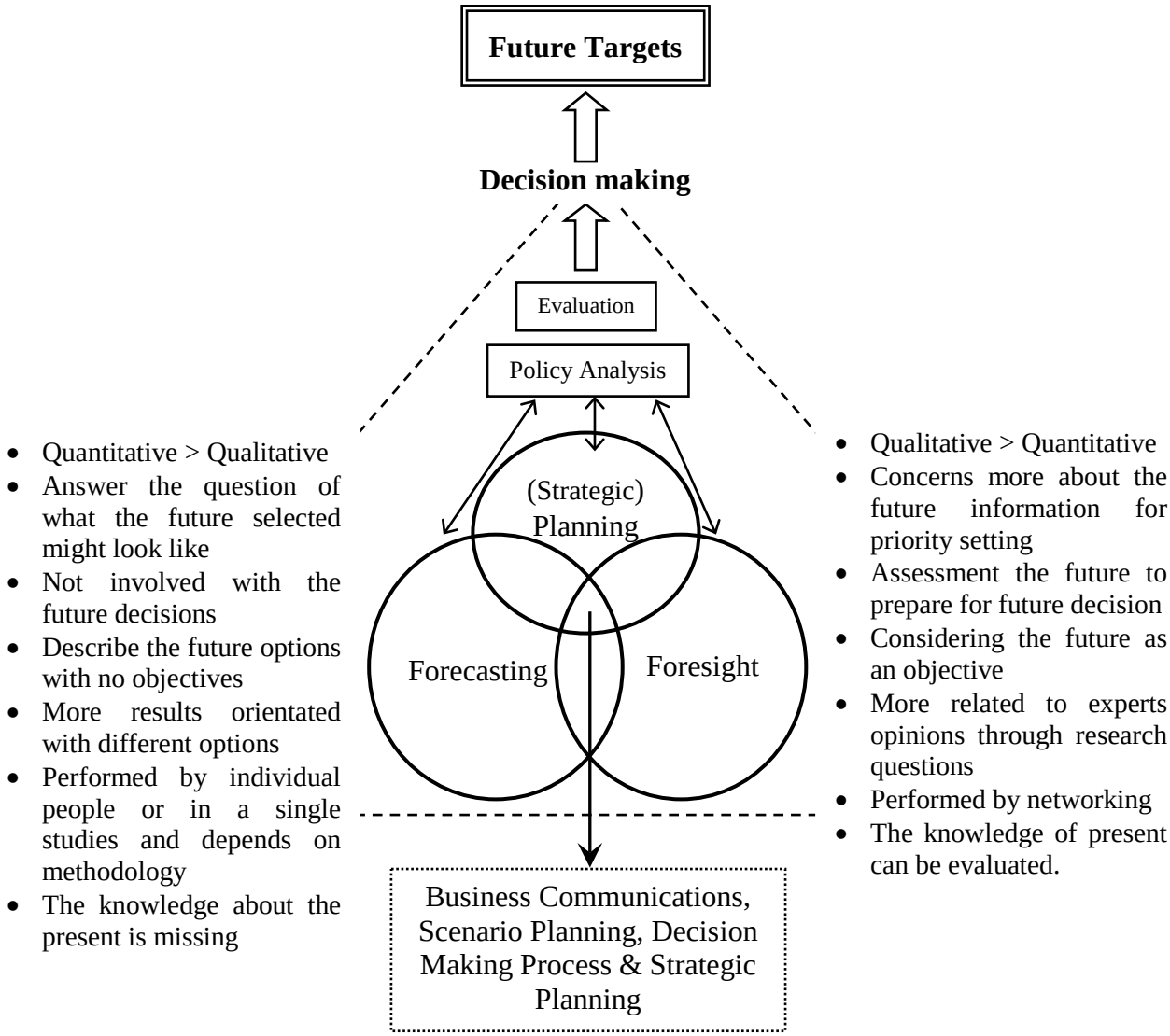



**Figure 2.6: The link between the foresight, forecasts and planning with decision making (Cuhls, 2003)**

In foresight, managers tend to take the false advices, and it has been said that the only useful advice is the unwelcome one, which tends to be rejected or ignored (Batson, 1975).

Filders (2010) argued that there is casual empirical evidence that many managers in different industries are confused about in their understanding of the differences between forecasts, plans, and targets. Forecasts are the expected sales values, whereas plans are the responses to the forecasts, which help organisations to develop and move forward to achieve their objectives. Forecasts should represent the most likely (or expected) values, whereas plans are a response by the organisation to the forecasts in order to move towards its objectives. Despite that plans themselves are dependent on the input forecasts (such as sales and cost forecasts), plans produce different forecasts as they depend on the procedures that the

organisations propose to implement (Filders, 2010). Targets are those optimistic estimates of what might be achieved and, therefore, they should be based on the corresponding forecast. In the example above, the margin on sales is a target, where the danger here occurs when this is built into the organisation's budgeting (Cuhls, 2003). The relationship between planning and forecasting is the central point to business and administrative processes because the results of the forecasting are used to make decisions that prepare for the predicted outcomes (Nash and Nash, 2001).

Decision makers need forecasting only when the future is uncertain within uncontrollable events or environments, thus, there is no need to forecast whether the sun will rise tomorrow, taking into considerations that forecasting is confused with planning, because planning concerns *what the world should like* while forecasting is about *what it will look like* (Hanke *et al.*, 2001). Forecasting helps people and organisations to plan for the future, and to make rational decisions that affect the companies' future and negotiations about the policy variables (Armstrong, 2001). Forecasting is meaningless without planning, but planning without forecasting is absolutely false, and that is why strategic managers use the environmental information in two ways: forecasting or estimating the future events, and creating a strategy to prepare the organisations for future events (Waddell and Sohal, 1994).

Cervone (2005) mentioned that decision making is the process of choosing option(s) from many options in a proactive manner, through the uncertain environmental factors, in order to achieve specific goals or objectives with a minimum percentage of risk. This makes decision making a complex process, because of the differences between team members in defining risks and the amount of uncertainty about a decision, especially the long-term decision. The accurate forecasts will decrease risks of uncertainty, especially when considering the uncertain variables.

Forecasting can be the hardest or the easiest task in companies depending on the consequences based on the results. There is no magical forecasting that would give 100% right results, but forecasts are made to be wrong. Forecasting in practice depends on different factors such as the market size, size of the company, the availability of historical data, company's strategy, type of the company (Business-to-Business or Business-to-Consumer), the existing competitors or expected ones, competitive advantage of the product, distribution outlets for the products, type of products forecasted, export or locally operating companies,

stage of the product life cycle, and whether the forecasting is long or short-term (Barron and Targett, 1986). Waddell and Sohal (1994) mentioned that forecasts are very important inputs to the planners to proceed with planning processes. Armstrong (2001) argued that the planning process starts with the initial plans to start the forecasting process. According to Fildes (2010), in order to minimise errors in future forecasts companies must consider a wider view of the complete picture as shown in Figure (2.7). This view includes resources allocation such as raw materials, labour, and finance, in addition to the competitive environment that would impact the operating and strategic decisions. The output of the forecasts is usually costs, assets and revenue which will directly affect the stock share. In the short-term forecast, many of the variables are considered as fixed variables. However, the longer the time scale of decision making, the more the managers should consider the slowly changing factors such as technology and the legislative and social factors, which are among the issues that are usually ignored in operational decision making (Chandar and Miranti, 2009). These variables should be considered in a checklist by the decision makers because of their importance in long-term forecasts. The forecasting capabilities improve the sensitivity of management to patterns of external change; for example, although the statistics division did not succeed in predicting a crash and a ten-year depression, its methodologies identified a significant slowing in the economy (Chandar and Miranti, 2009). As managers grow in the hierarchy of their organisational positions, they gradually shift their concerns from the operations to planning or from present day-to-day activities to future predictions and strategic thinking. Managers often use the available forecasting mathematical software with ignorance as they lack any specialist support to apply these software and techniques; sometimes mangers might be lucky enough and succeed, but at other times they might fail, thus, leading their companies to go out of business (Baines, 1992).

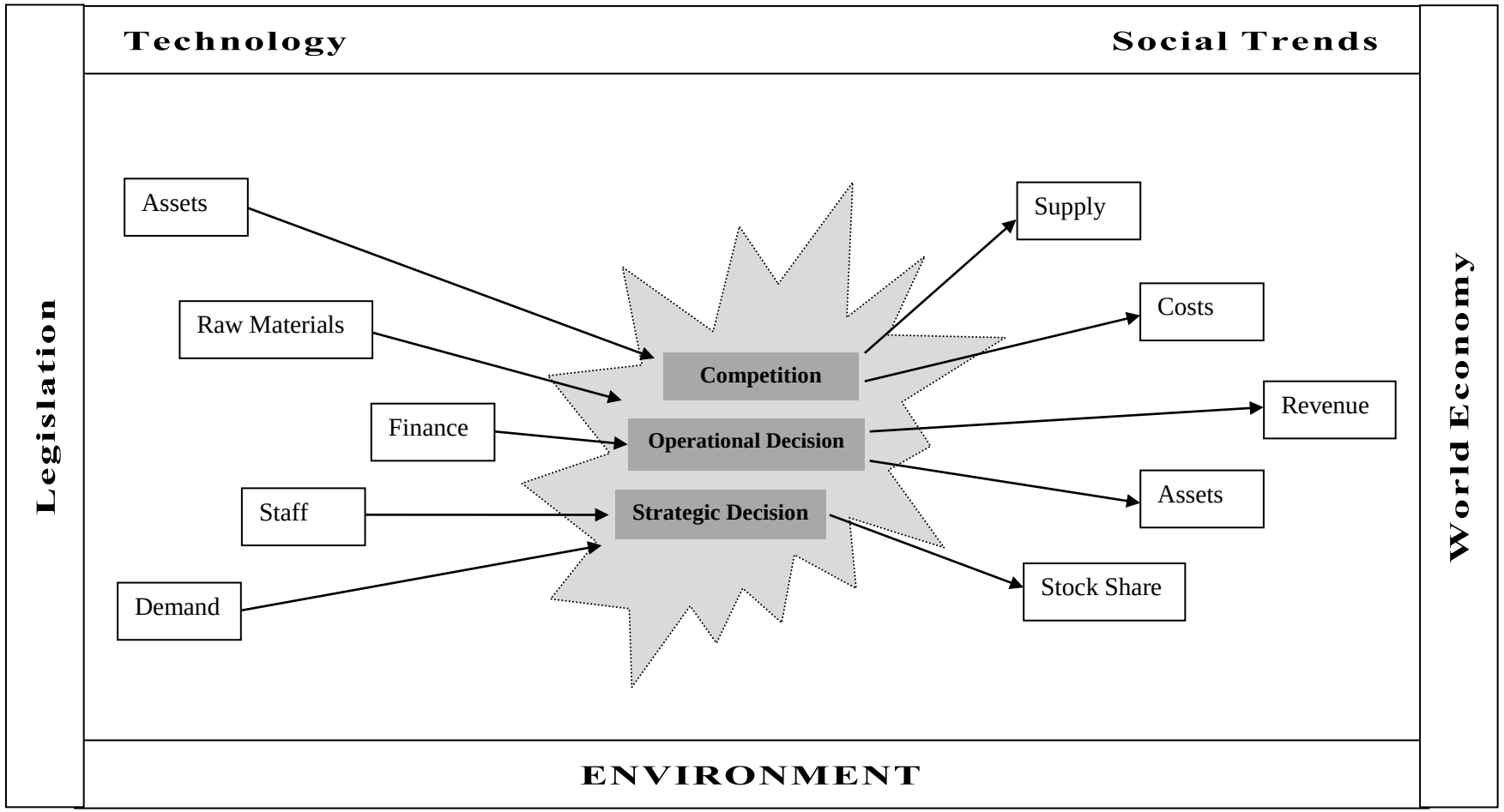



**Figure 2.7: The forecasting variables and its relationship with the decision making (Fildes, 2010).**

### 2.3.2 Relationship between the Forecaster and Decision Maker

Forecasting the future is very critical in decision making, it gives management the ability to plan, budget and control (Lawrence *et al*., 2000). In practice, many organisations revise their forecasts not their plans, because managers always think that forecasts change the employees' behaviour and objectivity (Armstrong, 2001). The difference between managers and businessmen is their willingness to take risk; businessmen are more willing to take risk than managers due to different factors that affect managers in taking decisions. Managers are more careful and predict the future within safe limits. Recognising the future risk factors will lead to initiating practice policies and activities. Forecasting is the basis of many decisions that need to be taken such as capacity planning, inventory management, purchasing control and plant investment decisions.

Forecasts should be adaptable and flexible because the nonflexible forecasts become misleading in decisions making. It is not possible to measure the forecasts accuracy due to different circumstances or assumptions which existed when forecast were prepared (Barrett, 2005). Forecasts are the reference for every future decision, because the future decisions might affect the market trend and consequently affect the demand (Waddell and Sohal, 1994). Based on the flexibility of the initial forecasts and changes in the marketplace, re-forecasting will create the opportunity to match the update forecasts with the current situation.

The organisational forecasting is the most critical organisational function because forecasts are used by managers to anticipate the future and plan accordingly. The lack of confidence in forecasts may be interpersonal, where decision makers fail to communicate with preparers or forecasters, even if the forecaster and decision maker are the same person the problem arises from difference aspects. The decision maker should be able to explain the forecasting results to superiors, and if decision makers do not fully understand the forecasting technique, they will not be able to explain to their superiors and most likely their forecasts will not be used (Sanders, 1995).

Some managers do not believe in giving attention to improving forecasting processes, and in some cases, companies might even need the latest forecasting capabilities that might not be fully leveraged or properly understood. Furthermore, companies refuse to overhaul the necessary major changes in existing forecasting processes (Dilgard, 2009).

Objective techniques might work well, and the problem does not lie in the technical issues that apply formulas. However, there is a gap between the forecasters and the managers because managers do not understand the technical method that forecasters use to obtain results , which makes managers ineligible to evaluate the forecasters results, thus leading to false results and failure to plan. At the same time, forecasters do not appreciate managers' needs and requirements. Forecasts are becoming more of a habit that should be done every year; however, they are still ill-matched to managers' needs and decisions, and do not provide supporting information in the way they should (Barron and Targett, 1986).

With reference to figure (2.8) page (46), based on the market analysis and data history the forecasters can choose the forecasting method and bring the forecasts to the decision makers to make decisions about the resources needed, promotional activities, return on investment, supply, and pricing. The framework about the organisational forecasting process starts from the forecasters, who provide the decision makers with the predictions, after considering the proposed set of plans or planning guidelines. Forecasters use selected information about the environment that is available through formal Management Information System (MIS) or on an informal basis. Forecasters will choose the certain forecasting procedure based on the cost, the deadlines and the expected accuracy of the forecasts, taking into considerations that the forecaster should take into account the value of improving forecast accuracy (Fildes, 2010).

As in figure (2.8), if the forecasting output is not as expected, the forecasters can modify the results by using alternative sources of information to produce new forecasts (working forecast). The working forecast may not meet the decision makers' expectations and objectives. At this point, decision makers and forecasters would revise the planning guidelines and the assumptions that lead to the initial forecasts (Fildes, 2010). The main initiator of the conflict between participants in the forecasting process, i.e. the forecaster and the decision maker, is that the interrelationship between the two protagonists is not included in the organisational framework, but it is affected by the organisational culture.

Another reason for the conflict between participants in the forecasting process is due to the different managerial views of random variables evaluations between departments within the same organisation, where these variables are affected by hidden assumptions that are affected by different types of pressures and experiences. This means that the same data used by different departments may produce contrasting forecasts with different forecast errors. For

example, when comparing the marketing department's views to the finance department's views of forecasting, the marketing and sales departments usually have the optimistic view, in contrast to the finance department, which has the responsibility of preparing the final figures to be shared in the stock market. In the case of the finance department forecasts, the organisational penalties or risks for over-forecasting or over-shooting are greater than those for the under-forecasting, which, thus, makes this department more cautious in its forecasts (Oral *et al*. 1992).

The forecasters and decision-makers are both affected by their own values, professional expertise and their personal career goals, which do not necessarily match or differ at all times, but they both affect each other in different directions. In fact, the forecasters' and corresponding decision-makers' views of the problem are often in substantial conflict (Wheelwright and Clarke, 1976). This conflict might be because the managers see forecasters as too technical people, who deal with data and forecasting formulas, without understanding and sometimes ignoring the managers' problems. Forecasters, on the other hand, view decision makers as people who have little understanding about the technical aspects of forecasting.

Among the suggestions to evaluate the organisation's forecasting performance is to examine how forecasts are used, not just how they are produced (Fildes and Hasting, 1994; Wheelwright and Clarke, 1976). This is important, especially that forecasting techniques alone do not necessarily improve the forecasting accuracy; managers should also consider other issues associated with the forecasting process management (Mentzer and Cox, 1984)

In some cases the forecaster who is responsible for forecast creation is also the user of the forecasts, and in this case the forecast is likely to be applied without adjustment (McCarthy *et al*., 2006). In case where separate individuals may be involved in forecast creation and utilisation, the direct relationship should be directed through the management policies and mandate application (Schultz, 1984).

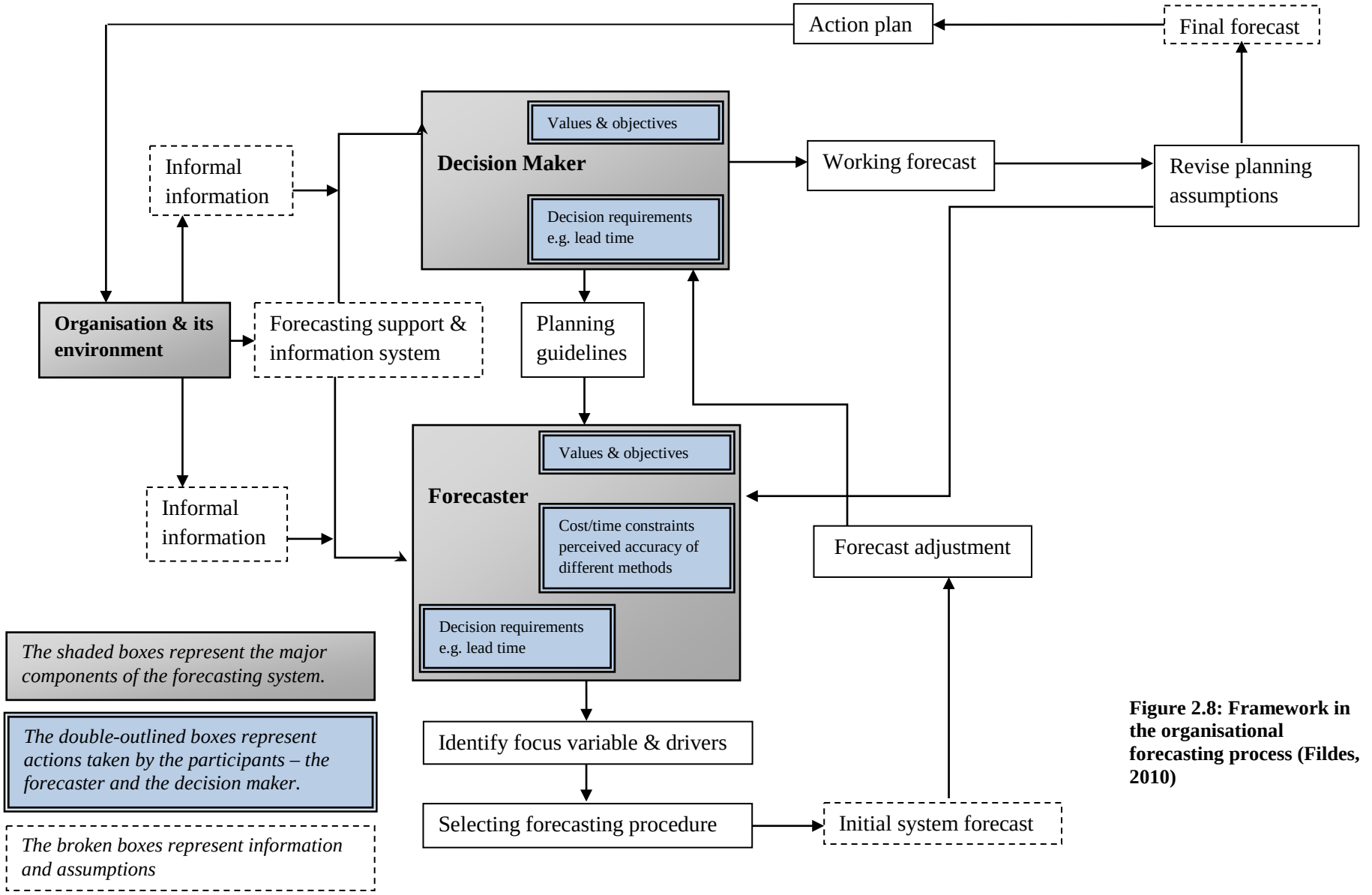



**Figure 2.8: Framework in the organisational forecasting process (Fildes, 2010)**

## 2.4 Stages of Forecasting in the Decision Making Process

Hooley *et al.* (1998) explained the stages of forecasting which are shown in Figure (2.9). The figure shows that the forecasting process starts from the total market size forecasts (Environmental Forecast) by which the economists analyse the environmental factors, such as inflation, unemployment, interest rate, currency exchange, consumer spending and saving and governmental spending. The second stage is the Industrial Demand Forecast, which considers forecasts of the specific market segment and estimate market size. This is followed by the Company Sales Forecast, which is done based on the market share of the industry sales and/or profit margins (Hooley *et al.*, 1998; Saunders *et al.*, 1987). Each of these three forecasts will be explained in more detail next.

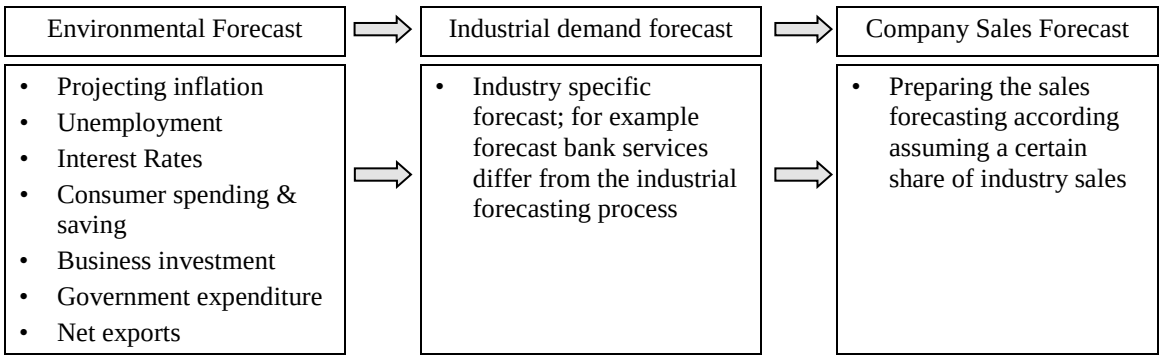



**Figure 2.9: Stages of forecasting (Hooley *et al.*, 1998).**

### 2.4.1 The Environmental Forecast

*"Forecasters cannot beat the market."* Adam Smith

The Environment or Market Forecast is related to forecasts of the whole market, which include the unemployment, interest rates, growth in GDP, government expenditure, consumer spending interest rates and projected inflation. Many researchers supported the use of econometric methods rather than subjective methods in forecasting the environment in long-term forecasts (Armstrong *et al.*, 1987; Armstrong and Brodie, 1999). In case of estimating the current size or status of markets, it has been found that combination of experts' judgments with econometric methods is helpful, however, the main concern remains about how to use the experts' judgments within the econometric models.

### 2.4.2 Industrial Demand Forecast

The industrial Demand forecast is industry based. Here, managers forecast the company's own actions, in addition to its suppliers, distributors and competitors. The company's own actions can be determined through different qualitative methods such as group interviews, work samples and role plays. In forecasting of the competitors, most of the forecasting processes take into account the objective methods such as experimentation, game theory and extrapolation; however, in some cases the use of the subjective methods might increase the accuracy level. The actions by suppliers and distributors can also be predicted based on the previous history and projected marketing activities (Armstrong *et al.*, 1987).

### 2.4.3 Company Sales Forecast

The Company Sales Forecast starts from the expected market share, by evaluating the total market size. For example, if the pharmaceutical industry wanted to launch a new antibiotic, the pharmaceutical company should then consider the total market of infectious diseases in environment forecast. However, in some cases, knowledge about the market is not accessible due to unavailability of historical data or data that are too expensive to get; here, bootstrapping[2] is a good option, because it is used by many practitioners and academics. The sales forecasting of the company might use either judgmental or statistical forecasting techniques or both. As shown in Table (2.2) that was presented by Armstrong *et al.* (1987) to find answers to a number of questions. The table shows a number of suggested questions under different areas, where, according to Armstrong *et al.* (1987), addressing these questions should help managers and forecasters to reach a point of agreement with minimum bias in their forecasting processes.

| Area | Question |
|---|---|
| Environmental forecasting | • Any conditional or unconditional factors affect the environment forecasting in short range?<br>• To what extent the forecasting error in environment is acceptable? |
| Marketing forecasting | • How to measure the market structure and size in an accurate way?<br>• What are the experts' judgments? And how to mix it with produced forecasts? How to control it?<br>• How to assess the uncertainty of the future?<br>• What is the econometric model would improve the forecasting accuracy? |
| Company action | What is the forecast behaviour of key shareholders in the organisation? |

[2] One of the qualitative methods used in forecasting - explained in detail in Chapter Three/forecasting methods

| | |
|---|---|
| | What are the relative abilities of projective tests and group depth interviews?<br>• What actions of the company that might resist forecasting process? |
| Competitors' actions | • How to forecast competitor's actions (game theory, expert opinion, analogies, or role play?) |
| Actions by Suppliers, Distributors, Government and Community | • How to forecast the actions of distributors, suppliers, and government actions |
| Market Share | • How to assess and control the biasness in judgements?<br>• How to increase the accuracy of data to decrease the errors?<br>• What are the most efficient forecasting methods to be used?<br>• How to improve the decision making process?<br>• What is the best way to forecast market share and sales by region? |
| Sales Forecasting | • How to decrease the biasness originated from sales and marketing people or in consumer intentions surveys?<br>• How should one combine judgments and statistical forecasts successfully? |
| Costs | • Does econometric statistics provide more accuracy than judgments?<br>• What is the cost of the forecasting process?<br>• Does econometric statistics help to predict large changes? |
| Assessing Uncertainty | • How to assess the uncertainty factor?<br>• Do we have an error margin or safely factors?<br>• How to measure the confidence intervals in forecasting? |
| Using Forecasts | • What are the procedures of using the forecasts effectively in decision-making? And what the scenarios that can be used to gain managers' commitments?<br>• Can computer software help managers to use the forecasts more effectively in decision making process? |

**Table 2.2: Questions related to forecasts in different departments**

For big organisations, the company sales forecasting is more complex, and the more complex they are, the greater the need for a formal approach. The organisations should carry out their evaluations by going through every component of the forecasts that will increase their accuracy. These components are explained in the matrix in Figure (2.10) (Armstrong, 2001). As explained in Figure (2.10), the environment has an effect on the market, competitors actions and companies actions, in addition to its effect on the cost. The companies' actions and competitors' actions are interrelated in the market, which is also linked to the actions by distributors and suppliers. The output of the companies' actions and competitors' actions, as well as the actions of suppliers, governments and distributors will support identifying the market share and, consequently, the sales. The cost contributes to calculating the profits of

the sales taking into considerations that the cost is related to the actions of suppliers and distributors (Armstrong, 2001).

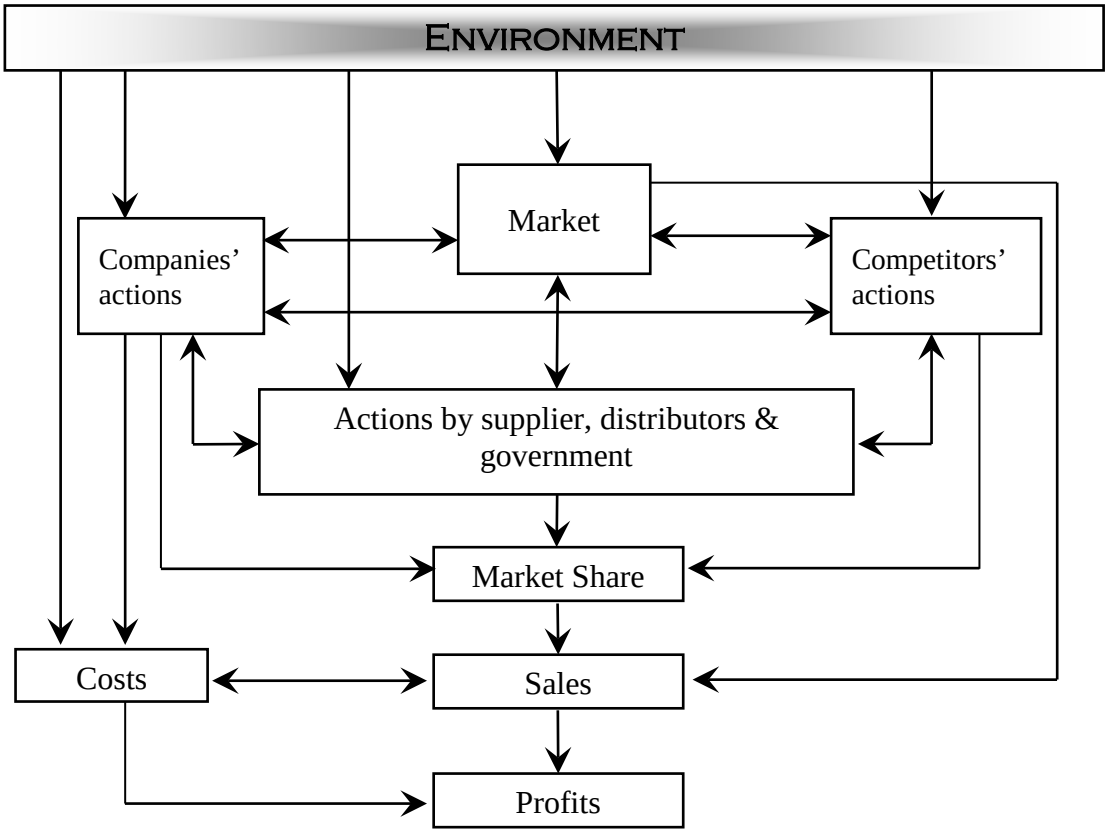



**Figure 2.10: The relationship between the different components and actions in the forecasting process (Armstrong, 2001).**

Figure (2.10) explains the relationship between the forecasting components as discussed by Armstrong (2001). The environment provides data through the environmental analysis that includes the external and internal data environment analysis, which will be used by the planner in the planning process. The forecasting process is performed through different stages that start from formulating the problem, then obtaining information to select the suitable forecasting methods, and implementing them. To explain more, Figure (2.11) shows the steps carried out between the forecasting process and the presentation of forecasts, which start with formulation of the problem; this involves deciding on the duration of the forecasts, the type of product, the market, the competitors and the suppliers.

This is then followed by obtaining the necessary information by answering the questions explained earlier in Table (2.2), which will lead the forecaster to choosing the forecasting method and evaluating it to decide on its appropriateness. The choice of forecasting methods

is usually judged by the forecaster, and if the results from the chosen forecasting method are not satisfying or not matching with the planning process, that was already suggested, the planning process is amended or another forecasting method is selected (Fildes, 2010). If the forecast results are satisfactory, they will be handed to planners who will proceed to implement the plans and monitor the results that will be part of the data bank for other future plans. In case the forecast results are still not satisfactory, then the planners will go back to revise the initial plans that will be handed to the forecasters in order to obtain the forecasts by repeating the process again, until satisfactory forecast outcomes are achieved (Armstrong, 2001).

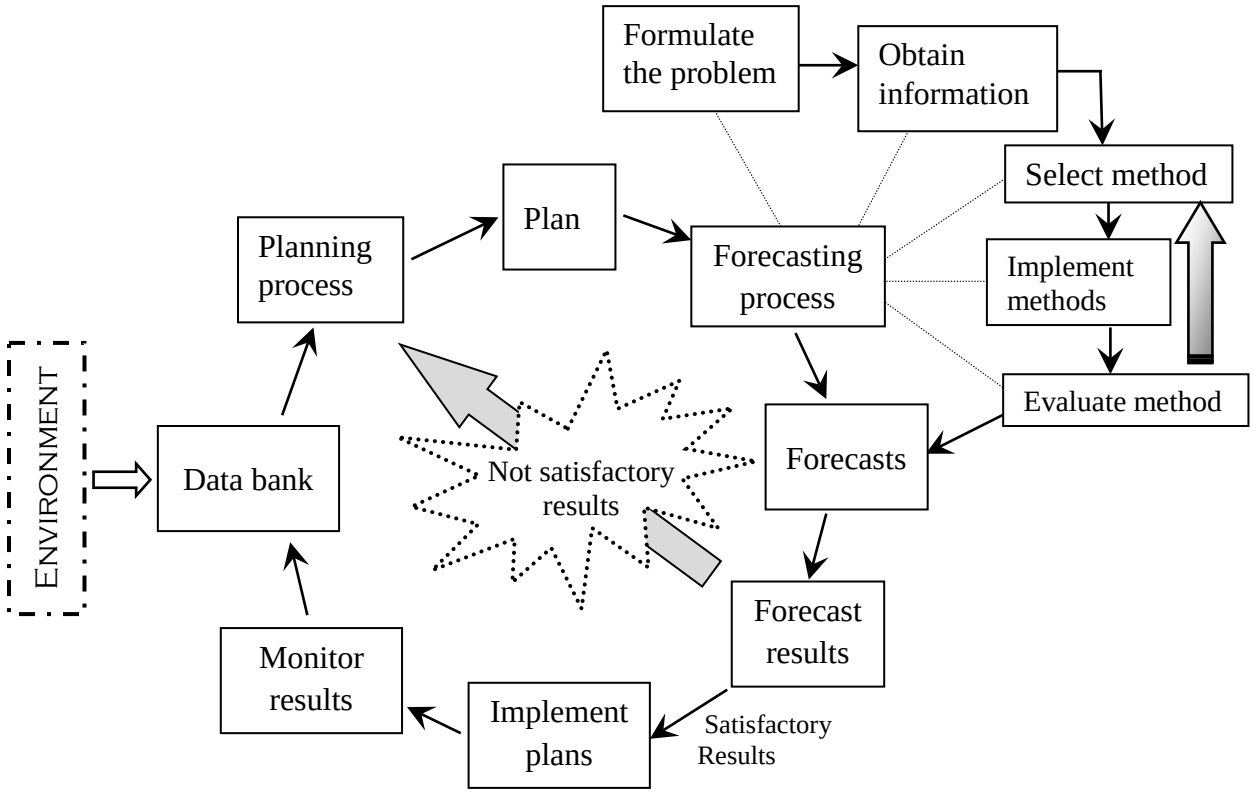



**Figure 2.11: The scope of forecasting: Explaining the relationship between the forecasting components and forecasting process in company sales forecast (Armstrong, 2001)**

Based on forecasts, decisions can be made, and many researchers see forecasts as real decisions (Mathews and Diamantopoulos, 1986). However, decision making is a more complex process than creating forecasts. Goodwin and Wright (1991) suggested decomposing decisions and forecasting to reduce the cognitive load on the judge, and, hence, improve the accuracy of the resulting decisions (Goodwin and Wright, 1991).

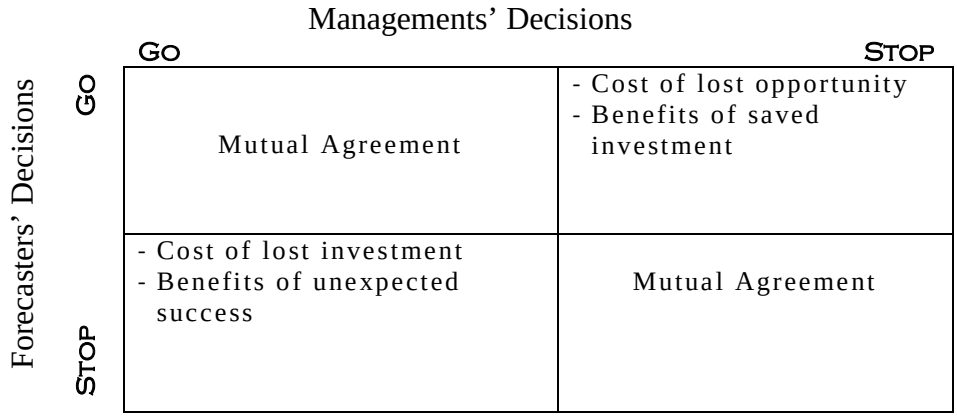



**Figure 2.12: Companies evaluation of advantage/disadvantage ratios to improve the accuracy of the resulting decisions (Johnson, 2005).**

As shown in Figure (2.12), management and forecasters' decisions can match in areas of Mutual Agreement, or mismatch in areas of losses or benefits. Areas of Mutual Agreement can be achieved when both the forecasters' and management decisions decide to go or not to go for action or activity. However, in areas of conflict between management and forecasters' decision, the indirect costs of inaccurate or wrong management and forecasters' decisions could be massive as these might result in the cost of losing investments or opportunities; yet, such conflicts might also result in the benefit of unexpected success or the benefit of saved investment (Johnson, 2005).

## 2.5 Forecasting, between Art and Science

Schnaars (1989) said that "*People want to believe in magic bullets in forecasting. They do not exist"* (p:5), and sometime even in the right approach there is *'no perfect way"* to conduct a successful forecasts (Johnson, 2005). Based on the previous literature, the forecasting methods are taught in the universities and schools in order to prepare statistician to forecast the future based on the available data (Johnson, 2005). In this case, the forecasting is considered as a science. This was promoted earlier by many scholars such as Armstrong, for example, who developed structured forecasting methods to be used in forecasting the future. The forecasting becomes an art when the experts use their judgements based on their professional experiences, where experienced managers will provide their views about the future. The improved forecasting tools support the procurement, pricing and sales decision making processes in both quantitative (the Science) and qualitative (the Art) ways.

As shown in Figure (2.13), forecast is sometime an art when it depends on the forecaster's views, it is mostly applied in small companies and in the case of forecasting new products,

and it can take into account the contextual information such as in the case of deciding the promotional mix, taking into consideration that the produced forecasts cannot be explained and can be biased. The structured forecasting process, on the other hand, is scientifically based and requires data to project the future; therefore, the forecast can be explained scientifically and can be studied. The figure also shows the mixed forecasting process that combines these two conventional methods of judgmental and statistical forecasting, where this mixed method is shown to provide more accurate results (Goodwin and Wright, 1991). The emergence of the non-conventional method of forecasting, the Bayesian theory, is the fusion of the probabilistic statement of belief with the historical data.

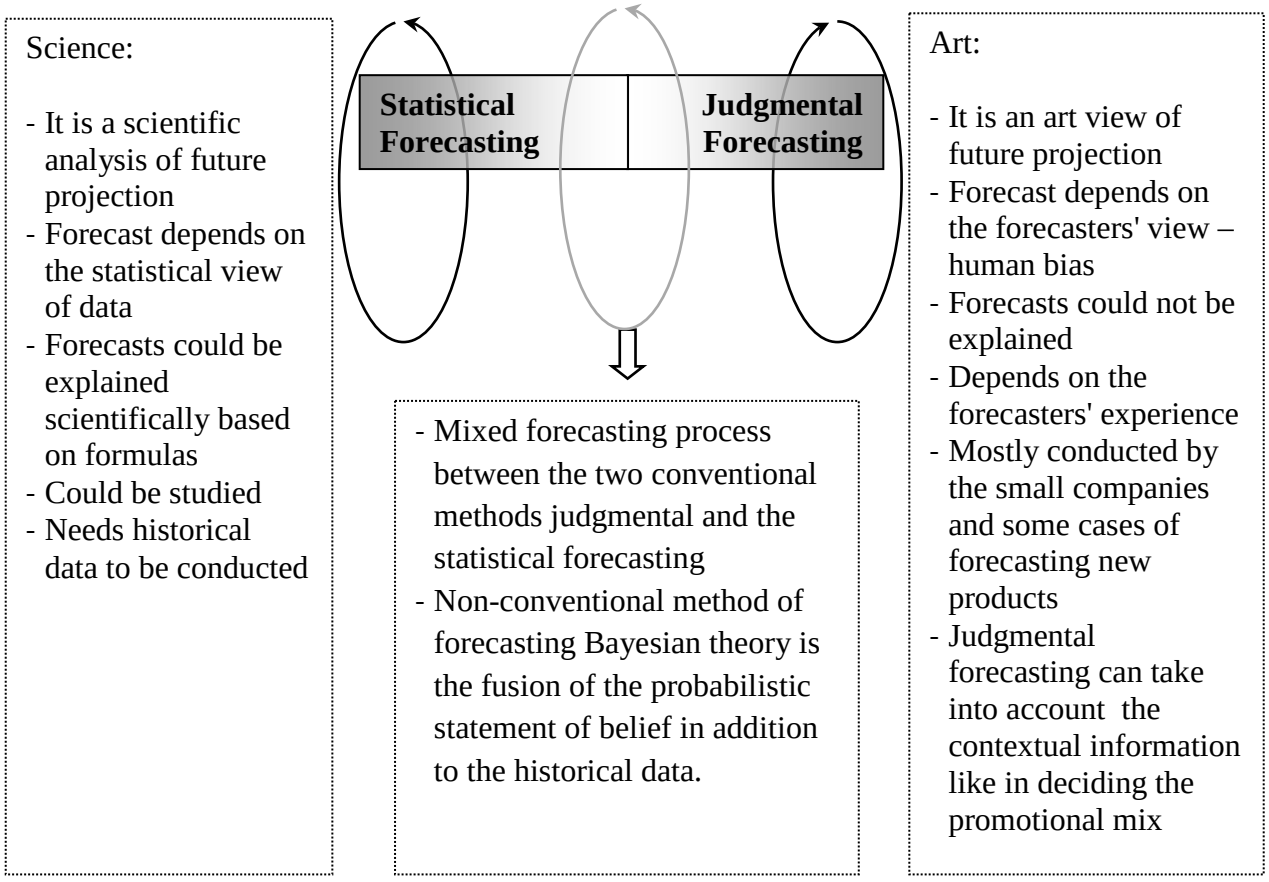



**Figure 2.13: Forecasting between Art and Science (Author's work, 2012).**

This figure explains the types of forecasting methods, judgemental and statistical forecasting methods and each side of them has its own characteristics. The mixed methods and Bayesian Theory is the mixed processes of forecast.

## 2.6 Judgments in the Forecasting Process

> *"Forecasters in firms are expected to employ mathematical techniques encoded in information systems in order to predict the future demand for a firm's goods. In practice, many forecasters have eschewed statistical methods of forecasting and depend instead on human expertise"* (Brown, 2011:77).

Judgments are not taught in universities but basically represent the personal experience in a certain area or subject. Hogarth and Makridakis (1981) warned about the judgemental forecasts due to the high possibility of human bias, and the low humans' capabilities to process large amount of information. Moreover, the involvement of the human values and overconfidence might lead to a fragile forecast. However, Lawrence *et al.* (2006) mentioned that judgments might improve the forecasting accuracy despite the human mind's limitations, like restricted memory (Miller, 1956) and the use of heuristics. Collopy and Armstrong (1992), Goodwin and Wright (1993), Armstrong (2003) and Fildes (2006) mentioned that judgment is an important part of the forecasting process, even when using the statistical approaches, because it involves the choice of the forecasting method, the data selected, and in cases of unavailability of data actions are decided based on the judgments of the forecasters. Moreover, the judgments might interfere with the produced forecasts (judgmental adjustments to statistical forecasts). Judgments might be based on the different people's visual illusions (Goodwin and Wright, 1993), these illusions might be a part of subconscious mental involvedness and cognitive limitation, and the famous example was presented by Müller-Lyer illusion (1889). This example is shown in Figure (2.14), in which the three horizontal lines have the same length but the first line looks longer due to the shape of arrows at the end and beginning. The judgments depend on the forecasters' views of the past sales data, which might not be always smooth, due to previous events and fluctuations of sales performance.

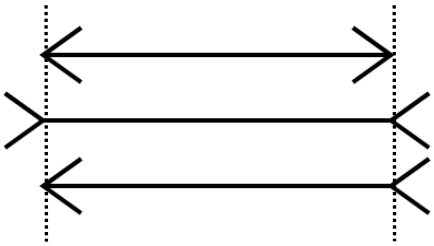


**Figure 2.14: The Müller-Lyer illusion (1889).**

In a cases study conducted by Edmundson *et al.* (1988), the judgmental forecasts as holistic as it sometime provides the most general forecasts and it was found to be superior for key

products, however, and in opposition of his published article in (2006), Lawrence *et al*. (2000) concluded in their empirical study on about 13 firms in Australia that holistic judgmental forecasts are worse than naïve forecasts, because holistic judgmental forecasts are calculated using past data and multiplying it by a certain factor. The holistic judgmental forecasts were produced and supported by managers because of personal benefits and behaviours toward forecasts such as achieving sales targets, which result in biased forecasts. Both of these empirical studies were conducted on people involved in the forecasting process such as marketing/ product managers, who are all engaged with consensus meetings on their judgements. This will lead to group bias, which has been identified in the psychology literature as two types including *groupthink* and *group polarisation*.

The group thinking was proposed by Irving Janis (1958), and it considers that reaching unanimity by members of a group is more significant and vital than the quality of the decision (Buchanan and Huczynski, 1997), and in this case, the group will go along with the preferred forecasts that would satisfy the senior members without adequately revising these forecasts, or negotiating different readings of the future. On the other hand, the group polarisation is very common, and it is the shift of a certain subject during discussion to another direction, and this could be raised by one person or more (Jones and Roelofsma, 2000). For example, in case the forecaster prepared the forecasts based on statistical figures, one or more members of the group might question the historical data that was used to produce the final forecasts, and then the meeting output would confirm the inaccuracy of the statistical forecasts produced, and, thus, deems judgemental adjustments as important to the final forecasts.

The judgments can be evaluated through the Social Decision Scheme (SDS) model, and can be used as a framework to justify contentions, and to specify conditions under which groups are both more and less biased than individuals. Rudman and Goodwin (2004) argued the differences between genders as the base of cognitive balance in-group bias.

Based on the Social Decision Scheme (SDS) model, the group and individual bias depends on many factors such as the size of the group, primary judgements by individuals, bias type and the group-judgement process (Davis and Kottemann, 1995). According to Whyte and Sebenius (1997), there are no differences found when comparing the anchoring and adjustment biases or the extent of biasness in judgements between individuals and groups,

however; the results are mixed if all forms of judgmental biases are considered (Kerr *et al.*, 1996).

There are debates about the judgmental forecasting to be *"…least as accurate as statistical techniques"* (Lawrence *et al.*, 1985:25). On the other hand, Carbone *et al.* (1983) justified that poor judgements are originated because of the low managers' knowledge of forecasting techniques.

Judgements are easier to understand than quantitative forecasting techniques; they are explained based on ones' gut feeling, and in some cases they are more acceptable (Taylor and Thomas, 1982). Judgments are important in the case of limited past data available to predict the future, and are useful when the forecasters incorporate some marketing activities or some uncontrollable factors, which affect the future and are usually not integrated in statistical forecasts (Goodwin, 2000b).

### 2.7 Integration of Judgment and Statistical Methods

The integration of judgment in statistical methods is defined by Lee (2007) as

> *"When a forecaster decides to use both statistical models and his/her judgment in creating forecasts, he/she may have only time series information or additional domain knowledge. Different heuristics and biases may be involved in these two situations and they will be considered in turn"* (p:39).

Sanders and Manrodt (1994) explained the use of judgments in the forecasting process within organisational settings in different ways. These could involve adjustments of the produced forecasts, adjustments of the forecasting statistical procedure, or adjustments of the initial data used in producing the forecasts. The differences created by integrating judgemental and statistical methods lead to conflicts between scholars in their evaluation of the judgemental integration into the forecasts. In some cases, managers make preliminary forecasts based on their judgments and then send them to another source to make the final forecasts; however, in some cases, the combination of the judgements within the forecasting process to produce the final forecasts can lead to less accurate forecasts. The variations among researchers' views about judgmental integration might have an effect on the pattern of results obtained in research, which might have some implications in practice (Harvey and Harries, 1999).

The integration of judgements into statistical forecasts was criticised by Sanders (1992), Harvey (1995) and Goodwin and Fildes (1999), as the integration of judgements into

statistical forecasts would decrease their accuracy due to confusion between statistics and managers' judgements that are based on the reality of the marketplace (Goodwin, 2002).

From another point of view, Willemain (1989) mentioned that if the forecasts that were produced statistically were suboptimal, judgemental adjustments would improve the accuracy of the produced forecasts. The improvement of accuracy also happens when domain knowledge is available; this was also supported by Turner (1990) and Donihue (1993) in macroeconomics researches, and by Wolfe and Flores (1990) and Flores *et al.* (1992) who conducted their researches on the earnings forecasting, as well as Sanders and Ritzman (2001) and Nikolopoulos *et al.* (2007) who conducted their research on the demand forecasting process, taking into consideration that bias results might be present in the final forecasts. Judgemental adjustments to forecasts provide a clear improvement to the forecasts accuracy; however, Mathews and Diamantopoulos (1992) raised conflict in amending the non-adjusted forecasts due to the flexibility of the forecasting system used in organisations.

From the other hand, Harvey and Fischer (1997) and Lim and O'Connor (1995, 1996) studied the received forecasts from another perspective, and they found that users of the forecasts fail to make adequate adjustments to the forecasts due to low understanding of the forecasting techniques and their low market knowledge. Goodwin and Wright (1994) and Webby and O'Connor (1996) studied the combination of judgments with statistical methods through mechanical averaging between both methods, and found that it would reduce the forecast errors, but it should be based on simple average forecasts. The organisation has an impact on the integration process of judgements with statistical forecasts, and it also affects the forecasting process and outcome (Harvey and Fischer; 1997).

Carbone and Gorr (1985) and Angus-Leppan and Fatseas (1986) looked into the practitioners' judgements after being exposed to historical data, which might lead to inappropriate judgements. At the same time, people tend to give their judgements a very high weight in the forecasting process and that was explained by Lim and O'Connor (1995) who said

> *"The typical strategy adopted by people was to tenaciously favour their own forecast over any additional information. It is suggestive of or similar to an anchoring-adjustment strategy. The weight people placed on the statistical forecast was much less than suggested by the optimal model. This finding goes in parallel with the Bayesian conservatism"* (p:160).

The conservatism is defined in the cognitive psychology as a decision science that is explained as a bias in human information processing. The biasness would clarify and rationalise the human belief revision (Edwards, 1982). The judgements are based on the experience or previous trainings that create the skills and ability to judge, such experience will also increase the self-confidence even with minimal changes in performance (Harvey, *et al*, 1987; Marteau *et al*, 1989; 1990). People's confidence in overestimation or underestimation of certain facts is relative to personal experiences and beliefs (Koehler and Harvey, 1997). According to Bandura (1997) in his book "Self-efficacy: The exercise of control", he said that beliefs of people about self-efficacy *"... affect thought processes, the level and persistency of motivation, and affective states, all of which are important contributors to the types of performances that are realised. People who doubt their capabilities in particular domains of activity shy away from difficult tasks in those domains. They find it hard to motivate themselves, and they slacken their efforts or give up quickly in the face of obstacles….People who have strong beliefs in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an affirmative orientation fosters interest and encourages involvement in activities"* (p:39). Harvey and Fischer (1997) also considered skilled people with overconfidence to have a competitive advantage; nevertheless, their judgments might create suboptimal performance.

Many researchers considered the statistical methods in forecasting to be more reliable and less prone to bias because these methods use the historical data. Despite that such statistical forecasting methods can be justified by the forecaster, these are considered myopic. On the other hand, the integration of judgemental and statistical forecasts seems to be practical and might lead to higher accuracy, even though, in some cases, the results are very unsuccessful (Bunn and Wright, 1991; Webby and O'Connor, 1996). Bunn and wright (1991) said that *"experts are used in their real world context and the judgemental process is made explicit through a form of decomposition or audit trail"* (p:512), and there is a need for re-evaluation of the basic psychological research on judgemental biases, bootstrapping, and calibration in this context in order to improve the best practice quality of the judgements in forecasting. Table (2.3) provides an overview of the previous studies that were conducted by different researchers in many journals about the judgmental integration of forecasting and forecasting management.

| Year | Author | Journal | Title of study | Industry/ literature | Results |
|---|---|---|---|---|---|
| 2009 | Fildes; Goodwin, Lawrence; and Nikolopoulos | International Journal of Forecasting | Effective forecasting and judgmental adjustments: an empirical evaluation and strategies for improvement in supply-chain planning | four UK-based companies | - Company forecasts we observed proved to be biased and inefficient<br>- The effectiveness of these judgmental adjustments has been moot, with very limited empirical evidence available<br>- Statistical forecasting systems employed by many of the companies could be improved to deliver a better baseline from which to make the judgmental adjustments |
| 2008 | Monti | NBB working paper - No. 153 | Forecast with judgment and models | Review | - Suggesting an econometric model to successful integration of judgments with statistical forecast |
| 2002 | Goodwin | Omega | Integrating management judgment and statistical methods to improve short-term forecasts | Review | - Types of judgmental integration methods |
| 1995 | Lim and O'Connor | Journal of Behavioral Decision Making | Judgemental Adjustment of Initial Forecasts: Its Effectiveness and Biases | Three experimental studies | - There are variations in reliability of statistical forecasts; however the judgmental effectiveness depends mainly on the reliability of statistical models used.<br>- Another issue in evaluating the judgments and people tend to have different weight of own judgments |
| 1991 | Kahneman | American Psychological Society | Judgment and Decision making: A Personal View | Review | - Review about the cognitive factors in judgment and decision making |
| 1991 | Bunn and Wright | Management Science | Interaction of Judgemental and Statistical Forecasting Methods: Issues & Analysis | Experimental Evidence | - There are many variables that can be used in testing the quality of judgments in reality; however, guidelines are suggested in order to get the maximum quality of judgments. |

**Table 2.3: Previous literature about the judgemental integration of forecasting.**

## 2.8 Handling Forecasts by Different Users

> *"Sophisticated techniques have had a negligible pay-off for accuracy in forecasting"* (Armstrong, 1984:52).

The forecasts are handled by many users for different purposes - as mentioned in table (2.1) page (35). As mentioned earlier, many researchers such as Davis and Mentzer (2007); Fildes (2006); Mentzer *et al*. (1999) and Winklehofer and Diamantopoulos (2003) developed different theories that help to describe the role of management in the forecasting process, and few studies considered the forecast users' influence (in their perceptions and actions) on the application of forecasts in planning and management activities (Forslund and Jonsson, 2007), which expected to lead to a gap in understanding of the forecasting-operating performance connection.

### 2.8.1 Forecasting and Financial Management Decisions

Financial management decisions can be divided into two types based on the duration of the decisions, whether it is long or short-term. For a long-term duration, the financial decisions are related to the optimal allocation of funds and the optimal financial structure, whereas short-term decisions are related to the management of working capital that is referred to the optimisation of stocks, cash, accounts receivable and short-term debts (Zopounidis, 1999).

Due to the importance of finance people in decision making within organisations, especially in cases like optimisation of stocks, current liabilities, accounts receivable and cash flow for example, the financial people are required to interfere with the final decision, taking into consideration that the financial analysis depends mainly of the forecasts (Danese and Kalchschmidt, 2011).

The financial theory analyses these decisions (short and long-terms), but always from an optimisation perspective (for example, theory of capital cost, portfolio theory, options theory and others). Bhaskar and McNamee (1983) did an empirical study about the objectives of large companies in the UK, and found out that financial managers make decisions based on two criteria including the companies' number of objectives, and the objectives' priorities. The study has shown that most companies appear to have more than one objective when an investment is being appraised. 77% of the companies set profitability as their primary

objective, whereas the second most important objective for companies is growth (Bhaskar and McNamee, 1983).

### 2.8.2 Forecasting and Supply Chain Management

Supply Chain Managers depend on the Demand Forecasting, which is what the market demands in order to create the balance between the production capacity and the market demand. Sales forecasting is the expectation of what a company will sell. The demand forecasts are made in units/week or units/month, whereas the sales forecasts are usually created at SKU (Stock Keeping Unit) level. In cases of inaccurate forecasts, the results are either excess inventories or lost sales, and in both cases the company will shoulder extra costs. Kotler (2005) said that *"…good forecasting becomes a key factor in company success. Poor forecasting can lead to overly large inventories, costly process markdowns or lost sales due to being out of stock"* (p:762)

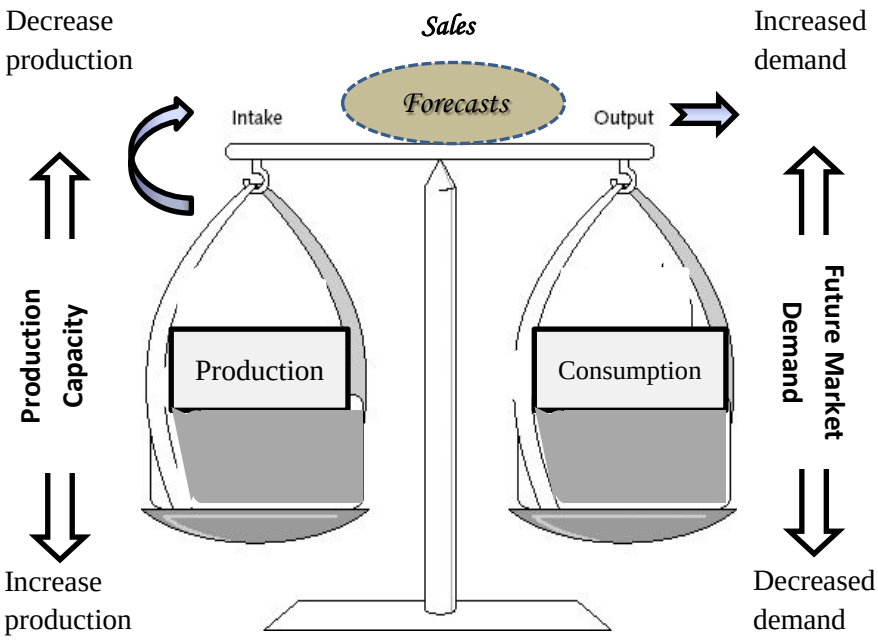



**Figure 2.15: The use of forecasts in the supply chain department (Author's work, 2012).**

Accurate forecasts can improve the operating performance of the supply chain departments and prepare them for short and long-term market changes. On the other hand, operational decisions based on inaccurate forecasts may lead to operational missteps (Fildes and Beard, 1992; Gardner, 1990; Wacker and Lummus, 2002). This is shown in Figure (2.15), which demonstrates the forecast as a balance between the production and consumption (or market

demand). The decrease in demand reflects a decrease in consumption that is translated in a decrease in the production, and the opposite is true. This is controlled by forecasts, which balance the intake and output of the supply chain department.

In the supply chain, there is a concept which was first proposed by Forrester (1961) called the *Bullwhip Effect*. Bullwhip Effect means that the influence of forecasts magnify as one moves up the supply chain, from retailers to suppliers (Lee *et al.*,1997a; 1997b), and this will reduce the loss and increase the profitability up to 30% (Metters, 1997).

Cisco provides one of the recent examples on the effect of forecasting on the organisation. In 2001, Cisco did not predict the dramatic fall in demand for its products, and, consequently, ended up with an extra of $2.2 billion in inventories, discharged more than 8,000 employees and experienced a stock decline of over 80% (Berinato, 2001). Inaccurate forecasts might lead to too little or too much inventory; in the case of too much inventory, the companies will face problems that include expired goods and storage space, while if the forecasts lead to too little inventory the problem will impact the sales teams as the company will run out of stock in the marketplace, and in both cases the results will lead to waste of money and loss of opportunities.

### 2.8.3 Forecasts Accuracy and Forecasting Errors

> *"…many companies have no forecasting capability at all because they feel it's not necessary at their companies"* (Dilgard, 2009:4).

The primary aims of forecasters were and continue to involve the studying of all types of quantitative forecasting methods that are of interests (Flides, 2006), but forecasters often ignore the effect of organisational issues and the effects of forecasting errors. Fildes (2006) believes that the gap between forecasting theoretical achievements and forecasting practice remains un-bridged. Armstrong (2001) argued that this gap is due to the shortage in adopting new forecasting techniques and understanding of their output. These new forecasting formulas offer better forecasting accuracy and minimum errors. As a consequence, the forecasting errors will generate more negative attitudes towards the forecasting techniques which will lead to changes in the organisational behaviours.

Forecasts were usually prepared through using naïve forecasting techniques or rules of thumb, and none these techniques had enough capability to predict the future demand. The

uses of the qualitative techniques that rely on non-statistical methods are needed to improve the forecasting accuracy. Qualitative techniques are very useful in several situations including when there are no historical data, when launching a new category product, or when the buying habits of customers are continually changing. The biggest obstacle is the lack of understanding of the costs of forecast accuracy, which makes it important to incorporate the judgements of trained sales teams into statistical forecast (Muscatello, 2009). This gave the motive to Mahmoud *et al*. (1988) and Dalrymple (1987) to make surveys which proved that forecasting accuracy is the most important criterion in selecting a forecasting strategy; they also added that the statistical forecasting techniques have two main problems including choosing the forecasting technique and evaluating the forecasting performance.

From another point of view, Barron and Targett (1985) argued that the impact of future events cannot be modelled by statistical packages, which could lead to poor forecasting processes. At the same time, many firms see the output of the forecasting packages as the final numbers. The costs of forecasting errors are described in finance, corporate planning and production management or supply management. Forecasting errors might be caused by different factors in organisations. The advanced forecasting techniques provide less forecasting errors, but they require lots of data, which some organisations do not keep or in some cases cannot attain as in the case of variables of new products which do not exist.

The selection of the key variables to forecasts depends on identifying the key variables and how they should be included in the forecasts. One of the common forecasting mistakes is neglecting to forecast some critical variables, and assuming that these variables are consistent and will not change like for example credit/debt ratio and production capacity. Another forecasting mistake is treating two interdependent items separately, like for example treating sales volume and margin on sales separately. In some cases, for example, the margin on sales might be decided by the administrative fiat of the financial manager and used in the corporate plan, while neglecting the fact that setting such a margin on sales will affect the revenue forecasts in the plan.

Forecasting methods that are used by the economists are causal methods that utilise the independent variables to forecast the dependent variables, like for example the regression analysis. In order to decrease the forecasting errors, the forecasters should systematically

consider the interrelationships of the planning assumptions and the variables (Subhanij, 2009).

### 2.8.4 The Forecasting Software

The new advancements in information technology allow the forecasters to use available software in order to perform the forecasting process. The new computer forecasting programs allow the users to make use of the complex algorithms (Tashman and Leach, 1991; Sanders and Manrodt, 2003). The use of these computer software programmes has also expanded in practice, thus, motivating researchers to test the level of satisfaction (Hoover, 1999; Tashman and Gros, 2001). In a study by Rycroft (1999), it was found that there are 51 computer forecasting program available from 33 companies. The forecasting software aims to increase accuracy of the forecasts and support the users' confidence of the produced forecasts.

Despite the availability of a wide range of computer software programmes that offer various technical advances, most companies still rely on the judgmental forecasts (Lawrence, 2000). This was mentioned earlier in the literature review, as people within an industry prefer the judgemental methods over the quantitative forecasting techniques. According to Muscatello (2009), who has forecasting experience in a major chemical company, he mentioned that using computer forecasting programs was expected to provide more security in term of forecasting accuracy, however, these programs failed to improve the accuracy of the forecasts for certain product lines when compared to judgmental models. In practice, the judgmental forecasting involves the use of historical data and contextual or domain knowledge that would include promotion plans, competitor intelligence and macro-economic situation. In their research, Sanders and Manrodt (2003) surveyed 240 US firms regarding the use of the forecasting software and the level of satisfaction, where they found that *"many corporate analysts continue to use spreadsheets as their primary analysis tool and avoid forecasting software because they fear it would take too long to master"* (p:90).

The ill-developed Management Information System (MIS) will result in slow adoption of quantitative forecasting techniques, which will lead forecasters or decision makers to rely more on informal information, which are expected to increase the chances of forecasting errors (Fildes and Hasting, 1994).

## 2.9 The Organisational Impact

> *"Sales forecasting management, just like any other area of business, must answer to corporate profitability, so these links between accuracy and profitability must be measured"* (Mentzer *et al.*, 1999:56).

Because the forecasting process permeates all aspects of firms' operations, different approaches of management have an effect on forecasts. Despite the increased attention toward the forecasting techniques, there is minimum attention to the forecasting process and the impact of the managerial approaches (Mentzer *et al.,* 1999). In their empirical study, Mentzer and Kahn (1997) surveyed 208 companies and highlighted the existence of system disconnections between three main areas including the needed information or accurate data to produce accurate forecasts, the forecasting function or production, and the users of the forecasts.

As mentioned earlier and as shown in figure (1.4) page (18), Mentzer and Moon (2005) identified four management approaches that have an effect on forecasting management which are the independent approach, the concentrated approach, the negotiated approach and the consensus approach. The *independent* managerial approach means that each department has its own development process, independent of the forecasting process, whereas the *concentrated* managerial approach means that one department is responsible to make the forecasts that all other departments must use it. The *negotiated* managerial approach is where each department makes its own forecasts and then conduct a meeting to discuss the final forecasts, whereas the *consensus* managerial approach is where a committee including members from each department works to develop the final agreed forecasts, having one person in charge. The majority of the companies selected in the research conducted by Mentzer and Kahn (1997) were found to apply the negotiated and consensus approaches which are unknown to be advantageous in forecasting management. Based on their research, Moon *et al.* (1998) developed the seven key managerial perspectives to guide the forecasting management, by studying the best practices of 20 selected companies that have well-acknowledged histories in the market share and financial performance.

The forecasting management performance is considered as a standard operating performance of the process of forecasting management, which may include the documentation of the forecasting process, identifying of the people working on the forecasting process and

description of their contribution in this process. In addition to the four management approaches, there are four dimensions in forecasting management, which have been suggested in the literature by Mentzer and Moon (2005); these include the Functional Integration, Approach, Systems, and Performance Measurement (Mentzer *et al.*, 1999), taking into considerations that these four dimensions are inextricably intertwined. These dimensions can also be used in identifying the gaps in forecasting practices in the real world.

### 2.9.1 Functional Integration

The functional integration includes the 3 Cs, which incorporate *Communication, Coordination,* and *Collaboration* between departments. As shown in Figure (2.8) page (46) by Fildes (2010), the communication (formal or informal) between the different functional business areas increases the level of integration. As mentioned earlier, each department has its own use of forecasts. Formal meetings and structured arrangements will increase the collaboration and setting of final goals through interactive actions between different departments. Figure (2.16) explains the functional integration stages and the link between these stages, as it starts from the sharing the knowledge of people within the same organisation. Marketing people want the annual forecasts, whereas salespeople are more interested in the quarterly forecasts per territory or geographical location. Finance people are more interested in the value of the forecasts annually, production are tied to the production cycle per Stock Keeping Unit (SKU), and logistics are more interested in the location (SKUL) and replenishment cycle (Mentzer and Moon, 2005). This is considered as the first stage of the functional integration, which is characterised by low forecasting accuracy. The second stage of functional integration is the coordination between departments to set the *"consensus forecasts"* that are needed for the users of forecasts in different areas, such as in marketing, sales, finance and logistics. Because of the nature of operations, there is a lack of common-goal setting between the operations, marketing, or finance. The third stage of functional integration is to reach true consensus forecasting through effective negotiation in order to reach a stage of commitment between the users of the forecasts that leads to achieving final forecasting or "forecasting champion". The last stage is to make sure that the system provides all the required information and data needed to deliver more accurate forecasts. The final forecast is related to the performance, and a more accurate forecast is rewarding on a divisional and corporate level. The functional integration will bridge the gaps

among different departmental functions to provide improved sales forecasts at all levels (Mentzer *et al.*, 1999).

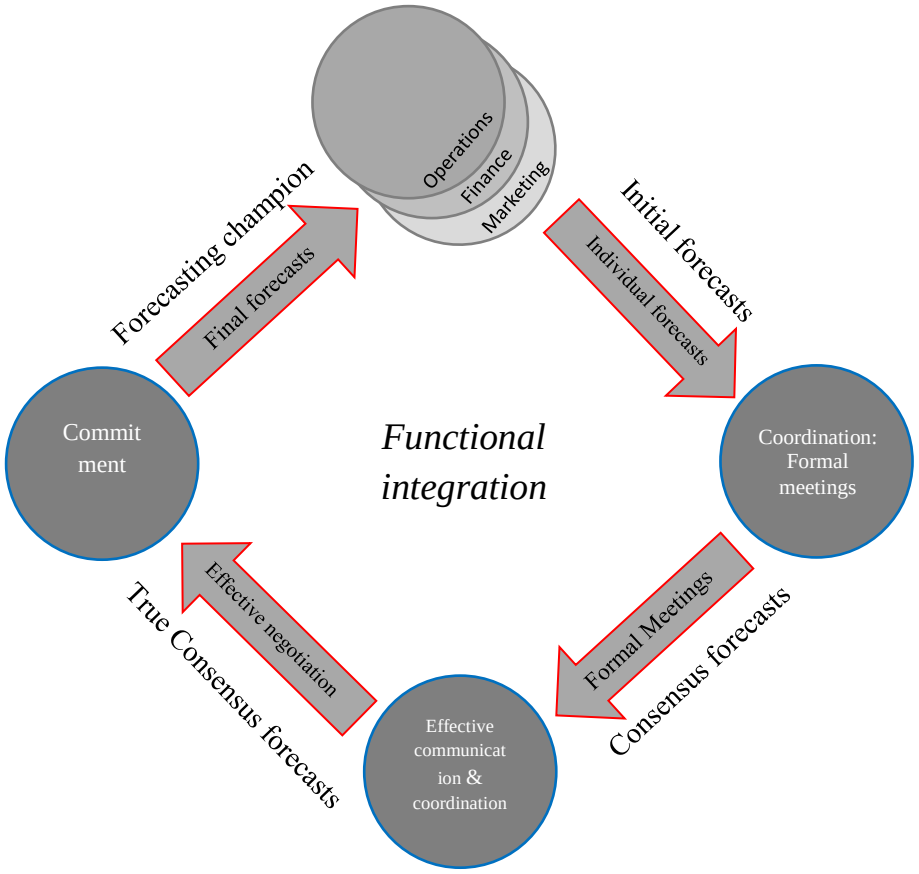



**Figure 2.16: Functional integration (Mentzer *et al.*, 1999; Mentzer and Moon, 2005).**

### 2.9.2 Forecasting Approach

The forecasting approach is related to what and how to forecast. The forecasting approach can be carried out in a four-stage approach (Mentzer and Moon, 2005). These four stages are shown in Figure (2.16) and include bottom-up forecasts, top-down forecasts, reconciliation of forecasts from the first two stages, and segment forecasts. According to the figure, stage one, the top-down forecasts, is the plan-driven forecasts which involves the corporate objective to profit plan without recognition of the effects of the economic situation and efforts from the marketing department. This stage is characterised by being very naive and subjective; it is referred to as the "*black box approach*" as people who work on forecasts

here do not receive trainings on forecasting techniques nor on how to understand the company's environment, and have little or no documentation available on the forecasting process. These bottom-up forecasts, which result from stage one, are based on SKUL up to corporate forecasts. At stage two, companies consider the bottom-up forecasts in order to improve the results of stage one in the forecasting approach. Moreover, stage two it is important to consider the interrelationships between forecasting and planning in order to respond to stage one in the forecasting approach. In stage three, the company brings together the results of the first two stages to reach reconciliation of forecasts.

At the third stage of forecasting, the relationship between the profitability and forecasts can be analysed through the ABC analysis, which is used in inventory control. Here, "*category A*" products are highly profitable, "*category B*" products have moderate profitability, and "*Category C*" products have marginal profitability. Such analysis should help companies in linking the forecasts with the profitability in practice. In the fourth and last stage, both the top-down and bottom-up forecasting stages become more interdependent rather than independent, and consider the segmentation factors between customers and locations. At this stage, the inventory should consider the shelf-life of products, the seasonal demand, the value of the products, production and raw materials lead time.

Figure (2.17) shows these four stages of the forecasting approach. To improve the forecasting approach then *"companies should first and foremost, understand and reconcile their top-down and bottom-up forecasting processes. This means understanding the interaction between the business plan and the forecasts, in other words, using forecasting to facilitate business planning. To promote such understanding and improvement, support from top management is essential"* (Mentzer *et al.*, 1999:53).

In business environments, there what is referred to as *"game playing"* between people conducting the forecasts, like, for example, distributors who will consider the over forecast to make greater produced quantities for their use, and the salespeople who will under forecast to obtain lower sales quotas. Training will support people to justify their forecasts based on statistics; however, the forecasts can be modified judgementally to increase their accuracy.

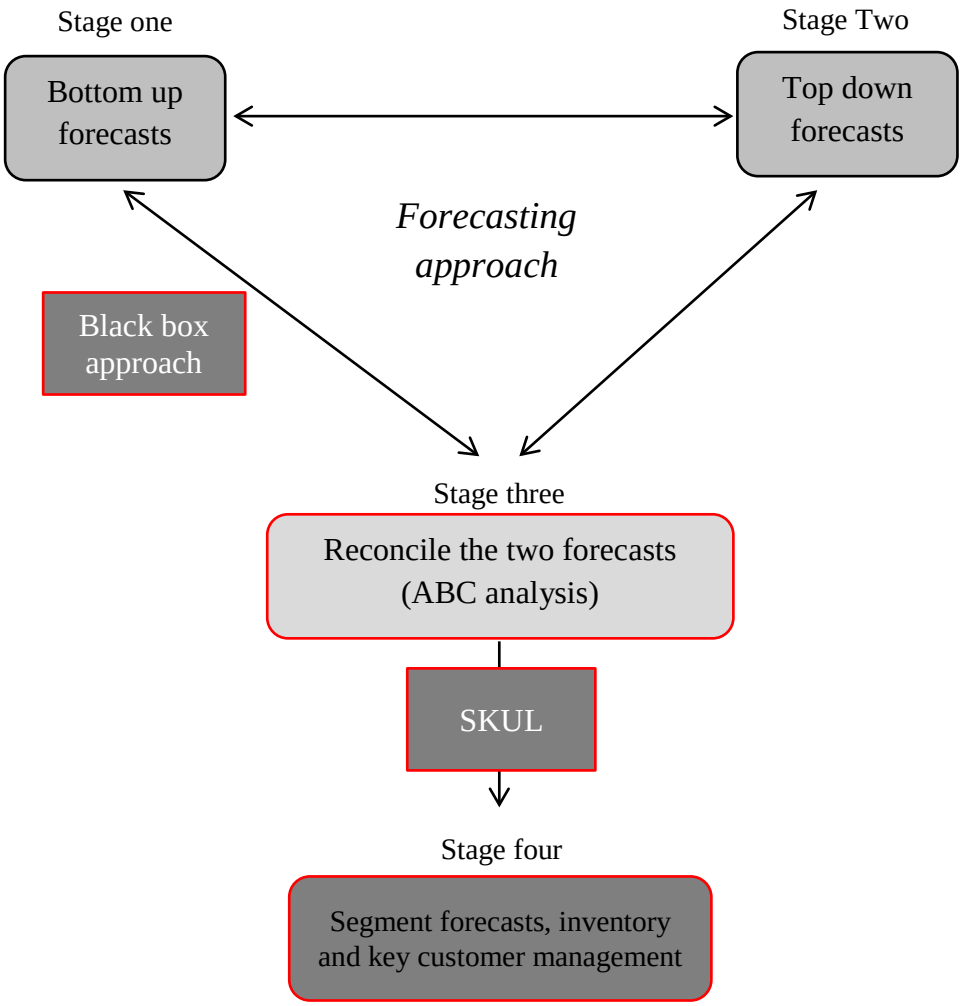



**Figure 2.17: Stages of the forecasting approach (Mentzer *et al.*, 1999).**

### 2.9.3 Forecasting Systems

The forecasting system is the process of setting the forecasts based on systems in developing the forecasts. Forecasting system can be set in two stages. The first stage of the forecasting system begins with each department having its own set of information that are not interconnected; such data is referred to as *"islands of analysis"*, and can be used in Management Information Systems (MIS). The second stage involves establishing the electronic links between the functional areas. The electronic data can be kept in the data warehouse to be exposed to all users of forecasts in order to improve the user interfaces. Thus, this is expected to enhance the effectiveness of forecasting system because everybody is exposed to the data in the forecasting process, which is important to develop common ownership of forecasting databases and information systems. This exposure of data will

allow inventory to benefit from the *Point of Sales* (POS) information in the formulation of demand forecasts (Mentzer and Moon, 2005).

### 2.9.4 Forecasting Performance Measurement

Because the forecasts accuracy is not related to the system or level of understanding of the process of forecasting, the accuracy of the developed forecast is not usually tested. At this stage, the company will incorporate the external factors, such as competitive activities and economic factors, to measure the effectiveness of the forecasts. The accuracy of the error will have an impact on marketing and supply chain activities. The forecasting errors should be investigated in order to decrease the future errors in the forecasting process. For example, Mentzer *et al.* (1999) found that forecasting errors are initiated because of the lack of communication between functional areas, taking into considerations that errors in forecasts have nothing to do with the forecasting techniques.

## 2.10 The Inter-departmental Conflicts and Organisational Culture

> *"Interdepartmental conflict in business enterprises remains a field in which there is a vast amount of research to be done" (*Bloch, 1988:11).

Interdepartmental conflicts have grown to become an area of growing importance in the past years, especially that the global competitiveness of organisations can be seriously threatened when such conflicts cannot be controlled (Mukhopadhyay and Gupta, 1998). Yet, there is still insufficient research into this issue (Mukhopadhyay and Gupta, 1998), especially in the field of marketing (Menon *et al*., 1996; Song *et al*., 2000).

Interdepartmental conflicts in this research refer to conflicts in inter-organisational relationships and generally investigate where the centre of power lies in distribution channels (Etgar, 1976; Gaski, 1984). Such research looks into identifying the factors that lead to conflicts and how they can be overcome (Frazier and Rody, 1991). Accordingly, conflict in the current research can be defined in accordance with Harris *et al.* (2008) who saw conflict to be *"conceptualised largely as negative and dysfunctional activity which must be avoided or minimised. Such narrow conceptualisations fail to incorporate the full range of consequences that are commonly acknowledged in the organisational behaviour literature from which the concept was borrowed"* (p:455).

According to Menon *et al*. (1996), the inter-departmental conflicts result from the dynamic interactions of interdependent colleagues who are involved in the constructive exchange of values, ideas and beliefs, which might be connected to the innovation within organisations (Eisenhardt and Bourgeois, 1988).

In forecasting and decision making, the conflicts in interdepartmental communication are linked to the process of decision-making (Harris *et al.*, 2008). The organisational settings that consider participation among the involved parties in decision-making will increase the satisfaction and motivation at both the individual and group levels (Latham *et al.*, 1994; Witt *et al*., 2000). This was also supported by Song *et al*. (2000) who argued that such participation involving the concerned parties will make resolution of conflicts easier, and also by and Dyer and Song (1997) who added that this participation will urge participants to discuss any debatable issues more openly in such ways that are likely to support finding solutions, thus, enhancing the quality of decisions and reducing the unhelpful political behaviours that ruin the application of marketing decisions (Harris *et al.*, 2008). According to Lancaster and Van Der Velden (2004) the inter-departmental conflict can affect the ability of organisations to become more market oriented and adapt changes in the market. The organisational culture contributes to these conflicts depending on the type of that culture that was which can be bureaucratic, innovative or supportive according to the classification by Litwin and Stringer (1968). The classical organisational culture is divided into three types; bureaucratic; innovative; and supportive (Litwin and Stringer, 1968; Wallach, 1983).

The bureaucratic organisational culture is a culture that is characterized by dominance of power and a high level of formalisation; this culture lacks flexibility, and clearly differentiates the roles and defines the relationships of subordinate. Organisations with bureaucratic cultures have organised functions of departments, and allow minimum communication of the lower-level employees of departments; rather, vertical communication channels are available to support interaction between departments (McClure, 2010).

The innovative organisational culture is usually results orientated, and organisations play the role of family in which all agree to achieve mutual commitments. It is opposite to bureaucratic organisational culture, as the innovative and supportive organisational culture is characterised with the warm relationship to become more achievement and results oriented. The innovative culture open the way for employees to participate in decisions and create

more innovative environment to excel (McClure, 2010). Table (2.4) provides the Characteristics of corporate culture typologies that were developed by Akaah (1993:60) (cited in McClure (2010:515). The interdepartmental conflicts can be minimised or decreased when link the degree of market orientation to the organisational culture. Carr and Lopez (2007) believed that mixing the market orientation and the organisational culture depends on both individuals' behaviour and culture, whereas, Farley *et al*. (2008) believe that market orientation and the organisational culture are separate from each other. Earlier Deshpandé and Webster (1989) found that market orientation and the organisational culture overlap, whereas Harris and Ogbonna (1999) said that market orientation is a set of behaviours by individuals that are driven by, or coexist with, various organisational types.

| Bureaucratic | Innovative | Supportive |
|---|---|---|
| Hierarchical | Risk taking | Collaborative |
| Procedural | Results-oriented | Relationship-oriented |
| Structured | Creative | Encouraging |
| Ordered | Pressurized | Sociable |
| Regulated | Stimulating | Personal freedom |
| Established/solid | Challenging | Equitable |
| Cautions | Enterprising | Safe |
| Power-oriented | Driving | Trusting |

**Table 2.4: Characteristics of corporate culture typologies (Akaah, 1993:60)**

## 2.11 Chapter Summary

Forecasting and its management are critical tasks in organisations due to the impact of forecasts on different level. Many researchers looked into forecasting in order to improve its accuracy (Wright *et al*., 1986). This chapter provided a collection of previous researchers' views about the forecasting process, its relationship with the decision making process and planning, in addition to presenting types of forecasting, judgemental effect on forecasts and its management. Moreover, the forecasting software, the managerial impact on forecasting and forecasting accuracy were also discussed in this chapter. The forecasting accuracy is hard to achieve, but it is of great importance since it has an effect on the performance of the operation's department, in addition to its effect on the marketing, sales and finance

departments' performance. Thus, all those who create forecasts and those who make use of them can a vital role in organisational success (Smith and Mentzer, 2010).

Many authors discussed the forecasting techniques and whether it is simple or sophisticated to improve the forecasts accuracy, where it has been established in several studies that the more sophisticated methods might increase the forecasts accuracy (Mentzer and Cox, 1984; Armstrong, 2001). Other scholars such as Mentzer and Bienstock (1998), Moon and Mentzer (1998), Mentzer *et al*. (1999), Chase (1999), Winklehofer and Diamantopoulos (2002) and Chaman (1999; 2001; 2004) argued about other areas to improve the forecasting process like setting a clear definition of the forecasting process, inter-functional integration, and information management and its impact on the forecasting accuracy. Some authors, on the other hand, focused on the organisational behaviour and the process of judgemental integration in the forecasting process (Cerullo and Avila, 1975; Dalrymple, 1987; Mady, 2000; McCarthy *et al*., 2006; Zotteri and Kalchschmidt, 2007).

Forecasting accuracy was the main objectives for many researchers and practitioners, who have been using and developing sophisticated quantitative approaches that aim to reduce the forecasting errors (Armstrong 2001), however, some researchers, like Mentzer and Cox (1984), Lawrence *et al*. (2000) and Sanders and Manrodt (1994), disagreed with these approaches and provided evidences that complex quantitative techniques do not decrease the forecasting errors when compared to the simple quantitative approaches.

In some cases, and for various reasons, judgments are used to adjust the quantitative forecasts to create the final forecasts. The main reason for applying adjustments is due to the belief that some critical information can't be incorporated in the forecasts, or the forecasters may not agree with obtained quantitative forecasts. This is called *"voluntary integration of statistical forecasts and managerial judgments"* (Goodwin, 2002:128). Blatiberg and Hoch (1990) mentioned the "*mechanical integration"* which combines the quantitative forecasts with judgments, and takes a simple average between the two results (Blatiberg and Hoch, 1990). A series of studies on actual company data were done by Mathews and Diamantopoulos (1990, 1989; 1992) which conclude that judgmental adjustments to statistical forecasts will improve the accuracy of forecasts.

The accuracy of the forecast is a quality that most people desire (Nash and Nash, 2001). Forecasts accuracy and forecasting errors are affected by the changes in the market that have become very rapid due to several factors such as global competition, faster product development and increasingly fixable manufacturing systems, all of which are contributing to the entrance of an unpredicted number and options of new products to compete with the available ones (Fisher *et al.,* 1994). Accurate response is a new term in business by which the company can reduce the cost and the impact of the inaccurate forecasts by changing the forecasts and simultaneously redesigning new plans. Accurate response is very important to implement in the case of new products, highly seasonal, or have a short lifetime (Fisher *et al.,* 1994). The new forecasting software allows the users to forecast the future targets, however, the majority of the users are not experts in forecasting techniques, which leaves the managers with final forecasts without statistical justifications (Sanders and Manrodt, 2003).

This research will investigate the forecasting process and the organisational factors that affect the forecasting management in international pharmaceutical companies. The research also aims to provide assessment criteria to be used in order to evaluate the forecasting process. The next chapter will provide details about the different forecasting methods that are used in academic literature and practice

# CHAPTER THREE

# FORECASTING METHODS

> *"…the central issue facing the typical business enterprise is not whether to forecast but rather how to forecast"* (Turner, 1974:7).

This chapter aims to provide an introduction into the forecasting methods that are widely used in academia and practice. Understanding the forecasting methods will help managers to choose the right method, with the right data. Statistical forecasting is used to predict the future. Mathematical statistics usually consider the use of two major concepts; conventional and Bayesian however, Bayesian methods offer a comprehensive paradigm for both statistical and decision making forecasts in cases of uncertainty (Bernardo, 2003).

This chapter is divided into three major parts; data use in forecasting, the conventional methods of forecasting and the Bayesian theory as shown in Figure (3.1) the chapter map.

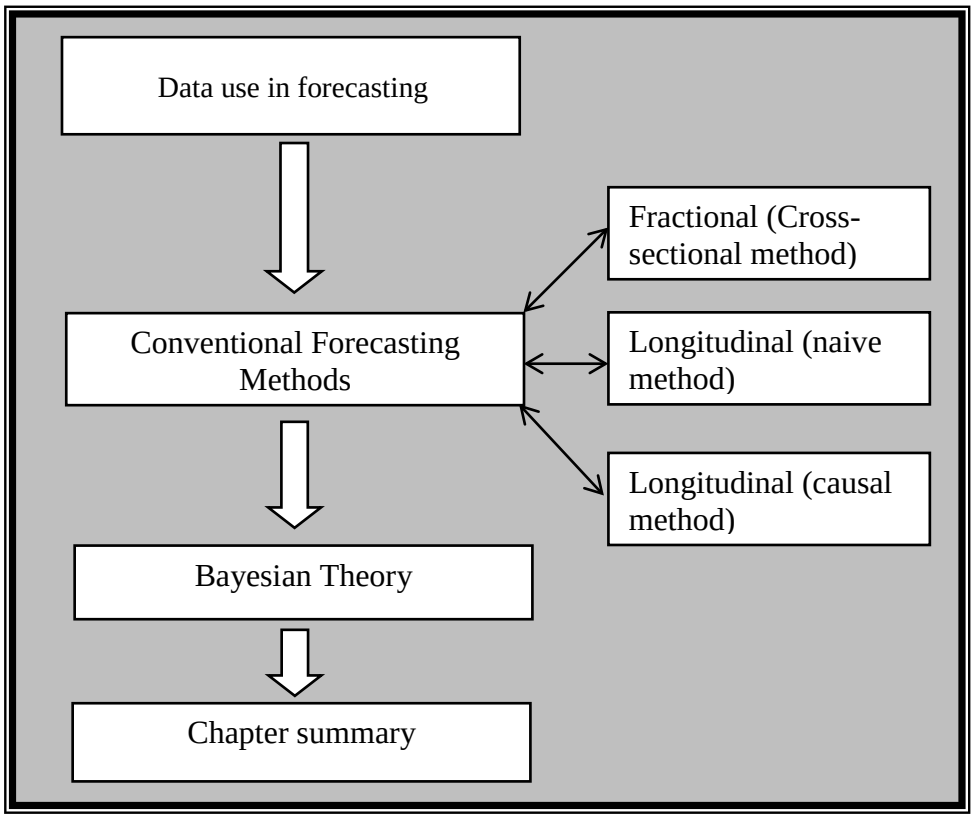



**Figure 3.1: Chapter Map – Chapter three: forecasting methods**

### 3.1 Data Use in Forecasting

Before the reader moves into the forecasting methods, the data is considered as an essential part in forecasting because these data will be processed in certain directions. Data can be divided in two types including internal data which are records of past sales history, production, marketing activity and others, and external data such as government and trade associations' data, competitors' data, suppliers' data and others. The first step in processing data involves collection of both the internal and external data, which is followed by the second step of data reduction. In the second step, the data chosen is that which fulfils the three Rs criteria including *Relevance* which means that the data selected should include the most directly relevant information available, *Reliability* which considers the reliability of the source from which the data were obtained and the level of data dependability, and *Recency* which means the data selected should cover the latest information available.

Then the data will be processed to find a way of analysis of the available data in order to apply the mathematical or statistical method of forecasting. After examining the data, certain forecasting equations can be used to describe the data to construct a mathematical or statistical method (Gilchrist, 1976).

In general, there are two main forecasting methods. The first type is the Conventional Forecasting Methods, which can be conducted by applying the longitudinal or cross-sectional methods according to the classification of Barnett (1988). The second type is the Non-Conventional Forecasting Methods, referred to as the Bayesian Methods, which offer a comprehensive paradigm for both statistical methods and decision making process in cases of uncertainty (Bernardo, 2003). Both, the Conventional forecasting methods and the Bayesian methods will be explained in detail in the following sections (3.2) and (3.3), respectively.

### 3.2 Conventional Forecasting Methods

Authors classified the forecasting procedures based on the forecasting objectives. The length of forecast also contributes as a selection factor whether the forecasts are needed for long-term or short-term decision making. Utilizing forecasts differs between different managers and departments; for example the top management is interested in forecasting the total sales of the entire company (Macro-forecast), while at the level of human resource, they might be

interested in the number of workers to be employed within the coming period of time (Micro-forecast).

As mentioned earlier in chapter two; the conventional Forecasts can be produced based on quantitative or qualitative methods; qualitative or judgmental forecasting requires no clear handling of data, however, quantitative forecasting deals with figures and historical data (Hanke *et al.*, 2001).

From another point of view Waddell and Shoal (1994) see that the conventional methods of forecasting can be divided into two types including informal and formal methods. Informal methods are conducted when there is a shortage in data or a time limitation, and usually these methods are conducted depending on individual experience and abilities and basically lead to predicting the future rather than forecasting it. However, forecasters use the formal methods of forecasting more often; these are divided into both qualitative and quantitative methods. Qualitative Method depend on professionals' judgements and experience, and are useful when data are undependable or limited, whereas Quantitative Methods are those mathematical models by which data can be used, analysed and manipulated to fit in the formulas to predict the future results. Those quantitative methods also include two methods including Auto projection (time series) and causal methods (Waddell and Shoal, 1994).

Nevertheless, it is important to point out here that upon review of the relevant literature, it appeared that, despite the availability of these types of forecasting approaches mentioned earlier, other classifications of forecasting approaches can be found by different authors. For example, as shown in Figure (3.2) page (79), Barnett (1988) divided the forecasting methods into longitudinal and cross-sectional methods. Such classification is based on the objectives of forecasting.

The figure shows that the cross-sectional method is applied through fractional analysis to estimate the total current market demand by answering the question of "*what is there?*" by applying the market build-up, the chain rations and the market factor index methods, which will be described in Sub-Section (3.2.1). In the longitudinal method, on the other hand, the past sales and other items are analysed and used to predict the future; this approach can be carried out through the naive approach by answering the question of *what happened?*, or through the causal approach by answering the question of *what happened when?*. These two

forecasting methods according to Barnett (1988) are explained in more detail in Sections 3.2.1 and 3.2.2. From another perspective, Armstrong (2001) divided the forecasting methods depending on the type of forecasting done into judgemental and statistical forecasting; this is shown in Figure (3.3) page (80), which shows that it starts from the source of knowledge is the main factor in choosing the forecasting methods, and it contribute in whether to choose the judgmental or statistical direction. The dotted arrows are the link between the judgment and statistics in the forecasting method.

Consequently, and based on the differences in presenting a classification of the available forecasting methods, this research will adopt Barnett (1988) classification of conventional forecasting methods, and these will be explained in detail next in Sub-Sections 3.2.1, 3.2.2 and 3.2.3.

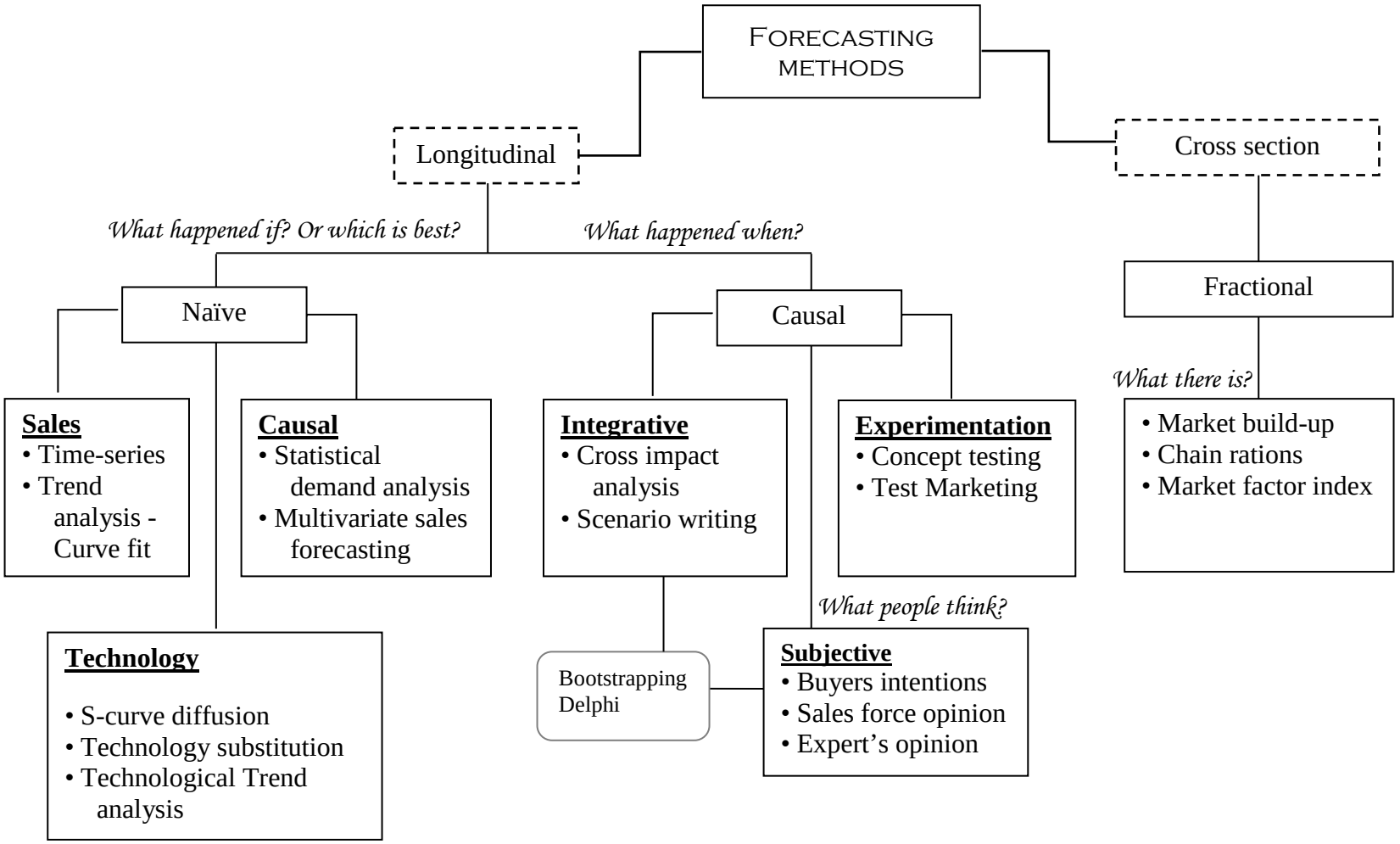



**Figure 3.2: the forecasting methods according to Barnett (1988).**

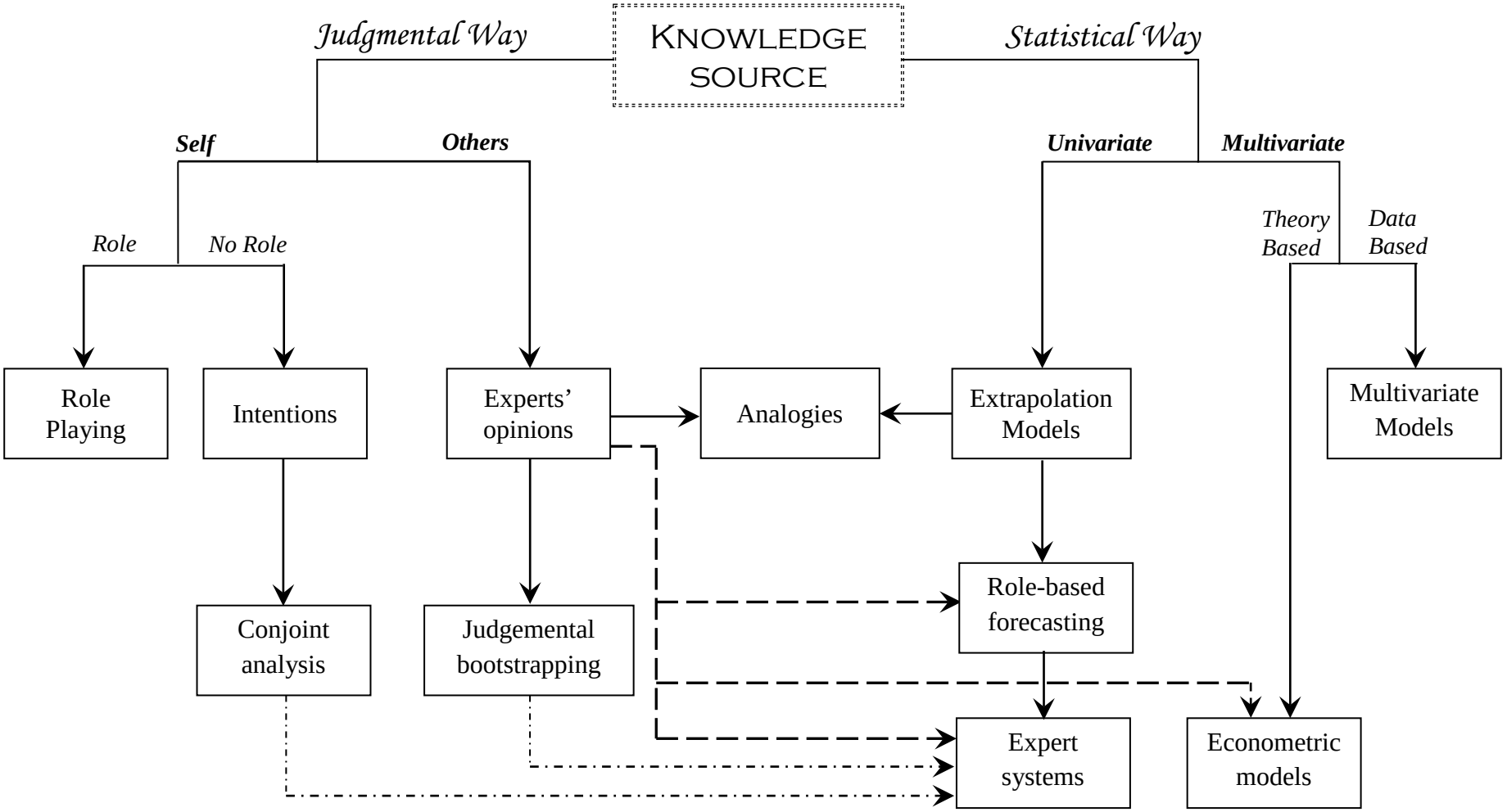



**Figure 3.3: Forecasting methods as seen by Armstrong (2001).**

### 3.2.1 Fractional (Cross-sectional method)

This method in this section is used to estimate the total current market demand, which answers the question of "*what is there?*" (Barnett, 1988). Three methods can be applied in this cross-sectional method including the market build-up method, the chain rations method and the market factor index method, which are explained next.

The *Market build-up method* identifies the potential buyers in each market and estimates their potential purchases. A common way to estimate the total market demand is as follows:

$$Q = n * q * p$$

| | | |
|---|---|---|
| *Q* | ➔ | Total market demand. |
| *n* | ➔ | Number of buyers in the market |
| *q* | ➔ | Quantity purchased by an average buyer per year |
| *P* | ➔ | Price of an average unit |

This equation calculates the present situation not the future one, but in order to calculate future forecasts, forecasters need to estimate the future number of buyers, quantity purchased and prices. Fortunately, these three components are easier to forecast (Barnett, 1988).

The *Chain ratios method* is a multiplication of the base number by the chain of adjusting percentages. This method depends on the percentages that we can have through conducting marketing research studies to evaluate the market potential, in order to set the sales target and prepare the action plans.

$$Q = n * p * w$$

| | | |
|---|---|---|
| *Q* | ➔ | Total estimated market |
| *n* | ➔ | Number of potential targets depending on the age and gender. |
| *P* | ➔ | Percentage of people eligible and / or able and / or qualified to buy |
| *W* | ➔ | Percentage of people willing or showing interest to buy |

The $w$ in the equation might be obtained by the subjective input and/or through conducting a marketing research by which we can consider this number (Barnett, 1988).

The *Market –factor index method*, on the other hand, estimates the market potential in a certain area for consumer goods in order to calculate the market share in a specific area and accordingly calculate the company's potential performance.

The second conventional forecasting method according to Barnett (1988) is the Longitudinal Method, which could take place through two main approaches; these include the Naïve Method, which will be explained next in Section 3.2.2, and the Causal Method, which will be explained in section 3.2.2.

### 3.2.2 Longitudinal (Naive Method)

In this method, the past sales and other items are analysed and used to predict the future. This method usually answers the question *what happened if?* Or *which is best?*. This method is mechanistic, where there is a little room for managerial interventions that could lead to bias of results. During the past 20 years, numerous models have been developed to make better marketing decisions, design sales territories and call plans, select outlets sites for retail businesses, develop advertising mixes and forecasting new product sales (Barnett, 1988; Armstrong, 2001).

According to Barnet (1988), three sub-categories of analysis fall under the Naive Longitudinal Method of forecasting including the Sales, Causal and Technology sub-categories. The Sales sub-category includes the Time Series analysis and Trend analysis – Curve fit. The Technology sub-category includes the S-curve diffusion analysis, the Technology Substitution analysis and the Trend analysis. The Causal sub-category, on the other hand, includes the Multivariate Statistical analysis, which could take place through Statistical Demand analysis or Multivariate Sales Forecasting analysis. Each of the types of analyses included under the three sub-categories of forecasting of Naive Longitudinal forecasting are explained in more detail next.

In the *Time-series analysis*, many firms base the future forecasts on past results, and it is believed that the statistical analysis can uncover the reasons of the past sales. Analysts will use the causal relations to predict the future sales (Barnett, 1988).

Time-series analysis has four components, which are *Trend*, *Cycle*, *Seasonality* and *Erratic Component*. These components are recombined to produce the sales forecasts. *Trend*, which is the long-term, and is dependent on past results of sales, whether those represent growth or

decline that is resulting from basic changes in population, capital formation and technology. *Cycle*, is usually medium-term, and is shaped like a wave movement of sales resulting from changes in general economic and competitive activity. Cycles are usually difficult to predict because they do not occur on a regular basis. *Seasonality* refers to a consistent pattern of sales within year/s. It is related to certain times of the month or year due to different factors such as weather factors, holidays and trade customs. *Erratic events* that include uncontrollable and unpredicted issues such as strikes, earthquakes, fires wars and others should be removed from the past data, and predictions of the normal sales behaviour should be done without considering these erratic events (Barnett 1988; Armstrong 2001). For example, the Iceland volcano ash cloud caused the biggest flight disruption since the terrorist action on 9/11, this event disabled the flights around the world, however, this event was ignored in the following year forecasts. Generally speaking, time series analysis treats past and future sales as a function of time but not as a function of a real demand factor.

The *Trend analysis – Curve fitting*, is the most widely used method in management because it is popular, quick, easy to use and provides statistically reliable results. In this approach, forecasters use the historical time-series data to project the future. So many equations can be created here like Quadratic Equation Forecast, Straight Line Equation Forecast, Log Quadratic Forecast, Exponential Forecast and Modified Hyperbola as shown in Figure (3.4).

This forecasting technique has the limitation of providing unrealistic forecasting results, which would make the forecasters use more complicated equations to come up with accurate and justifiable forecast based on scientific equations.

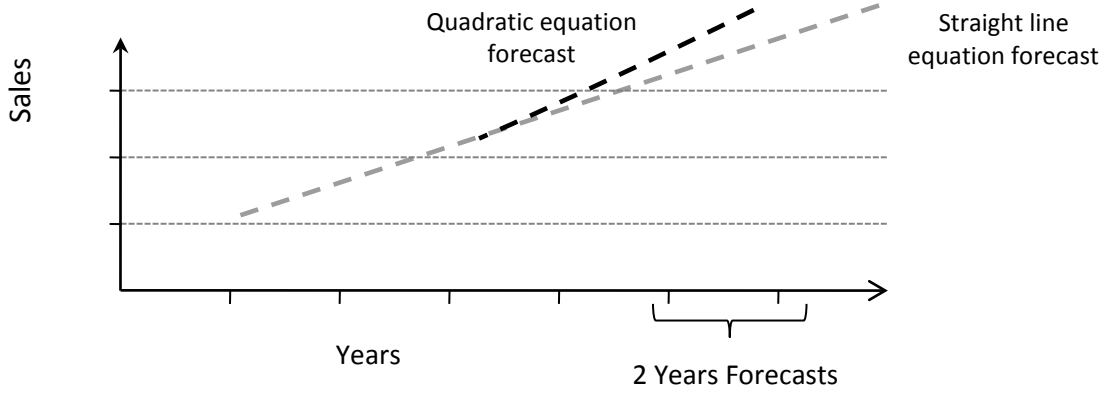



**Figure 3.4: Time-series analysis (Barnett 1988).**

*The S curve diffusion*

The S curve is the S shaped time series suited to time-series analysis. It uses the curves that would give an idea about the saturation or the upper limit beyond which performance or sales could never go. Gompertz curve which is S shaped and shows saturation level is expressed in the following equation and in Figure (3.5).

$$F_T = a_0 \ X \ a_1^{(a2)^T}$$

| | |
|---|---|
| $a_0$ | The saturation level (*usually assumed*) |
| $a_1$ & $a_2$ | Parameters to be estimated |
| $F_T$ | Forecast at T time |

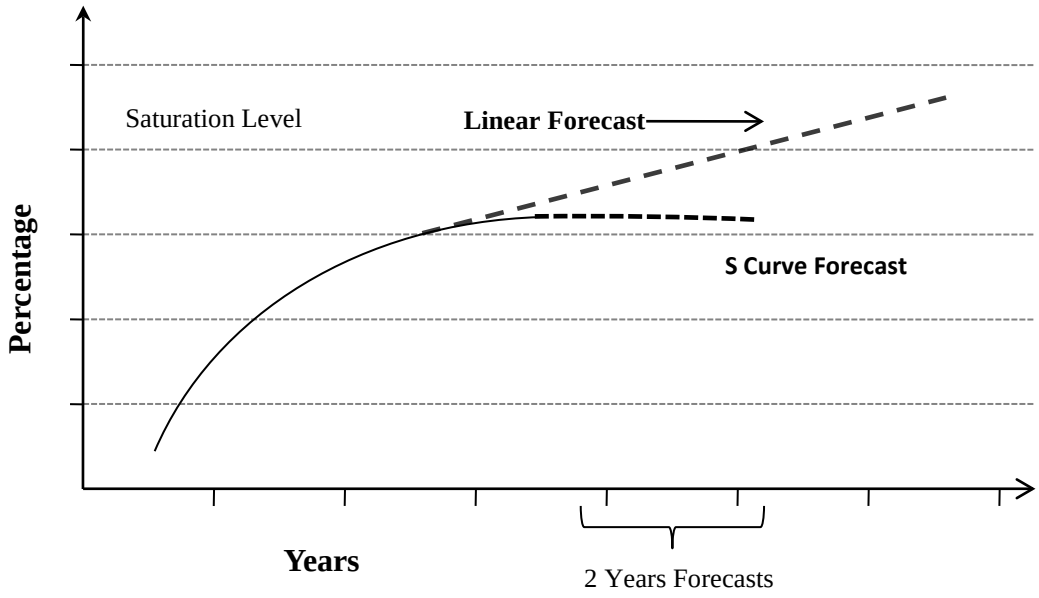



**Figure 3.5: S shaped time series suited to time-series analysis (Barnett 1988).**

The S curve represents the number of buyers in the market who are willing to buy the product, and, accordingly, the S curve can explain the diffusion of innovation. Using the product life cycle might be misleading because the product life cycle tracks sales that include repeated purchases as well as first-time users to represent the total market demand.

Bass (1969) produced a product growth model for consumer durables, which he named as the *Bass Diffusion Model*; this model is based on 2 aspects including the rate of imitative behaviour (p) and rate of innovative behaviour (r). Unlike the time series, the diffusion equations are helpful in identifying the consumer behaviour to be used in conventional trend

analysis. It is far more complicated than it looks, but the resulting equations are robust and can produce reliable forecasts.

*Technology substitution*

It is used in the case of diffusion of innovation in the existence of a new technology to replace the old one. Substitution can be forecasted in the same way as the conventional diffusion process by highly efficient methods devised by Fisher and Pry (1971).

The Fisher-Pry method is a very simple way of looking at a very complex process. This method shares the properties of the trend analysis methods as it observes the aggregate effect of all past influences and assumes that they will produce the same pattern of substitution in the future, as they did in the past. Sometimes, one of the major influences might undergo a major change that might affect the rate of substitution. In Technology Trend Analysis, the analysis of technological changes is calculated rather than the changes in sales. The companies need to identify the leading indicators in order to forecast the sales. The leading indicator is a time-series that changes in the same direction, but ahead of the company's sales. For example, the leading indicator of birth rate and life expectancy, which could show huge shifts in markets in the next millennium.

*Multivariate statistical analysis*

This type of forecasting is based on real factors that affect the future sales. It could be *Statistical Demand Analysis* and *Multivariate Sales Forecasting*. Statistical Demand Analysis is a statistical procedure that is used to discover the critical factors affecting sales. These factors include prices, income, population and promotion. Using the multiple-regression analysis, different equations can be built-in to obtain the best predicting factors and equations. Marketers should predict the next year's changes in the factors such as predict the change in per capita income, the prices and the population. Statistical demand analysis could be very complex; the marketer should be careful in the designing process and the method of analysis. Multivariate Sales Forecasting, on the other hand, requires more information to be analysed in addition to advanced statistical analysis to explain the relationship between a set of data and their statistical reliability. It will help to answer the marketing questions about the chief variable, price elasticity, suitable advertisement activities and expenditures and the target segments (Armstrong, 2001).

### 3.2.3 Longitudinal (Causal Method)

This method answers the questions of *what happened when?* and *what people will think about?* The first question of *what happened when?* could be answered through the *Experimentation* or *Integrative* methods, whereas the second question of *what people think*? Could be answered through the subjective approach. This sub-section will explain the three sub-types of Experimentation, Integrative and Subjective methods next.

The first type of the Causal Longitudinal Methods is the Experimentation Method. This method is very useful in the case of forecasting new product sales or establishing product sales in a new distribution channel. It could be done by using quick and inexpensive *Concept Testing* to highly complicated and expensive *Test Markets*, which tests the whole marketing mix in a geographical region. *Concept testing* is used to estimate the potential buyers and evaluate the buying intensions based on the product description, features and advantages. This would give an idea about the market potentiality and the projected sales; however, it might be misleading because the buying intentions are not static and would change over the time. Concept Testing provides the opportunity to get the feedback from the customers that would refine the concept and suggest ideas. *Test Market*, on the other hand, is a technique that is very effective to forecast the performance of Fast Moving Consumer Goods (FMCG) and retail business. Test market can be applied in different forms including pre-test market, Mini-test market, Full-test market, Product-use tests, Trade shows and Distributor and dealer display rooms (Armstrong, 2001), which are explained in the next paragraphs.

In the *Pre-test market* form, companies can test the new product in a simulated shopping environment, and let the consumer choose from the shelf. The marketers will then study the behaviour and the choosing criteria upon which the consumers based their purchase decision for the specific type of product, and the researchers will ask the consumers about the reasons for their purchase and non-purchase; this could be done through telephone interviews for example, where consumers are asked to determine the product attributes and usage, and asked about their extent of satisfaction with the product and their repurchasing intentions. The data will be used through complicated computer programs to project the national sales from the result of simulated market. The pre-test market costs less than the other types of test markets, provides faster results, and, at the same time, does not expose the new products to competitors. Many marketers do not think that pre-test markets are as accurate or reliable as

larger real world tests, but still, these tests will provide an indication about the future of the product (Urban and Katz, 1983).

In the *Mini-test market or controlled test-market* form, the research is based on the testing of the new products at certain stores and geographical locations. The marketers test each variable that affects the product purchase intentions, such as the amount of shelf space, displays and points-of-purchase (POP). Sales results will determine the impact of these factors. This would give the opportunity to track the product sales store-by-store, and it could provide information about the repeated sales. This test usually lasts for a maximum of six months, but the main problem with it is that the selected stores might not represent the total market, and it will expose the product to competitors, thus, allowing them the opportunity to prepare counteracting marketing and promotional plans.

The *Full test market* form, on the other hand, is testing the consumption of the products under similar conditions that would be available in a full-scale launch. This test involves putting the product on shelves with a full advertising and promotional campaign in markets over long periods of time, which could exceed one year. The product is placed in certain stores to test the market and the consumption in order to calculate the national sales and profits, to discover the market potential and find out the product's problems before official launching, which will allow for amending the marketing programme as appropriate. The disadvantages of this form of testing are that it takes longer time to complete, it is very costly and it will give the competitors the opportunity to see the product and counteract. At the same time, this test might offer competitors the opportunity to interfere with the results because they might cut their prices and increase their promotion or buying up of the new products.

In the *Product-use tests* form, the manufacturer selects a number of customers who agree to use the new products for a limited time. These customers are then observed to learn about their training and servicing needs, as well as inquire about their experience in using this new product when compared to the existing products in order to evaluate their level of satisfaction and future purchase intentions.

*Trade shows* is to show to draw the potential buyers who view products in a few concentrated days. The manufacture sees how customers react to the new product and evaluate the level of interest and purchase intentions and this is very familiar in car industry.

*Distributor and dealer display rooms*: the company may build a display room that include new products and competitors' product and put the customers in the normal selling atmosphere of the product to examine the purchasing behaviour.

The second type of Causal Longitudinal methods is the Subjective methods. This method basically means subjective input from buyers, sales force and experts. It can be applied through the Buyer Intentions analysis, Sales Force opinions analysis and Experts' Opinions analysis, which are explained next. The *Buyer intentions (or Surveys and Interviews) analysis* involves the application of surveys that are usually conducted by research organisations whereby the potential buyers can be interviewed. Each country nation has it is own estimation of intentions, for example, the Japanese tend to make fewer overstatements than the Chinese.

*Sales force opinions* are usually done by asking the sales team about the estimated sales per product per customer in their territories, and this will lead to an estimate of the national sales forecasts. Salespeople might benefit the forecasting because they are in direct contact with the customers, and they may have better insights into developing trends. Nevertheless, salespeople may vary in their way of forecasting because they might be pessimistic or optimistic, or they may go to one extreme rather than the other. Salespeople are often unaware of larger economic developments, and might be unaware of the company's marketing plans that will affect the future achievements. Participation of salespeople in the sales forecast would increase their level of commitments and confidence, and enhance the process of 'grassroots' forecasting that is broken down by product, territory, customer and salesperson. *Dealer opinions analysis* are used in short-term forecasting, and quite commonly applied by motor vehicle companies. Role-playing is a process in which forecasters involve salespeople and dealers to make different scenarios aimed to improve the forecasting accuracy. In *Expert opinions analysis* on the other hand, companies can seek the opinions of experts such as distributors, suppliers, marketing consultants and trade associations to gain good insights, however, the opinions they get might still be widely wrong. For example, in 1943, IBM's chairman, Thomas Watson, predicted that *"the world market for five computers'"* which means that the total global demand for computer will be five.

Based on the Expert opinions analysis that falls under the Subjective forecasting methods, the *Delphi method* was introduced. This is originally an old method that was used by a

psychologist named Oracle, who used a group of mentally disabled patients to find their attitude about certain future events. The Delphi method is based on the assumption that group judgments are more valid than individual judgments when using the experts' opinions to predict the future. This method could be done by utilising one of three approaches. In the first approach, expert opinions are sought through *group discussions*, which might lead to be bias of results due to contradicting opinions. In the second approach, the company will seek the experts' opinions individually, and then sum up the total opinions to achieve what is referred to as pooling of individual estimates. The third approach involves seeking experts and individuals' opinions, and these assumptions are reviewed by a company's analyst and followed by using the Delphi Method.

According to Armstrong (1985), the more the opinions of experts sought, the more the reliability of subjective forecasting. This process is not very expensive because the Delphi method needs modest experts who can be reached over the phone (Hogarth, 1978); this is because highly experienced people who are involved with the product being forecasted might give biased opinions (Tyebjee, 1987). Based on the Delphi method, *Bootstrapping* can be applied. Here, the judgments of experts are converted into objective measures by incorporating the process that experts use to come up with forecasts. The judgemental forecasts are then compared against the existing forecasts. This method usually provides useful improvements to the accuracy of forecasts (Armstrong, 2001). The third and last type of Causal Longitudinal methods is the Integrative Method, which includes the Cross Impact analysis and Scenario Writing analysis.

The *Cross Impact analysis* is considered as an extension of Delphi method, because it identifies the trends and events' impact on each other. Cross Impact analysis can help expert in exploring hypotheses and help to locate the agreement and divergence points. Weimer-Jehle (2005) said that

> *"Cross-Impact methods are standard tools of the scenario technique. They provide a number of structured processes for the deduction of plausible developments of the future in the form of rough scenarios and are based on expert judgments about systemic interactions"* (p:334).

As for the *Scenario writing or role playing* analysis, Armstrong (2001) explained that the role playing is a way of predicting the decisions by people or groups engaged in conflict. Table (3.1) provides an example of the studies that used different forecasting methods.

| Class | Forecasting method | Classification | | | | References |
|---|---|---|---|---|---|---|
| | | Time series | Explanatory | Hybrid | Other | |
| Traditional time series | Traditional time series, moving average, exponentials smoothing, EWMA | √ | | | | Brown (1959; 1960); Makridakis *et al*, (1998) |
| Modified traditional time series | Adjusted EWMA<br>Adjusted holt and holt-winters methods | √<br>√ | | | | Johnston and Boylan (1996)<br>Bermudez *et al* (2006); Altay *et al* (2008) |
| Croston's method and modifications | Croston<br>Syntetos and Boylan approximation<br>Croston modified | √<br>√<br>√ | | | | Creston (1972); Rao (1973); Schultz (1987)<br>Syntetos and Boylan (2001; 2005)<br>Leven and Segerstedt (2004) |
| Bootstrapping | Modified bootstrap method | √ | | | | Snyder (2002); Willemain el al (2004) |
| Demand aggregation/disaggregation | Filtering / clustering methods | √ | | | | Kalchschmidt *et al* (2003; 2006) |
| Advance demand information | Order over planning<br>Early sales | | | | √<br>√ | Verganti (1997); Bartezzaghi *et al* (1999)<br>Fisher and Raman (1992); Fisher *et al* (1994); Bartezzaghi *et al* (1999) |
| Analysis of reliability | Failure rate analysis<br>Operating condition analysis | | √<br>√ | | | Tibben-Lemke and Amato (2001); Yamashina (1989)<br>Ghodrati and Kumar (2005) |
| Regression | Integrated forecasting method | | | √ | | Hua *et al* (2007) |
| Neural network | Neural networks<br>Support vector machines | | | √<br>√ | | Gutierrez, *et al* (2008)<br>Bao, *et al* (2004); Hua and Zhang (2006) |
| Bayesian approach | Beta-binomial model (allowing for different demand variance) | | | √ | | Dolgui and Pashkevich (2008) |

**Table 3.1: Examples of the studies that used different forecasting methods**

### 3.3 Bayesian Theory

> *"...in terms of forecasting ability ... a good Bayesian will beat a non-Bayesian, who will do better than a bad Bayesian"* (Granger, 1986a:16).

Despite the importance of statistical forecasting techniques in predicting the future, based on either judgemental or mathematical approaches, Bayesian methods offer a comprehensive paradigm for both statistical and decision making in cases of uncertainty (Bernardo, 2003). Bayesian methods may be derived from an obvious system and provide rational methodology that would allow the incorporation of significant or related initial information; such information would provide solutions to many difficulties faced when using the conventional/mathematical statistical methods (Jaynes, 1986). Bayesian methods provide an interpretation of probability as a conditional measure of uncertainty (Bernardo, 2003).

The history of Bayesian theory started with Thomas Bayes, an English clergyman who died in 1760. He created a curtained modern statistical methodology type named (*Bayesian*), which came as a consequence of the publication of *an essay towards solving a problem in the doctrine of chances* attributed to Bayes and communicated to the royal society after Bayes' death by Richard Price in 1763. The technical result at the heart of the essay is what we now know as Bayes' theorem. The 1980s presented a revolution in the probabilistic approach, and that was a recovery to the Bayesian approach of probability (Berger, 1985, Bernado and Smith, 1994), with more elaboration by using graphical methods and computational programs (Lauritzen and Spiegelhalter, 1988; Neapolitan, 1990; Pearl, 1988). These developments lead to innovations that helped in enriching the theoretical framework for dealing with the cognitive science of human inference later on (Geman and Geman, 1984; Manning and Schütze, 1999; Pearl, 1998; 2000).

Conventional/mathematical methods suffer from the lack of an axiomatic effect in which forecaster cannot use personal opinions in forecasting method. Moreover, the forecast results in mathematical methods are often mutually incompatible and the analysis of the same data may lead to incompatible results in each method (Lindley, 1972; Jaynes, 1976). Kuhn (1962) argued that the Bayesian approach is a scientific revolution because it is firmly based on axiomatic foundations, which provide a combining logical structure and mutual consistency of the methods proposed. Bayesian methods would reduce the statistical inference to problems in the probability theory, and consequently reduce the need for completely new

concepts; at the same time, the Bayesian methods distinguish among conventional/mathematical statistical techniques by providing a logical justification and/or proving the logical inconsistency of others (Bernardo, 2003).

Many scholars presented the Bayesian statistics and their importance in forecasting as a Probability Theory such as De Laplace (1812), Jeffreys (1961) and De Finetti (1975). The existence of the Bayesian approach was due to the *need* to describe probability distributions of all uncertainties present in the decision making situation. In particular, unidentified parameters in probability models should have a joint probability distribution that describes the available information, which is considered as *the* characteristic factor of a Bayesian approach. At the same time, Bayesian considers *parameters are treated as random variables* and this is considered as critical difference to conventional/Mathematical statistics, in which parameters are described as *fixed unknown* quantities.

The fundamental component of the Bayesian statistics is using the probability distributions to express all relevant unknown issues, and then interpreting the probability of an event as a conditional degree of uncertainty that is associated with certain issues, taking into consideration giving information to accept assumptions (Bernardo, 2003). A major criticism of the Bayesian viewpoint has been its lack of objectivity, since it is misleadingly associated with prior information. Nevertheless, there is no point in arguing whether or not the non-Bayesian approaches are objective, since the meaning of objectivity itself, according to Bayesians, is very subjective (Dempster, 1969; Lindley, 1972; De Finetti, 1975; Barnett, 1982; Berger, 1985).

- **Role of probability and The Bayesian Decision Theory**

> *"Bayesian probability is usually identified with the agent's degrees of belief, but that interpretation makes Bayesian decision theory a poor explication of the relevant concept of rational choice"* (Maher, 2010:119).

*Probability (Pr)* is the measurement of *beliefs (B)* of certain *issues* and *events (E)* under certain *circumstances* or *conditions (C)*, taking into considerations that there is no absolute Probability. Probability (Pr) is extracted from the available data (D) that would lead to the *set of assumptions (A)*, which an individual is making about the mechanism which has generated the *data (D)*, plus the relevant *contextual knowledge (K)* which might be available (Bernardo,

2003). As shown in figure (3.6); the zero probability means it is impossible to achieve, whereas the 100% probability means that the event is certain.

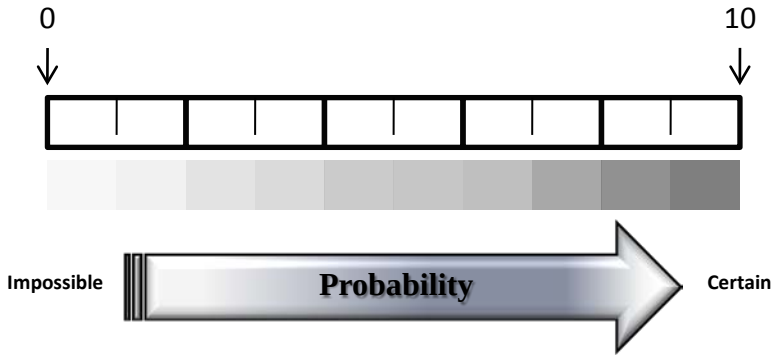



**Figure 3.6: The zero probability and 100% probability (Bernardo, 2003)**

The limiting extreme values of interpretation of probability are from 0% to 100%. Accordingly, Pr (E | D, A, K) is to be translated as a measure of rationality or beliefs in the case of the occurrence of the event E, given data D, assumptions A, in addition to any other available knowledge K, and this will answer the question or give indications of "how likely" the occurrence of E is in these conditions. In some cases, the Probability (Pr) of an Event (E) under certain Circumstances or Conditions (C) may be associated with the comparative frequency of similar Event (E) that have be done within similar Conditions (C). Bayesian paradigm guarantees the coherence of the proposed solutions because it uses the probability distributions to characterise all uncertainties in the problem, which would reduce the statistical inference to applied probability (Bernardo, 2003).

Maher (2010) divided the human sense based on the level of rationality into two areas. The first area is the *absolutely rational area*, which involves decisions based on empirical evidences with the agent or manager, while the second is the *deontologically rational area*, which involves making wrong or illogical choices under the available circumstances for the choices. Both of these rationality concepts are unclear and vague concepts, which were tested by Maher (2007) through a methodology called *explication* to identify these concepts, and find the variation between people's views of rationality to propose the *Bayesian decision theory*.

In ordinary language, the definition of the word "*Probability*" can be explained in two different senses, *Inductive* and *Physical* probability (Maher, 2010). The inductive probability

is related to the available or actual evidence that is very independent from the facts of the world, and the physical probability is totally the opposite because it depends mainly on the surrounding world.

The physical probability is related to the type of experiment used, in which the decision maker focuses on the rational evidence, and then the manager can make a rational choice. The physical probability is related to exploring whether coins have two faces or not, and then make a decision without calculating the evidence. The Inductive probability is pegged to the available evidence; it depends on the degree of belief that can justify the personal belief about certain hypothesis (H), taking into considerations that the belief is related to the logic (Carnap, 1950). It is important to say that the inductive probabilities can't offer precise numeric values because they are related to the beliefs that are based on the personal logic. Furthermore, the inductive probability is very vague, and might be source of conflicts in decision making (Maher, 2010).

The Bayesian result is only a mathematical consequence of explicitly stated assumptions, and it cannot be wrong unless logical mistakes have been counted and it has been mentioned that conventional methods cannot be used by themselves to defend or prove certain counterexamples (Bernardo, 2003).

Generally speaking, subjectivity is accepted in statistical analysis, which means it is always conditional on accepted assumptions that are definitely subjective choices, taking into consideration that it is very essential and critically important to make all assumptions very explicit. For example, assumptions about the structure of the data, the probability model or the outcome space. Statisticians who are using the conventional statistics do not usually argue the mathematical foundations of the Bayesian approach, but they claim to be able to produce more "objective" answers that are related to numbers and percentages. At the same time, Bayesian methods require the choice of a prior distribution, which had been criticised because the results must be totally dependent on documented data, such as scientific reporting and public decision making, which might be subject to independent examination. This is absolutely true if critics ignore the use of reference prior distributions that are derived mathematically through a statistically accepted probability model. At the same time, the Bayesian approach is able to deliver posterior probability distributions. The following

formula in Figure (3.7) explains the components of Bayesian theory and the link between the data and personal hypotheses about H condition.

$$P\left(\frac{H}{D}\right) = P\left(\frac{D}{H}\right) X \frac{P\,[H]}{P\,[D]}$$

P (H/D) is a probabilistic statement of belief about ***H*** **after** obtaining the data ***D***

P (D/H) is the mechanism of the theorem provides a solution to the problem of how to learn from data

P (H/D) is a probabilistic statement of belief about ***H*** **before** obtaining the data ***D***.

**Figure 3.7: The correlation between the belief and the historical data in Bayesian method.**

Like any theorem in probability, Bayes' theorem merely provides a form of "uncertainty accounting" at the technical level. Statistical inference is viewed as a particular decision problem, which may be analysed with the framework of decision theory. The concept of rationality is explored in the context of representing beliefs or choosing actions in situations of uncertainty, which could be considered the basis for introducing the decision theory. The uncertainty, which is a feeling that might be shared by individuals, should be evaluated taking into considerations that we do not attempt to treat all individuals' uncertainties with the same degree of interest or seriousness (Bernardo and Smith, 2000). The classical conception of the mind is Logicism, which is the engine of logical conclusion in its modern guise in cognitive science (Oaksford and Chater, 1991; 2007).

## 3.4 Chapter Summary

This chapter provided an overview of the available forecasting methods, while focusing on the classification of conventional forecasting methods as presented by Barnett (1988). The mathematical statistics usually consider the use of two major concepts, conventional and Bayesian, where the latter offer a comprehensive paradigm for both statistical and decision making in cases of uncertainty (Bernardo, 2003). There are various forecasting methods that are used by users in academic institutions and practice. Each of these methods has its own advantages and disadvantages that might lead to more or less "*accurate*" forecasts.

Different researchers mentioned these forecasting techniques in many published studies and books. Authors such as (Bernardo, 2009) and (Maher 2010) see that Bayesian methods offer the future framework as they are very general and helpful methods that can be applied in relatively simple stylised situations. From another point of view, authors such as (Armstrong, 2001) and (Barnett, 1988) prefer the conventional methods since they can be justified and understood.

Following this literature review or forecasting in Chapter Two and forecasting methods in Chapter Three, the following chapter will provide an overview about the pharmaceutical industry, which represents the context of this study, and its importance in the future.

# CHAPTER FOUR

# THE PHARMACEUTICAL INDUSTRY

In this chapter, the researcher will explain the rationale behind selecting the pharmaceutical industry as the context of this study, where this industry offers a good example of a well-established and well-acknowledged industry in terms of its contribution to the economy and public health. This chapter is divided into eight sub-sections; the first sub-section is the introduction to pharmaceutical industry, in which the researcher will provide an overview about the pharmaceutical companies and the historical development of pharmaceutical industry. The second subsection will discuss the stages of change in pharmaceutical industry, and the current factors that affected the pharmaceutical companies. The third subsection will talk about research and development (R&D) in pharmaceutical companies and its important role in sustaining the pharmaceutical business, supporting pharmacoeconomics, and improving the health services provided. The forth subsection will talk about the organisational structure of pharmaceutical industry. The fifth subsection will provide an overview about the pharmaceutical market and its global performance. The sixth subsection is concerned with the pharmaceutical sales forecasting and its importance to this industry. The seventh subsection is about the genericization pharmaceutical industry, its role in economy, and its impact on the future of the pharmaceutical industry. The last subsection is the conclusion in which the researcher summarizes the chapter. Figure (4.1) presents this chapter map.

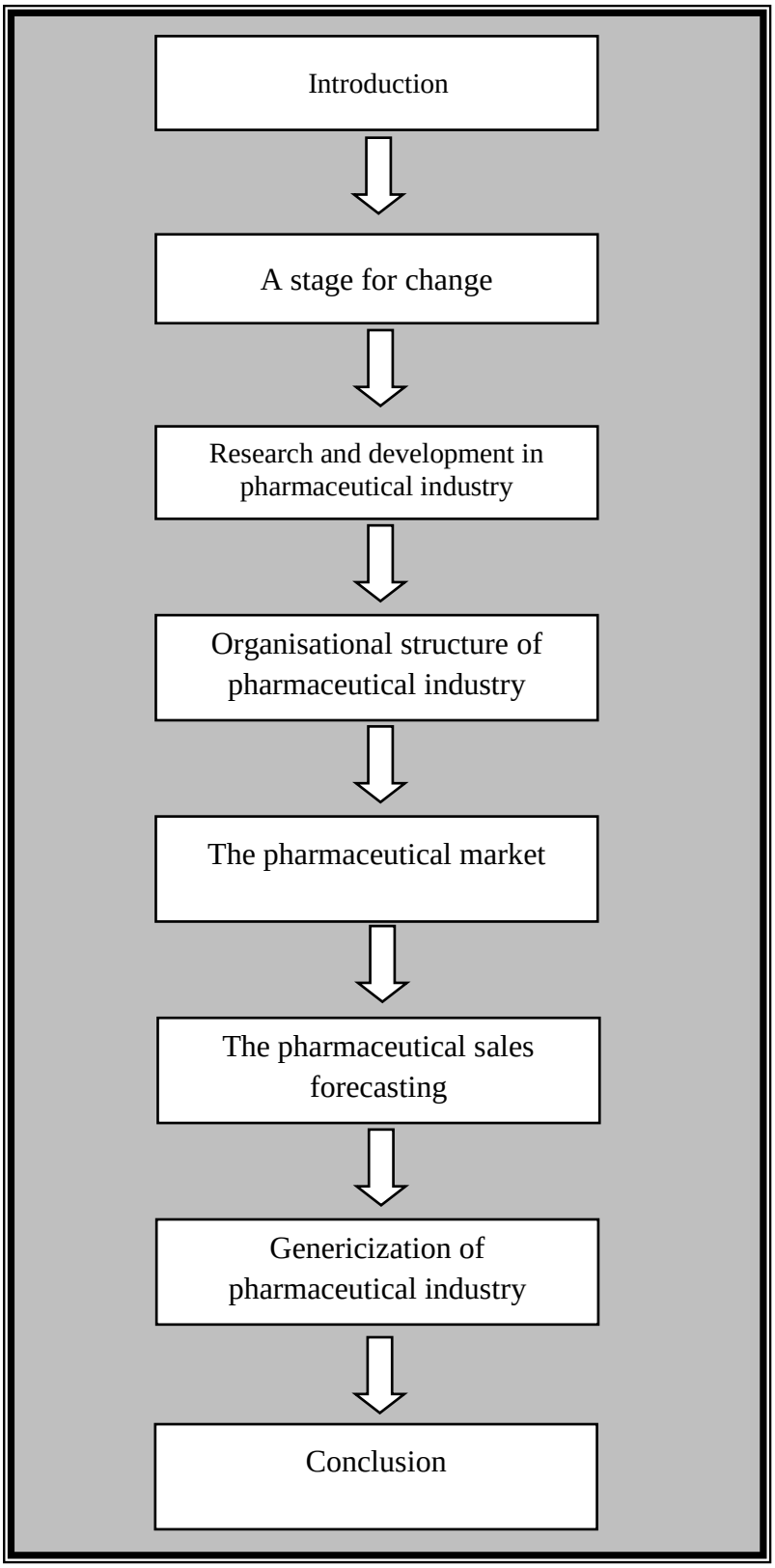



**Figure 4.1: Chapter Map – Chapter Four - Pharmaceutical Industry**

## 4.1 Introduction

The initial idea about the pharmaceutical industry started in the late 1850s. Before that period, diseases were regarded one of mankind's obsessions, they were regarded as black evil or an alien, which enters the body and causes high fever, weakness, fatigue and sometimes death. People used to relate diseases to the past sins, which they believed affected the patients' social image in the community (Lynn, 1993). Patients used to go to different places looking for treatment; they used to go churches, herb experts and doctors. Accordingly, the emergence of pharmaceutical industry was a breakthrough whereby the drug makers created the idea of, if *"You Have a Problem, We Have a Pill" (p.5).* This idea made the pharmaceutical business one of the world's largest industries, in addition to being one of the most profitable ones. Since that time, developments in the medicines industry have not ceased to continue and serve humanity in prevention of diseases (Lynn, 1993).

The pharmaceutical firms are companies that are responsible for manufacturing, developing and promoting medications. This industry is highly controlled by different governmental and health agencies regulations, in addition to chemical and safety concerns, in nearly every aspect. The health authorities' regulations also affect the promotion and launch of new drugs, which affect the performance of the pharmaceutical companies. For example, governments and authorities obligate the firms to obey the manufacturing regulations, registration laws, storage conditions, labelling and packaging, product marketing, distribution, public awareness, prescription and patenting (John *et al.*, 2007).

The majority of pharmaceutical companies were established in the early 20$^{th}$ century and late 19$^{th}$ century, however, the main discoveries were between the 1920s and 1930s when scientists discovered penicillin and insulin, and manufacturers started to produce and distribute these products worldwide after the World War II (Lynn, 1993). Between 1950s and 1960s, the pharmaceutical companies succeed in developing numerous drugs for example the development of the first oral contraceptives, drugs that controls blood pressure, narcotics and others, whereas the period between 1970 and 1976 was marked by the development of cancer drugs (Moynihan and Cassels, 2005). Nowadays, pharmaceutical companies are investing in treating patients through the use of human genes (DNA) in treatment and diagnoses.

According to Arias (2004), the mortality rate in the United States (US) decreased significantly at various ages because of the developments in health services, in addition to the availability

of drugs for treatment and vaccines for prevention of diseases. Figure (4.2) shows the United States life expectancy at different ages (from birth to the age of 100). The highest change in the life expectancy appears at birth (age 0) in the figure, and the average life expectancy has increased by about 57%.

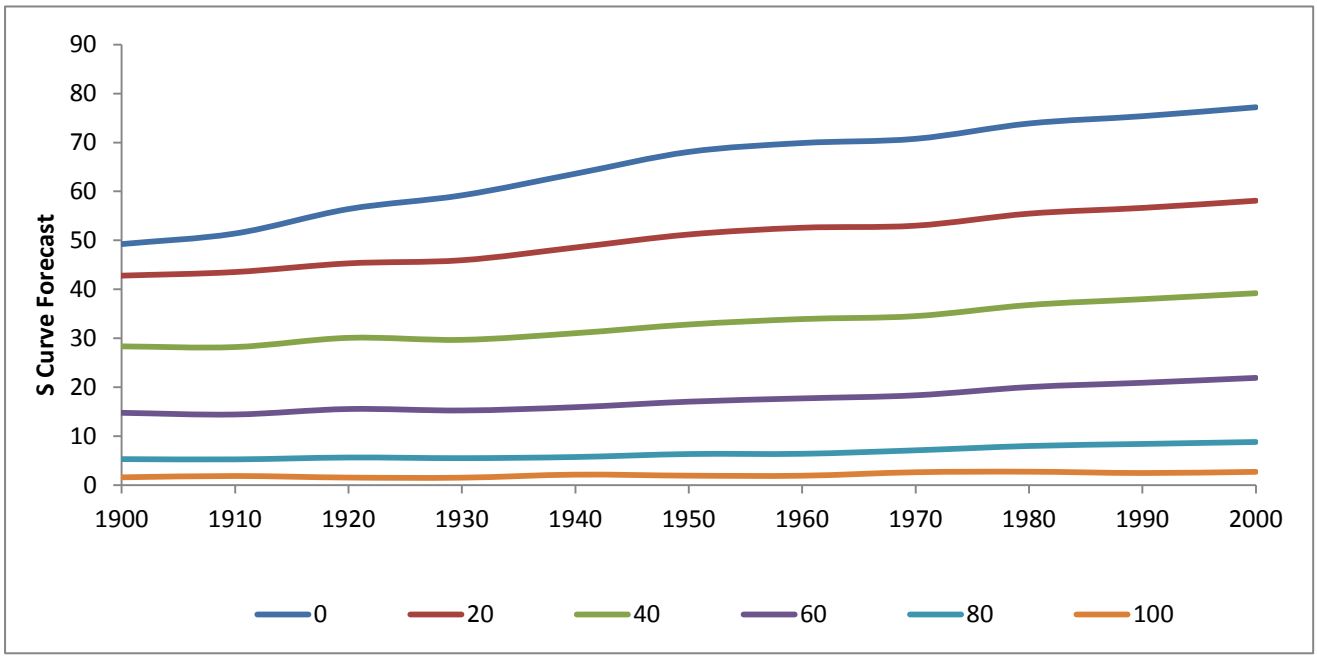



**Figure 4.2: Life expectancy in the US at different ages (Arias, 2004).**

Figure (4.2) explains that the life expectancy for people at birth was 49 in the year 1900, and increased significantly to reach 77 in the year 2000, which represents about 50% increase in 100 years. Moreover, the life expectancy for people aged 20, 40 and 60 increased as well; however, the life expectancy of people aged 80 and 100 remained the same (Arias, 2004).

Despite that the life expectancy is a very complex area and cannot be necessarily derived from the contribution of new and innovative drugs, new and innovative drugs will have a definite contribution toward the life expectancy (Grootendorst *et al.*, 2009).

Pharmaceutical companies can be divided inn more than one way. They can be divided into three types; originator companies that invent and develop new products, generic companies that manufacture off-patent products, and medical consumables and devices companies that manufacture important devices that are necessary for the health industry. The pharmaceutical companies can also be divided into four sections; the big/global companies, the specialist/niche companies, the me-too companies and biochemical companies. The big/global pharmaceutical companies are research-based firms that invent, make and sell products

globally, such as for example GlaxoSmithKline, AstraZeneca and Pfizer. Whereas the specialist/niche pharmaceutical companies are companies that are specialized only in specific directions, and promote their products globally like, for example, Novo Nordisk and Astellas that are specialised in the diabetic drugs and oncology market, respectively. The me-too companies are companies that produce off-patent pharmaceuticals, which are called generics, such as Teva Pharmaceuticals.

The drugs are classified into two categories; prescribed and non- prescribed or Over-the-Counter (OTC). OTC products are drugs that can be obtained without a prescription, whereas prescribed drugs need to be prescribed by a physicians or prescription. For example, Aspirin is an OTC drug, whereas penicillin is a prescribed one. The classification of the drugs is monitored by the health authorities like the Food and Drug Administration (FDA) in the US, and the Medicines & Healthcare products Regulatory Agency (MHRA) in the UK. These authorities changed the marketing of products dramatically, because the OTC or direct-to-consumer drugs, allow consumers to purchase drugs without consultations or prescriptions. OTC provided the marketing department in pharmaceutical companies with a flexibility to conduct new innovative promotional plans; this created a big transformation in the business nature and impacted the sales volumes. The best example about this is Fluoxetine[3] (or Prozac®) that became the bestselling drug in 1997 in the US, after approving it as an OTC drug in that year in the US.

The success of the pharmaceutical companies has influenced the social and economic environments for many decades, but the survival of the pharmaceutical companies depend on the complex relationships between the business and the science, the economic sustainability of the current business model and its operational capabilities to react fast toward the dynamic changes, as well as the ability to create more innovative products as expected by the physicians and the global demand (Earl-Slater, 1998; Smith, 2011)

[3] Fluoxetine (or Prozac®) is antidepressant drug that is classified as Selective serotonin reuptake inhibitors SSRIs. Prozac® manufactured by Pfizer – American based company.

### 4.2 A Stage for Change

Currently, the pharmaceutical industry is one of the major industries worldwide that have gained a huge interest due to its basic mission in developing the medical market and general health to cure and/or prevent diseases. The pharmaceutical companies are responsible for developing new products that will maintain the increase in the healthcare burden, which is due to increase of new diseases, climate changes, ageing population and the emergence of new therapies and treatment strategies (Earl-Slater, 1998; Greer, Ng and Fisman, 2008; Hunter, 2011). Currently, the pharmaceutical companies are considered major sectors in global businesses that have a very important impact on the global economy. Despite the importance of this sector, pharmaceutical industries face high challenges from the business environment and regulatory agencies.

The challenges were also mentioned by Ernst and Young in their global pharmaceutical industry report (2010), which mentioned that *"Pharmaceutical companies have been moving to reinvent their business models in recent years, driven by trends such as the patent cliff, decreasing R&D productivity, pricing pressures, globalisation and demographics"* (p:2). These challenges transformed the business from the old model (Pharma 1.0), which is the relationship between the pharmaceutical company and patients, through providing appropriate treatments to different complex structures as explained in Figure (4.3) page (104).

The first change in pharmaceutical business was from Pharma 1.0 to Pharma 2.0, where the latter is focused on diversified drugs portfolios; at this stage the market was becoming influenced by several shifts like branded generics, over-the-counter drugs (OTC), consumer/cosmetics products, veterinary medicines, and vaccines. The shift from Pharma 1.0 to Pharma 2.0 affected the R&D departments and the overall firms' strategies. R&D became more flexible and independent and created a partnership with biotech firms, academics, and contract research/ manufacturing organisations (CROs / CMOs). At the same time, the pharmaceutical companies became more focused on the specialised therapeutics like immunology and cancer diseases.

On the other hand, the finance management became more directed toward the managing revenues (as in Pharma 1.0) to return management and aggressive cost-cutting strategies. Furthermore, the finance management in pharmaceutical companies became more interested in boosting cash flows and return on investment in Pharma 2.0. These simple changes do not

indicate that the Pharma 2.0 is a newer edition of Pharma 1.0, but rather a movement stage from independent industry into more integrated, dynamic, complex firms and interdependent ecosystems.

The Pharma 3.0 is the biggest transformation that leads to healthy outcomes of ecosystems, which basically involve the emergence of new trends like demographics, health care reform and health Information Technology (IT), which allowed several companies that have not been involved in health care businesses to enter into the pharmaceutical industry. The changes at this stage were affected by the *physicians'* approach in treatment affected by the contract research organisations, *providers* of the raw materials based on price, quality and speed of supply, and *information* that emerge everyday through the *social media* and *telecommunication*. The roles of *insurers*, *retailers* and *government regulations* also affect the outcome of the pharmaceutical business. Moreover, the changes in food intake also affected this stage of pharmaceutical business, as shown in Figure (4.3).

Matching with Ernst and Young report in Figure (4.3), Smith (2011) mentioned that the pharmaceutical companies have undergone five technological transformations that are uncertain and unstructured. These technological transformations are the therapeutic revolution, the communication technology, the new R&D technologies, the efficiency imperative and the death of the traditional salesman. Each of these technological transformations is explained next.

The therapeutic revolution involves the new R&D approaches that have moved toward the understanding of biological revolution in treatment, which can be rationalized through the use of pharmacokinetics and pharmacodynamics in developing new drugs. This was mentioned by Shah *et al.* (2010) who said *"the trend to moving away from reductionist towards a more holistic approach … is likely to continue with the belated realisations that omics as such are not the solution to everything but should be incorporated into a fuller mechanistic and quantitative appreciating of biological system. The latter is expected to develop not just at a cellular level but also in a broader framework of pharmacokinetics and pharmacodynamics (including biomarker development) at the organs ad whole body levels"* (p:2) The therapeutic revolution faces high challenges in inventing personalised medicines, but the main issue that the pharmaceutical companies face is the need for huge development costs (Zemmel and Sheikh, 2010).

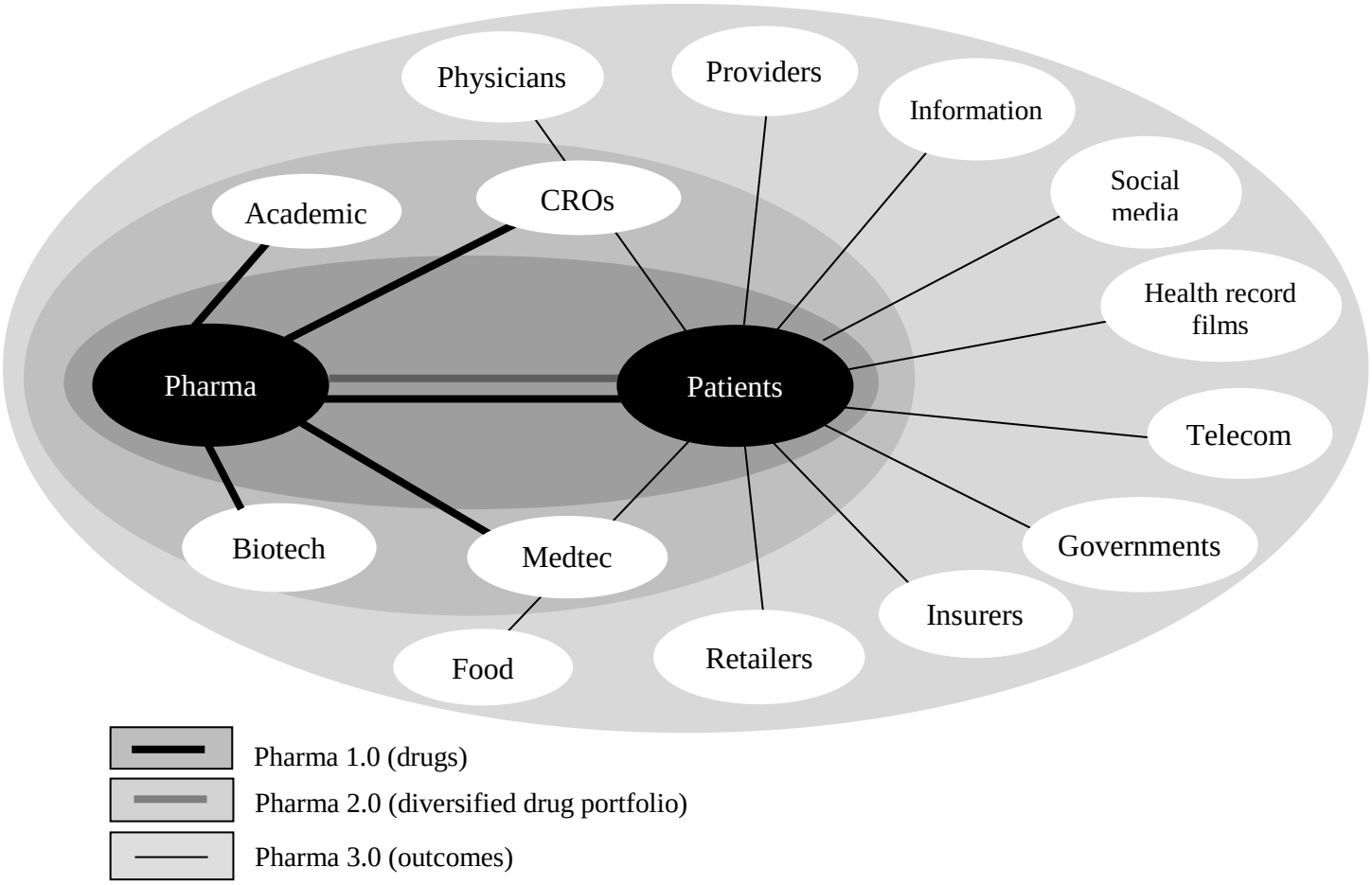



**Figure 4.3: The change in pharmaceutical business (Reproduced from Ernst and Young global pharmaceutical industry report (2010))**

The communication technology involves the new technological advancements that have changed the healthcare landscape and shaped the pharmaceutical market. The rise of telemedicine and smart phones provide the opportunity to access the clinical data and find the information needed for health improvement. The use of communication technology is important for pharmaceutical companies as the patients do not only buy the drugs, but they also buy a package of knowledge (Smith, 2011).

As for the new R&D technologies, only 10% of drugs that enter the pre-clinical development will be launched into the market (Lynn, 1993), as will explained later in the next Section 1.3, which will examine the R&D progress in pharmaceutical companies. The new technological emergent and evolving information technology provides the opportunity to use more clinical data (Larson, 2006).

The efficiency imperative is concerned with the efficiency of supply chain management in pharmaceutical business, which is very important. However, in producing new and innovative products, the supply chain can't support these new products, and that is the reason why pharmaceutical companies enquire about outsourcing the production and distribution of goods. Porter's forces (1980), described how firms can develop competitive advantages. Harrison and New (2002), conducted a cross sectional study about the strategy of supply chain in achieving competitive advantages, however, pharmaceutical companies were not one of the strangest sectors when compared to other sectors.

The death of a traditional salesman deals with the fact that pharmaceutical companies have changed their strategy in contacting doctors, where they previously used salesmen or medical representatives to present the companies' products to physicians, however, the new telecommunications have replaced the jobs of the sales representatives. Moreover, the physicians are no longer interested in meeting medical representatives, so the companies are now employing less sales people who focus on key accounts and high rated doctors.

### 4.3 Research and Development (R&D) in Pharmaceutical Companies

In order for pharmaceutical companies to survive and develop the global health sector, the pharmaceutical companies are required to continue investments in R&D, which is very important to maintain companies' efficiency. The greatest hit of the pharmaceutical companies was in 1928 after the penicillin discovery by Alexander Fleming, and since then the pharmaceutical companies are striving to produce more innovative antibiotics.

The healthcare experts met under the sponsorship of the Office of Health Economics in the early 1970s to discuss the expected future progress in pharmaceutical industry by the 1990s, and they saw that, by the 1990s, the healthcare can be able to predict heart attacks days in advance, cure or control 70% of cancer cases, make artificial hearts and produce drugs that dissolve away dangerous clots (Breckon, 1972), where the latter was the only one they succeed to achieve (Lynn, 1993).

However, during the last 10 years, many pharmaceutical companies underwent mergers and acquisitions, which leave the budget allocated and spent on R&D to shrink, moreover, merge and acquisition allow the companies to benefit from experts from different areas to reduce the costs and incidence of risks (Baun, *et al*. 2010; Hunter, 2011). These results were

contradicted by Paruchuri *et al.*(2006) and Kapoor and Lim (2007), who found that merger activities don't contribute to the innovation productivity of R&D, however, it may increase the R&D budget without increasing the innovation of the R&D,. Furthermore, Guler and Nerkar (2012) found that mergers and acquisitions do not have an impact on R&D productivity.

The past six years have shown a significant decrease in the R&D spending over the years 2005 – 2011. This is shown in Figure (4.4).

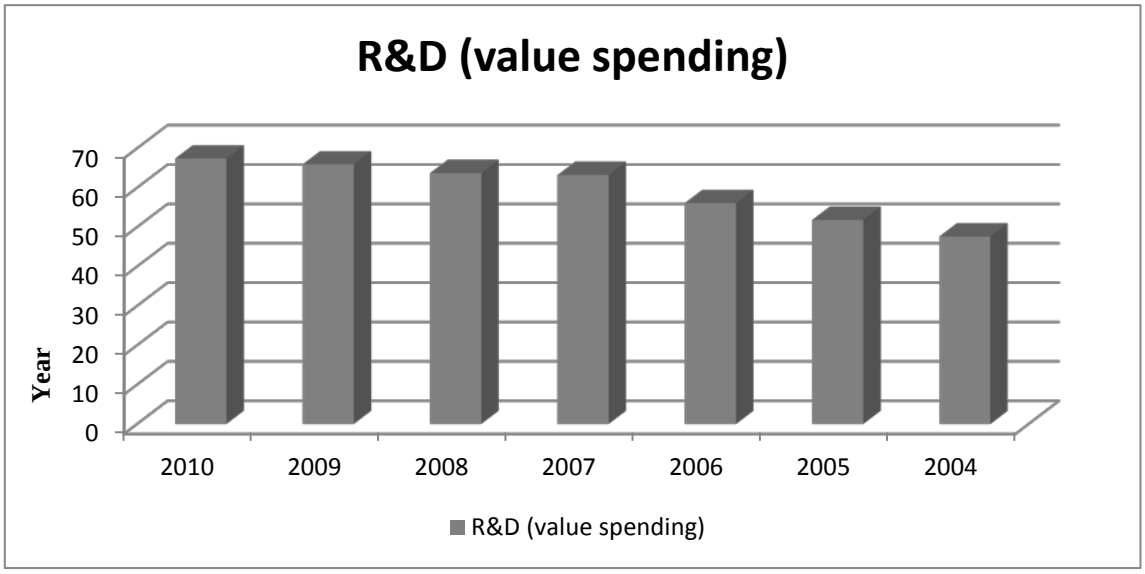



**Figure 4.4: Global R&D value spending (2004 – 2010) reproduced from (IMAP, 2011).**

Furthermore, the pharmaceutical companies are searching for outsourcing their R&D and conducting R&D actions externally instead of investing internally. Despite that the R&D spending represents about 15% - 18% of revenue, the productivity of R&D declined by 20% over the period- 2001 to 2007 (IMAP, 2011; Johnson, 2005).

Figure (4.5) shows the stages that R&D goes through in developing new drugs. He figure shows how the innovation of new drugs starts from the targeted diseases to treat, where scientists start to search for new compounds that might reach thousands at the stage of drug discovery. The safety, drug kinetics and metabolism are tested on rats to prepare these drugs to a stage of clinical development in which the drugs are tested on humans. After succeeding at these stages, which take about 9 -14 years to complete, the drug is applied for registration and launching stage which might take up to 2 years. The post marketing surveillance might take an indefinite time; the launch stage usually covers the patency period which might vary according to the different countries' laws and regulations. The genericization stage starts after

the expiry of patency time. The production of new innovative products might take up to 16 years before it goes to the market and start being promoted (Hunter, 2011).

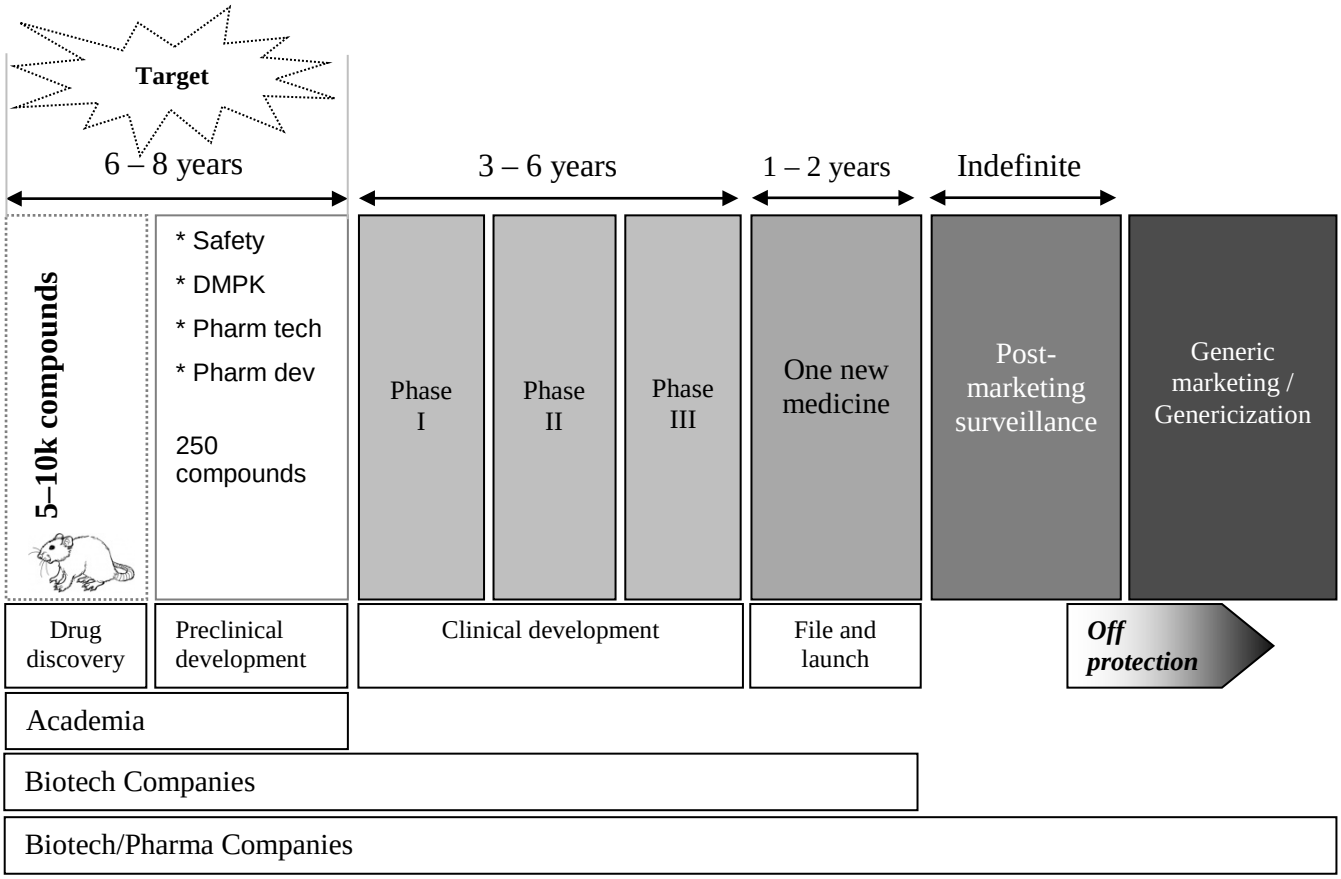



**Figure 4.5: Stages of R&D in pharmaceutical industry reproduced from Hunter (2011) - DMPK, drug metabolism and pharmacokinetics.**

The R&D is a relationship between the industry and academia, and this relationship is affected by the new stage of pharmaceutical industry. The success of R&D can be achieved by allowing academics more flexibility in gaining access to drug tools, and the development and sharing of Intellectual Property Rights (IPR), which might leave companies with lower control over the confidential data and internal functions (Hunter, 2011).

Figure (4.5) shows the indefinite stage in post-marketing surveillance and the link between the R&D and patients in the marketplace. In the post-marketing surveillance the feedback from the sales and marketing team is communicated with the R&D in addition to reporting it to the Ministry of Health (MOH), depending on the country's own laws. Genericization is a constant feature of the pharmaceutical industry which is a process of developing the same product and/or remanufacturing it by adding other pharmaceutical excipients after the expiry of the originator product's patency.

> Wokasch (2010) said *"these days, when promising new drugs are patented, other companies often rush in to create similar but slightly modified "me too" drugs in order to capitalize on lucrative mass markets. While some of these "me too" drugs may have fewer side effects or improve dosing schedules, most provide little therapeutic advantage to drugs that are already available to physicians and patients. Nevertheless, the ability to "pick off" even a small share of the highly lucrative "chronic diseases" market has the potential to generate substantial profits for companies"* cited by Smith (2011:14).

Despite that R&D value spending is increasing over the years, as shown in figure (4.4), there are very slow improvements in creating new drugs due to the decline in innovation drivers and shrinkage in the level of motivation of pharmaceutical companies in creating new molecule. According to Smith (2011), the decline in innovation drivers is because of the *"low hanging fruit"* or the opportunity of creating the new drugs and the new trend in finding new biotech and genetic projects that substitute the traditional drugs, which is a new research area in pharmaceutical companies that might need even longer periods of time than needed. The changes in government spending on healthcare increase the pressure on drug pricing and the shifting of the market toward generics, moreover, price erosion and changes in insurers' health funds and government sponsorships increase the pressure on developing new innovative drugs (IMAP, 2011). Patent cliff, or loss of patency, is another factor that affects the huge pharmaceutical companies by opening the market to generics, and in order to preserve the profitability and share in the market, pharmaceutical companies should be more engaged in smart investments in R&D, along with licensing and acquisitions. The main challenges facing pharmaceutical industry can be summarized in the therapeutic and cost effectiveness of drugs, access to and compliance of therapeutic treatments, as well as changing distribution models (Scherer, 2001; Nickisch *et al.*, 2011; SAM, 2012).

One of new approaches in patency protection was introduced lately; this approach involves getting patency on the tools of drug application, like, for example, the patent that Novo Nordisk got on insulin administration and the patent that GlaxoSmithKline got by introducing another oral measurement tool of drug administration for infants based on weight.

The new product in pharmaceutical companies has patent regimes that vary between countries. The patency can be in different forms including patents on the process, product patents, composition patents, and in some countries the patency might cover the application or drug usage by patients (Slinn, 2008; UN Report, 1979). The patent system in pharmaceutical industry is an essential business model, as it allows the inventor for a limited

monopoly for a certain period of time (usually 20 years), and this would permit companies to charge high prices to increase the profits and compensate the millions invested to create a new molecule (Barton, 2004). Despite these huge investments, pharmaceutical companies capitalise on the return on investment (ROI) for these products. On the other hand, neglected diseases by big companies' R&D lead to launching non-for-profit funding to support innovation to create and develop more innovative drugs, like for example Medicines for Malaria Venture (MMV) and Drugs for Neglected Diseases Initiative (DNDI).

Pharmaceutical companies are striving to be different than other companies, with a higher degree of medical differentiation to enable companies to introduce new products into the market successfully. The medical differentiation can be achieved by focusing on the specific diseases, and to be away from generic companies. For example, during the 1990s the pharmaceutical companies focused on newer chemotherapies for cancer patients. *"In today's market, differentiation is more important than ever. Big Pharma's customers increasingly are payers (very often government units) and patients who care about two criteria: health outcomes and affordability"* (IMAP, 2011:8).

In summary, R&D is considered one of the main driving forces in the pharmaceutical industry that produce new drugs with high sales potential. R&D investments depend on the disease selection and on the present data that is used as a base for forecasting. Statistics are used in a majority of papers that are published in health and medical care journals, because it is used to improve the research design as well as suggesting the optimum analysis of results (Bowers, 2008). R&D in the pharmaceutical firms use statistics to evaluate the new and innovative products, evaluate the future market size of the new drug, design scientific competitive advantages over the existing items and estimate the expected market returns on investment. The statisticians are usually involved in the whole process of R&D in pharmaceutical industry, putting their input in order to make the right decisions. The diffusion between the science and statistics might lead to evaluating the decision making process based on subjective factors (Bayesian approach) and choosing the best case scenario.

### 4.4 The Organisational Structure of Pharmaceutical Industry

As mentioned earlier, the pharmaceutical industry is facing a drop in the innovative performance due to several causes including the lack of knowledge diversity and high costs. However, the structure of the pharmaceutical companies was found to have an impact on the

organisational developments and innovation performance (Guler and Nerkar, 2012). The organisational structure affects the flow of information between people within an organisation; for example, the patent collaboration networks within an organisation will prevent leaks in communicating information between people. In their research about the impact of global and local cohesion on innovation in the pharmaceutical industry, Guler and Nerkar (2012) found that collaborative work will foster innovation management. Accordingly, some scholars like Obstfeld (2005) called for "*action and information problems"*, which is the reconciliation for the tension between cohesive networks and structural holes within organisations. Despite that cohesive networks might offer a systematic way in transferring the knowledge between members of the organisation, it may also limit the rate of innovation because it does not allow the smooth transfer of knowledge and information. The organisational structure might not only contribute to increasing the informal communication between different departments at an individual level, but also affect persons' ego level to become more cooperative about the future and innovation management (Guler and Nerkar, 2012).

As mentioned earlier in Section (2.3.1) in the literature review page (36), the size of the firm, the structure of companies and the type of business contribute to the success of the produced forecasts (Kahn and Mentzer, 1994; Kalchschmidt, 2005). In pharmaceutical companies, and according to Nerkar and Roberts (2004), the communication between the R&D and the marketing department will determine the future of the new product development and direct the product-market performance, taking into consideration that there are a lot of variations between pharmaceutical companies in sustaining the advantageous product-market positions over time (Roberts, 1999), this can be seen in Zantac® or Claritin®[4] which are considered as blockbusters (Guler and Nerkar, 2012), but not all products launched will be of the same performance. Joint aims and efforts between both the marketing department and the R&D experience will have definite impact on increasing the sales and prescriptions of new drugs (Roberts, 1999).

The majority of people employed in the pharmaceutical companies are pharmacists because the degree of pharmacy will support their experience and expansion in the market. On the other hand, pharmacists might not be qualified enough for handling the business challenges and fulfilling the companies' aims and objectives, which might, consequently, lead to

[4] Zantac® and Claritin® are both anti-histamine, which are manufactured by GSK and Schering-Plough respectively which are used for peptic ulcer and hay fever.

organisational conflicts (Refai, 2012). The organisational structure might contribute to decreasing these conflicts within organisations.

### 4.5 The Pharmaceutical Market

The pharmaceutical business is one of the most profitable businesses that operate globally and locally depending on the countries' own regulations. The global market shows an increase in the market demand, the sales estimation was about USD 400.6 Billion in 2003, and reached up to USD 875 Billion in 2010. Still, the global pharmaceutical market is expected to grow at a 5-8 percent Compound Annual Growth Rate through 2014 (IMAP, 2011), as shown in Figure (4.6). Moreover, Figure (4.6) shows that the growth rate fluctuates, showing an increase in one year and a decrease in the next, and this expected to continue according to IMAP (2011).

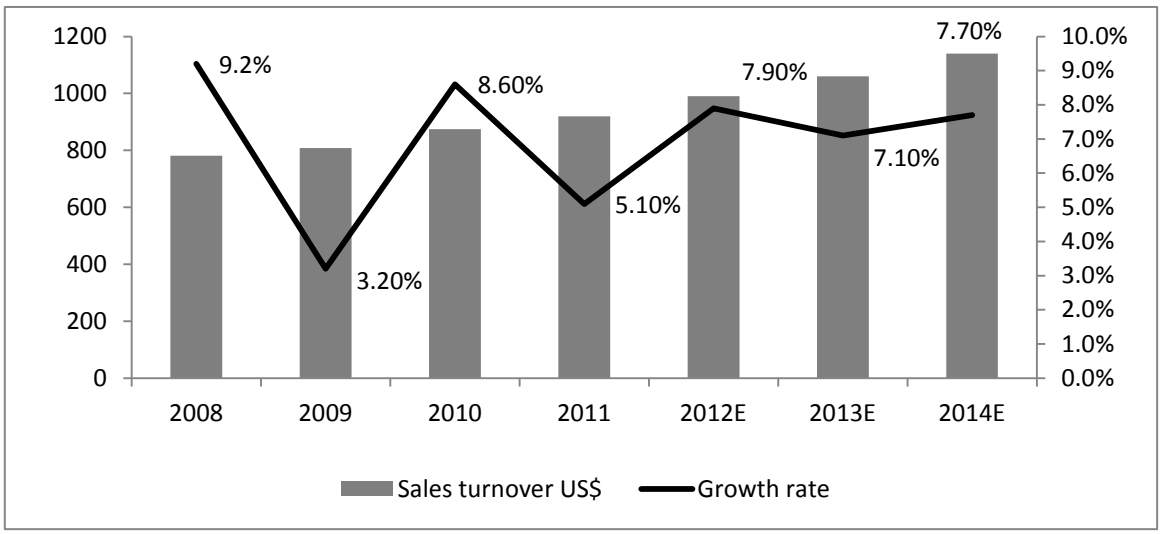



**Figure 4.6: The global performance of the pharmaceutical companies (IMAP, 2011)**

Despite that the global pharmaceutical market is expected to show positive performance, the growth is mid-single digit which is derived by the innovation of R&D and patent cliff of the existing products like Lipitor that is manufactured by Pfizer (EvaluatePharma, 2011). Moreover, the growth is controlled by the impact of the changing mix of innovative and mature products and the rising healthcare access in emerging markets, in addition to the price pressure by regulators in developed countries. As shown in Figure (4.7), the developed countries represent more than 50% of the global pharmaceutical market value; in the year 2009, 28% of the global sales was from USA, and 15% was from EU, whereas Japan represented about 12% of the global pharmaceutical sales (IMAP, 2011).

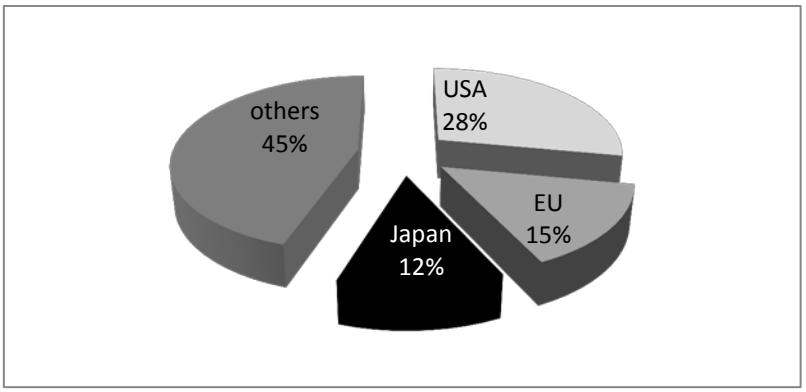



**Figure 4.7: The global pharmaceutical market overview (value) (IMAP, 2011).**

Consequently, the global pharmaceutical market is expected to grow to reach $1.1 trillion USD by 2014, mostly driven by the growth in the pharmerging countries that are expected to grow by 13-16% taking into considerations that China's pharmaceutical market is expected to continue to grow at a pace of more than 20 percent annually over the next five years (IMAP, 2011). According to EvaluatePharma (2011), there will be a decrease in the Worldwide Prescription & OTC product sales as these products are expected to become substituted by the new biotechnological products (2002-2016). The biotechnological products include bioengineered vaccines and biologics. The expected increase in using these new products is presented in Figure (4.8).

The performance of global pharmaceutical market is controlled by different parties that include some controlling agencies to provide access to market. For example, UK is the sixth largest pharmaceutical market in the world, and it is controlled by the National Health Services (NHS), which account for about 98% of the UK prescription medicines market (Towse, 1996). Moreover, the governments can control drugs' registration processes. Thus, affecting the ability of manufacturers to launch their products.

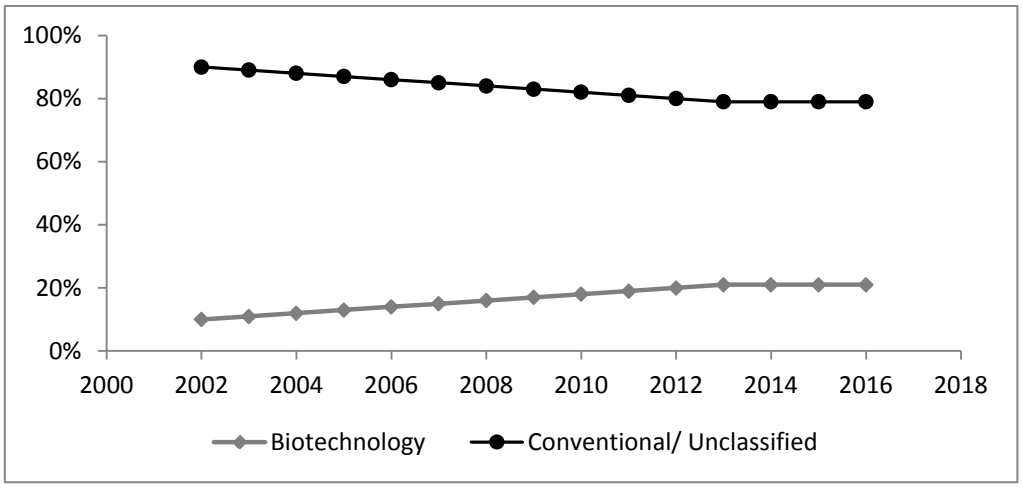



**Figure 4.8: The use of Conventional/ Unclassified products vs. Biotechnological product in pharmaceutical industry.**

## 4.6 Pharmaceutical Sales Forecasting

In all firms, forecasting is important since good forecasts minimise the level of uncertainty and help in identifying and evaluating the expected risks. According to Johnson (2005) *"forecasting in the pharmaceutical industry could be done much better"* (p:1). The need for better forecasting in pharmaceutical companies is due to the high operating costs, and the fact that the costs of inaccurate forecasts could be massive.

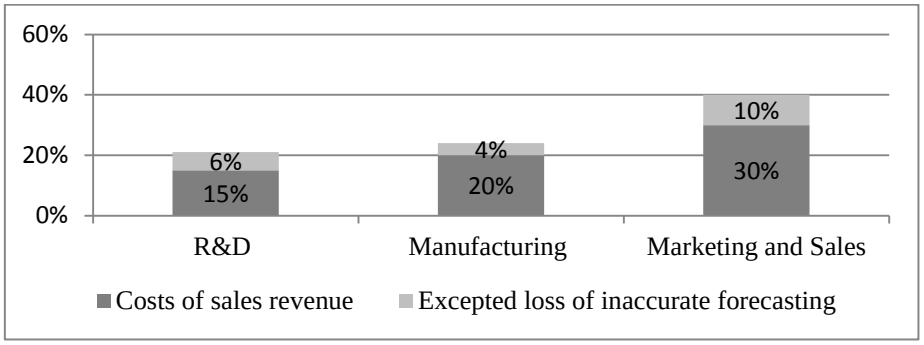
In the pharmaceutical industry, most managers come from a medical or chemical background, with no expert in estimating the future or performing accurate forecasts, which is expected to lead to disastrous results. Overshooting forecasts means over stocking, unnecessary capital investment, marketing costs, over employment, purchasing of extra raw materials, and wasting of R&D resources. On the other hand, very conservative forecasts will lead the company to running Out of Stock (OOS), increase its manufacturing costs, lose its revenues, fail to launch new items, and worst of all effect patients' health, especially those suffering from life-threatening conditions (Johnson, 2005).

R&D expenses might reach up to around 15% of sales revenues, taking into consideration that 20% of the R&D projects generate revenues more than the costs of development, whereas the rest of the projects might return half of their costs. In cases of poor forecasting of products, an additional loss of 6%[5] from R&D revenues is expected (Johnson, 2005; Helms, 1996). This is shown in Figure (4.9). The figure also shows that the manufacturing costs

[5] 15% X 80% = 12% and half of it is 6%

might reach up to around 20% of the sales revenues, and it is estimated to save about 20% of the costs if the forecast is perfect (Carroll, 1997), i.e. another 4% of sales. Marketing costs, on the other hand, are represented in the figure to reach about 30% of the sales. Forecasts play a major role in appropriate promotional spends, i.e. in overshooting forecasts the promotional spends will be high, which will result in investing in wrong items. Lord Leverhulme famously said that *"…half my advertising is waste, I just don't know which half"*, and it could be worse in pharmaceutical companies, where it could add up to an additional 10% (Johnson, 2005).

Despite that accurate forecasting is rarely achieved, it is important to minimize the variation size between the forecasts and the actual achievement (Barrett and Hope, 2006). Accurate forecasting is important because it contributes in the development of new products and sustaining the economic impact of the pharmaceutical companies in the market, furthermore, forecasting will contribute in preparing management to react quickly in the multi-dynamic changing environment.




| Category | Costs of sales revenue | Excepted loss of inaccurate forecasting |
|---|---|---|
| R&D | 15% | 6% |
| Manufacturing | 20% | 4% |
| Marketing and Sales | 30% | 10% |
| Excepted Profit margin | 25% | ----- |
| Miscellaneous | 10% | ----- |

**Figure 4.9: The expected loss because of inaccurate forecasting in pharmaceutical companies (Johnson, 2005)**

The dynamic changes in the environment affect the pharmaceutical companies' performance as described Section 1.2 page (3) about A Stage for a Change, and it should be well justified in the produced forecasts. According to Dilgard (2009), the forecaster is described as a champion who does the worst forecasts by saying "*worst of all is that some feel that they are*

*doing a good job in forecasting, while others have products they believe cannot be forecasted … the person selected as a champion for forecasting should not reside with any functional area"* (p:4). Like any other companies, the majority of decisions based on forecasting in pharmaceutical companies are judgmental and not based on scientific explanations, and that is because of the shortage of knowledge and awareness about the consequences (Johnson, 2005).

The pharmaceutical companies shoulder great responsibilities in developing new drugs and improving the quality of life for patients. The availability of powerful forecasting management and development will support the output of R&D as well as the level of investment, which will consequently contribute to the survival of both pharmaceutical companies and patients.

The data in pharmaceutical companies are obtained from two sources; the historical data and the third party research supplier like, for example, the Intercontinental Medical Statistics (IMS) and ACNielsen, which own data through conducting market research to evaluate the market size, companies' market share, trends in treatment and future prediction of markets.

### 4.7 Genericization Pharmaceutical Industry

Genericization is the process of copying original branded molecules after the expiry of the product patency. Moreover, the generic substitution is derived by economic force because the generic molecules are cheaper than the original molecules (Smith, 2011).

> *"Generic prescription volume surpassed branded volume for the first time in US history, as generic drug manufacturers became more aggressive in their efforts to gain market share"* (Gray, 2006:79).

Kanavos *et al.* (2008) defined generic medicines as the products that are chemically equivalent and bioequivalent to originator brands, and allowed to be promoted after the patent expiry of the originator brand. These products are characterized by being low priced drugs, because their manufacturing does not incur R&D costs. The main concern of the health sector in developing countries is the ability of generics to decrease costs and provide significant savings to overstretched healthcare budgets. According to IMAP (2011), there have been a lot of patent expirations, which allowed generics to penetrate the markets more strongly, to reach sales of $107.8 billion in 2009, and expected to grow to $129.3 billion by 2014. Such an

increase is justifiable because of cost pressure and the decrease of 30% - 80% less than their original equivalents.

Kanavos *et al.* (2008) conducted an empirical study on developed countries, which include Germany, Italy, United States, United Kingdom and Canada, where they disagreed with the concept of decreasing the cost pressure or that generics might provide financial benefits. Even though the generics are cheaper in cost, they sometimes fail to differentiate, the regulations might not support their entry, and their prices are still high when compared to the cost and frequently tied, directly or indirectly, to originator drug prices.

### 4.8 Chapter Summary

Despite that the global pharmaceutical market is huge and extremely profitable, there are a lot of key resistors to growth in the pharmaceutical business; these resistors can be classified into external or internal factors. The changes in pharmaceutical business as shown in Figure (4.3) page (104) have gone into three phases (Ernst and Young global pharmaceutical industry report, 2010). According to Smith (2011), the technological transformations that affect the pharmaceutical companies are the therapeutic revolution, communication technology, new R&D technologies, the efficiency imperative and the death of a traditional salesman. R&D innovation is considered as one of the key factors that contribute to the growth of pharmaceutical companies, and that is because of the “patent cliffs” (IMAP, 2011) accompanied with the regulatory pressure and reimbursement restrictions. The new biotechnological innovation contributes to expanding the global pharmaceutical market, especially that the company should focus on targeting specialist secondary care indications, while maintaining the marketing efforts in the emerging markets (Kanavos, Costa-Font and Seeley, 2008). From an investment standpoint, the pharmaceutical companies should be equipped to deal with the challenges through robust pipeline capabilities to offset the effect from patent expires.

Forecasting the future in pharmaceutical industry is very critical (Johnson, 2005) in avoiding the future expected crises, and saving efforts and money through mergers, acquisitions, and diversification into new areas such as consumer health and geographic expansion. Forecasting in pharmaceutical industry can leave the forecasters to feel that they are doing a good job in forecasting while they are not (Dilgard, 2009). The organisational structure has an impact on forecasting management because the impact of structure affects the level of

communication. Guler and Nerkar (2012) mentioned that the organisational structure might not only contribute to increasing the informal communication between different departments at an individual level, but also affects the persons' ego level to become more cooperative about the future prediction and innovation management. Despite all these factors and challenges that affect the performance of pharmaceutical companies and influence the capabilities for future survival, the industry remains extraordinarily profitable. Understanding these factors in addition to good internal knowledge and collaboration will contribute to future success. The shortage in knowledge and awareness about forecasting might lead to chaotic situations and high percentages of loss.

# CHAPTER FIVE

# THE CONCEPTUAL FRAMEWORK OF THE RESEARCH

> *Managers evaluate the effectiveness of forecast by "Lower errors = Better forecast performance"* (Winklehofer and Diamantopoulos, 2002:151)

Based on the above mentioned literature, this chapter will provide a justification of the research objectives. This chapter will link the literature with the research methodology and to remind the reader with the research aim and objectives. These objectives were mentioned in section (1.7) page (11), however, this chapter will present the conceptual framework of the research.

With reference to figure (1.2) page (14) the research scope, the research aims to address real and pressing management conflicts between the marketing/sales, finance and supply chain department's goals and objectives and its impact on the forecasting management. These conflicts are developed because of the different matters and affect the variations in judgments and perceptions to forecasts.

Due to the nature of this research and the chosen methodology (Grounded Theory), the researcher examined current literature about the topic, however, the type of methodology allowed the researcher to let the data emerge from interviews. The conceptual framework has been clearly defined after conducting the interviews and analysis of the research. The gaps in the literature review regarding the forecasting managerial process in addition to the difficultness and high challenges of the pharmaceutical industry make this research very unique in conceptual framework among the other researches. After the literature review chapter and before we move into the methodology it is important to remind the readers with the research objectives, which are:

- Identify the level of knowledge about the forecasting techniques by the users and forecasters in pharmaceutical companies.
- Define the factors that affect the understanding and behaviour of each user of the forecasts and its managerial implications in the international pharmaceutical companies.
- Identify the effect of variations in the management approaches on the forecasting management that were introduced earlier by Mentzer and Kahn (1999) in the international pharmaceutical companies.

- Develop an assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.

These objectives are presented in figure (5.1), the research conceptual framework as presented in page (121).

**Objective one:** *The knowledge of forecasting process by the users and forecasters in pharmaceutical companies.*

This objective will identify the forecasters' ability of forecasting by evaluating their knowledge of the forecasting methods in pharmaceutical companies. This research will investigate the forecasting knowledge of the people who are working in international pharmaceutical companies, as many references mentioned the failure of managers to differentiate between the planning and forecasting, which will lead to disastrous impact on the business performance (Dilgard, 2009).

The knowledge about forecasting techniques are very important to forecast the future, what is the forecasting process considered in pharmaceutical companies? And how are these techniques used? Do they use the statistical forecasting techniques only? Or in combination method of forecasting (judgements and statistics)? Do the users of forecasts interfere with these judgements? Despite that the integration of judgements that might affect the output of the forecasting process, to become more accurate forecasts but it may harm the forecasting process (Glendinning, 1975; Malley, 1975; Turner, 1990; Bunn and Wright, 1991; Lawson, 1981).

**Objective two:** *Factors that affect understanding and behaviour of each user of the forecasts and its managerial implications on the international pharmaceutical companies.*

This objective aims to identify the influential factors on the produced forecasts by the different users of forecasts. Mentzer, *et al* (1999) identified the users of forecasts are usually three departments which are marketing/sales, finance and supply chain (or logistics).

Based on the conceptual framework, this objective will verify the factors that affect the users of forecasts in the literature and its influence on the departmental perceptions and understandings of the produced forecasts in pharmaceutical companies. This research will also identify the factors that have an effect on users' evaluation of the forecasts.

The individual behaviours and management have an impact on the forecast application (Fildes, 2006; Armstrong, 2001; Lawrence, 2000) and different theoretical grounding has emerged that explain the management role in the development of forecasts like Davis and Mentzer (2007), Winklehofer and Diamantopoulos (2003) and Mentzer *et al*. (1999). Lack of empirical evidence that explain the impact of the users' actions and perceptions on the utilisation of forecasts lead to conflicts in finding the relationship between the forecasting and operating performance (Smith and Mentzer, 2010).

**Objective three:** *Variations in the management approaches on the forecasting management in the international pharmaceutical companies.*

The forecasting management is affected by the management approaches, which were identified by Mentzer *et al* (1999), Mentzer and Kahn (1997) and Moon *et al* (1998) in the literature review.

Dimensions in forecasting management that were identified by Mentzer *et al* (1999), will also be used in identifying the gaps in the forecasting practices in the international pharmaceutical companies. As shown in the conceptual framework, the management will filter the departmental conflicts and priorities to produce the final forecasts.

**Objective four:** *Forecasting assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.*

In this objective the researcher will link the variables found in this research into forecasting assessment matrix that can help pharmaceutical companies to evaluate the whole forecasting management process within their companies. These variables will be extracted from the interviews conducted in this research. These assessment criteria can be anticipated in practice to increase the awareness of forecasting management and allow companies to create corrective measures for the future development of the forecasting management.

The researcher will refer to each of the research objectives of this study and expand on the level of understanding of each empirical study mentioned in the introduction chapter in order to criticise it.

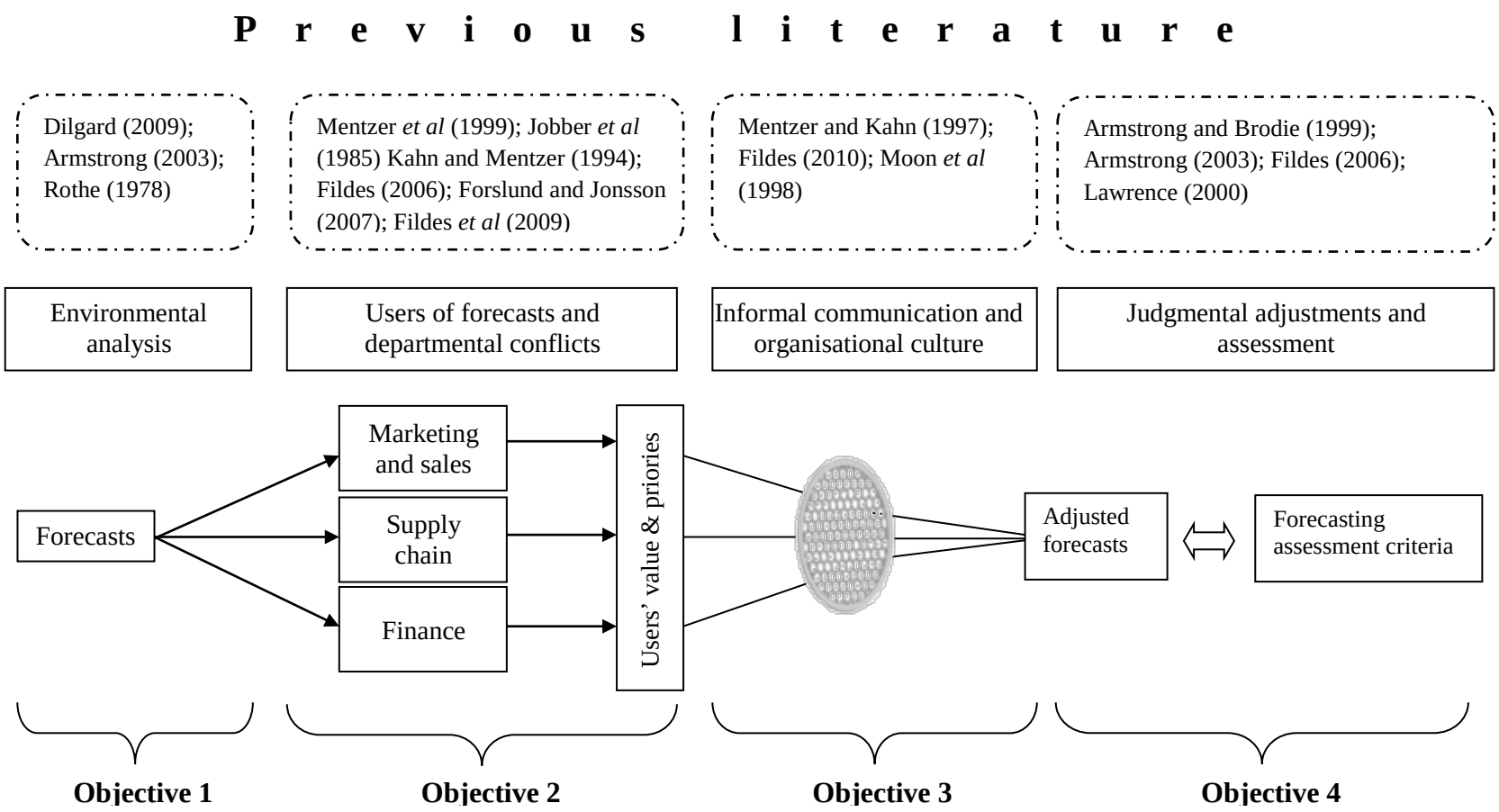



**Figure 5.1: the research conceptual framework (Author's work, 2012)**

# CHAPTER SIX

# PHILOSOPHICAL CONSIDERATIONS AND METHODOLOGICAL DESIGN

> "*The research process is rarely rational and straightforward, the reality [being] considerably messier*" (Saunders, *et al.* 2003:5).

There are debates in the social sciences about the relationship between the views of the researchers, the type of research questions and research objectives on the one side, and the research methodologies used on the other side (Morgan and Smircich, 1980), and any adopted research methodology should address these debates.

This chapter will discuss the conceptual framework of the research in addition to the practical elements of the research. Furthermore, it will discuss the suitable research methods that are required to fulfil the research aim and objectives through rationalisation of certain methodological approaches and recognition of any limitations. This chapter will place the research within a suitable ontological position and explain the research paradigm, design and philosophy. Furthermore, this chapter will explain the different research methods in general, and those that will be used by the researcher, alongside a theoretical justification of these methods. This chapter will also provide a brief about the traditional research paradigms available, and consequently explain the rationale behind selecting the current research paradigm. The final part of this chapter will discuss the research ethics and trustworthiness of the study to ensure the credibility of the knowledge gained.

Accordingly, this chapter is divided into ten parts. The first part is about the research design, the second is about the research philosophy and the approach alongside a justification of the chosen philosophy. Part three is description of the method of data analysis applied in this research. Part four discusses the qualitative research methods. Part five provides an overview of the Grounded Theory, its historical development, and how it matches with the research objectives. Part six relates the methodology of this research to the relevant literature. Part seven discusses the sampling and validity assessment of the method. Part eight discusses the process of data collection and ordering, as well as the method of data analysis applied. Part nine provides an overview of the ethical considerations in this research including and part ten is the trustworthiness which include

the credibility, transferability, dependability, confirmability. Last section is the chapter summary. Last part of this chapter provides a summary of the whole chapter. Figure (6.1) provides a diagram of this chapter's map.

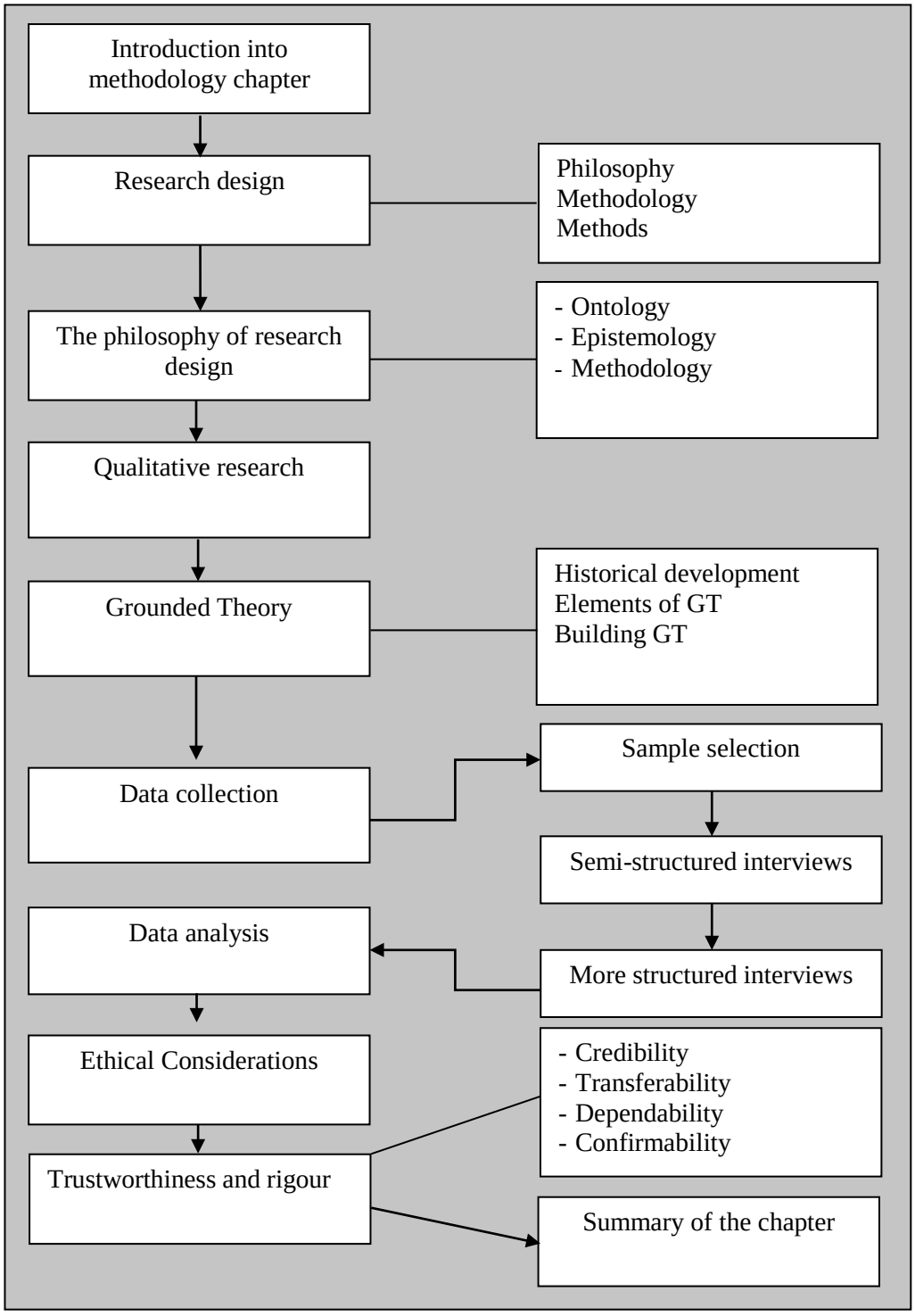



**Figure 6.1: a diagram of this chapter's map**

## 6.1 Research Design

Easterby-Smith *et al*. (1991) defined the research design as *"the overall configuration of a piece of research: what kind of evidence is gathered from where, and how such evidence is interpreted in order to provide good answers to the basic research question [s]"* (p:21).

The components of research design include the research philosophy, which describes the relationship between the knowledge and the process by which it developed. The second component is the research methodology, which describe the set of principles that link the research philosophy to the third component in research design, and that is the methods and procedures that will be used in the research to analyse data as shown in Figure (6.2) (Birks and Mills, 2011).

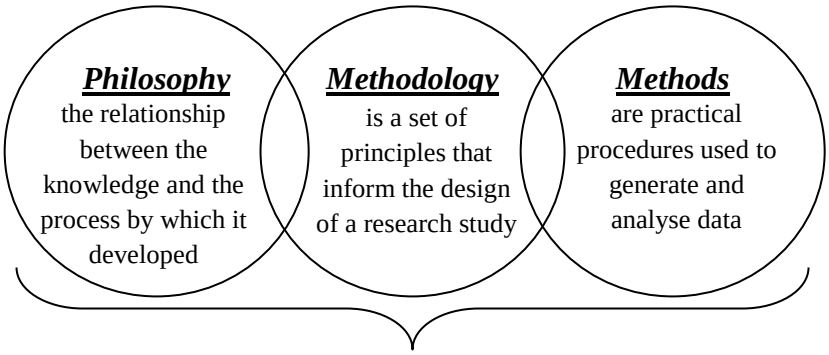



**Figure 6.2: The components of the Research Design Adapted from (Birks and Mills, 2011)**

The philosophy of this research matches with the *Interpretivism* or *Post-positivisims* philosophy. The selected methodology is *Grounded Theory*, and the methods conducted are *interviews*. The following sections will explain in details these components of the research design.

## 6.2 Research Philosophy and Approach

The main influence in the research philosophy is the researcher's particular views of the relationship between knowledge and the processes by which this knowledge developed, because, for example, researchers who are more concerned with facts are more likely to have different views from those who are more concerned with feeling and attitudes. Determining the research philosophy is the outmost layer in the research design, and determining the data collection methods is the core of the research methods. So, making the assumptions about the research

philosophy and approach ensures that the research is conducted in a rational manner (Easterby-Smith *et al.*, 2002).

In any type of research, the research paradigm is a set of assumptions that guide the writers or researchers about choosing the most suitable methods that link three components of research paradigm including, ontology, epistemology and axiology. *Ontology* is concerned with the beliefs of the researcher about the world (*what the world is*), whereas *Epistemology* is concerned with the nature of the knowledge (*how we can know about the world*), and *Axiology* is concerned with studying judgments about value (Guba and Lincoln, 1994). Despite that the philosophy cannot provide a definitive answer, it should help in guiding the research and justifying the actions taken (Easton, 2002). Easterby *et al.* (1991) mentioned that understanding philosophies will support explaining and recognising the research design, and will also guide the researcher to decide the type of evidence that should be gathered, where it should be gathered from, and how this evidence can be interpreted to answer the research questions and fulfil the research objectives.

Each philosophy has its own influence on the research process. The methodology chapter provides answers to three main questions. The first question of, what is the reality nature of the research (or the *ontology*)? Second question of, what is the nature of knowledge (or the *epistemology*)? And, the third question of, how can the researcher acquire the knowledge (or the *methodology*)? Furthermore, the methodology chapter provides a brief discussion about the research paradigms, the reasons for choosing a certain paradigm, which will, consequently, support the justification of the research methods used, and researcher's actions taken to guarantee the credibility of the collected knowledge.

It is critically important to explain the aims of choosing a certain research philosophy that suites the researcher (Lincoln and Guba, 2000; Easton, 2002). A suitable research philosophy will improve the way by which the researcher will approach the study. Figure (6.3) explains the Saunders onion and the relationship between the different research paradigms, and Table (6.1) explains these types of research paradigms. The first type of paradigm as shown in Figure (6.3) and Table (6.1) is the Positivism paradigm, which views that that world exists externally and can be tested through objective methods, whereby the truth can be reached using statistical

approaches (Easterby-Smith *et al.*, 1991). The second paradigm is Realism, which sees that reality exists independent of the human mind, opposite to idealism that considers reality to be mentally constructed. The third paradigm is Interpretivism or Post-positivism, which came to support "*logical empiricism*"; this paradigm views that knowledge about reality can be gained and confirmed gradually, and at the same time, probabilistically rather than perfectly (Easton, 2002).

Figure (6.3) and Table (6.1) also show the three main types of ontology. The first being Objectivism, which separates between the subject and the object and sees that social reality exists external to the mind (Denzin and Lincoln, 2008). The second ontology is Subjectivism, which does not separate between the subjects and objects, but rather sees them as dependent on one another; therefore, this ontology sees that social phenomena result from social actions (Ittelson, 1973). Pragmatism, on the other hand, is the third ontological view, which sees that something is true if it is working satisfactorily, it has notable practical consequences, and has proven its validity through testing; therefore, it can be said that pragmatism adopts a practical approach in assessing situations or solving problems.

Finally, Figure (6.3) and Table (6.1) also present the different research axiologies, including the Functionalist, the Interpretive, the Radical Humanist and the Radical Structuralist.

| Research philosophies | Philosophies | Definitions and Research strategy |
|---|---|---|
| *Epistemology*: is the theory of knowledge or 'resources' which is concerned with the nature and scope of knowledge | Positivism | Working with observable social reality and dealing with phenomena only, and this could be measured through using the objective and statistical methods (Easterby *et al*., 1991). Use the existing theory in developing hypotheses that will be tested (right or wrong) to develop the theory and test the hypotheses through statistical approaches (Remenyi *et al*., 1998). |
| | Realism | Similar to Positivism; working with the objects as they have independent position in human minds. Opposite to idealism, and it is related to the scientific enquiry (Bhaskar, 1989) |
| | Interpretivism or Post-positivism | Interpretivism developed due to the growing value of the phenomenology and symbolic interactionism. Phenomenology is the way by which humans make sense of the surrounding world whereas, symbolic interactionism is the continuous process of understanding the actions of others and lead to adjustments on researchers' meanings and actions. Interpretivism approach gained more attention as it supports the phenomenological view and grew with the increasing support toward logical empiricism which sees that facts can be derived by a process of gradually increasing confirmation (Easton, 2002). The post-positivistic view was supported by Hudson and Ozanne (1988), and it can enrich the knowledge in different perspectives. Saunders *et al*. (2007) argued that the post-positivistic view is very suitable for research that is conducted in business management, especially in areas of organisational behaviour, marketing and human resource management. |
| *Ontology*: is concerned with studying of the existing nature of reality and being. | Objectivism | is the social entities that exist in reality, external to social actors (Denzin and Lincoln, 2008). |
| | Subjectivism | is the social phenomena that is created form different perceptions & consequent action of social behaviour (Ittelson, 1973). |
| | Pragmatism | is the proposition that it is only true if it is working satisfactorily and practically accepted and prove its validity through testing (Saunders *et al*, 2007). |
| *Axiology*: is concerned with studying of the judgments value. | Functionalist | is concerned with the rational explanations of a certain problem and suggest solutions (Saunders *et al*, 2007). |
| | Interpretive | is the way by which human make sense of the surrounding world (Saunders *et al*, 2007). |
| | Radical Humanist | is concerned with understanding the subjective input of the participating social actors within organisations (Saunders *et al*, 2007). |
| | Radical Structuralist | is concerned with understanding the structural patterns in organisations through adopting the objective inputs (Saunders *et al*, 2007). |

**Table 6.1: The research philosophies (Crotty 1998; Denzin and Lincoln, 2000)**

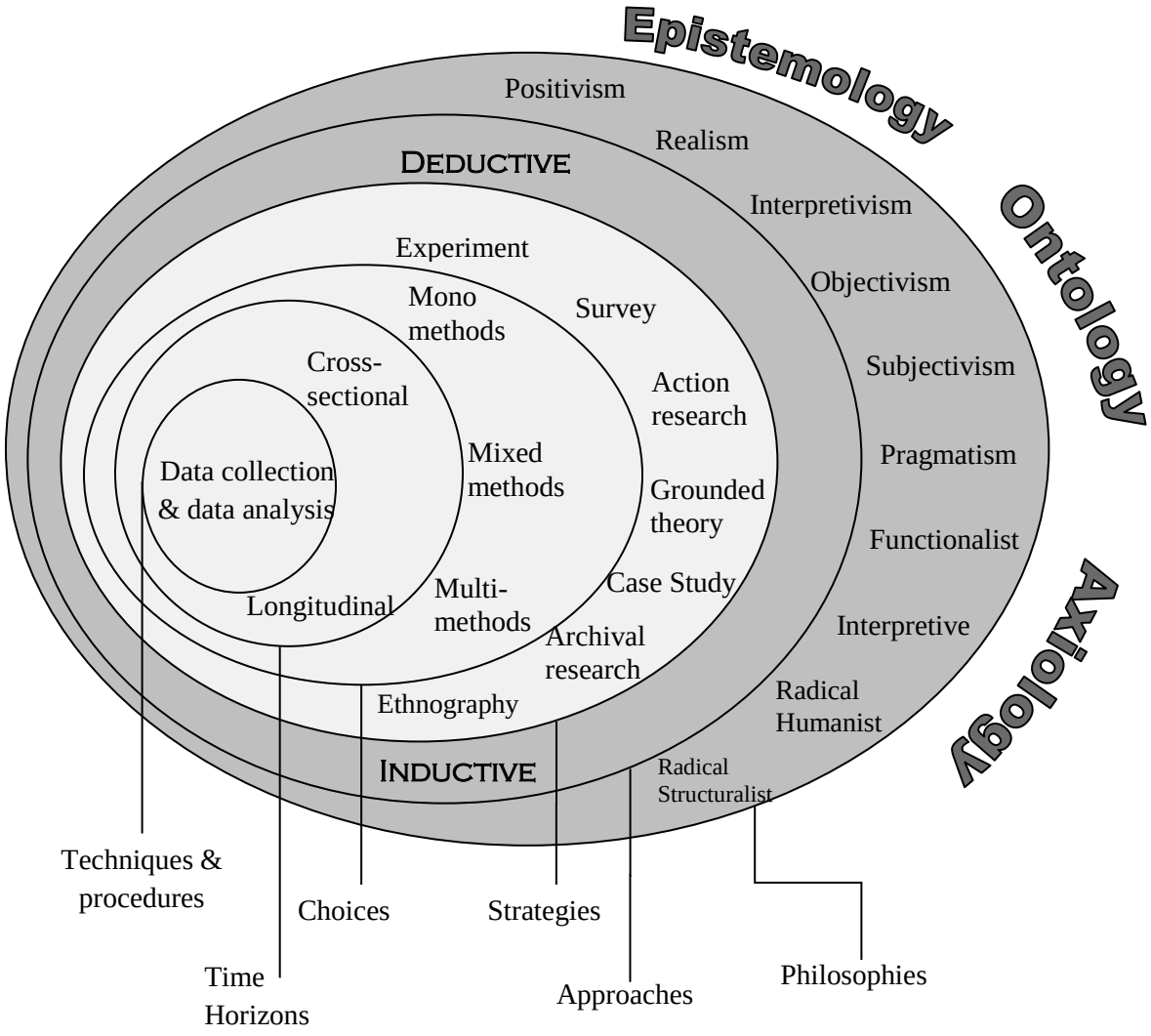



**Figure 6.3: The Research Onion (Saunders *et al*, 2007)**

Research approaches are divided into two types including the *Deductive* and *Inductive Approaches*. The *Deductive Research Approach* in where the research strategy is designed to test existing hypotheses, whereas the *Inductive Research Approach* is where data is collected to develop theory as a result of data analysis; i.e. theory would follow the data collected and not the opposite way as in the *deductive approach* (Saunders *et al.*, 2007).

Most researchers divide the research methods into two ways: Quantitative and Qualitative. This is done to reflect the differences in the researches style or make it easier to understand the

process of the method of data collection (Saunders *et al*., 2007). Based on the nature or positivist approach in measuring the world and using existing theory, many researchers support the use of quantitative methods in data collection (Easterby-Smith *et al*., 2002). However, Yates (2004) highlights that choosing the quantitative methods is not always related to the positivist approach and it can be used in other areas in social sciences. Ticehurst and Veal (2000) said that the connection of the quantitative/ qualitative methods and positivism / interpretivism epistemologies is known as *"management science or operations research"*. Figure (6.4) shows the Ticehurst and Veal (2000) views of the relationship between the methodologies and approaches, where the rationale behind applying qualitative research increases as the research moves more from the positivist toward the interpretive paradigm.

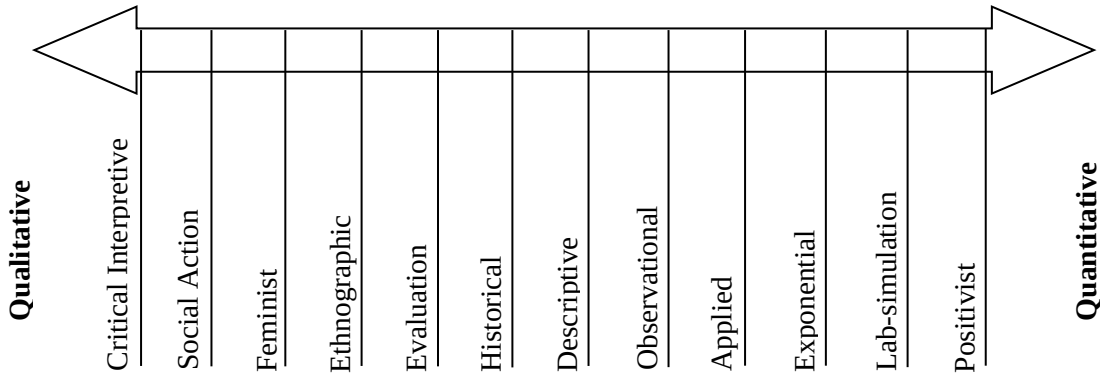



**Figure 6.4: The relationship between research methodologies and methods (Ticehurst and Veal, 2000)**

Figure (6.4) is also supported by Saunders *et al.* (2007) who referred to the research process as an "*onion*" by linking the philosophies to approaches together as shown previously in figure (6.3) page (128). The users of the inductive approach criticized the users of the deductive approach because the latter tends to be rigid and does not permit alternative explanations (Saunders *et al.*, 2007).

This research aims to address real and pressing management conflicts between the marketing/sales, finance and supply chain department's goals and objectives and its impact on the forecasting management. This aim can be achieved through uncover the organisational practices regarding forecasting management in pharmaceutical companies through examining the interrelationship between the different departments of marketing/sales, finance and supply chain,

in managing the forecasts. This research will examine the factors that affect the forecasting management for international pharmaceutical companies. This research will add more clarity to the current forecasting practices and different departmental conflicts and views in the pharmaceutical firms. The research will also describe the gaps in the process of forecasting in the pharmaceutical companies and actions needed to fill these gaps in order to develop the overall performance.

The researchers' knowledge is developed through interaction between the researcher and a number of various interviewees/ respondents from different departments within various international pharmaceutical companies, which will offer the researcher the opportunity to ask these firms about their views and opinions regarding the practices in forecasting management.

The interviewees who were involved in this research include managers from the departments of finance, supply chain, and marketing and sales. Some general managers were also included to ask about the overall performance of organisations and how the forecasting process contributes to work progression and excellence. Methods of data collection are discussed in detail in Section (6.8) page (158).

### 6.2.1 Relevance of Critical Realism

The main objective of the research is to identify the real and pressing management conflicts between the marketing/sales, finance and supply chain departments' goals and objectives, and their impact on forecasting management. These conflicts are developed because of the different matters, and are expected to lead to variations in judgments and perceptions to forecasts.

The primary assumptions in this research were in match with the critical realism views. These assumptions were initially made based on the different levels of involvement of the forecasting users within organisations and many possible judgmental influences from different users that were originated from the different values and priorities. The key focus of the research is to identify these forces and conflicts between users of forecasts.

The critical realism philosophy was criticised by Fern and Brown (1984) who saw that the variations in responses in a critical realism philosophy might lead to overlaps, so the researcher

will not be able to warrant separate theoretical developments or emerge with new theory. Yet, in the current research, the aim is to explore reasons behind particular phenomena in specific cases and critical realism was used by Tsoukas, (1989), Costello (2000) and Harrison & Easton (2002) to transpire complex phenomena in organisations using a critical realists perspective.

The study's conceptual framework was used to guide data collection and data analysis. The researcher's view complies with the post-positivism paradigm in which details about certain situations can be obtained by understanding the reality behind them (Saunders *et al*., 2007). This matches with the critical realism epistemology, where Mason (2002) mentioned that critical realists believed that information, perceptions, opinions, and understanding people is very important in understanding the realities. Unlike the naïve reality or idealism, the critical reality can be probabilistically rather than perfectly determined.

### 6.2.2 Relevance of Subjectivism

As mentioned earlier, the current research paradigm is interpretivism or postpositivism and matches with the views of critical realism which sees that reality exists outside the mind, i.e. there is separation between the subject and the object, so the reality exists whether or not people aware of it. However, the truth about reality or understanding this reality can only be determined proportionally rather than perfectly.

Consequently, the ontology of this research matches with the subjectivism view. Subjectivism is the social phenomenon that is created form different perceptions and consequent actions of social behaviour. The subjectivity in the research is very important due to the nature of the current research as it looks into the factors that affect the forecasting management in term of creating judgments.

In general, most of the previous forecasting research followed the positivist paradigm, as most published forecasting studies are related to the pure science of statistics and mathematical formulas. The positivists look at the world as a real objective to be studied, through the use of certain measurements in understanding the subject patterns. Post-positivists or interpretivists, on the other hand, look at the world as un-absolute reality that is very subjective as it is shaped by people's perceptions (Maylor and Blackmon, 2005). In general, previous studies like those by

Dalrymple (1987) and Sanders and Manrodt (2003) applied research that used surveys as the method of data collection, whereas research by Goodwin (2000) and Lawrence *et al*. (2002) used laboratory experiments.

Due to the nature of this research, which is concerned in investigating the judgmental integration into forecasts, and the factors that influence these judgments, qualitative research methods were deemed appropriate for data collection, where this will be done through conducting personal interviews, while applying the Grounded Theory methodology. Qualitative research methods will be discussed in detail next.

### 6.3 Qualitative Research Methods

According to Carcary (2011), the interpretivist emphasises qualitative research methods that seek to decode, describe, interpret, and come up with meaning and understanding of phenomena in the social world. Qualitative methods can use words and pictures rather than numbers to describe various situations and phenomena (Carcary, 2011; Easterby *et al*., 1991).

Qualitative research methods are more fixable and context sensitive, and they give the opportunity to understand complex situations (Mason, 2002). Qualitative methods depend on rational conclusions (Hinton *et al*, 2003), and involve human contact to exchange ideas (Kvale, 1996). Furthermore, qualitative research methods maintain the contextual focus in studying a wider range of social dimensions (Mason, 2002). According to Van Maanen (1983), qualitative research involves *"an array of interpretive techniques which seek to describe, decode, translate, and otherwise come to terms with the meaning, not the frequency, of certain more or less naturally occurring phenomena in the social world"* (p:9).

Generally, in qualitative methods, the researcher is able to collect large quantities of detailed evidence that allows researchers to make in-depth analysis (Blaxter *et al.*, 2006; Snape and Spencer, 2003; Veal, 2005). Qualitative methods are very beneficial for researches that focus on process dynamics including meanings and contexts of complex phenomena. Furthermore, qualitative methods concentrate on deeper understanding of behaviour (Alvesson and Sköldberg, 2009; Snape and Spencer, 2003). According to Creswell (1994), the dialect approach that is applied in the qualitative research can generate understanding of the social world.

According to Mason (2002), the guidelines for conducting qualitative methods in the research should be applied systematically and rigorously in a strategic, flexible and contextual approach. Qualitative research involves more subjective input that can provide the ability to understand social or human problems through complex and multi-dimensional views that are developed from respondents' opinions (Creswell, 1994; Smircich and Morgan, 1980).

In comparison to quantitative research, qualitative research involves the multiple relationships between different aspects by using multiple practices (Punch, 2005). It also directs the researchers into several dimensions and varieties in responses due to the differences in the respondents' way of thinking and traditions (Patton, 1990).

Despite that qualitative methods achieved scientific acceptance through various studies since the 19$^{th}$ century (Smith and Heshusius, 1986), there are still some epistemological debates about the validity of the science produced. Qualitative research uses contextual data in the description of situations from the respondents' perspectives, rather than determining the numerical data in the analysis and causality from an objective stance (Bassett, 2004). Furthermore, in qualitative methods, the relationship between the researcher and respondents tends to be less formal than in quantitative research, which allows more in depth participation and elaboration rather than having pre-set responses as in quantitative research.

The validity concept in qualitative methods was widely debated by many scholars, some of whom considered it as "inappropriate" and suggested the use of the word "truthvalue", which demonstrate the in-depth description of the topic area in addition to complexities of data interaction, and any data variations to confirm validity of the data collected (Grumet, 1990; Eisner, 1991; Lincoln & Guba, 1985; Marshall & Rossman, 2006).

Due to the researcher previous experience in the field of the pharmaceutical management, the interpretation of data collected might be mixed with the researcher's viewpoints, however, the researcher's beliefs that were obtained from the previous experience in the same field of the research are important in a reflexive manner (Warnke, 1987).

Creswell (1994) divided qualitative research designs into four basic theories; *ethnography*, *Grounded Theory*, *case studies* and *phenomenology*. *Ethnography* is used in studying people's

behaviour, whereas *Grounded Theory* is used to emphasize generation of theory from the process of observation of social phenomena. *Case studies* are used for individuals or groups of people to study a medical or social phenomenon, and *Phenomenology* is the way by which humans are making sense of the surrounding world.

The qualitative methods should match with the ontology and epistemology of the research, in addition to matching with the participants who are going to create and build the social reality. It is believed that the interaction of contextual frameworks of knowledge and people's activities will create their social realities. Grounded Theory is adopted in this study to explore the relationship and managerial conflicts between the inter-departmental attitudes and opinions toward managing the forecasting process in international pharmaceutical companies.

### 6.4 Grounded Theory

> *"Unlike quantitative research, Grounded Theory does not begin with an existing theory but rather generates theory in a specific substantive area. The primary purpose of Grounded Theory research is the discovery of theory from methodical data generation"* (Glaser and Strauss, 1967:7).

According to Eaves (2001), there is an increase in the number of researchers who are using the qualitative research methods and those who are applying the Grounded Theory method in particular. *"Recent years have seen an unprecedented growth in the use of qualitative research methods. In particular, there has been a steady rise in the number of published research reports that use the Grounded Theory method"* (Eaves, 2001:654). These researches have been criticized because of failing to present the Grounded Theory precisely as it has originated (Stern, 1994, Wilson & Hutchinson, 1996). The Grounded Theory is widely used in the methodology of social studies, but it is one of the most misunderstood methodologies in social sciences (Shah and Corley, 2006; Suddaby, 2006).

Glaser and Strauss (1967), the founders of the Grounded Theory, believed in inadequate logical deduction in sociology, and most studies were focused on verifying the existing theories. Grounded Theory was a constructive methodology used by the qualitative researchers to guide them in the theory development process (Pettigrew, 2000). Grounded Theory assists in discovering relationships and concepts that have not been previously defined or explained in

social phenomena from the perspective of symbolic interactionism (Bowers, 1988), which will support researchers in developing hypothesis.

According to Glaser & Strauss (1967), the simple definition of the Grounded Theory is *"the discovery of theory from data"*, whereas Crotty (1998) explained that Grounded Theory is derived from the symbolic interactionist theoretical perspective. At the same time, Grounded Theory incorporates the researcher's perspectives that are explicitly and exclusively *'Grounded'* in the perspectives of participants as they appear in collected data, which, consequently, gives the Grounded Theory strong explanatory power of phenomena to develop theory through Grounded consideration.

Grounded Theory is a comprehensive approach that produces explanations for uniformity of social behaviour, social organisation, and social change (Merton, 1968). The Grounded Theory method was developed to avoid obstacles that are related to grand theories, and which are mainly due to the reason of generating new knowledge through verification processes of grand theories.

Hammersley (1989) mentioned that researchers who are using the Grounded Theory will be able to bridge the gap between empirical data and theory generation. In addition, Grounded Theory has an emphasis on the socially constructed nature of reality (Goulding, 1998), and helps in producing interpretations to explain the social phenomena and the main concerns of social actors to justify their behaviour (Annells, 1996; Wuest 1995; Glaser 1992; Hammersley 1989; Glaser and Strauss, 1967). Furthermore, Grounded Theory can recognise the complexity of the social world, and works to make sense of it to both the analysts and lay-people (Wells, 1995). In Grounded Theory, the data is collected through the usual methods of interviews (Morse & Field, 1995), but theory development is based on comparative analyses (or constant comparison) between or among groups of persons within a particular area of interest, and this is considered a central feature of Grounded Theory (Strauss & Corbin, 1994; Glaser & Strauss, 1967) that will permit the researcher to recognise patterns and relationships between these patterns (Glaser, 1978, 1992).

> *"The process of generating Grounded Theory is both hierarchical and recursive because researchers must systematically categorise data and limit theorising until patterns in the data emerge from the categorising operation. This method requires*

> *data collection, open categorising, writing memos, determining a core category, recycling earlier steps in terms of the core category, sorting memos, and writing up the theory"* (Morse and Field, 1995:157).

Grounded Theory allows the research to generate explanatory models of human social processes that are Grounded in the data (Morse & Field, 1995). Furthermore, Grounded Theory can provide modification to existing theories and models (Strauss & Corbin, 1990). The major difference between the Grounded Theory and qualitative research methods is its emphasis on theory development, whether the theory is substantive or formal (Strauss and Corbin, 1994). *Substantive theory* is Grounded in research that focuses on a certain area to study one phenomenon that present on the one particular situational context, whereas, the *formal theory* is related to conceptual area and the theory emerges from the study of a phenomenon situated in one particular situational context (Glaser & Straus 1967; Strauss & Corbin, 1990).

This research focuses on the impact of interdepartmental conflicts on judgemental interference in forecasting management in the pharmaceutical companies. The researcher made interviews in three different departments (finance, marketing/sales and supply chain departments), and compared the respondents' thoughts, knowledge and challenges between these groups in pharmaceutical industry, and their impact on decisions and the performance of business.

### 6.4.1 The Historical Development of Grounded Theory

Anselm Strauss and Barney Glaser developed the Grounded Theory during the 1960s (Baker *et al*., 1992). The original Grounded Theory that was developed by Glaser and Strauss was considered in the nursing doctoral program at the University of California, in which Glaser and Strauss were appointed (Stern, 1985). That is why the initial studies on the Grounded Theory were nursing studies (Baker *et al*., 1992).

The original Grounded Theory started by Glaser and Strauss (1967). In 1990, Strauss and Corbin clarified the Grounded Theory to become more programmatic and over-formulaic (Melia, 1996), and following that, in 2006, Charmaz (2006) established the constructivist's approach of Grounded Theory. According to Chesler (1987) mentioned that *"the issue is not who is right about Grounded Theory and whether you agree with Glaser and Strauss (1967), Strauss and*

*Corbin (1990), or Glaser (1992) – The issue is – what you will take from them and do with it and how you will argue for, advocate, and defend your own position"* (cited in Eaves, 2001:662)

In their book, Glaser and Strauss (1967) mentioned that *"The Discovery of Grounded Theory"* believed that specific techniques in data-gathering and analysis will lead to generation of theory that is sufficient to add to both the breadth and depth of content. Glaser and Strauss mentioned that a Grounded Theory can represent a mirror–reflection test for established abstract theories, which will help in evaluation if there is a fit between the theory and the reality of the empirical data.

> *"A Grounded Theory can be used as a fuller test of a logico-deductive theory pertaining to the same area by comparison of both theories than an accurate description used to verify a few propositions would provide. Whether or not there is a previous speculative theory, discovery gives us a theory that 'fits' or 'works' in a substantive or formal area – though further testing, clarification, or reformulation is still necessary since the theory has been derived from data, not deduced from logical assumptions"* (Glaser and Strauss, 1967:29).

Later in 1990, more specifically after Strauss and Corbin's publication, Glaser and Strauss's version of Grounded Theory became devastated. This was followed by further debates on the Grounded Theory's meaning and distinctive characteristics. However, it is obvious that there are more similarities between the two than differences.

> *"When the theory seems sufficiently Grounded in a core variable and in an emerging integration of categories and properties, then the researcher may begin to review the literature in the substantive field and relate the literature to his own work in many ways. Thus scholarship in the same area starts after the emerging theory is sufficiently developed"* (Glaser, 1992:32).

Glaser keeps on the initial approach that focuses on total emergence and the main purpose of Grounded Theory is exploration (Glaser, 1992). On the other hand, Strauss prefers a dimensional approach that influences behaviour, and Grounded Theory is "*a combination of hypothesis generation and verification"* (Strauss and Corbin, 1990) in which the researchers are allowed for variations in interpretations according to the characteristics of the researchers, but Glaser seeks a *"correct interpretation"* that exists independent of the researcher.

Researchers who are using the Grounded Theory method are divided according to their preferences, taking into consideration that there is still no consensus among Grounded theorists to decide which method provides superior interpretation of social phenomena (Kools *et al*., 1996).

Holloway and Wheeler (1996) mentioned that researchers can adopt one approach of the Grounded Theory during the process of research. In order to call a study as a Grounded research; major features of Grounded Theory should be used and theoretical ideas should be generated. Figure (6.5) showed the chronological development of Grounded Theory (Birks and Mills, 2011).

Glaser (1978; 1992; 1998; 2001) emphasized the inductive approach in the Grounded Theory, which is a well-recognized and credible methodology in social science. Grounded Theory will be very suitable in the evaluation of complex social processes, to end up with a substantive theory from data as will be shown in Figure (6.8) page (158) (Scott and Howell, 2008; McCaslin & Scott, 2003; Burchill and Fine 1997). Accordingly, the version of Grounded Theory developed by Strauss and Corbin (1992) was deemed more appropriate in this research because Grounded Theory allow the theory to develop based on comparative analyses (or constant comparison) between or among groups of persons within a particular area of interest, and this is considered a central feature of Grounded Theory which will allow the researcher to recognise patterns and find the relationships (Glaser & Strauss, 1967; Strauss & Corbin, 1994; Morse & Field, 1995).

In order for researchers to come up with the theory, they are required to understand the problem through the words of the respondents and how the respondents or participants dealt with such situations. The results of the Grounded Theory methodology will be more contextual explanations rather than descriptions, which will provide the *"theoretical lens"* for researchers and practitioners to share the research results in the practical life (Creswell, 1998; Partington, 2000; Locke, 2001; Dick, 2002).

> According to Glaser (2003) novice researchers must have an ability *"to conceptualise, to organise, to tolerate confusion with some incident depression, to make abstract connections, to remain open, to be a bit visual, to thinking multivariately, and most of all to trust to preconscious processing and to emergence"* (p:62).

It is obvious that the differences between the terms ‘Grounded Theory’ and ‘qualitative data analysis’ are not clear in research practices. At the same time, researchers have to differentiate between using the Grounded approach to data collection or analysis, or the combination of Grounded Theory and qualitative data collection methods, and the original application of traditional Grounded Theory (Pettigrew, 2000). Easterby *et al.* (2006) found that Grounded Theory is more related to emergence and discovery rather than accuracy and verification in qualitative data analysis. On the other hand, the case study method involves a constant comparison method that will help the researcher in developing the theory and building a story line (Rothwell, 1980).

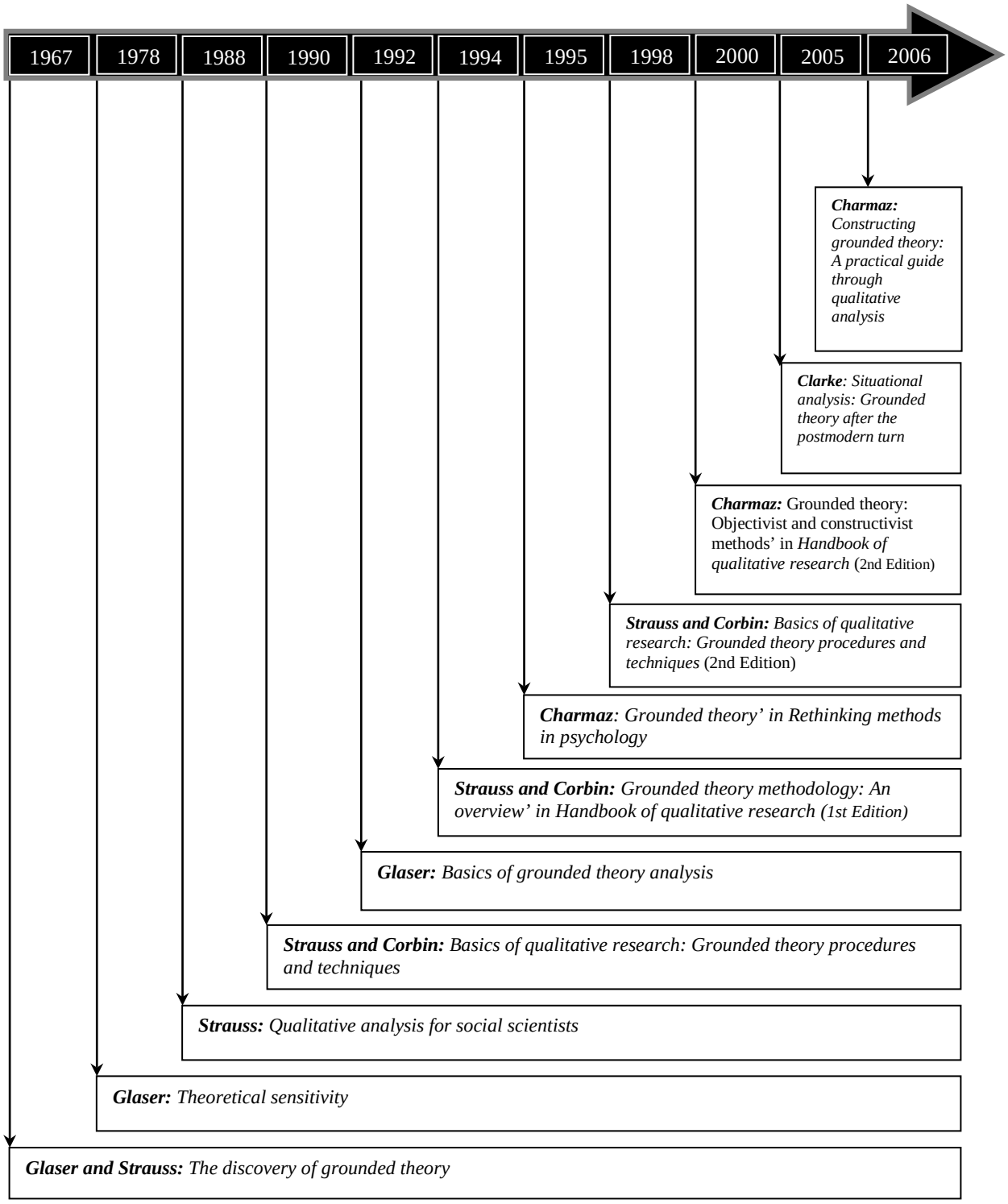



**Figure 6.5: The chronological development of Grounded Theory (Adapted from Birks and Mills, 2011)**

According to Huberman and Miles (1994), the research method operates based on the importance of gaining familiar with the specific setting(s) to measure behaviour and generate practical theories and concepts for social actors and theorists. The method of Grounded Theory begins with no specific research question (Melia, 1996), and the questions slowly emerge from a broad research area to data relevant to the chosen social phenomenon (Wuest, 1995; Glaser, 1992).

It is important to consider the literature as another informant and not the dominant contributor to the emerging interpretations (Goulding, 1998), and the main aim of this step is to prevent contamination of the analysis with preconceived theories to present a fresh perspective on the phenomenon (Locke, 1996).

The difference in approach between the two founding fathers (*Barney Glaser* and *Anselm Strauss*) of Grounded Theory is on the extent to which researchers should avoid all relevant material prior to the analysis of the data, which is a point of contention among Grounded theorists. Strauss and Corbin (1990) allowed some flexibility to have some in depth reading of the literature in the early stages, but Glaser (1992) did not allow any contamination until identifying of the core category(s) that were obtained from the data collected (Goulding, 1998; Melia, 1996). The interests and attentions of the research area were accumulated from the researchers' past experience (Kools *et al.*, 1996).

In this research, the area of this research is concerned with the researcher's previous experience in the area of forecasting management in the pharmaceutical industries, methods of handling the process of forecasting, and, at the same time, the impact of forecasting on the whole performance. The professional experience exposed the researcher to the field of forecasting management in pharmaceutical and FMCG companies. According to Goulding (1998) and Hirschman and Thompson (1997), the prior knowledge of researchers is appropriate and recommended as it will be utilized in the literature review, as well as in the data collection and analysis. Grounded Theory is very flexible in application and provides the researchers with wider analysis techniques to achieve the research requirements and objectives.

Grounded Theory is a well-established methodology that is widely recognised by different researchers in business research (Ng, 2005; Ng and Hase, 2008). The systematic procedures and

techniques of Grounded Theory will help researchers to tail a practical framework for the empirical work and data collection processes. The researchers should check the saturation level of the data to finish the process of data collection.

Martin and Turner (1986) mentioned that Grounded Theory is suitable in complex situations, where it can help n generating a comprehensive account of organisational action. On the other hand, Locke (2001) said that the Grounded Theory is *"particularly appropriate to researching managerial behaviour"* as it provides explanations to the complexity of the managerial process, which further adds to its appropriateness for this research.

### 6.4.2 The Elements of Grounded Theory

There are three fundamental elements of the Grounded Theory including *concepts*, *categories* and *propositions*.

***Concepts*** are derived from conceptualisation of data collected, which is considered as the basic units of analysis to develop theory.

> *"Theories cannot be built with actual incidents or activities as observed or reported; that is, from raw data. The incidents, events, happenings are taken as, or analysed as, potential indicators of phenomena, which are thereby given conceptual labels… Only by comparing incidents and naming like phenomena with the same term can the theorist accumulate the basic units for theory"* (Corbin and Strauss, 1990:7)

***Categories*** are the second element of the Grounded Theory, and categories were defined by Corbin and Strauss (1990).

> *"Categories are higher in level and more abstract than the concepts they represent. They are generated through the same analytic process of making comparisons to highlight similarities and differences that is used to produce lower level concepts. Categories are the cornerstones of developing theory. They provide the means by which the theory can be integrated"* (Corbin and Strauss, 1990: 7).

***Propositions*** are the third element of Grounded Theory, it was hypothesis by Glaser and Strauss (1967), but Whetten (1989) found propositions more appropriate because he explained that propositions involve conceptual relationships whereas hypotheses require measured

relationships, because Grounded Theory does not measure the relationships, but produces conceptual relationships (Pandit, 1996).

> *"Grounded Theory is not generated a priori and then subsequently tested. Rather, it is, inductively derived from the study of the phenomenon it represents. That is, discovered, developed, and provisionally verified through systematic data collection and analysis of data pertaining to that phenomenon. Therefore, data collection, analysis, and theory should stand in reciprocal relationship with each other. One does not begin with a theory, then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge* (Strauss and Corbin, 1990:23).

### 6.4.3 Building the Grounded Theory

With reference to Pandit (1996), there are five phases in building the Grounded Theory as shown in Figure (6.6), which are the research design, collection of data, data ordering, analysis of data and literature comparison. These phases are not strictly sequential, and each phase contains different procedures that will be used to judge the quality of the Grounded research based on four criteria including the construct validity, internal validity, external validity and reliability. These criteria of quality and ethical considerations are discussed in detail in Section (6.9) and (6.10) pages (163) and (164) respectively. According to Figure (6.6), building the Grounded Theory involves five phases. The first phase is the research design phase, which includes reviewing technical literature and selecting cases. The second phase is the data collection phase, which involves develop a rigorous data collection protocol and entering the field. The third phase is the data ordering phase, which involves data ordering. The fourth phase is the data analysis phase, which involves analysing data relating to the first case (coding process), theoretical sampling, and reaching closure. The fifth and final phase is the literature comparison phase, which involves comparing emergent theory with extant literature.

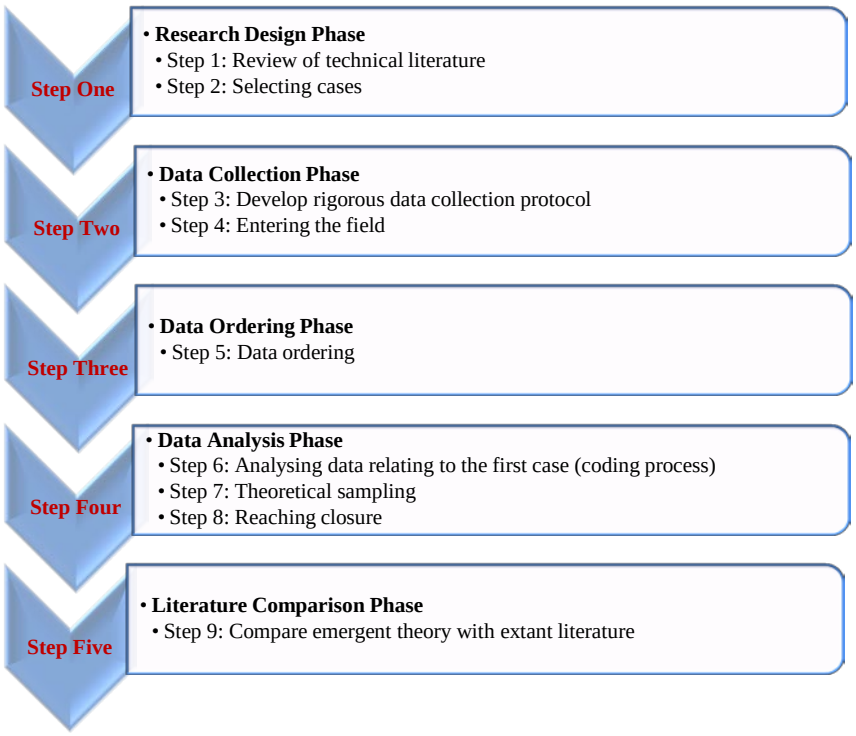



**Figure 6.6: The general five phases in building the Grounded Theory**

## 6.5 Review of Technical Literature

This research is explaining the real applications of the forecasting process in pharmaceutical companies. Fildes (2006) mentioned that some journals, like the *International Journal of Forecasting (IJF)*, have a mission of bridging the gaps between theory and practice. Forecasting is usually managed in the different departments of finance, supply chain and sales/marketing, and it is backbone for any future decision making. The interdepartmental conflicts in managing the forecasts in addition to organisational structure and corporate culture affect the level of coordination and affect the process of handling the forecasts in an efficient way. This research will explore these conflicts that interfere with handling forecasts in the decision making process in pharmaceutical industry.

In order to address the mix of approaches, beliefs and perceptions of different persons in different managerial departments, subjective evaluation (qualitative methodology) is needed to measure the respondents' views through techniques that enable the researcher in achieving the aim and objectives of the research. The respondents' views reflect the quality and texture of

human experiences, and this can be measured successfully by using qualitative methods in detail experiences (Willig, 2001).

The qualitative methods will facilitate arguments and descriptions regarding the size of the problem. At the same time, qualitative methods can explore agreements and contradictions between different departments' views, beliefs and even emotions about forecasting management in pharmaceutical companies. Furthermore, the researcher-respondent relationship is more likely to be less formal than in the case of using quantitative research within a friendly atmosphere, which will provide the opportunity to gain more in-depth elaboration and participation to give the opportunity for respondents to clarify their issues using their own way in explanation. This would be much better in the analysis than the pre-set responses.

The importance of the future forecasting in pharmaceutical companies is related to the improvement of efficiency of this important industry, especially that the R&D investments are related to future forecasting (Smith, 2011). This research will identify different pressures that affect the users' perceptions and actions in different departments, which consequently interfere with the forecasting management. Forecasting the future in pharmaceutical industry is very critical (Johnson, 2005) as it helps in avoiding any future expected crises, and saving efforts and money through mergers and acquisitions, diversification into new areas such as consumer health and geographic expansion. The following section will explain the sampling techniques, methods of data collection and data analysis methods applied.

### 6.6 Selecting Cases / Sample Population

Choosing the target sample is very critical as respondents should be appropriate and matching with the phenomenon under investigation to support the generalisability of the results. The sampling process in a Grounded Theory study is different from that in quantitative research because the research sample cannot be planned earlier; however, the specific sampling decisions evolve during the research process (Strauss and Corbin, 1990).

In this research the sample population is taken from persons who work in international pharmaceutical companies. This exploratory research will bridge the gap in actions and perception between three different departments and accordingly the sample population can be

divided into three divisions; these include people from finance departments, people from marketing/sales department, and people from supply chain department in pharmaceutical companies. Then researcher started to interview people from the marketing/sales at the beginning, where the interviewee in the first interview stressed the impact of the users of forecasts and their judgements on the forecasting process. This was considered as a turnover in data collection and research aims, and, accordingly, the researcher considered people working in the other departments of finance and supply chain, and expanded in exploring the gap areas in forecasting management. The Grounded Theory provided flexibility for the researcher to take aboard this issue which supported the whole idea of the research.

In this research, the researcher contacted people in international pharmaceutical companies who work in the departments of sales/marketing, finance, and supply chain. Pharmaceutical companies were very cautious about being a part of this research, mainly because of the competition, in addition to their assumption that the forecasting techniques and management are well established.

Moreover, because the researcher is using the Grounded Theory approach (Strauss and Corbin, 1991), the interview questions evolved depending on the stage of the data collection. The initial interviews in data collection were unstructured, and focused on asking general questions to test the understanding of the forecasting management. Then each interview was analysed separately to use the codes in the following interview. So the research questions were evolving in each step in the data collection. The researcher stopped to conduct further interviews after reaching the saturation stage at which the no significant new codes emerged.

Approaching the sample in this research was done through a snowball sampling techniques, where the latter is also referred to as network or chain referral sampling as well. The Snowball sampling techniques helped the researcher in contacting different persons in the field of pharmaceutical industry, taking into consideration that getting contacts through friends or colleagues might build up the trust between the researcher and the respondents, but might also affect the opinions of respondents due to exchanging knowledge about the subject of the research. However, the researcher changed the questions in every interview, which helped in decreasing bias in results. The researcher also attempted to get more contacts from each

interviewee working in pharmaceutical companies to access the other users of forecasts. The snowball technique was carried on until the researcher reached a saturation level of information, i.e. the data collection yielded no additional consequential information.

Different pharmaceutical companies were contacted to participate in the research to achieve a comprehensive idea about the research topic. The researcher created a list of all international pharmaceutical companies alongside their contact numbers, as well as the email addresses and contact persons, when possible. Some of the pharmaceutical companies refused to contribute in this study due to confidentiality issues, even though the researcher made it clear in the interview request letters that the information provided will be treated as strictly confidential and completely anonymous to reassure the participants and motivate them to take part in the research.

The researcher focused on the international pharmaceutical companies as these companies are more keen about the future of the industry and future constrains that might affect their performance (Smith, 2011). International pharmaceutical companies were contacted through email, post or phone calls to provide them with a brief about my research and define the research problem to them. Furthermore, and in order to motivate respondents, the researcher promised to provide them with a book of the final work after submitting the final PhD thesis to the research office in University of Huddersfield.

The interviews varied in it length, but the minimum length of interviews was about 30 min and the maximum was 80 min. In total, 18 interviews were conducted. These interviews were conducted with respondents from the finance, supply chain and marketing/sales departments in international pharmaceutical companies.

### 6.7 Data Collection Method and Data Ordering

During the data collection, the research codes and categories were emerged based on the full and deep understanding of the data, and theoretical sampling obligated the researcher to collect data on categories, to be used in the development of properties and propositions until reaching the 'theoretical saturation' stage. The term *'theoretical saturation'* was explained by Glaser and Strauss (1967).

> *"... No additional data are being found whereby the (researcher) can develop properties of the category. As he sees similar instances over and over again, the researcher becomes empirically confident that a category is saturated ... when one category is saturated, nothing remains but to go on to new groups for data on other categories, and attempt to saturate these categories also"* (Glaser and Strauss, 1967:65).

The researcher started to evaluate forecasting management in international pharmaceutical companies from the marketing/sales prospective; however, during the interviews it has been found that the finance and supply chain departments also affect the forecasting decision in different ways. Accordingly, the researcher started to contact people from these departments as well.

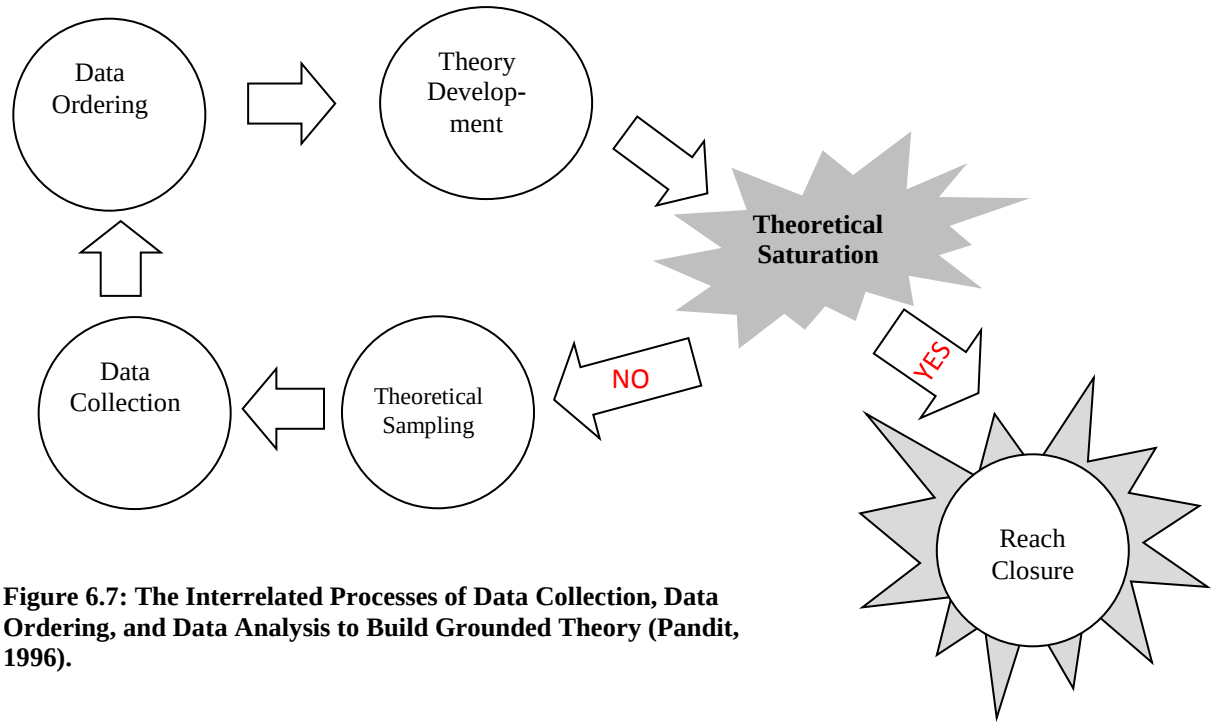



**Figure 6.7: The Interrelated Processes of Data Collection, Data Ordering, and Data Analysis to Build Grounded Theory (Pandit, 1996).**

Unstructured interviews followed by semi-structured interviews were applied in the data collection process. Interviews were audio-taped and then transcribed verbatim before starting the analysis.

- ***In-depth interviews with the experts from pharmaceutical companies:***

The ontological assumption of this research considers people's knowledge, beliefs, understandings, experiences and opinions, in order to understand the underlying perceptions of respondents which reflect people's social realities. In-depth interviews can provide exhaustive and comprehensive information that are useful in exploring new directions and evidence in social sciences (Reige, 2003; Denscombe, 1998). Furthermore, in-depth interviews are considered as the fundamental approach for data collection in qualitative research (Easterby *et al.*, 1991).

Different types and approaches for collecting qualitative data through interviews. Interviews might be conducted in an informal conversational way, in which questions are generated spontaneously during the natural flow of communication. Interviews might also follow a standardised list of questions that is mainly open-ended and organised in a certain flow. From another perspective, interviews might be semi-structured, where they would follow a general guideline of questions that will be discussed and explored with each respondent (Mason, 2002). Semi-structured interviews assist the researcher to identify all relevant issues (Easterby *et al.*, 1991). In addition, semi-structured interviews allow a flexible approach in developing the sequence of question by the interviewer (Jones, 1985), and excessive interactivities between the researcher and the interviewees, which can be initiated by starting with general descriptive questions and probing to allow recalling (Patton, 1990) to extract more information and initiate opinions and feelings.

The interview questions were developed through the interviewing process, the initials interviews were generally unstructured, where the respondents were given the opportunity to talk in general about the subject in order for the researcher to explore codes and ideas about forecasting as a general subject. Then, the researcher analysed each interview to prepare for the following interview, and this was carried out until the saturation level was reached. Through this process, it was noted that each respondent in each department focuses on their own specific terms, thus, leading to creation of different questions between these three departments. For example, the respondents from the finance department focused on the profit and loss statement, currency exchange, cost of sales, whereas the marketing and sales respondents were more into competition, customer care, market segmentation and environmental changes. On the other hand,

respondents from the supply chain department were more into purchasing processes, and raw materials and inventory requirements.

In order to explore the reality of these conflicts and pressures on each department, the researcher focused on questions related to each department at the beginning of the interviews, and then moved on to involve different codes from other departments in order to measure the perception and level of conflict between these departments. For example, in an interview with a respondent in the financial department, the researcher started the interview with financial codes that were obtained from the earlier interviews, and then included the other codes taken from respondents in marketing/sales and supply chain departments to get closer to the reality. All questions were open-ended to allow the respondents to talk freely about their experiences and their level of knowledge about the subject (Sekaran, 1984). Probing was used to make the interviews more like conversations of purpose; this contributed to improving the participants' verbalisation and conceptualisation (Burgess, 1984), in addition to allowing respondents to use their own words and ways of explanation.

The in-depth interviews can be biased due to the effects from the interviewer on interviewees in the way of asking question or interpreting responses (Easterby *et al.*, 1991). To reduce the possibilities of any errors or misinterpretations, the interviewer can decrease this bias by reflecting on the respondents' responses. Accordingly, this was applied in interviews in this research, which helped the researcher in confirming personal perceptions and understandings, while, at the same time, allowing participants to re-consider their answers and possibly elaborate more on them.

After conducting a few interviews, the researcher carried on with semi-structured interviews, which were divided into three parts. The first part included a general introduction about the research topic and what is going on; at this stage the researcher left the respondents to freely explain their views about this topic and evaluate the need for the research. The second part included more direct questions based on the codes that the researcher has derived from the previous interviews and literature. The final part of the interviews was about the respondents' personal views and ways of developing the process of forecasting in international pharmaceutical companies.

All questions focused on the process of forecasting in international pharmaceutical companies and each interview was based on the analysis of previous interviews and literature, which lead the data to evolve over time in a relevant direction to fulfil the research objectives. The last interview did not provide any consequential data, and, thus, the saturation level was reached (Glaser and Strauss, 1967).

### 6.8 Method of Data Analysis

The method of data analysis was identified by Strauss and Corbin (1990) as:

> *"The touchstone of your own experience may be more valuable an indicator for you of a potentially successful research endeavour"* (Strauss and Corbin, 1990:35-36).

Despite the fact that the qualitative methods, including the Grounded Theory, can't have prescribed or standard procedures, research tools can explain the process (Scott and Howell, 2008). According to Pandit (1996) The data analysis stage comes after the data ordering, and it is considered the central point in building the Grounded Theory research, as shown in Figure (6.7) page (148), the data collection, ordering, and analysis were interrelated to construct the Grounded research.

In order to generate Grounded Theory, the researcher engaged in a rigorous and iterative process of data collection and constant comparative analysis; this aimed at bringing the raw data to increasingly higher levels of abstraction until theory is generated. This method of theory generation has very well defined and clearly articulated techniques for data analysis embedded within it. It is this clear articulation of Grounded Theory techniques that have brought them become central to many qualitative data analysis strategies.

There are big debates in carrying out the analysis of data in Grounded Theory (Boeije, 2002). However, the lack of a clear process for analysis in Grounded Theory motivates researchers to be creative in using the art and science in the analysis (Strauss & Corbin, 1998), which might confuse un experienced researchers (McCaslin & Scott, 2003). Many studies described different approaches in data analysis (Scott and Howell, 2008), however, Boeije (2002), McCaslin and

Scott (2003), Scott (2002), and Suddaby (2006) suggested increasing the systematisation in the analysis.

The Grounded Theory approach that was developed by Strauss and Corbin (1998) provides guidance to the research step by step to assure the outcome of good theory, where such theory is characterized by generalisability, reproducibility, precision, rigour, and verification. Strauss and Corbin (1998) mentioned that Grounded Theory is *"theory that was derived from data systematically gathered and analysed through the research process"* (P: 12). Moreover, Charmaz (1994) suggested, *"the researcher constructs theory from the data. By starting with data from the lived experience of the research participants, the researchers can, from the beginning, attend to how they construct their worlds. That lived experience shapes the researcher's approach to data collection and analysis"* (p:68).

Strauss and Corbin (1998) mentioned that researchers who are using the Grounded Theory to analyse will *"uncover relationships among categories . . . by answering the questions of who, when, why, how, and with what consequences . . . to relate structure with process"* (Strauss and Corbin, 1998:127)

As suggested by Strauss and Corbin (1998), the researcher in this research will use the diagrams to illustrate and explain the axial coding and core categories of the research. The data analysis started from the beginning of the data collection process. Figure (6.8) page (158) explains the steps of data analysis and collection. The figure shows that the analysis of qualitative data in this research is composed of eight phases including the start with unstructured and semi-structured interviews, and then coding, find similarities to make core categories, and then conduct the core categorical relationship, then conditional relationship guide, followed by reflective coding matrix, then interpretation and finally the development of the story line. Each of these phases will be explained next in more detail.

***Phase one: Unstructured and Semi-structured interviews***

The respondents in the international pharmaceutical companies were approached through emails, post and phone calls. The initial interviews carried out in this research were unstructured for reasons that were explained earlier. Following that, the researcher carried on with semi-

structured interviews in which general questions about the forecasting techniques and management were asked.

As indicated by Strauss and Corbin (1990), the *'technical literature'* is the source of research questions; this is the literature that relates to the research subject, which should tell the general research problem. The research becomes more focused after selecting the first case or the principal unit of data, which is based on theoretical sampling (Pandit, 1996).

The researcher transcribed each interview in this research before starting the following one, where the latter was based on the analysis of the first interviews to allow the emergence of knowledge about the research subject. This was done based on the principles of conducting analysis in Grounded Theory, as stated by Glaser and Straus (1967) *"The process of data collection for generating theory whereby the analyst jointly collects, codes, and analyses his data and decides what data to collect next and where to find them, in order to develop his theory as it emerges"* (Glaser and Strauss, 1967:45).

The initial interviews were considered as a part of building experience in the process of interviewing respondents. The initial interviews also gave the opportunity to explore the open codes that will be used in the analysis.

After getting approval from the respondents, the interviews were audio taped. In total 9 were audio taped, and 9 were not since the interviewees refused that, however, written notes were taken during these interviews. The advantages of using audio taping is that the researcher will have the opportunity to repeat the interviews as many times as needed to get the actual and complete assessment of the data. Furthermore, audio taping gives evidence that supports the trustworthiness and rigour of the research process and findings. The audio taping was used in transcription of the interviews to prepare for the analysis. The transcriptions did not include gestures and pauses as these did not affect the interpretation of the data.

After each interview, the researcher analysed each one to break down the information into open codes, then the information were used to link it to previous interviews to help the researcher in identifying common and conflicting points of view between respondents. Any uncertainties were

clarified by modifying and developing new interview questions. This was done based on the constant comparison method, which is applied in Grounded Theory.

The interviews and analysis continued till reaching the saturation level (in *phase six* of the analysis), where the same codes and information were largely repeated (Glaser and Strauss, 1967). Strauss and Corbin (1990) identified the saturation level when categories identified in the research will connect to each other, and further interviews will not provide new inputs, but will rather repeat the same information and data that had been collected before. As this research involved three different departments, each respondent provided his views based on the questions that were produced according to the analysis of previous interviews and literature. The researcher avoided imposing personal views in interviews with respondents, whether from finance, supply chain or marketing/sales departments, to specify answers and prevent any interference of the researcher's knowledge in the respondents' answers (Mason, 2002).

***Phase two: Coding***

> The coding process "*represents the operations by which data are broken down, conceptualised, and put back together in new ways, it is the central process by which theories are built from data"* (Strauss and Corbin, 1990:57).

According to Creswell (1994), meaningful data can be extracted through miscellaneous processes and in different directions, and deciding the direction of data analysis and determining the themes is influenced by the research objectives that will determine the areas of comparison and interest.

Because of the nature of the qualitative data and interviews, some data are not relevant to the research and can be considered as extra data that are not needed to address the objectives of this research (Silverman, 2000). Despite this fact, the researcher should not ignore these data, and they should be coded to make clear differences that are important for the research findings and contribution (Knight, 2002).

It is critical to prevent short-sightedness during the process of developing codes, and to have them arranged all together (Huberman and Miles, 1998; Knight, 2002). The generated codes that

are not related to the research literature or research assumptions were also continuously tested and checked against their thematic categories to ensure they fitted within them.

Consequently, conditions and dimensions are developed, and finally, through an interpretive process called selective coding, theory starts to emerge (Glaser, 1978; Glaser & Strauss, 1967; Strauss & Corbin, 1990). Nevertheless, the data generated were not all handled at the same time, but were rather put aside for some time during the analysis and attended to later for any inconsistencies or irregularities in setting codes or thematic categories. Accordingly the researcher double checked the coded transcripts at different times to evaluate their relevancy and suitability of the codes assigned; this also provided the opportunity for the researcher to modify and adjust the research codes.

The coding process is divided into three analytic types including open coding, axial coding, and selective coding, and it not strictly necessary to move sequentially from the open through axial to selective coding. The following will explain each of these types.

***Action one*** ➔ **Open coding**

Open coding is the initial stage of the Grounded Theory analysis (Glaser and Strauss, 1967; Strauss and Corbin, 1990). The open coding is related to identifying, naming, categorising and describing phenomena found in the text, where each line and sentence is read and coded, through the *constant comparative method* (Scott and Howell, 2008). This method enables the researcher to derive general descriptors and understand the construction of interrelationships to be used in the researcher's analytical properties, and these are considered the basic building blocks in the construction of Grounded Theory.

> *"Grounded Theory is based on a concept-indicator model, which directs the conceptual coding of a set of empirical indicators. This model provides the essential link between data and concept, which results in theory generated from data... "*(Glaser, 1978:29).

The open codes will go through the process of elaboration, refining and reduction of the results. The similar data will be grouped together and labelled under the same conceptual label, this process is called *categorising*.

These concepts were put into categories to be linked through finding the relationship in a process called *axial coding*.

***Action two*** ➔ **Axial coding**

Axial coding is the process of finding the connections between a category and its sub-categories, which will results in developing research categories. These connections will be in the form of hypothesised propositions specifying conditions.

***Action three*** ➔ **Selective coding**

Selective coding is the process of *integration* of the categories to create the initial theoretical framework or core categories as in phase three.

***Phase three: Core categories***

Strauss and Corbin (1990) recognise the core categories as the *"…the sun, standing in orderly systematic relationships to its planets"*. Core categories are the central ideas or phenomena and are the first story line in the generation of theory. The story has a descriptive nature about specific phenomena of the research; however, the *story line* is a process of *abstracting* and *conceptualisation* of the story of the research. Writing memos is an important activity during the open coding process, which was recommended by Corbin and Strauss (1990) who mentioned that *"Writing theoretical memos is an integral part of doing Grounded Theory. Since the analyst cannot readily keep track of all the categories, properties, hypotheses, and generative questions that evolve from the analytical process, there must be a system for doing so. The use of memos constitutes such a system. Memos are not simply ideas; they are involved in the formulation and revision of theory during the research process"* (p:10). There are three different types of memos including code memos, theoretical memos and operational memos. The first type code memos, are needed to explain the links between open codes and decide the conceptual labelling. On the other hand, the theoretical memos link the axial and selective coding. Operational memos contain directions that represent the evolving research design. The categories are linked to the core category through the *core categorical relationship.* Appendix One provides an example of the memos used in research analysis.

***Phase four: Core categorical relationship***

The core categorical relationship is based on the *schema* which can be analysed by identifying the causal conditions that will lead to the development of phenomena. Here, the context is considered as a set of intervening conditions in which the phenomena are expressed or formulated. As a result of phenomena, actions/interactions occur leading to intended or/and unintended outcomes and responses that are called consequences (Pandit, 1996). Subsidiary categories can be included in the analysis; these categories may explain the linkages between categories and improve the level of complexity of the data analysis and validation.

Understanding the core categorical relationship can be done in the following phases of the reflective coding matrix and the conditional relationship guide, in order to help the researcher in developing emerging theory, because these steps will provide the opportunity for the researcher to fill gaps in the codes and reach closure at the stage of theoretical saturation, which is the stage at which the marginal value of the new data is minimal (Pandit, 1996).

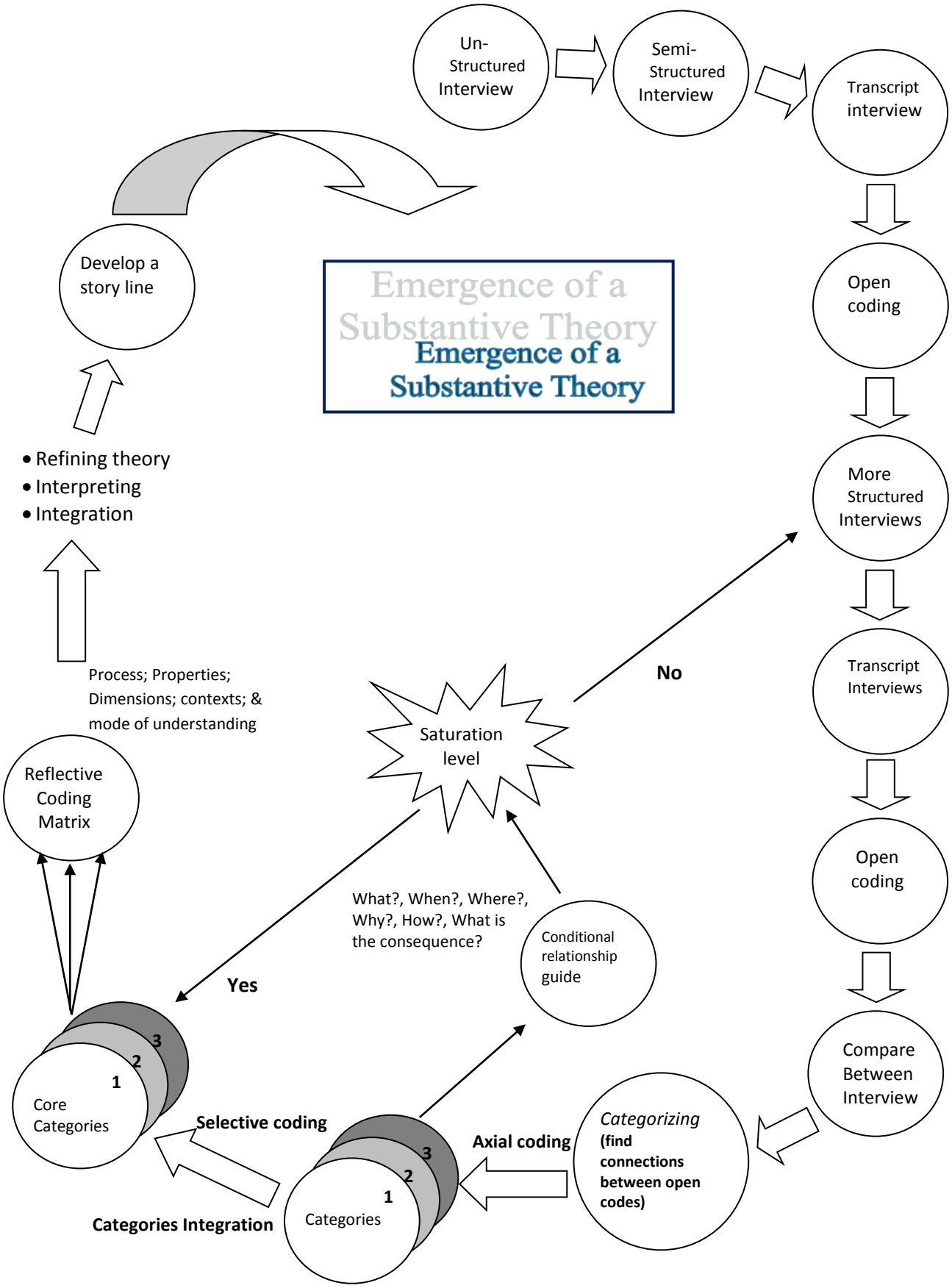



**Figure 6.8: The process of collecting data and analysis based on grounded theory method and methodology (Author's work, 2012).**

***Phase five: Conditional relationship guide***

The conditional relationship guide will help the researcher to contextualise a central phenomenon by arranging the relationships between the categories. According to McCaslin (1993), the conditional relationship guide or conditional matrix will help the researcher in constructing theory (Scott and Howell, 2008; Strauss & Corbin, 1998).

The data are initially broken down by asking the questions of what, when, where, why, how, and what are the consequences (Strauss & Corbin, 1998). These questions and categories are collected in Table (6.2). Each question in the table will be answered by using the participant's words to avoid bias. These questions helped the researcher in reaching the saturation stage in this research. According to Scott (2004), the conditional relationship guide can be conducted by asking the following questions:

- *What is [the category]? (Using a participant's words helps avoid bias)*
- *When does [the category] occur? (Using "during . . ." helps form the answer)*
- *Where does [the category] occur? (Using "in . . ." helps form the answer)*
- *Why does [the category] occur? (Using "because . . ." helps form the answer)*
- *How does [the category] occur? (Using "by . . ." helps form the answer)*
- *With what consequence does [the category] occur or is [the category] understood?* (Scott, 2004: 205, cited in Scott and Howell, 2008:6)

| ***Conditional relationship guide*** | | | | | | |
|---|---|---|---|---|---|---|
| Category | What | When | Where | Why | How | What are the consequences |
| Subcategory (or axial code 1) | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes |
| Subcategory (or axial code 2) | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes |
| Subcategory (or axial code 3) | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes | Answered from open codes |

**Table 6.2: The conditional relationship guide (Scott and Howell 2008).**

Due to the emergence of the different participant's characters in this research, the researcher will conduct different conditional relationship guides for each group in the research, and then the

researcher will fill the gaps in the level of managing the forecasting between the three departments in pharmaceutical companies. The constant comparative nature will make sure the research will reach into the saturation stage which is needed to construct theory. The continuous interaction between the participants with their realities during the time of research will not affect the researcher's results of the research because the research problem is not related to time. Strauss and Corbin have referred to that dynamic element as *process*.

The conditional relationship guide presents the process of moving the open coding to axial coding and according to Scott (2004) *"this method (conditional relationship guide) also began to help the dimension of time, or process, to emerge, and move the concepts from a flat, linear conceptualisation to a more complex pattern of understanding"* (p:83).

After the development of the conditional relationship guide, the researcher can evaluate the relationship between the research categories, to support the central phenomenon (Scott and Howell, 2008). This table, especially the consequence categories emerging, will be very useful in the reflective coding matrix to explain the dimensions and conditions of the story line (Glaser & Strauss, 1967; Strauss & Corbin, 1998).

According to Richardson (2000), the subjectivity of the data is the main motive for the crystallised verification in the relationships between the data collected in different directions, and this is why memos are a very important step in the analysis of data (Glaser & Strauss, 1967; Glaser, 1978; Richardson, 1994).

***Phase six: reflective coding matrix***

> *"The conditional relationship guide contextualises the central phenomenon and relates categories linking structure with process. The reflective coding matrix serves as a bridge to the final phase of Grounded Theory analysis, selective coding and interpretation, and, ultimately, to substantive theory generation"* (Scott and Howell, 2008:1).

After reaching the theoretical saturation level, the researcher will consider the consequence categories (Glaser, 1978) in the conditional matrix, the research will move forward to the process of interpretation and theory and development of the story line.

Once the researcher recognises the core category, all the other categories become subcategories, which will be used in the reflective coding matrix to become the *core category descriptors*. These descriptors are defined in relation to core category based on the *"the properties, processes, dimensions, contexts, and modes for understanding the consequences of the central phenomenon of interest"* (Scott and Howell, 2008).

The reflective coding matrix descriptors can be identified based on the conditional relationship guide, and they link with the core category. The descriptors are the characteristics of the core categories.

The reflective coding matrix is important to construct the relational hierarchy, contextualise the core category and link the major and minor sub-categories (Strauss & Corbin, 1998) in a table in order to clarify the picture of the central phenomenon through defining and describing the core category. The reflective coding matrix is described as in Table (6.3). The researcher processes the easiest descriptor to start with at the beginning of the reflective coding matrix, because it involves actions and interactions, and, at the same time, it will help in constructing the matrix and, consequently, the story line.

> "*Identifying the reflective coding matrix descriptors is rather like putting a jigsaw puzzle together, trying a piece at a time through multiple iterations until all of the pieces form a narrative picture that fits with verisimilitude as perceived by the researcher, the participants, and the extant literature. Next the researcher identifies which of the primary consequence categories is the mode for understanding the consequences of a core category. As with the context, there should be a good fit with the process. Early in the process it might seem that some selected categories fit in multiple descriptor blocks"* (Scott and Howell, 2008:8).

| ***Reflective coding matrix*** | | | | | |
|---|---|---|---|---|---|
| *Central Phenomenon* | *Core Category Name* | | | | |
| Processes *(actions/interactions)* | | | | | |
| Properties *(characteristics of category)* | | | | | |
| Dimensions *(property location on continuum)* | | | | | |
| Contexts | | | | | |
| Modes of understanding the consequences *(process outcome)* | | | | | |
| | *Story one* | *Story two* | *Story three* | *Story four* | *Story five* |

**Table 6.3: The reflective coding matrix (Scott and Howell, 2008).**

Memos during the data analysis will help the researcher finish the reflective coding matrix and succeed in identifying the core category to the readers through improving the understanding of the relationship between the data. Each column and raw in the reflective coding matrix, moving from left to right and from top to bottom, should make sense and provide a story. The initial reflective coding matrix can be changed several times till the story line matches with the data collected and to the literature review. The last stage in the process of analysis in the Grounded Theory is integrating, interpreting, and refining the theory (McCaslin & Scott, 2003; Strauss & Corbin, 1998).

### *Phase seven: Interpretation and theory*

As mentioned earlier, and according to Strauss & Corbin, (1998), the selective codes are used to integrate all the interpretive work of analysis which will explain the story line. At this stage the researcher managed to establish categorical relationships through the use of conditional relationship guide and the reflective coding matrix, which will describe the central phenomenon and discuss its process as it exists dynamically in its ecology (Scott and Howell, 2008).

***Phase eight: Development of the story line***

After the use of the two tools, the conditional relationship guide and the reflective coding matrix, the researcher should be ready to develop the cohesion and trustworthiness story line. Reading the reflective coding matrix from left to right should describe the participants' story of the central phenomenon, and each process of the analysis is described and supported in participants' words. *"Each researcher constructed a conditional matrix based on his or her study's reflective coding matrix that serves as a model representing the emergent theory"* (Scott and Howell, 2008:14).

## 6.9 Ethical Considerations

According to Opie (2004) the main objective of the ethical considerations in research is to avoid any dishonest behaviour through applying the moral values. At each stage of the research, the researcher needs to consider ethical issues (Punch, 2005).

As shown in Appendix Two, the interviewees were contacted through a written paper from the university signed by the research supervisor. The paper mentioned the subject and the aim of research and the expected duration of the interview. The paper stated clearly that the main objective of the interview was for academic purposes, and that interviewees' and companies' names will remain completely anonymous, as well as the contents of the interview which will be treated as strictly confidential. The data will not be kept longer than necessary to complete a full analysis, and no company or individual will be contacted as a result of the information provided. As a motivational factor to receive more respondents the researcher mentioned that the findings of this research will be shared once the study is completed. The researchers asked the interested respondents to set a time depending on their own convenience.

Such considerations were necessary to encourage more respondents and motivate them to take part in the research. Punch (2005) contended that establishing mutual interest in the research objectives and having respondents more motivated to invest in their time will support the ethical considerations of the research. People, who did not respond to the researcher's communication, were not contacted again. In the initial stages, the respondents were hesitant to participate due to sensitivity of the subject, and possibly the company's strategies and performance. Furthermore,

some respondents did not consider the importance of the subject, or they might not have had enough knowledge about the forecasting topic. On the other hand, some respondents found the topic very interesting to evaluate the current situation in the pharmaceutical industry.

The researcher is the one who is responsible of protecting the identities of respondents (Patton, 2002). Accordingly, the transcripts of interviews and the quotations taken from them were labelled by the users' job, i.e. the finance interviewees' were labelled with an F, whereas the supply interviewees' were labelled with an S, and the marketing interviewees' were labelled with an M. Transcripts were saved on the university' computer that is only accessible by the researcher with a private password.

### 6.10 Trustworthiness and Rigour

Punch (2005) pointed out the advantages of having full details from respondents in qualitative research, where the research trustworthiness and rigour can be achieved by the establishing the process of data collection and the building up of knowledge through the interviews and research program. The good practice includes the researcher's orientation and close engagement with the material in addition to grounding of interpretations using examples and providing more descriptions than explanations.

The formal 'trustworthiness' and 'rigour' of qualitative research can be achieved through certain criteria which are credibility, transferability, dependability and confirmability (Lincoln and Guba, 1985).

Lately, there have been attempts to establish the quality standards in qualitative research. Stiles (1993) set two quality standards, the ***first*** *is the standard of good practice,* which represents the reliability and internal validity in traditional quantitative research, and reflects the "*trustworthiness of observations and data"*. These elements of reliability and internal validity are replaced by the *creditability* and *dependability* elements in qualitative research (Elliott, 1999). Reliability means that the future researches about the same method of data collection and analysis will provide the same results (Pandit, 1996), while dependability reflects the extent to which the research findings would be replicated in case the study was repeated with similar subjects and in a similar context.

*Second* *the standards of validity* that reflects the "*trustworthiness of the interpretations or conclusions drawn from the data"*. The *internal validity* includes providing evidences regarding the value of the interpretation and establishing causal relationships that might indicate other conditions (Pandit, 1996). It also involves showing clear consistency in the researcher's interpretations (Stiles, 1993). It is considered in the *transferability* and *confirmability* of the qualitative research (Elliott, 1999).

Each of these four elements of credibility, dependability, transferability and confirmability, which are essential for establishing the trustworthiness and rigour in qualitative research, will be discussed next.

### 6.10.1 Credibility of the Research

The credibility represents the extent to which the observations make sense and match with the reality. It is considered as very significant criteria in establishing trustworthiness (Lincoln and Guba, 1985).

Using audio recording to record interviews is very important in supporting the credibility of the research. Audio recording provide significant amounts of data that can be used to provide valuable analysis and interpretation (Silverman, 2000). In this research, the researcher audio taped 9 interviews, while 9 interviews were not recorded since the respondents did not approve that. The data were transcript for the analysis to support researcher's interpretation.

According to Lincoln and Guba (1985), and Erlandson *et al*. (1993), prolonged engagement with interviewees increase the credibility of the research due to the development of informal relationships and interactive conversations with interviewees.

The use of a certain research methodology should be compatible with the topic of the research (Yin, 2003). The Grounded Theory is very compatible in researches that investigate organisational behaviour and issues at the managerial level. It helps the researcher in building up knowledge through interviews and provides views and explanations to managerial behaviours. This research focuses on the inter-departmental management of forecasting through identifying management influences and users' behaviours towards the understandability of forecasting in

different departments in international pharmaceutical companies. The management influences vary depending on the organisational culture, departments and individuals that use the forecasts. The researcher considered the use of qualitative collection of data by using the Grounded Theory. Selecting Grounded Theory is related to the knowledge and past experience of the researcher in the field of pharmaceutical industry and forecasting. Furthermore, the interviewees found it easier to explain in their language the process of managing forecasts and evaluating performance. The researcher analysed every interview and used the analysis in the following interview for developing new information and building up of knowledge.

Shenton (2003) believed that people who had been contacted have the right to refuse participating in the research to get the chance for honest views of interviewees. Contacting the interviewees was done through sending emails, post and making phone calls which enable the researcher to provided them with a small introduction about the topic of the research, in addition to the researcher's contact number and supervisor's approval as shown in Appendix Two, and only those who showed interest in taking part in the research were interviewed. Moreover, the researcher contacted some respondents by the use of the university's email, as in Appendix Three.

The creditability of the research was also supported through limiting the sampling among people who are involved in the forecasting process and the users of forecasts. The respondents were very motivated about the subject, but were anxious at the same time, which could be probably related to certain company policies in the pharmaceutical industry. The sample that was considered in this research represented the international pharmaceutical companies as they all face the same pressures and challenges. The level of forces might vary depending on the size, type of product, laws and regulations. The representative sample helps to uncovering the unknown influences that may exist on the forecasting processes in this type of business (Bouma and Atkinson, 1995; Preece, 1994).

The researcher's background, qualifications and experience are critical in the interpretation of data collection in qualitative research, which added credibility for the research and results (Patton, 1990; Alkin *et al.*, 1979). The researcher used to work in different departments in pharmaceutical industry in sales and marketing departments. His role was to contact different

people in planning and supply chain departments in addition to his contacts in financial departments. The researcher participated in the future development of existing and new projects, and also holds a degree in pharmacy, which allowed smooth discussions and engagement in the problems facing the pharmaceutical forecasting management using the respondents' language and way of thinking. The interviews provided a clear picture about the nature of the conflicts and the views related to forecasting from each individual in pharmaceutical companies.

### 6.10.2 Transferability of the Research

According to Punch (2005), the transferability of qualitative research represents the generalisability of the research and it refers to the extent to which the results of the research can be applicable in other contexts. In the quantitative research, transferability matches with external validity that is demonstrated by the positivist's work, and shows that the results can be applied to larger populations (Merriam, 1998). External validity requires the researcher to provide a clear area of research that supports generalisation that involves certain and broad theory rather than broad population, and the references should be analytic and not statistical (Pandit, 1996).

Different authors like Cole and Gardner (1979), Marchionini and Teague (1987), and Pitts (1994) highlighted considering clear viewpoints in establishing transferability of research findings. Erlandson *et al*. (1993) discussed the limitations of findings of qualitative research as they are based on the responses, views, opinions and observations of a limited number of respondents, which makes it not possible to generalise the findings. On the other hand, Denscombe (1998) and Stake (1994) disagreed with Erlandson *et al*. and supported the transferability concept in qualitative research as the research can offer a representative example of a larger group.

So far, the transferability concept had been very critically examined for Gomm *et al*. (2000) due to the significant influence of contextual factors that rely basically on the researcher who has to present sufficient amounts of contextual information to support the fieldwork and the transferability of the findings (Lincoln and Guba, 1985; Firestone, 1993).

In this regard, the researcher considered a number of criteria that included different sizes of the chosen international pharmaceutical companies, in addition to different ranges of the

pharmaceutical products produced by each. In addition to that, the researcher also collected data from international companies using the Grounded Theory where the researcher analysed each interview to build for the coming ones. After analysing the data, the researcher conducted structured interviews with academics to help filling the gap between the practice and academia views. All that supported the transferability of this research.

### 6.10.3 Dependability of the Research

Assessing the dependability of the qualitative research is important, because it determines whether this research would produce replicate findings in case the study was repeated with similar subjects and in a similar context (Knight, 2002).

According to Lincoln and Guba (1985), the higher the credibility of the research, the higher its dependability of results. The researcher addressed the dependability of this research through providing the rationale behind the researcher's decisions at each stage of the research. The researcher also provided a detailed explanation of the research design, and the process by which the research was implemented including details about the fieldwork and data analysis.

Such detailed explanations should enabled others to fully understand the methods and processes applied to measure the effectiveness of the research (Shenton, 2003), and, accordingly, support the dependability of results.

### 6.10.4 Confirmability of the Research

According to Lincoln and Guba (2003) and Miles and Huberman (1994), confirmability of the research is the degree to which the research findings and results do not reflect biases, motivations, interests and viewpoints of the researcher. Shenton (2003) explained that confirmability of qualitative research is related to the objectivity of the research that is determined by making sure that the research findings are related to the respondents' opinions and experiences and not the perceptions of the researcher. However, Lincoln and Guba (2003) argued that the difficulty that might face the researcher in minimising the level of personal influence on the findings of the study.

Confirmability in this research is established through providing explanations about the researcher's beliefs that support the decisions made and methods employed. Furthermore, 9 out of 18 interviews were recorded to allow the researcher to recognise the words under the skin of respondents. At the same time, recordings were used to write transcripts that represented the respondents' views with no additions or cancellations from the researcher's side.

### 6.11 Chapter Summary

This chapter discussed the philosophical background of the research, in addition to the method and methodology used to achieve the research objectives. The methodology chapter linked the literature review with the data analysis and collection processes. The current research paradigm is interpretivism or postpositivism and matches with the views of critical realism, which sees that reality exists outside the mind, so the reality exists whether or not people are aware of it. However, the truth about reality or understanding the reality can only be determined proportionally rather than perfectly.

The nature of the research directs the researcher to choose the suitable methodology in collecting data and analysing it. The chosen methodology for this research is Grounded Theory according to which the data is allowed to emerge. According to Locke (2001), the researcher's experience allowed having some prior specifications of existing theory to enable the narrowing down of data to direct analysis. The data ordering as in Figure (6.6) page (144) and Figure (6.7) page (148) allowed the researcher to reduce the data ambiguity (Miles and Huberman, 1994) that resulted from unstructured data. Furthermore, the constant comparison approach during data collection was important to generate more structured interviews that enabled the researcher to reach the saturation stage. The systematic coding procedures mentioned in Figure (6.8) page (158) provided the researcher with tools to develop a story line. Finally, this chapter presented a detailed explanation about the ethical considerations in this research, and the issues considered that support the elements of trustworthiness and rigour in this qualitative research.

# CHAPTER SEVEN

# DATA ANALYSIS AND PRESENTATION OF RESULTS

This chapter describes the analysis of the data collected as described in Chapter Six, the Methodology Chapter, and presents the results of the research. This chapter also presents an overview of the respondents, the variables that were found, and the relationships between these variables based on the researcher's observations, to enable the researcher to achieve the research aim and objectives, and the readers to connect these objectives with the reality of the research. Some examples of axial codes (or categories) in each core category (selective codes) can be found in Appendix Four. As mentioned earlier in the method of data analysis in Section 6.8, page (151) in the Methodology Chapter.

This chapter is divided into three sub-sections. The First Sub-Section represents the respondents' overviews, and provides an identity and badge assigned by the researcher to each respondent who participated in this research; this is important because there are three groups of users in forecasting management that were considered in the sample, and each of these users was found to have different opinions and variable understanding of forecasting management.

The Second Sub-Section presents the findings from the results. In this sub-section, the researcher presents the findings divided into six *Core Categories* (Selective Codes) as drawn from the analysis, where a number of *sub-categories* (Axial Codes) are explained under each of these core categories. As shown in Figure (7.1), the presentation of each core category and sub-category is followed by a *Conditional Relationship Guide* for each core category to help the researcher contextualise a *Central Phenomenon* under each core category. The central phenomena for each core category are provided, and followed by a *Reflective Coding Matrix* for each core category. Reflective coding matrices are essential for constructing the relational hierarchy and contextualising each core category, while considering any links between major and minor sub-categories; these matrices are provided in tables that help in clarifying each central phenomenon through defining and describing the core category that each central phenomenon relates to. Finally, the researcher develops cohesive and trustworthy *Story Lines*, which are presented in the reflective coding matrices for each core category.

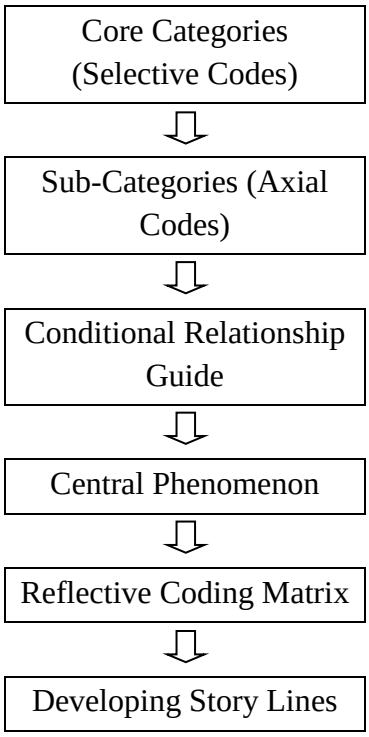



**Figure 7.1: Presentation of findings under each core category in the analysis**

The following Table (7.1) presents the six core categories that were identified in the analysis of this research. The table also shows the sub-categories that fall under each core category as well as the central phenomena derived from each core category. Each of these core categories, sub-categories and central phenomena will be explained in detail in the Second Sub-Section of this chapter.

| Core Categories (Selective Codes) | Sub-categories (Axial Codes) | The Central Phenomena related to each core category |
|---|---|---|
| Forecasting Ambiguity | - The lack of forecasting experts<br>- Inconsistence of the forecasting knowledge<br>- The forecasting construction<br>- Initial forecasting errors | Uncertainty about prediction capabilities in pharmaceutical industries |
| Internal Contamination | - Marketing and Sales views of forecasting<br>- Financial views of forecasting<br>- Supply chain views of forecasting | The variations of values between forecasting users can be destructive or constructive conflicts |
| External Noise | - Market Complexity<br>- Cross boarders' issues<br>- Market instability and turbulence | Inability to predict the uncontrollable issues in pharmaceutical industries |
| Individuals' Celebrity and Users' Insight | - Forecasting-Behaviour relationship<br>- Behaviour-Forecasting relationship<br>- Forecasting credibility | Individuals' celebrity and insight support selling and accepting the forecasts |
| New Product Puzzle | - New guesses<br>- Team work | Solving the new product forecasts puzzle is a team work |
| Management Style and Philosophy | - Functional integration<br>- Performance measurement<br>- Forecasting process | Forecasting procedure is the frame of organisational culture and management style |

**Table 7.1: Core categories, sub-categories and central phenomena identified in the analysis of this research**

The Second Sub-Section will provide a discussion of the findings in order to identify the gaps in the forecasting management practice, and the consequences related to each core category, taking into consideration that the next chapter, Chapter Eight, will present a story line by linking all the core categories together. The Third Sub-Section in this chapter is the summary in which the researcher summarises the findings of the research.

## 7.1 An Overview of the Characteristics of Respondents

The research covers 18 interviews with respondents from pharmaceutical companies who are involved in the forecasting management in the three departments of finance, sales and marketing, and supply chain management. All respondents selected worked in one of these three departments, and involved directly in the process of forecasting management, which enabled the researcher to provide appropriate results that match with research problem. All interviews were conducted by individuals who are working in international pharmaceutical companies inside and outside the UK, and these companies varied based on the type of their business.

The following Table (7.2) and Figure (7.2) provide an overview of the characteristics of respondents involved in this research. The table shows the reference symbols provided for respondents; each reference symbol includes a number from 1-18 indicating the 18 respondents interviewed, and a letter indicating the department in which each respondent works, where M, F and S are used to indicate the departments of Marketing/ Sales, Finance and Supply chain management, respectively. The table also provide a brief description of the pharmaceutical company that each respondent works in, and a note of the position that each respondent holds at the company.

Figure (7.2) also provides a brief description of the pharmaceutical company that each respondent works in, showing whether it is a local or international company, operates in a wide range of markets or a niche market, and whether it manufactures originator or generic products. Providing a summary of such characteristics in Figure (7.2) and Table (7.2) is deemed important as it supports pointing out any major differences between the opinions of different groups of respondents and different types of companies, thus, supporting the investigation of this research objectives.

| Ref. | Company description | Respondents title | Department | Interview |
|---|---|---|---|---|
| 1/M | One of the UK subsidiaries, an *originator* company and specialised in one line of pharmaceutical business | Medical Advisor | Marketing | Tab recorded |
| 2/F | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Treasury Manager | Finance | Notes taking |
| 3/F | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Finance Manager | Finance | Notes taking |
| 4/M | The Global Headquarters of an *originator* pharmaceutical company, with many therapeutic areas | Sales Manager | Marketing | Notes taking |
| 5/M | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Sales Manager | Marketing | Tab recorded |
| 6/M | The Global Headquarters of an *originator* pharmaceutical company, with many therapeutic areas | Sales Manager | Marketing | Notes taking |
| 7/M | The Global Headquarters of an *originator* pharmaceutical company, with many therapeutic areas | Franchise Manager | Marketing | Tab recorded |
| 8/M | The Global Headquarters of an *originator* pharmaceutical company, and specialised in one line of pharma business | Senior Product Manager | Marketing | Tab recorded |
| 9/S | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Supply Chain Manager | Supply chain | Tab recorded |
| 10/S | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Purchaser | Supply chain | Tab recorded |
| 11/S | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Supply Chain Manager | Supply chain | Tab recorded |
| 12/S | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Supply Chain Manager | Supply chain | Tab recorded |
| 13/F | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Financial Manager | Finance | Notes taking |
| 14/M | The Global Headquarters of an *originator* pharmaceutical company, with many therapeutic areas | Marketing Manager | Marketing | Notes taking |
| 15/M | The Global Headquarters of an *originator* pharmaceutical company, with many therapeutic areas | Marketing Manager | Marketing | Tab recorded |
| 16/F | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Financial Managers | Finance | Notes taking |
| 17/S | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Supply chain director | Supply chain | Notes taking |
| 18/S | The Global Headquarters of a *generic* pharmaceutical company, with many therapeutic areas | Supply chain manager | Supply chain | Notes taking |

**Table 7.2: Summary of the characteristics of respondents who participated in the interviews**

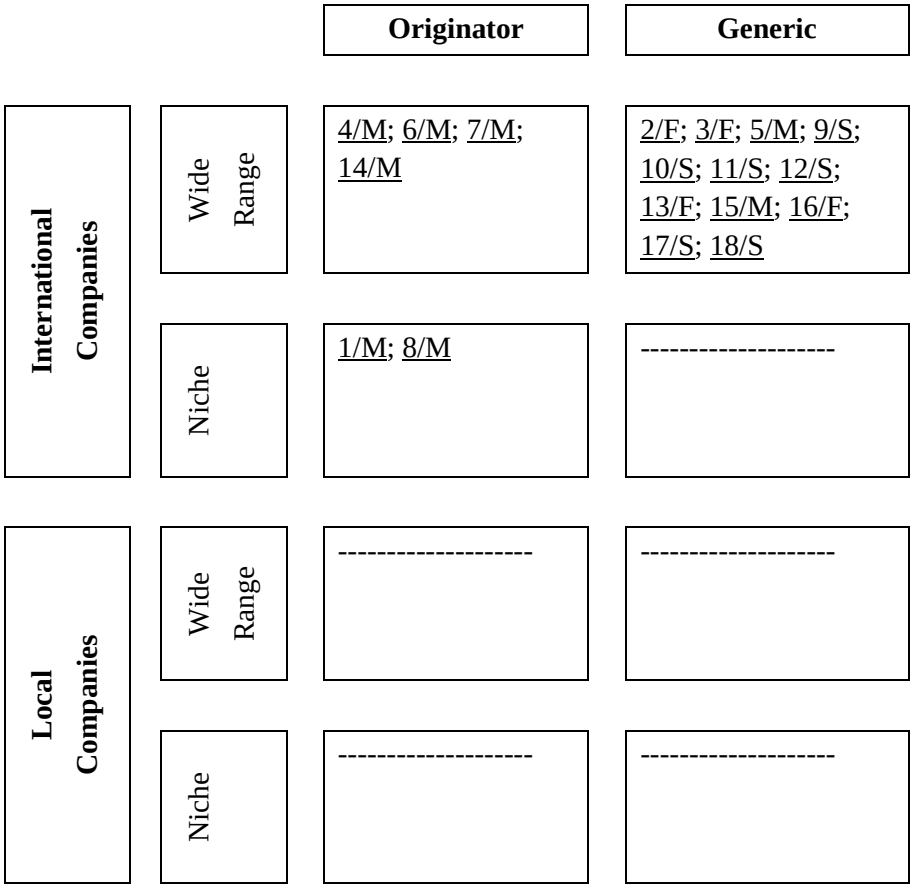



**Figure 7.2: The distribution of international pharmaceutical companies that distributed in the research**

As shown in Figure (7.2), the interviews included six respondents from originator international pharmaceutical companies, four out of which are working in a wide range industry, i.e. these respondents deal with different categories in the pharmaceutical market, whereas the other two respondents have the experience in specialised companies that deal with niche markets on certain diseases like cancer, diabetes and orthopaedics. All respondents working in generic companies are experts in wide range pharmaceuticals. The total number of international pharmaceutical companies that participated in the research was nine companies.

## 7.2 Findings of the Research

This section presents the core categories that were obtained by linking the similar open codes together to get the core categories. The research findings are summarised in six core categories including forecasting ambiguity, internal contamination, external noise, individuals' celebrity

and users' insight, new product puzzle, and management style and philosophy. Each of these core categories is explained in detail next.

### 7.2.1 Core Category One: Forecasting Ambiguity

There are reasonably clear variations between the users' knowledge of forecasting and forecasting techniques; there are also some differences between respondents due to their practical experience and type of companies. The continuous comparison between respondents' interviews revealed clear distinctions in the theoretical and practical construction of forecasts and the consequences of forecasting errors. This core category is a reflection of the initial stage of developing annual plans and setting the forecasts to establish and agree on certain decisions in management meetings. Among the respondents, those working at originator companies showed better understanding of forecasting with lower ambiguity than those at generic companies, however, they both shared a degree of forecasting ambiguity that lead to same problems and obstacles.

The description of this core category is in line with the literature about the forecasting management. Four sub-categories were derived from the First Core Category including the lack of forecasting experts, inconsistence of the forecasting knowledge, the forecasting construction method and dealing with initial forecasting errors. Table (7.3) page (180) shows the conditional relationship guide for the forecasting ambiguity. The aggregation of these sub-categories will lead to the central phenomenon in Table (7.4) page (181) for Core Category One which is: *uncertainty about prediction capabilities in pharmaceutical industries.*

#### 7.2.1.1 Core Category One: Sub-Category One: The lack of forecasting experts

Respondents from the marketing department showed some hesitance in defining forecasting, without realising the importance of the forecasting and the high costs that are linked to the forecasting errors. The majority of respondents mentioned the unavailability of a specialised forecasting department within the organisational structure, due to the high costs of the forecasting experts or forecasting system, so the pharmaceutical companies might face high forecasting errors with an increase in the judgmental forecasting. Moreover, the use of external experts might be difficult because of the confidentiality reasons. The judgemental forecasting is

based on the experience, personal views and assessment criteria which will lead to forecasting bias.

This was mentioned by respondent (1/M) who said that *"forecasting is difficult and easy to conduct, it all depends on the data to judge about the future, we count on marketing people to get the future forecasts"*[6]. From another point of view, respondent (2/F) mentioned that the knowledge of uncertainty is important to consider because forecasting should be built on science and experiment, he also said *"forecasting is the most important stage for us to start setting the future plan, expenses, employment, operations but .... we don't have qualified people to do appropriate forecasts, because of different pressures....."*.

Respondent (7/M), Respondent (6/M) thought that most of the originator pharmaceuticals companies have specialised departments to make forecasting, because it is linked to research and development of new medicines. Moreover, originator companies distribute and market their products overseas and forecasting experts have to be available to support and manage the forecasting process and set targets for the overall organisational goals. Respondent (9/S) said that *"inaccurate forecast confuse us but we do not have experts in this area"*.

Lack of forecasting experts lead to a stage of mysteriousness and low confidence between employees in addition to the normal consequences like; losing sales and being reactive towards any unexpected or not speculated matters. This view is supported by respondent (5/M) who said "*we are generic company and like other generic pharmaceutical companies and we do not have specialised forecasting department, we depend on the sales representative insight, but this might be misleading"*. Lack of forecasting experts bring more arguments to move to the next sub-category which is inconsistence of the forecasting knowledge.

#### 7.2.1.2 Core Category One: Sub-Category Two: Inconsistence of the forecasting knowledge

Inadequate training on forecasting management and techniques in pharmaceutical companies has led to variations in defining and understanding forecasting, which has led to communication clashes. The differences between users' priorities of forecasts in different departments affect the forecasting management. The various pressures (as will be explored in core category *internal*

[6] All quotations in this chapter from respondents' interviews will be highlighted in a separate appendix

*contamination*) basically originate from the inconsistence of the forecasting knowledge that will, consequently, lead to a stage of interdepartmental conflicts and individualism. According to respondent (17/S) who supported these consequences by saying *"each user of forecasting has his own priorities, and his own effect on the company and his work, organisation and shareholders*". On the other hand, some respondents mentioned the users' priorities as the main factor in the inconsistence of forecasting knowledge due to a low level of communication as in respondent (13/F) who said *"Communications is important for all users of forecasts, but because no one can justify the produced forecasts, this will lead to decreased communication between individuals"*. The inconsistent of the forecasting knowledge might lead to individualism in which some individuals refuse to talk about the produced forecasts and lead to a stage of individualism.

The inconsistence of the forecasting knowledge leads to different arguments that might be misinterpreted by others. For example, respondent (5/M) said that "*when forecasting the future sales, we are so keen about others' attitude to our forecasts, ..... the low forecasts could be defined as low ambition without considering the changes in the market, especially that we are a generic company so we cannot negotiate too much with management"*. The inconsistence of the forecasting knowledge has contributed to the emergence of Core Category Two which is internal contamination.

#### 7.2.1.3 Core Category One: Sub-Category Three: The forecasting construction

It has been agreed among respondents that forecasting is constructed by the sales and marketing department in case forecasting experts are unavailable. Sales and marketing provide their inputs in the forecasts, and according to respondent (1/M) *"we – means the marketing teams – are forced to do it"*. Moreover, this was supported by respondent (4/M) who said "*sales and marketing are the people who are responsible for putting the numbers to the higher management, and they have to be capable to justify these numbers based on their knowledge and experience, but the higher management always interferes with these numbers*". When linking this sub-category to Sub-Category One (*lack of forecasting experts*), it appears that the marketing department depend on their judgements and market experience.

From another point of view, since the performance appraisal system for sales and marketing departments in pharmaceutical companies is based on achievement of targets and forecasts, the

sales and marketing departments might abuse the actual truth of sales forecasting and produce biased forecasts. Respondent (3/F) said that *"forecasts are made by sales and marketing to gain sales and marketing people's commitments to achieve what they already wrote and predicted about the future, and they are appraised based on their achievements"*.

Building the forecasts is obviously based on judgements and marketing experience, without considering any scientific justification for the forecasts presented. Moreover, the shortage of forecasting knowledge, in addition to bias forecasting will lead to high initial forecasting errors.

#### 7.2.1.4 Core Category One: Sub-Category Four: Initial forecasting errors

The initial forecasting errors are never calculated in pharmaceutical companies. Instead of calculating the forecasting errors, the management puts a margin of error, usually indicated by a certain percentage, through a shallow and superficial calculation, just in case markets might demand more goods. There is no calculation of these errors in a scientific way during the management decision making due to unrealised importance of forecasting errors and insufficient training. This will lead to organisational loss because of over or under production and team de-motivation. This was supported by respondent (9/S) who said *"the initial forecasting errors are never calculated, but we add an error margin that is fixed every year to make sure we are not out of stock"*.

***Core Category One: Forecasting Ambiguity***

| Sub-categories | What | When | Where | Why | How | What are the consequences |
|---|---|---|---|---|---|---|
| *The lack of forecasting experts* | - There are no forecasting experts<br>- No forecasting department | - During the annual planning review and setting the forecasts | - In the management and decision making teams | - Because of unrealised importance of forecasters<br>- High costs of forecasting experts<br>- Confidentiality issue preventing external experts | - By the organisational structure | - Reactive strategies<br>- High forecasting errors<br>- mysteriousness and low confidence<br>- Loss sales |
| *Inconsistence of the forecasting knowledge between the users* | - There are differences in defining and understanding forecasting | | | - Because of unrealised importance of forecasters<br>- Insufficient training on forecasting management<br>- Different departmental priorities | - By communication clash | - Interdepartmental conflicts<br>- Inconsistent departmental strategies<br>- Individualism |
| *The forecasting construction* | - Forecasting is basically conducted by the sales and marketing department | | | - Because the management will need to get the sales and marketing commitment<br>- The marketing and sales teams are appraised based on the sales achievements and this will affect their views of forecasting | - By judgements<br>- By experience<br>- By considering performance assessment | - Forecasting bias |
| *Initial forecasting errors* | - The initial forecasting errors are never calculated | | | - Because of unrealised importance of forecasting errors<br>- Insufficient training | - By shallow and superficial check | - Organisational loss<br>- Team de-motivation |

**Table 7.3: The Conditional relationship guide for Core Category One: Forecasting Ambiguity**

**The First Central Phenomenon for Core Category One:** *Uncertainty about prediction capabilities in pharmaceutical industries*

The aggregation of the sub-categories under Core Category One has led the researcher to the First Central Phenomenon in this analysis which is *uncertainty about prediction capabilities in pharmaceutical industries*. The First Central Phenomenon is included in the reflective coding matrix in Table (7.4) for Core Category One. Based on this reflective coding matrix, the First Central Phenomenon, *uncertainty in prediction capabilities in pharmaceutical industries*, can be explained in three stories. The following Table (7.4) shows the three story scenarios for the First Core Category, which are based on variations in forecasting processes, properties, dimensions, contexts and modes of understanding the consequences. Each of these stories is explained in detail next.

| Core Category One: *Forecasting Ambiguity* | **The First Central Phenomenon** *Uncertainty in prediction capabilities in pharmaceutical industries* | | |
|---|---|---|---|
| Processes | - Vague | - Overall efforts | - Random judgements<br>- Greed<br>- Personal benefits |
| Properties | - Confusion | - Confidence<br>- Efficiency | - Uncertain<br>- Personal interest |
| Dimensions | - Low communication | - Leadership & team spirit<br>- Sharing ideas<br>- Work with teammates | - Attitude influence<br>- Individual or personal targets |
| Contexts | - Struggling | - United<br>- Integration | - Weak influence<br>- Conflicts |
| Modes of understanding the consequences | - Contradictions | - Awareness<br>- Professionalism | - Low self confidence<br>- Reactive strategy<br>- Biased<br>- Untrusted output |

**Table 7.4: Reflective coding matrix for Core Category One: Forecasting Ambiguity**

*Story One: Vague Process*

Unclear forecasting processes in the pharmaceutical industry leads to a stage of confusion, and decreases the level of collaboration between the users involved because of disability of justifying these forecasts. Consequently, the company will face a struggling context and contradictions between departments. The vague process is the unavailability of a clear forecasting process, which will obligate people to judge the future without any forecasting framework, or any procedures to manage these judgments that are based on peoples' experiences, as some of these judgments are important to consider in the forecasting future. The unavailability of formal forecasting process that can orient people involved in the forecasting will increase the vagueness of forecasts and conflicts.

*Story Two: Overall Effort*

This is when constructing forecasts is considered as an overall effort between users of forecasts, like in some originator companies, where everybody contributes to the process of tailing the expected future forecasts. It is accompanied with high confidence and efficiency based on the team leadership, the sharing of ideas and working with teammates. Such forecasts are achieved in contexts of high integration and harmony between the teams, and might result in gaining team commitments due to distribution of market knowledge.

*Story Three: Random Judgement Process*

The ambiguity of forecasts might lead to random judgments that are based on personal experiences and personal benefits, rather than scientific justifications. The property of this story is characterised by uncertain situations, in which attitude and benefits of the constructor influence the forecasts, though it is a weak influence due to uncertainty of the forecasting situation. In this story, the company reacts to sudden changes in the judgments conduced, and that is why the confidence is low in random judgments.

In some cases the forecasting process is based on personal benefits of the constructors, and the output of forecasts is not trusted and biased which might lead to conflicts between the departments. The construction of forecasts is linked to interdepartmental conflicts that will be mentioned in Core Category Two, Internal Contamination.

### 7.2.2 Core Category Two: Internal Contamination

A clear division and conflict has been noted between the users of the forecasts in the pharmaceutical industry regarding their views of forecasts and their definition of forecasting success and organisational achievements. Internal contamination is the relationship between the users of forecasts within an organisation, and it is named so by the researcher because of interdepartmental conflicts which are related to the variations of departmental views of forecasting. Job description, employees' behaviour, appraisal system, personal and professional targets and commitment are the source of the internal contamination in the forecasting management.

Based on the respondents' job title, this core category has three sub-categories which are, marketing/sales views of forecasting, financial views of forecasting and supply chain views of forecasting. This is due to the internal contamination between the users of the forecasting that might affect the process of forecasting management and the level of commitment and adaptation of the forecasts produced. As respondent (4/M) said *"low forecasting error or high forecasting accuracy does not mean that forecasts can be achieved, success of forecasts depends on accuracy and commitment from all departments"*. The marketing and sales values are different from the finance and supply chain values, as well as the priorities in each department. However, there are some areas of similarities between these departments, as shown later in this core category. Describing the core category is initiated by distinguishing the forecasting views of each department. Table (7.5) page (187) shows the conditional relationship guide for Core Category Two, Internal Contamination; the table also provides details about the relationship between each category and answers the questions of *"what, when, where, why, how and the consequences"* to ensure the saturation stage is reached in this core category.

Differences in the views and values of forecasts might lead to interdepartmental conflicts, which if not solved will injure the organisational progress and achievements. The Second Central Phenomenon for Core Category Two is: *the variations of values between forecasting users can be destructive or constructive conflicts.*

#### 7.2.2.1 Core Category Two: Sub-Category One: Marketing and sales views of forecasting

All respondents in the marketing department regarded forecasting and forecasting management as an established subject in the literature and practice, and saw no need to investigate them as an area of research. This was reflected in respondent (1/M) comment who said "*what you (researcher) are doing, forecasting is not new and it is very well established in management and economic books"*. That is possibly due to the point shown in Core Category One that marketing people are the main constructors of forecasts and targets. Moreover, shortage in the knowledge about the forecasting and interference of marketing and sales views mislead the forecasts and, consequently, marketing people cannot see any obstacles in forecasting management. The marketing views of forecasting are basically focused on the customers, appraisals, targets, market size, competition, sales turnover, market trend, price, patients, promotions and distribution. The marketing views of forecasting are basically from one side, which are the market views, in addition to their personal values and interests. The sales teams' views and opinions about forecasting and its management are basically the same as the marketing views. Sales teams' views are affected by the customers, value targets, market trends, profits, promotions and numbers of outlets. This is mentioned by respondent (18/S) who said that *"sales and marketing people have the same values and priorities when looking into forecasts, the lower the future targets the better for them"*.

According to respondent (4/M) the sales teams are more interested in achieving or exceeding the forecasts and targets, without considering the reasons behind the over achievements in sales, which might be due to errors in forecasts or any other uncertain factors, he said "*sometimes salespeople are more directed toward the achievement without any consideration of other factors due to the pressure of sales"*. From the other point of view, respondent (14/M) consider the forecast as a behavioural factor of the sales and marketing teams, and over achievement is seen as superb work or more hard work, and is not considered as a forecasting error or underestimated forecast, he said *"it is funny when marketing and sales over achieve targets, nobody asks why this happened… as we achieve the value we are looking for"*.

Different marketing respondents (1/M, 7/M, 8/M, 15/M) mentioned that our main priorities are customers' satisfaction, targets, promotional campaigns, market trends, market dynamics,

competition, patients, distributors, sales turnover, costs and profits, expenses and personal appraisal systems.

The majority of respondents (4/M, 13/F, 6/M) mentioned that their targets are value based targets, which means that the sales people performance is related to the value achievement rather than the unit sales.

#### 7.2.2.2 Core Category Two: Sub-Category Two: Financial views of forecasting

All financial managers confessed that there are big obstacles facing the forecasting management and processes of setting targets. The financial department justified the reason behind that with the shortage in knowledge about forecasting, in addition to the gap between the reality of the market and the personal values of the forecasting constructors who are the marketing department. This was mentioned by respondent (2/F) who said *"marketing people are not experts in forecasting management, and they either overshoot or underestimate, overshooting forecasts to get more complements from the upper management, but in some cases marketing people might underestimate the forecasts to make it easier to achieve targets"*. This was supported by respondent (1/M) who said *"under forecasting the future will allow less future efforts, and marketing people will look good"*; the consequent results are forecasting bias and more conflicts as mentioned by respondent (2/F).

The finance respondents (2/F, 13/F, 3/F) looked at the forecasts from a different angle than the marketing people since the finance department views forecast as future sales turnover, cost of sales, profits, expenses, share prices, shareholders satisfaction, budgets, purchasing, debit/credit ratio, payroll, financial commitments like banks' loans and product manufacturing.

From another point of view, respondent (4/M) justified the origin of conflicts between departments as a consequence of the differences between the departmental goals and objectives, in addition to shortage in the formal and informal data that is needed to build a bridge of trust between departments in forecasting management, which will be described in detail in Core Category Six, *Management Style and Philosophy*. Moreover respondent (16/F) and respondent (13/F) mentioned the effect of the ownership on the firms' strategy in the forecasting, as the ownership has an impact on the organisational objectives and culture. Forecasting in

international pharmaceutical companies is different and is difficult as mentioned by Respondent (3/F) who said *"I (the respondent) tried to make an economic formula and forecasting process through my career in 18 years, but I failed because of the type of industry we are working in"*. These views led the researcher to initiate Core Category Three, *The External Noise in Pharmaceutical Market.*

#### 7.2.2.3 Core Category Two: Sub-Category Three: Supply chain views of forecasting

The consequences of forecasts are delivered to the supply chain department to comply with the demand figures. Based on the views of respondent (9/S) who mentioned that *"the output of the forecasting process from all departments is the starting point for us, and any errors have the worst implications on the supply chain department"*.

The forecasting errors will have tremendous implications on this department because the supply chain department usually plans the raw materials and goods based on the forecasts submitted and agreed on. Respondent (10/S) mentioned that the purchase of raw materials depends basically on the forecasts and goods needed as free medical samples and extra goods. Respondent (11/S) said that *"from our experience in the previous forecasts, we usually add 20% on the forecasts as a margin for all goods, whether these products are existing or new, needed to be manufactured or produced, regardless of the type of product or the quantity in the forecasts"*. This situation leads to increased losses in storage and costs of sales, in addition to increasing the overall costs of manufacturing.

The supply views of forecasts focus on the effects of forecasts on packaging, price, raw materials, storage space and conditions, drug registration, distribution, purchasing, shipping, manufacturing and forecasting errors. On the other hand, the supply chain might increase or decrease the forecasts based on the production capacity, and according to respondent (12/S) the increase or decrease in the forecasts is usually based on the manufacturing capacity to make a full batch of a certain product, which is a normal procedure for the supply department.

| *Core Category Two: Internal contamination* | | | | | | |
|---|---|---|---|---|---|---|
| Sub-categories | What | When | Where | Why | How | What are the consequences |
| ***Marketing and sales views of forecasting*** | - The marketing view is based on the customers, market, targets, market size, competition, sales turnover, market trend, profits, drug registration, price, patients, promotion and distribution.<br>- The sales view is based on the customers, targets, market trend, profits, promotion and number of pharmacies/outlets | - During the annual planning review and setting the forecasts | - In the future plans and decision making processes | - Because marketing and sales teams are the front line of the business<br>- These powers have an effect on their views of forecasting | - The forecasting process is affected by different values and job descriptions | - Interdepartmental conflicts<br>- Inconsistent departmental strategies<br>- Individualism<br>- Reactivity |
| ***Financial views of forecasting*** | - The finance view is based on profits, expenses, sales turnover, cost of sales, share price, shareholders satisfaction, purchasing, debit/credit ratio, payroll, financial commitments & product manufacturing | | | - Because finance department presents ratios, and is responsible to provide the overall business performance to shareholders | | |
| ***Supply chain views of forecasting*** | - The supply chain view is based on packaging, price, raw materials, storage space and conditions, drug registration, distribution, purchasing, shipping, manufacturing & errors | | | - Because the forecast is the initial input in the supply chain department | - Supply chain is the actual planning of goods supply | |

**Table 7.5: The Conditional relationship guide for the Core Category Two: Internal Contamination**

**The Second Central Phenomenon for Core Category Two:** *The variations of values between forecasting users can be destructive or constructive conflicts*

The aggregation of the sub-categories under Core Category Two has led the researcher to the Second Central Phenomenon in this analysis which is *the variations of values between forecasting users can be destructive or constructive conflicts*. The Second Central Phenomenon is included in the reflective coding matrix in Table (7.6) for Core Category Two.

The consequences of differences in the views and objectives between different departments lead to conflicts between users of forecasts. These conflicts lead to individualism and reactive strategies as the achieving forecasts is mix between a team work and individual efforts. Based on the reflective coding matrix for Core Category Two, the Second Central Phenomenon, *the variations of values between forecasting users can be destructive or constructive conflicts*, can be explained in four stories. The following Table (7.6) shows the four story scenarios for the Second Core Category, which are based on variations in forecasting processes, properties, dimensions, contexts and modes of understanding the consequences. Each of these stories is explained in detail next.

| Core Category: *Internal Contamination* | **The Second Central Phenomenon** *The variations of values between forecasting users can be destructive or constructive conflicts* | | | |
|---|---|---|---|---|
| Processes | - Disagreement<br>- Rejected | - Dynamic struggling<br>- Contradiction | - Accept | - Outstanding |
| Properties | - Walk against the flow | - Variations in values | - Relevant personality | - Effectiveness |
| Dimensions | - Unequal responsibility<br>- Adverse reaction | - High Caution<br>- Unappreciated action | - Positive reaction | - Sharing experiences<br>- Interaction<br>- Positive challenges |
| Contexts | - Dynamic struggling | - De-motivation | - Team work<br>- Reassurance | - Comprehensiveness |
| Modes of understanding the consequences | - Insecure actions<br>- Lack of confidence | - No appreciations or confirmation | - Comfort | - Managerial Influence |

**Table 7.6: Reflective coding matrix for Core Category Two: Internal Contamination**

*Story One: Disagreement or Rejected Forecasts*

This is the condition where the forecaster or manager faces rejection in convincing other users of forecasts about the forecasting output, where the situation can be described as walking against the flow. This is due to unequal responsibilities between the users of forecasts, thus, resulting internal struggling, insecure actions and lack of confidence. In this case the conflicts are destructive and might lead to failure of the company's performance and activity toward the market.

*Story Two: Dynamic Struggling and Contradicting Conditions*

Dynamic struggling is also a stage of destructive conflicts, in which actions are not appreciated and high contradictions of interests exist. De-motivated employees and high caution areas of conflicts will be the dimension and context of story. The difference between Story One and Story Two is the individual effect and the organisational effect of the destructive conflicts in forecasting.

*Story Three: Accepted Forecasts*

In case of accepted forecasts, people will have appropriate personal communication and team work towards the forecasts produced within a comfortable mode of understanding and positive reaction.

*Story Four: Outstanding Situation*

Outstanding situation is the place in which organisations have high effectiveness criteria that are achieved through sharing experiences and interactive environments, in order to produce a managerial influence on the results and cooperation between departments. The hesitance in Story Three affects reaching an outstanding position or organisation.

### 7.2.3 Core Category Three: External Noise

External Noise represents the uncontrollable factors that affect the forecasting in pharmaceutical companies due to the governmental and organisational bodies. The external noise has three sub-categories including market complexity, cross boarders' issues and market instability and turbulence. Table (7.7) is the conditional relationship guide for the external noise.

#### 7.2.3.1 Core Category Three: Sub-Category One: Market complexity

The market complexity was mentioned by the marketing people; other users did not mention it as they are not familiar with the real impact of market complexity. The differences between countries in the registration and legality concerns might increase the constraints on the forecasting process. The type of the drug registration affects the forecasts, so does the process of dispensing the various drugs based on the local laws managed by the National Health Services authorities (NHS). One respondent (14/M) mentioned that the NHS has a powerful effect on the product performance and, consequently, will affect the planned forecasting. Respondent (1/M) said *"In the UK, the biggest problem is what happens in the NHS is reflected directly into the pharma industry anyway. Practically, for all the pharma practices in the UK there is only one customer, it's a single customer market. So the NHS, whenever it moves it's muscle, your products goes up and down you know"*. The NHS has the power to change the product performance based on the changes in drug categories, like, for example, if the NHS changes the drug registration from prescribed to OTC, it will make a massive change in the drug performance and, consequently, affect the existing forecasts. For example, products that can be purchased as OTC medications might be easier to penetrate the market and expand in different directions, whereas the prescribed drugs are not consumed unless through a doctor's prescriptions.

However, this is not the case in some developing countries, as only narcotics "hallucinating drugs" are those which cannot be dispensed without a prescription. But the market complexity is basically related to the uncontrolled patent rights in some countries, grey markets, registration issues, political and economic situation, and entrance of more advanced competitors. This was mentioned by respondent (14/M) who said that *"the complex markets are affected by the regulations of the MOH - Ministry Of Health - like the NHS in the UK"*. The R&D also contributes to the market complexity as the new innovative products with lower side effects can

change the market dynamics. Technological advancements and new treatment procedures can also be classified as market instability. This was raised by respondent (7/M) who said *"new drugs might be a copy of ours with different pharmaceutical excipients and salts or structure, like Omeprazole and Esomeprazole, and might be faster in action or lower in side effects. But there are some new drugs that are not related, but might affect the market of other products, and that is why R&D is important in pharmaceutical industry"*.

#### 7.2.3.2 Core Category Three: Sub-Category Two: Cross boarders' issues

Forecasting is more difficult to conduct in the case of overseas business due to the differences in the characteristics of customers and business environments between the country of region and the importing countries. Constrains of knowledge and social barriers, in addition to prescription habits and the school of education, might affect the demand of the drugs. Cross boarders' issues come under the market knowledge, and marketing, finance and supply chain managers find it difficult to evaluate the forecasts in such cases until it is too late; respondent (16/S) commented that *"we do not know the people overseas, and we can't know how they forecast, but we have to trust them"*.

The differences between the countries, the types and severity of diseases and the Ministry of Health (MOH) regulations will definitely have an impact on the forecasts, and shortage of communication between the departments and people overseas with the manufacturer will lead to gaps in the forecasting management. This was supported by respondent (9/S) *"each country has its own regulations regarding importing and exporting and we (supply chain people) consider this very important in forecasts, as it will affect packaging, languages used in leaflets and many other factors, which are basically the requirements of the ministries of health in these countries"*. The international pharmaceutical companies suffer from specific centuries' requirements like, for example, the variations in packing, expiry dates, outer pack description, method of distribution and leaflets information, which will impose constraints in front of the supply chain as the extra manufactured goods might be lost if the forecast is wrong, thus, leading to a high percentage of errors. This was supported by respondent (8/M) who said that *"forecast is affected by many factors that are uncontrollable due to counties' own regulations"*.

#### 7.2.3.3 Core Category Three: Sub-Category Three: Market instability and turbulence

Market turbulence affects the forecasting especially in cases of political and economic issues, which were seen to form the most common sources of turbulence. This was mentioned by respondent (8/M) who said that *"unpredicted turbulence will affect the business positively by creating opportunities to some of the pharmaceutical companies and negatively crushing other companies, for example any change in the Iraqi Ministry of Health will affect the whole international pharmaceutical business, lately, we lost a very big tender due to this reason"*. Such turbulences are difficult to predict, but their effect on the forecasts is almost certain. Respondent (6/M) mentioned that they consider some countries to be more risky than others, and they have to consider this risk as a percentage in forecasts.

| ***Core Category Three: External noise*** | | | | | | |
|---|---|---|---|---|---|---|
| Sub-categories | What | When | Where | Why | How | What are the consequences |
| *Market complexity* | - The type of drug registration affect the forecasts | - In setting the future plans | - In different internation al countries | - Due to variations in drug regulation rules | - The drug registration affect the consumption of drugs and any unpredictable change will affect the forecasts | - High percentage of wastes.<br>- Difficult recovery of extra-goods |
| *Cross boarders issues* | - In the overseas business the forecasting is difficult to be conducted | | | - Constrains of knowledge and social barriers, prescription habits and the school of education affect the demand of the drugs. | - Different markets and different prescription trends<br>- Variations in packing, expiry date, outer pack description, method of distribution and leaflets info. | - Uncertainty of forecasts<br>- High percentage of wastes.<br>- Difficult recovery of extra-goods |
| *Market Turbulence* | - The political and economic conditions | | | - The political and economic stability might be difficult to predict | - The political turbulence will affect the overseas business<br>- The economic turbulence will change the costumers' behaviour | - Uncertainty of forecasts |

**Table 7.7: The Conditional relationship guide for Core Category Three: External Noise**

**The Third Central Phenomenon for Core Category Three:** *Inability to predict the uncontrollable issues in pharmaceutical industries*

The aggregation of the sub-categories under Core Category Three has led the researcher to the Third Central Phenomenon in this analysis which is *Inability to predict the uncontrollable issues in pharmaceutical industries*. The Third Central Phenomenon is included in the reflective coding matrix in Table (7.8) for Core Category Three.

The inability of pharmaceutical companies to predict the uncontrollable issues in pharmaceutical industries can leave the companies in confusion and an awkward environment. Based on the reflective coding matrix for Core Category Three, the Third Central Phenomenon, *Inability to predict the uncontrollable issues in pharmaceutical industries*, can be explained in three stories. The following Table (7.8) shows the three story scenarios for the Third Core Category, which are based on variations in forecasting processes, properties, dimensions, contexts and modes of understanding the consequences. Each of these stories is explained in detail next.

| Core Category Three: *External Noise* | **The Third Central Phenomenon** *Inability to predict the uncontrollable issues in pharmaceutical industries* | | |
|---|---|---|---|
| Processes | - Overseas mystery | - Unpredictable,<br>- Uncontrollable | - Expected or predictable disaster |
| Properties | - Unreliable input | - Uncertain influences | - Searching for substitution and alternatives |
| Dimensions | - Losing control | - Scenario planning | - Pack up plans |
| Contexts | - Disconnection with overseas market | - Risk management<br>- Conflicts | - Alternative sales and marketing strategy |
| Modes of understanding the consequences | - Reactive strategy<br>- Loss sales | - Opportunist<br>- Harmed | - New product development<br>- More R&D investment |

**Table 7.8: The reflective coding matrix for Core Category Three: External Noise**

*Story One: Overseas Market Mystery*

In this story, the managers in the pharmaceutical companies depend on the input from the people overseas, which might be unreliable due to disengagement with the market regulations, which might lead to a reactive strategy and loss in sales in the overseas market. This is related to interdepartmental communication in Core Category Two, Internal Contamination, and its effect on the mysteriousness of the market.

*Story Two: Uncontrolled Factors within the Medical/ Pharmaceutical Environment*

Some of the external factors in pharmaceutical companies cannot be predicted, like sudden changes in the overseas countries regulations of import and export, health insurance, and developing new and advanced drugs that substitute the old drug generations. Companies might conduct a scenario plan to manage the uncontrollable issues in the market, which could lead to conflict management. The consequences of these uncontrollable factors might create an opportunity or harm companies.

*Story Three: Predictable Disaster can be Valuable*

The expiry of the product patency is one expected or predictable disaster for originator companies, which is why these companies continuously look for substitution and alternative solutions as back-up plans to compensate the expected loss due to the expected emergence of generics, which will harm the originator companies while providing an opportunity for the generic market. Alternative sales and marketing strategy will be adapted as the market will change after the expiry of patency. Companies are looking for new product development through more investments in the R&D.

### 7.2.4 Core Category Four: Celebrity of individuals and insights of users

Based on the respondents' views, the effect of the manager's personality and his/her ability and skills in persuading others about the produced forecasts will affect the process of setting the forecasts and its management. Moreover, the manager's self-confidence will have an effect on the others perceptions about the forecasting credibility because of the power of changing people and persuading others. From another point of view, the produced forecasts will have an impact on the behaviour of the managers and employees because the whole company has to act and

achieve the agreed forecasts. The main reason for changing behaviour is derived by the appraisal system that most companies are using in pharmaceutical industry.

This core category has three sub-categories including behaviour – forecasting relationship, forecasting – behaviour relationship and forecasting credibility. Table (7.9) page (198) represents the conditional relationship guide for the *celebrity of individuals and insights of users*.

#### 7.2.4.1 Core Category Four: Sub-Category One: Behaviour - forecasting relationship

Behaviour and intentions of the forecasters are linked to the produced forecasts, like, for example, their ambitious, managerial position, motivation, expectations and perception, which will have an impact on the judgments and the forecasts decision making. There is a link between the knowledge of the markets and the forecasting techniques from the one hand, and the celebrity and managers' self-confidence as well as their ability to present or sell the forecasts on the other hand. Respondent (11/S) said that "*even the good forecast is not always enough; the manager should be able to sell it to others in order to work as a proper team*", and respondent (8/M) also said "*we play a very important role in guiding our people to targets, this is our job*". Because the majority of the produced forecasts depend on personal judgments to impress the top management, the personal judgments and the management's behaviour will affect the judgements and the forecasting process. Respondent (13/F) said "*unfortunately, our managers do not differentiate between what they want and they like or what is the reality of the market, to find ourselves eventually in complicated situations*".

The values and behaviour of manager who prepare forecasts might affect the output of the forecasts. Respondent (18/S) said that "*managers sometimes produce forecasts that are matching with their shareholders' ambitious to be in a good shape in front of the management, without considering the marketplace"*. The consequences of the managers' behaviour on the forecasts are increasing the interdepartmental conflicts and bias in forecasts.

#### 7.2.4.2 Core Category Four: Sub-Category Two: Forecasting - behaviour relationship

The forecasts affect the management's behaviour because they are pegged to the appraisal system. This was explained by respondent (15/M) who said achievement of the target and

forecasts are the responsibility of all employees, but the marketing and sales department is the main responsible department because they are in direct contact with the customers.

Forecast can be either accurate or inaccurate, and the inaccurate forecasts can be either under or over-estimated forecasts. The underestimated forecasts affect the managers and employees by making them slack and less interested, however, the overestimated forecasts put unnecessary pressures on the employees and managers to achieve targets. The consequences of the inaccurate forecast can be over or under employment, which increases the vertical pressure on employees. This was supported by respondent (4/M) who said "*our situation can be misunderstood, because if I negotiate the forecasts then my managers might say you are not positive, and if I leave it as it is I will face underachievement, which will affect my appraisal in the company and my career"*.

Furthermore, over or under-forecast might lead to major mistakes in the sales promotion and discounts, which will have a direct hit on the organisational profitability. This was mentioned by respondent (3/F) who said that "*we put a figure that exceeds the market capacity to find that we are eating from profits*", and also by respondent (5/M) who said "*this is really confusing as figures are distributed on employees and people working without considering that forecasts might be wrong*".

#### 7.2.4.3 Core Category Four: Sub-Category Three: Forecasting credibility

The credibly of forecasts is judged based on the confidence level of the producer, which is a mix of experience, knowledge and management leadership, this was mentioned by respondent (15/M) who said "*we have to present the forecasts in a good way to show some commitments and confidence*". Moreover, the management's perception of the forecasts depends on the way of presenting the forecasts and the scientific justification of the produced forecasts. Respondent (17/S) talked about the importance of the insight and celebrity of the producer of forecasts, and its contribution to the overall judgments of forecasts. Respondent (18/S) said that the credibility of forecasts starts when the forecaster can show that he/she is certain about the produced forecasts, even if it were incorrect.

| ***Core Category Four: Celebrity of individuals and insights of users*** | | | | | | |
|---|---|---|---|---|---|---|
| Sub-categories | What | When | Where | Why | How | What are the consequences |
| *Behaviour - Forecasting relationship* | - Personal judgments and management's behaviour affect the judgements and the forecasting process | - During the annual planning review and setting the forecasts | - In the future plans and decision making processes | - Because the majority of forecasts depends on personal judgments to impress the top management | - The forecasting judgement of the producers / managers will be evaluated by the top management | - Forecasting bias<br>- Error |
| *Forecasting - Behaviour relationship* | - The forecasts affect the management's behaviour | | | - Because managers should achieve this target as a part of appraisal performance | - The forecasts might be underestimated to make employees and managers less interested<br>- The forecasts might be overestimated to put managers and employees under high pressure to achieve targets for appraisal | - Major mistakes in sales promotion<br>- Over or under-employment<br>- Demotivation |
| *Forecasting credibility* | - Leadership of the producer, experience and knowledge affect the perception of the forecasts<br>- Way of presenting forecasts<br>- The scientific statement | | | - Because the manager should convince the top management with his forecasts based on his insight and celebrity | - The forecasting judgement of the producers / managers will be evaluated by the top management | - Forecasting bias<br>- Error |

**Table 7.9: The Conditional relationship guide for Core Category Four: Celebrity of individuals and insights of users**

**The Fourth Central Phenomenon** for Core Category Four is: *Celebrity of individuals and insight will support selling and accepting the forecasts.*

The aggregation of the sub-categories under Core Category Four has led the researcher to the Fourth Central Phenomenon in this analysis which is *Celebrity of individuals and insight will support selling and accepting the forecasts*. The Fourth Central Phenomenon is included in the reflective coding matrix in Table (7.10) for Core Category Four. The celebrity of individuals is related to the forecasting constructors within the pharmaceutical industry and their ability to convince people within an organisation. This is related to constructors' views and behaviours, and will affect the credibility of the produced forecasts. From another point of view, the forecasts will affect the behaviour of employees, which might affect the organisation in a positive or a negative way. Based on the reflective coding matrix for Core Category Four, the Fourth Central Phenomenon, *Celebrity of individuals' and insight will support selling and accepting the forecasts*, can be explained in three stories. The following Table (7.10) shows the three story scenarios for the Fourth Core Category, which are based on variations in forecasting processes, properties, dimensions, contexts and modes of understanding the consequences. Each of these stories is explained in detail next.

| Core Category Three: *Celebrity of individuals* | **The Fourth Central Phenomenon** *Celebrity of Individuals and insight will support selling and accepting the forecasts* | | |
|---|---|---|---|
| Processes | - Undervalued | - Misjudged | - Shareholders' expectations |
| Properties | - Judgmental / biased forecasts | - Overestimate or underestimate forecasts | - Big high thumb<br>- Shareholders' power<br>- Minimum rejection |
| Dimensions | - Trusted or un-trusted forecasts<br>- Personal targets | - Trusted or un-trusted forecasts<br>- Personal targets | - Trusted forecasts<br>- Difficult to complain |
| Contexts | - Hidden intentions<br>- Mysterious | - Hidden intentions<br>- Acknowledge about forecasting techniques | - Increase share value<br>- Shareholders' concerns |
| Modes of understanding the consequences | - Conflicts<br>- Changes behaviour<br>- High risks, Bias | - Over employment or Underemployment<br>- Bias and Conflicts<br>- Changes behaviour | - High risks, bias & Conflicts<br>- Forced forecasts<br>- Infect culture & changes behaviour |

**Table 7.10: Reflective coding matrix for Core Category Four: Individuals' Celebrity and Producers' insights**

*Story One: Undervalued Processes*

In this story, the celebrity of individuals might undervalue the forecasting process and the forecast can be characterised by being more judgmental and biased. The level of trust or un-trust in the constructor contributes to believing in the produced forecasts. The hidden intentions and mysterious issues like personal targets contribute to the constructor's judgments. The consequences are changing behaviour, internal conflicts, high risks and biased forecasts. The produced forecasts from well-recognised character of constructors will be characterised by high credibility, without considering the hidden intentions of the constructors or the personal mysteriousness. In mixing this story with Core Category One, Forecasting Ambiguity, the celebrity with high forecasting ambiguity will mislead the future expectations.

*Story Two: Misjudged Process*

The constructors might misjudge the outcome of forecasts and produce either overestimated or underestimated forecasts. This will lead to increasing or decreasing the level of investment, and employing more or less people than required. The consequences will be a change in behaviour and a conflict of interests. Celebrity might cover the constructors' ability to produce accurate forecasts through the constructor's ability to sell his/her forecasts. Misjudgement will lead to high risks and biased behaviour.

*Story Three: Matching Shareholders' Expectations*

The celebrity might be gained through producing forecasts that match with the shareholders' expectations. This will grant the constructors a big high thumb with minimum rejection. This forecast is characterised by being trusted, and it is difficult to be faced with objection by others. The consequences will include raising the shareholders' interests over the reality of the market, increasing the share value in the stock share market, forced forecasts which might change behaviour to infect the organisational culture and lead to conflicts.

### 7.2.5 Core Category Five: New Product Puzzle

The forecasting of new products is very difficult in the pharmaceutical industry. According to respondent (4/M), new products in pharmaceuticals are different from existing ones because new

products can be in the form of a new dosage form, a completely new product, a new pharmaceutical category, a generic or originator or a new packaging size.

Regarding forecasting new products, the marketing department might consider pure judgemental forecasts, possibly due to shortage of data. However, some companies might consider conducting research through asking the practitioner doctors about the new product in order to estimate the market demand, but even in these cases they will still have a high percentage of error. This was supported by respondent (1/M) who said that *"we are forced to do it – means forecasts- even for new products, and if we are wrong we change our forecasts"*

This core category has two sub-categories, new guesses and team work. Pharmaceutical companies find the new product forecasting very difficult and relying on team work. Table (7.11) page (203) is the conditional relationship guide for the new product puzzle.

#### 7.2.5.1 Core Category Five: Sub-Category One: New guesses

The new product forecasting is mostly judgmental, and might be considered under the trail/error, which means that management learns from the first forecasts and adapts changes for the future, which adds more costs to the errors accompanying new products.

The main issue of new product forecast is that there is no market research due to limitation of available data, but respondent (15/M) said that the manager (or forecaster) should start from a certain point and test his forecasts based on experience; the respondent mentioned that *"I have been in a situation where I did a big mistake…. We have a new product (OTC product) with two bottle sizes, and my estimation was that the bigger bottle will have the majority of the market share, but I was totally wrong, I did not test the market, it was a very unlucky guess"*.

Respondent (16/F) mentioned that new products are usually associated with a high forecasting error, and the supply chain and other finance people agreed with respondent (16/F). Respondent (11/S) also said that he always allows a 20% margin of forecasts to cover any expected errors in forecasts. Respondent (12/S) said that *"our main concern in the new products is from which area you should start"*. Respondent (15/M) identified the new product as any new physical product, which has its own indication and never existed before, or a product with a new indication that

took a place in the market. Launching an existing product with a new indication might be considered as launching of a new product because the new market will affect the market demand. For example, the same product can be promoted in different diseases, so forecasting the same existing product for another disease will be considered as a new product that needs new additional forecasts. Aspirin, for example, was used earlier only as a pain killer; but more recently, Bayar, the manufacturer, proved that Aspirin can also be used in preventing heart attacks due to its anticoagulant properties. The level or the percentage of error depends mainly on the management's definition of the new product, as well as the type of the new product.

#### 7.2.5.2 Core Category Five: Sub-Category Two: Team work

In the new product puzzle, the pharmaceutical companies usually conduct several workshops in order to reach the right approach in the forecasting process. In this process, managers are sharing ideas to obtain the most possible actual forecasts with minimal errors. The teamwork is usually conducted through brainstorming sessions and presentations. This was supported by respondent (17/S) who said *"before forecasts are finalised, people meet to consider achieving these figures before buying raw materials and this is the key to finding a solution"*. Respondent (15/M) said *"sharing data though team members is important within the team to look at the future in a clear way, but nobody can evaluate clearly the other roles as everybody has his own experience"*. This category code varies based on the type of the company, taking into consideration that team work might provide a ground for discussing the future, but will not interfere with the department's priorities that lead to interdepartmental conflicts in Core Category Two. Originator companies see the need for teamwork to launch new products as very critical, whereas the generic companies consider trail/error strategy in which the management sets expectations of not achieving the forecasts.

| ***Core Category Five: New product puzzle*** | | | | | | |
|---|---|---|---|---|---|---|
| Sub-categories | What | When | Where | Why | How | What are the consequences |
| *New guesses* | - The new product forecasting is mostly judgmental<br>- Trail/error | - During the launch / introductory stage | - In the future plans and decision making processes | - There is no market research / unavailability of data<br>- Managers should start from certain point | - Based on person's experience | - High forecasting error |
| *Team work* | - It is the process of sharing ideas to provide the best forecasting numbers in formal and informal communication | | | - To obtain the most possible actual forecasts with minimal errors | - Brainstorming<br>- Presentations | - Support the harmony between people who are involved in forecasting. |

**Table 7.11: The Conditional Relationship Guide for Core Category Five: New Product Puzzle**

**The Fifth Central Phenomenon** for Core Category Five is: *Solving the new product forecasts puzzle is a team work.*

The aggregation of the sub-categories under Core Category Five has led the researcher to the Fifth Central Phenomenon in this analysis which is, *Solving the new product forecasts puzzle is a team work*. The Fifth Central Phenomenon is included in the reflective coding matrix in Table (7.12) for Core Category Five.

Based on the reflective coding matrix for Core Category Five, the Fifth Central Phenomenon, *Solving the new product forecasts puzzle is a team work*, can be explained in two stories. The following Table (7.12) shows the two story scenarios for the Fifth Core Category, which are based on variations in forecasting processes, properties, dimensions, contexts and modes of understanding the consequences. Each of these stories is explained in detail next.

| Core Category Five: *New product puzzle* | **The Fifth Central Phenomenon** *Solving the new product forecasts puzzle is a team work* | |
|---|---|---|
| Processes | - Forced to forecast<br>- Uncertain<br>- Unfamiliar | - Discussion |
| Properties | - Personal influence | - Brainstorming<br>- Meetings |
| Dimensions | - Management pressure | - Experience sharing |
| Contexts | - Confusion<br>- Trail / error | - Reassurance |
| Modes of understanding the consequences | - Unconfident<br>- Error<br>- Biased | - Coordination<br>- Better collaboration<br>- Group target<br>- Allow research |

**Table 7.12: Reflective coding matrix for Core Category Five: New Product Puzzle**

The *First Story* is where the forecaster, usually the marketing or sales people, are left alone in the forecasting of new products. In this case, the forecasters appeared uncertain about the future because they are unfamiliar about the new product, but they are forced to forecast. The process of forecasting is usually mixed with personal influences, i.e. from the person's expectations.

Moreover, the constructor is exposed to the management pressure, which leads to a confusion stage that obligates the producer or constructor to consider trail/ error contexts. The consequences of this story are an unconfident constructor, biased forecasts and high percentage of error.

The *Second Story* is where the forecaster discusses the new product with teammates within the organisation through meetings and brainstorming sessions, in which the team will share experiences and coordinate for better achievements. The results of discussion will lead to considering the forecasts as a group responsibility that all should work on, and might also lead to conducting market research.

### 7.2.6 Core Category Six: Management Style and Philosophy

The forecasting management is affected by the management style and philosophy due to its effect on the internal conditions and surrounding environment. This core category is related to Core Category Two, Internal Contamination, as the management style and philosophy helps in reducing departmental conflicts. The management style is related to the organisational behaviour and structure, which will affect the process of functional integration, performance measurement and consequently the forecasting process.

This core category has three sub-categories including Functional Integration, Performance Measurement and Forecasting Process. Table (7.13) page (209) represents the conditional relationship guide for Core Category Six, Management Style and Philosophy.

#### 7.2.6.1 Core Category Six: Sub-Category One: Functional integration

The integration between departments within organisations affects the level of internal communications and the transfer of knowledge and information. The integration of ideas will support organisational agreements on conflicts that might emerge during the annual planning review and setting the forecasts to produce more accurate forecasts. This was supported by respondent (13/F) who said *"working together with the sales managers in different countries and communicating all information everything will improve our forecasting performance and achievement, because we (the finance) can't understand the market situation unless we talk about it with people who are already in"*. This was also supported by respondent (16/S) who said

*"I always make sure to ship goods on time agreed with the sales managers even if we have plans and this will protect us from any confusion or potential loss"*. Respondent (17/S) agreed with the importance of functional integration within pharmaceutical companies, but he said it should be built in to the organisational structure, he said *"our company should create a new position to link the departments together, which is the position of a chief operating officer who is responsible for contacting everybody concerned with forecasting to solve problems and decrease conflicts"*

The functional integration reduces the interdepartmental conflicts and supports the collaboration and coordination between departments to get more commitment toward the produced forecasts. The functional integration was supported by respondent (6/M) who said "*organisational culture is important to pass ideas, open doors is critical because sharing ideas create positive attitude within companies, and it will add to our updated knowledge about the market*". The functional integration will improve the information communications between departments which would provide more confidence to the produced forecasts. This was supported by respondent (8/M) who said "*we are like a family and everybody can speak to anyone within the company, even if a junior wants to talk a big manager in - - - - , it is fine with us*". One respondent (13/F) mentioned the effect of shareholders on the functional integration, and if the company is family owned the pressure of forecasting and biasness is higher and this will affect the over-all performance and organisational culture.

#### 7.2.6.2 Core Category Six: Sub-Category Two: Performance measurement

Based on the organisation's strategy and style, respondent (4/M) mentioned the forecasts as a measure of the performance of the sales and marketing rather than other departments. In some companies the performance is measured and appraised based on the forecasts achievement at the end of the annual or fiscal year. However, respondent (3/F) and respondent (9/S) mentioned that different departments have different appraisal systems.

Performance appraisal is based on the management's rewarding philosophy, and it will have an effect on the behaviour and attitude of the employees. The performance has many meanings, which can be either based on quantitative or qualitative measures.

The management style has a direct impact on the team work and the extent to which teams support each other; however, it also depends on individuals as it might not be required by the organisational strategy. Respondent (9/S) mentioned that the supply chain department does not involve in the sales performance and achievement, but, yet, the forecasts might be the biggest obstacles to achieve the supply chain targets. On the other hand, respondent (2/F) mentioned that forecasts have an impact on finance department's performance in measuring the market expenses and planning the future of the business. Respondent (2/F) said *"appraising people who are working in the sales and marketing department based on the achievement of the forecasts is essential, because the finance department focuses on the expenses that include the cost of sales, labour, raw materials…. And this is the main reason for losing control and losing money"*.

Respondent (9/S) mentioned that *"our appraisal is to deliver goods in time without any delay and decrease the cost of sales by finding cheaper suppliers and expiries in inventories"*. Inconsistent departmental strategies and variation in the appraisal system between departments will lead to more Interdepartmental conflicts and Individualism.

#### 7.2.6.3 Core Category Six: Sub-Category Three: Forecasting process

Different respondents have engaged in the forecasting process during the annual planning reviews, where they worked to set the forecasts according to their experience. The forecasting process in pharmaceutical industries can be conducted using one of two directions, or using a combination of both directions, including, the top-down forecasting process and the down-top forecasting process. Respondent (8/M) mentioned the differences in the forecasting process and said *"we are very careful in setting the future forecasts, and it starts from our sales team to the upper management, and then revised by others to either accept or refuse it"*. The top-down process means that forecasting is built without market knowledge, and down top process means that forecasting might be biased and not matching with the company's strategy.

Respondent (2/F) mentioned the importance of conducting forecasts using a combination of both processes because the top-down process will satisfy the shareholders and allow them to put their input, while the down-top process will provide commitment based on market factors and personal insights. The forecasting process is a part of the management strategy and human resources management; some respondents like (15/M) and (5/M) provided the researcher a

written document about the procedures and standards of forecasting, we well as the processes of presenting the forecasts; these procedures provide a guidance to the constructors about points that should be considered when building the forecasts and producing them.

| *Core Category Six: Management Style and Philosophy* | | | | | | |
|---|---|---|---|---|---|---|
| Sub-categories | What | When | Where | Why | How | What are the consequences |
| *Functional integration* | - Inter-departmental communication, coordination and collaboration. | - During the annual planning review and setting the forecasts | - Within the departments in the organisation | - Because the communication will integrate ideas to agree on certain points and forecasts | - Communication will lead to a higher level of commitment | - Interdepartmental conflicts<br>- Inconsistent departmental strategies<br>- Individualism |
| *Performance measurement* | - The bases of appraisal for managers and employees | - At the end of each year (annual or fiscal) | - In the human resource management | - Because different departments have different appraisal systems | - The performance is the percentage achievement of the sales forecasts | |
| *Forecasting process* | - Top-down process<br>- Down-top process | - During the annual planning review and setting the forecasts | - Within the departments in the organisation | - Top-down to satisfy the shareholders<br>- Down-top to get commitment based on market factors and personal insights | - The Top-down strategy means the forecast is chosen by the top management | |

**Table 7.13: The conditional relationship guide for Core Category Six: Management Style and Philosophy**

**The Sixth Central Phenomenon** for Core Category Six is: *Forecasting procedure is the frame of organisational culture and management style.*

The aggregation of the sub-categories under Core Category Six has led the researcher to the Sixth Central Phenomenon in this analysis which is, *Forecasting procedure is the frame of organisational culture and management style*. The Sixth Central Phenomenon is included in the reflective coding matrix in Table (7.14) for Core Category Six.

There is a relationship between the forecasting procedure and the organisational culture and style due to the effect of the organisational culture and management style on the performance measures and integration between departments within the pharmaceutical industry. Based on the reflective coding matrix for Core Category Six, the Sixth Central Phenomenon, *Forecasting procedure is the frame of organisational culture and management style*, can be explained in two stories. The following Table (7.14) shows the two story scenarios for the Sixth Core Category, which are based on variations in forecasting processes, properties, dimensions, contexts and modes of understanding the consequences. Each of these stories is explained in detail next.

| Core Category Six: *Management style and philosophy* | **The Sixth Central Phenomenon** *Forecasting procedure is the frame of organisational culture and management style* | |
|---|---|---|
| Processes | - Open doors<br>- Democratic<br>- Free talk | - Bureaucratic structure<br>- Bossy |
| Properties | - Modern management | - Ancient management |
| Dimensions | - High flexibility<br>- Down-top process<br>- Discussion | - Top-down process<br>- Forced system |
| Contexts | - Teamwork | - Management pressure |
| Modes of understanding the consequences | - Comfortable working environment<br>- Bias | - Internal pressure<br>- Uncomfortable environment |

**Table 7.14: Reflective coding matrix for Core Category Six: Management Style and Philosophy**

*Story One: Democratic Management Style*

From the interviews conducted, the democratic management style reflects free talk and open doors, in which everyone has the right to share and communicate their own ideas and views. It is considered as a character of modern management because it allows high flexibility to participate in future forecasts. The consequences are increasing the teamwork between people within the organisation and creating a comfortable working environment, however, biased forecasts might sometimes be another consequence of democratic management style.

*Story Two: Bureaucratic Management Style*

From the interviews conducted, the Second Story of bureaucratic management style is where the forecasts are set by the top management in a forced system. It is a top-down forecasting process, which contributes in increasing the internal pressure and the creation of a stressful environment. This strategy will satisfy the top managers to force their employees into a certain direction. In this core category, there are clear differences between companies depending on the products.

Originator companies are more systemic and proactive in their management style; their management style mostly democratic and their forecasting process is conducted using the combination of both down-top and top-down strategy. The generic companies are, however, more bureaucratic in their forecasting process, where the management often forces the forecast in a certain direction to serve the future plans and the decision making processes.

## 7.3 Chapter Summary

This chapter presented a comprehensive analysis of the data collected in this research through interviews that were conducted with 18 respondents working in international pharmaceutical companies. The data collected were processed and analysed as presented in Figure (6.8) page (158) of the Methodology Chapter. Reflective coding matrices and conditional relationship guides were provided in the analysis to ensure that each core category reached the saturation stage. As explained earlier in Methodology Chapter, the researcher considered contextualisation of the core categories in order to explain the central phenomena that emerged from each, taking into consideration that the researcher's approach was to step back from the data every once in a while in order to gain a more holistic constructivist perspective of the data. The Reflective coding matrices or the conditional matrices are designed to paint a

picture of the central phenomena through providing a more comprehensive description and definition of the stories resulting from each central phenomenon.

Despite the fact that forecasting is the science of predicting the unknown, there are some issues raised by the users of forecasts in pharmaceutical companies that contribute to more frustration in the forecasting process. Such issues were extracted from interviews in the current research, and were divided into six core categories and six central phenomena, as shown in Table (7.15) which provides a summary of data analysis.

| **The Central Phenomena of the research** | **Core categories (selective codes)** | **Sub-categories (axial codes)** |
|---|---|---|
| Uncertainty about prediction capabilities in pharmaceutical industries | Forecasting Ambiguity | - The lack of forecasting experts<br>- Inconsistence of the forecasting knowledge<br>- The forecasting construction<br>- Initial forecasting errors |
| The variations of values between forecasting users can be destructive or constructive conflicts | Internal Contamination | - Marketing and Sales views of forecasting<br>- Financial views of forecasting<br>- Supply chain views of forecasting |
| Inability to predict the uncontrollable issues in pharmaceutical industries | External Noise | - Market Complexity<br>- Cross boarders' issues<br>- Market instability and turbulence |
| Celebrity of individuals and insight support selling and accepting the forecasts | Celebrity of individuals and Insight of Users | - Forecasting-Behaviour relationship<br>- Behaviour-Forecasting relationship<br>- Forecasting credibility |
| Solving the new product forecasts puzzle is a team work | New Product Puzzle | - New guesses<br>- Team work |
| Forecasting procedure is the frame of organisational culture and management style | Management Style and Philosophy | - Functional integration<br>- Performance measurement<br>- Forecasting process |

**Table 7.15: Core categories, sub-categories and central phenomena identified in the analysis of this research**

The First Central Phenomenon is *uncertainty about prediction capabilities in pharmaceutical industries*, which is a result of the forecasting ambiguity. This phenomenon emerged basically due to the lack of forecasting experience and forecasting knowledge by the constructors of the forecasts in pharmaceutical industry, which led to massive mistakes in future readings. These mistakes are expected to affect people within organisations, as well as their judgments about future decisions, investments and marketing and promotional activities. The users of forecasts were found to have limited knowledge about the forecasting techniques and the prediction of future, especially that most of the respondents realise the meaning of forecasts without having the suitable knowledge about the forecasting techniques, which are almost always conducted in a judgmental way. This complicated the situation, as the accumulated previous mistakes contributed to obtaining inaccurate historical data, which could confuse the constructors of the forecasts leading them to ignore the forecasting knowledge. This issue was raised by one of the respondents in the supply chain (17/S), and is expected to contribute to minimising the interest in gaining more knowledge about the forecasting techniques.

The Second Central Phenomenon is *the variations of values between forecasting users can be destructive or constructive conflicts*, depending on the type of internal contamination. Each user of forecasts has their own values that affect their judgements and evaluation of the forecasts. Finance, marketing and supply chain have different priorities in evaluating the produced forecasts. The respondents mentioned that the definition of forecasts reflects the points of convergence and ignorance between the users of the forecasts in the three departments. The variations will lead to internal contamination between departments and consequently affect the homogeneity of departments. The values' influence depends on the organisational philosophy and culture as will be described in the Sixth Central Phenomenon.

The Third Central Phenomenon is the in*ability to predict the uncontrollable issues in pharmaceutical industries*, which emerged due to the high restrictions in the medical market by governments and health organisations, in addition to dissimilarities between markets, which resulted in an increased risk percentage of forecasting errors. The international markets are associated with market instability and turbulence, which can be uncontainable.

The Fourth Central Phenomenon is *celebrity of individuals' and insight support selling and accepting the forecasts*. One of the main factors in forecasts is how to address it and convince

others about it. The individuals' celebrity is somehow related to forecasting ambiguity (in the First Central Phenomenon), because justification of forecasts is related to the person's knowledge of forecasting. Furthermore, it is important to say that personal experience and personal capabilities will create personal celebrity and contribute to increasing the accepting forecasts. The forecasts play an important part in changing behaviour and the opposite is true, where behaviour will also affect forecasts. The credibility of forecasts increases as the knowledge and experience of the forecasting constructor increases.

The Fifth Central Phenomenon is *solving the new product forecasts puzzle is a team work.* This was mentioned by respondents since the forecasting of new products can be a test of the market rather than a forecast. The team within an organisation should be aware of this, and such a matter needs to be discussed in group meetings, while selecting the most appropriate forecasts that match with market needs.

The Sixth Central Phenomenon is *forecasting procedure is the frame of organisational culture and management style*. This is important since the organisational culture and management style can support team spirit through supporting communication across departments and involving everybody in the forecasting process in order to produce forecasts that can be accepted and achievable. The variations between companies were so obvious and noticeable when comparing the formal forecasting procedures in originator companies with other generic pharmaceutical companies. The management style, whether democratic or bureaucratic, will have an impact on functional integration between departments and supporting the forecasting process. The top down management style was found in generic companies, whereas the combination of down top and top down management style was found in the originator companies. The importance of the management style is related to its impact on the appraisal system that is compared with the achievement of forecasts in the marketing and sales departments, which may, consequently, lead to an unnecessary stressful and chaotic organisational situation.

The next chapter will present the story line by linking all the core categories together. This will further explain the overall picture within organisations, and shed more light on the consequences of the core categories discussed in this chapter.

# CHAPTER EIGHT

# CONSOLIDATION OF RESULTS: THE COMPLETE PICTURE (STORY LINE)

This chapter presents the research problem and the emergence of theory based on the research objectives that were mentioned in Chapter One. This chapter also presents the complete picture of the research that was derived from the findings and data analysis in Chapter Seven. This research aims to evaluate the forecasting knowledge of forecasting people in pharmaceutical companies. Moreover, this research also addresses real and pressing management conflicts between the marketing/sales, finance and supply chain departments' goals and objectives, and their impact on the forecasting management. These conflicts are developed because of the different matters and affect the variations in judgments and perceptions to forecasts.

The research objectives are to:

- Identify the level of knowledge about the forecasting techniques by the users and forecasters in pharmaceutical companies.
- Define the factors that affect the understanding and behaviour of each user of the forecasts and their managerial implications in the international pharmaceutical companies.
- Identify the effects of variations in the management approaches on forecasting management, which were introduced earlier by Mentzer and Kahn (1999) in the international pharmaceutical companies.
- Develop an assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.

This chapter is divided based on the research objectives; i.e. Sections One, Two, Three and Four of this chapter will discuss Objectives One, Two, Three and Four, respectively.

## 8.1 Objective One: Evaluate the level of knowledge about the forecasting techniques

The findings of this research are related to the research objectives. This section discusses research Objective One, which is to assess the level of knowledge about the forecasting techniques. Based on the analysis provided in Chapter Seven (Data Analysis), the first core category that the researcher developed from the analysis was the forecasting ambiguity.

Figure (8.1) explains the researcher's observation regarding the relationship between the categories.

Forecasting ambiguity is justified by the lack of experts and knowledge in the field of forecasting. The lack of forecasting experts and knowledge will lead to neglecting the calculation of forecasting errors; furthermore, the unavailability of experts will put the forecasting responsibilities in the hands of others, which are the sales and marketing departments as agreed by the respondents in the research, in the process of forecasting construction, which will, consequently, lead to neglecting the forecasting errors.

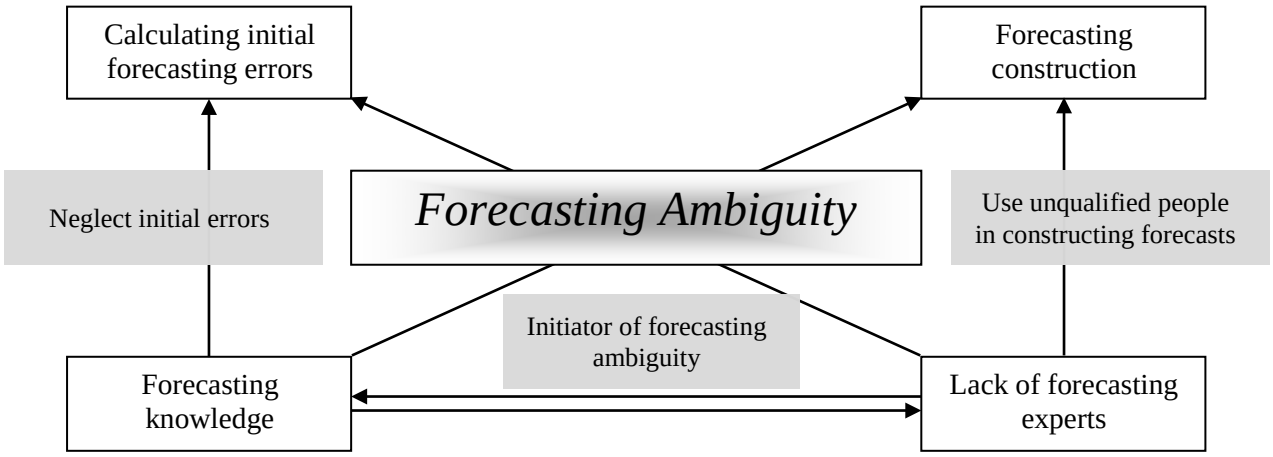



**Figure 8.1: The relationship between Core Category One "Forecasting Ambiguity" and its sub-categories (Author's work, 2012).**

As shown in Figure (8.1), the initiators of forecasting ambiguity include the lack of forecasting experts and the low forecasting knowledge in international pharmaceutical companies. The forecasting ambiguity would raise the conflicts and affect the communication because of the failure to explain and defend the produced forecasts. As mentioned in the Data Analysis Chapter, the constructors of forecasts are marketing and sales teams. The impact of this situation is losing confidence in the produced forecasts, as well as conflicts and bias. Teamwork will lead to sharing ideas and integrating in the system to decrease conflicts that have originated due to departmental differences.

## 8.2 Objective Two: Define the factors that affect the understanding and behaviour of each user of the forecasts in the international pharmaceutical companies

Based on the data analysis of this research, Figure (8.2) explains the researcher's observations about the differences in values that will lead to conflicts in handling forecasts. As mentioned earlier, there are three main users of forecasts, marketing/sales department, supply chain department and finance department. These departments hold different views of forecasts, and the points of convergence between the three departments might lead into more political and internal conflicts between them as explained in Figure (8.2).

Figure (8.2) points the convergence and ignorance issues of interests between the users of the forecasts in the three departments. Each respondent from these different departments mentioned the factors they deal with that affect the business. As mentioned earlier in the data analysis, the marketing department's main priorities are the customer focus and this might not cross matches with other departments as shown in Figure (8.2). The customer focus includes trends, distributors and competition, whereas the personal appraisal system is related to criteria of assessment like targets, sales turnover, expenses and profits.

The finance department's views are related to shareholders satisfaction, debit/credit ratios, financial commitments, purchasing raw materials and manufacturing. The supply chain department's views of forecasts, however, are based on packaging, raw materials, storage conditions and space, drug registration, distribution, purchasing, shipping, manufacturing and forecasting errors. There are a lot variations in forecasting views; however, the convergence points between the three departments are sales, targets, profits, expenses and CIF price which includes the cost, insurance, and freight. In interviews, respondent (16/F) raised an important point, which is the "value based targets", in which marketing and sales are responsible for value rather than sales units, and this would confuse the other departments like the supply chain department, which considers the Stock Keeping Unit (SKU), as well as the finance department, which considers the profitability of each SKU, but will give the marketing/sales department the flexibility in the dynamic market to achieve the value targets.

The judgemental influence of different departments was found to affect the forecasting process based on the job pressures and factors that would consequently affect the behaviour and attitude of the users of forecasts as explained in Figure (8.2).

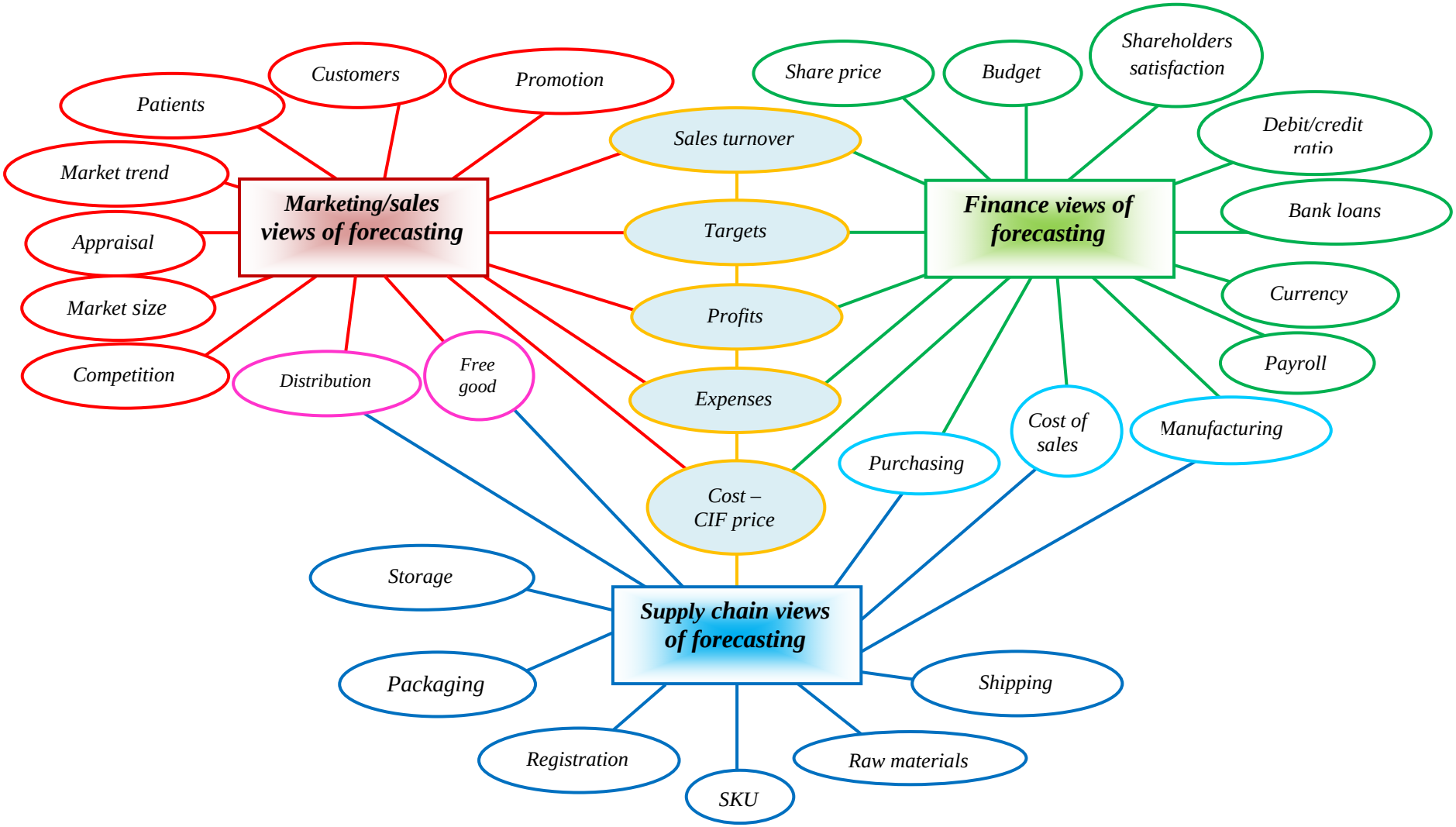



**Figure 8.2: The points of convergence and ignorance between the users of the forecasts in the three departments of marketing/sales, finance and supply chain (Author's work, 2012).**

### 8.3 Objective Three: Identify the effects of variations in the management approaches on forecasting management.

As mentioned earlier in the reflective code matrix of Core Category Six, *Management style and philosophy*, there are bureaucratic and democratic organisational structures. The frame of organisational culture and management style can support interdepartmental communication to produce forecasts that can be accepted and achievable. As mentioned by respondent (18/S) *"Even if the forecasts are accurate, it cannot be achieved because it is a team effort"*.

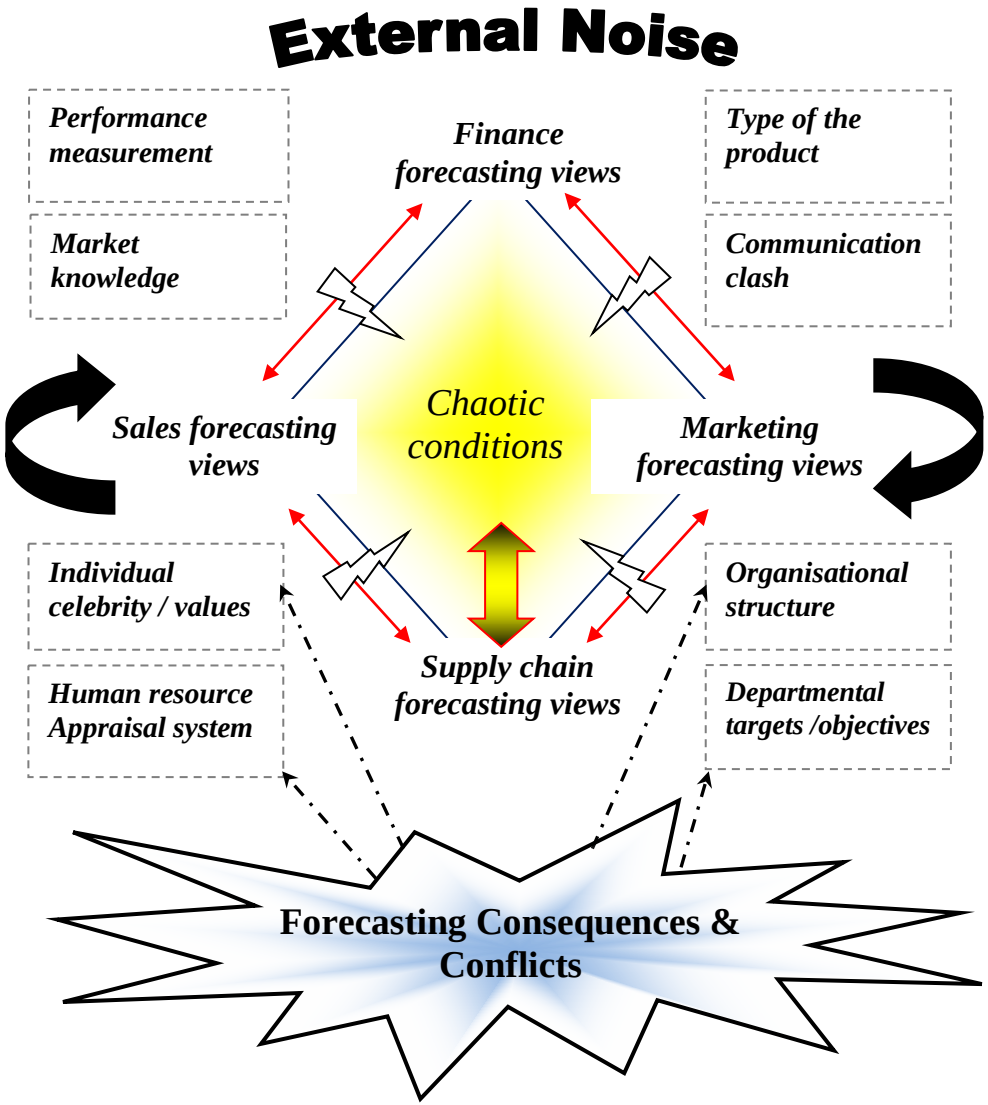
The variations between companies were so obvious and noticeable when comparing the formal forecasting procedures in originator companies with other generic pharmaceutical companies. The top down management style was found in generic companies, whereas the down top management style was found in originator companies. In addition to the organisational structure, the celebrity of individuals and insight support selling and accepting the forecasts. One of the main factors in forecasts is how to address them and convince others about them. The celebrity of individuals is somehow related to forecasting ambiguity (in the first central phenomenon) because justification of forecasts is related to the person's knowledge of forecasting. The forecasts credibility perception depends on the behaviour of the producer and the accuracy of forecasts produced. The credibility is the result of both the forecasting techniques and the behaviour of the organisation, however, the forecasts affect the behaviour, and the behaviour affects the forecasts, and such effects are continuous and, thus, lead to a change in organisational culture.

### 8.4 Objective Four: Develop an assessment model to evaluate forecasting management capabilities in international pharmaceutical companies

All factors mentioned in the research have enabled the researcher to develop assessment criteria that can be used to provide an overview of forecasting management. These assessment criteria are: interdepartmental communication, forecasting knowledge (or level of forecasting ambiguity), managers' (or constructors') confidence and level of market knowledge. These criteria were developed through the analysis of the data collected in the current research. The assessment forecasting criteria are nominated as *Haloub Assessment of Forecasting* (HAF) Index that can rank companies based on their forecasting management. These assessment criteria can be studied in matrix that will be discussed in detail in Chapter Ten, in the discussion of the conclusions and contributions of this research.

## 8.5 The Full Picture of the Research Data

As shown in Figure (8.3), the forecasting ambiguity, affects the peoples' views of the produced forecasts and might lead to a chaotic situation; this is due to the differences between the users' views and values about the forecasts. The break in the interdepartmental relationship will worsen the situation. The other factors like external noise that include external noise, and these factors are: drug registration, R&D, product patency, competition, medical treatment habits, new technological treatments, boarders' regulations and political and economic situation. Different factors like type of the product whether it is existing or new, principles of performance measurements, Market knowledge, individual celebrity / values, departmental targets /objectives, organisational structure and communication clash contribute to the forecasting consequences and forecasting conflicts.



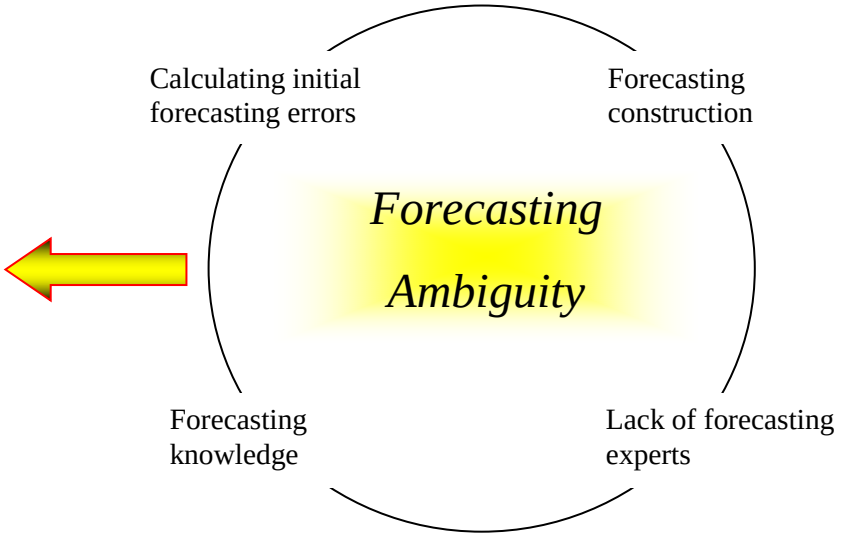




**Figure 8.3: the full story of the research (Author's work, 2012).**

# CHAPTER NINE

# DISCUSSION

This chapter explores the research results and links them to the relevant literature while pointing out any main differences or contributions. This research is conducted in the context of pharmaceutical industry. The uniqueness of the current research is that it aims to assess the forecasting management practices through addressing real and pressing management conflicts between the goals and objectives of the marketing/sales, finance and supply chain department, and the impact that such conflicts could have on forecasting management. These inter-departmental conflicts have emerged as a result of the different interests between departments, and have, accordingly, led to variations in judgments and perceptions to forecasts. Moreover, this research will also study the impact of the variations in management approaches, and provide suggestions of assessment approaches and tools that can be utilised to assess the forecasting management performance. This Grounded Theory research explored the depth of gaps of forecasts management, through commutation of data collected to reach the saturation level and method of analysis by the use of conditional relationship matrix and reflective coding matrix in chapter seven.

After conducting 18 interviews in 8 different international pharmaceutical companies, as described in table (7.2) page (174), the researcher was able to reach the saturation level and discuss the research's four main objectives which are:

- Identify the level of knowledge about the forecasting techniques by the users and forecasters in pharmaceutical companies.
- Define the factors that affect the understanding and behaviour of each user of the forecasts and its managerial implications in the international pharmaceutical companies.
- Identify the effect of variations in the management approaches on forecasting management in the international pharmaceutical companies.
- Develop an assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.

Due to the nature of this research and the chosen methodology of Grounded Theory, the researcher examined the current relevant literature, but allowed the data to emerge from the interviews as required by the research methodology. The gaps in the literature review

regarding the forecasting managerial process, in addition to the difficultness and high challenges of the pharmaceutical industry, have made this research very unique among other researches in terms of its conceptual framework, as shown in figure (5.1) page (121).

The purpose of the current chapter is to combine the core categories mentioned in the data analysis chapter into the research objectives and link them to the available literature. The contribution of the current grounded research is related to finding solutions and providing suggestions for forecasting management in the future. This chapter will also incorporate the findings of the research with the researcher's interpretations in ways that address and fulfil the research objectives. Due to the nature of Grounded Theory, this chapter is linked to Chapter Five, Conceptual Framework, that justifies the research objectives, as well as Chapter Eight, Consolidation of Results: The Complete Picture, which links the central phenomena in order to create new theory.

## 9.1 Objective One: The knowledge of forecasting process by the users and forecasters in pharmaceutical companies.

In this objective, the researcher aimed to evaluate the knowledge about forecasting methods and identify the ability of forecasters or constructors in international pharmaceutical companies. It has been found that there is high ambiguity in forecasting knowledge, as described in the data analysis chapter, and forecasting is often mixed with planning terms rather than real forecasting or formal processes that the companies do. Such a finding matches with the previous literature related to forecasting knowledge; for example, Dilgard (2009) mentioned that the forecasters and managers do not differentiate between forecasting and planning, and this will have an impact on organisational performance.

The low level of forecasting knowledge has led to increased usage of judgments or judgmental adjustments in forecasts. This matches with the findings of Cerullo and Avila (1975), who assessed the forecasting practices for 110 companies and found that the majority of these companies use judgmental rather than statistical methods. At the same time, these results also match with Rothe (1978) that judgements are used in forecasting with a minimum knowledge about the formal statistical methods, which will lead to increasing the forecasting errors. Respondents described judgments as the opinions of managers, and some respondents agreed that mixing judgmental forecasting with statistical methods would lead to decreased

errors, which matches with the views of Klein and Linneman (1984) and Dalrymple (1987) in literature regarding mixing statistical and judgemental methods.

It has also been found in this research that the low forecasting knowledge will obligate the forecaster, or constructor, to use judgments in forecasting, and this matches with Armstrong (2003) argument where he justified the use of judgements in forecasting with the shortage of useful knowledge in forecasting that can used in practice, which is happening due to the fact that managers and corporations are looking for low-cost and accessible sources of knowledge that are hard to find in journal papers.

In some pharmaceutical companies, it was also found that the judgmental integration into the forecasting process is not an organised process, but rather a biased one. This point was also raised by Tyebjee (1987), who mentioned that managers are usually reluctant to accept forecasts since they are not experts in the forecasting methods. The research results also match with Armstrong and Brodie (1999) who explained that the involvement of judgments in forecasts is mainly due to the fact that the majority of users of forecasts seldom understand the forecasting methods. This research findings also supported researchers like Glendinning (1975), Malley (1975), Turner (1990), Bunn and Wright (1991) and Lawson (1981) who agreed that the integration of judgements into forecasts might have a positive effect on the output of the forecasting process to produce more accurate forecasts, but it may harm the forecasting process because of biasness caused by the lack of understanding of forecasting methods by the forecasters or constructors of forecasts. The integration of judgments in naïve forecasts will create sort of confusion in organisational performance.

Moreover, the research results showed that Steiner's recommendations (1979) regarding having a formal forecasting system is not applied in pharmaceutical companies, which were shown to lack such system, taking into consideration that the forecasting process in pharmaceutical companies is considered vague and the produced forecasts are subject to many unclear factors.

The main issue regarding judgmental integration of forecasts is the difficulty in measuring the initial forecasting errors (Fildes *et al.*, 2009), which will, consequently, have an effect on the practical performance of the company (Harvey and Harries, 1999). Sanders (1992), Harvey (1995) and Goodwin and Fildes (1999) criticised the integration of judgements into statistical forecasts since they believed that such integration would decrease the accuracy of

forecasts as a result of confusing statistics with the judgements of managers, which are based on the reality of the marketplace (Goodwin, 2002). From another point of view, Willemain (1989) argued that integrating judgements into suboptimal statistically produced forecasts will increase their accuracy. Such accuracy can be improved also in cases of availability of domain knowledge; this point was also supported by Turner (1990) and Donihue (1993) in macroeconomics researches, and by Wolfe and Flores (1990) and Flores *et al*. (1992) in their research into the earnings forecasting, as well as Sanders and Ritzman (2001) and Nikolopoulos *et al*. (2007) in their research on the demand forecasting process, taking into consideration that bias results might be present in the final forecasts. So even though some researchers like Mathews and Diamantopoulos (1992) raised some conflicts regarding amending the non-adjusted forecasts through the flexible forecasting systems used in organisations, the findings of this research supported that judgmental adjustments to forecasts can provide an improvement to the forecasts accuracy.

Furthermore, there is an obvious lack of forecasting experts and pharmaceutical companies cannot use external forecasters due to the sensitivity of data. The unavailability of forecasting experts might be due to unrealised importance of forecasters and high costs of forecasting experts, which will, thus, lead to gaps in the forecasting process, in addition to low confidence in the produced forecasts and high initial forecasting errors (Tyebjee, 1987). In order to reduce the lack of experts and lack of understanding about forecasting, pharmaceutical companies must invest more to train more people on forecasting in order to support the forecasting management process; this is important especially that the pharmaceutical industry is considered to be very complicated, and is affected by many external factors controllable and uncontrollable factors that should be tracked by the forecasters or constructors of the forecasts in pharmaceutical industry as emphasised by Smith (2011).

Findings of this research showed that the constructors of forecasts in pharmaceutical companies are mainly the marketing/sales department since the management focuses on the commitment of this department in achieving the future forecasts. This might lead to biased forecasts since the personal interests and benefits of the constructors of forecasts might affect the forecasting output. This issue was argued by Mentzer *et al*. (1999) who mentioned that the forecasting output might be biased intentionally or unintentionally because the appraisal system is related to the achievement of forecasts. The combination of low forecasting

knowledge with psychological forces will produce biased, naïve and untrusted forecasts in addition to reactive companies' strategies.

The pharmaceutical companies could be divided based on the size of the use of judgements. Despite the biasness in judgments, pharmaceutical companies could be divided, according to these research findings, into companies applying judgmentally based forecasts and companies applying judgmentally integrated forecasts. In this regard, it has been found that originator companies have a higher level of forecasting knowledge than generic companies, possibly due to the fact that originator companies are involved in high amounts of future investments than generic ones. Moreover, generic companies are more involved in focusing on "value based targets" rather than forecasts, which, accordingly, made them more focused on getting the cash targets, and not the forecasts.

The constructor's ability to sell the forecasts depends on the level of celebrity and his/her ability to convince others. Depending on the type of person and the pressures identified in setting the final forecasts, the produced forecasted might be misjudged by being undervalued or overvalued. The effect of the celebrity of individuals might be related to the shareholders' expectations about the future growth as pointed out by Sudarsanam *et al.* (2002). The main concern about produced unrealistic forecasts is that they can have an effect on individuals' behaviour. The forecasts change behaviour and the behaviour of individual affects the success of forecasts. The second objective will examine this point in more detail, and will further discuss the impact of change in behaviour on interdepartmental communication.

### 9.2 Objective Two: Factors that affect understanding and behaviour of each user of the forecasts and its managerial implications on the international pharmaceutical companies.

As explained earlier that this objective aims to identify factors that influence the produced forecasts by the different users of forecasts. The users of forecasts were defined by Mentzer *et al* (1999) to include three departments which are marketing/sales, finance and supply chain (or logistics).

Based on the findings of this research, it has been concluded that the behaviour of the users of forecasts toward the produced forecasts will lead to different conflicts between these users. The researcher collected data in this research from the three departments of the users of forecasts in order to investigate differences between these departments, factors that affect

their behaviour and forces that affect their judgments. The conflicts emerged during the process of data collection, and were confirmed through feedback from marketing personnel who stressed that the finance and supply chain departments should be involved in this research.

Based on the conceptual framework, this research identified the forces that affect the users of forecasts, and their influence on the perceptions of users and the understanding of departments about the produced forecasts in pharmaceutical companies. This matches with the previous literature supporting that individual behaviour and management styles can have an impact on the application of forecasting (Fildes, 2006; Armstrong, 2001; Lawrence, 2000), and different theoretical grounding has emerged to explain the management role in the development of forecasts like Davis and Mentzer (2007), Winklehofer and Diamantopoulos (2003) and Mentzer *et al*. (1999). However, Smith and Mentzer (2010) highlighted the lack of research explaining the impact of the actions and perceptions of users on the utilisation of forecasts, which has led to conflicts in identifying the relationship between the forecasting and operating performance.

At the same time, Filders *et al.* (2009) highlighted the importance of conducting future research that investigates the impact of psychological forces on the forecasting process in his study titled *"effective forecasting and judgmental adjustments: an empirical evaluation and strategies for improvement in supply-chain planning"*. Furthermore, Bunn and Wright (1991) said that *"experts are used to their real world context and the judgemental process is made explicit through a form of decomposition or audit trail"* (P: 512), and there is a need for re-evaluation of the basic psychological research on judgemental biases, bootstrapping, and calibration in this context in order to improve the best practice quality of the judgements in forecasting. This research revealed that there are differences in the priorities and lists of issues that concern each user that might interfere with the views of users about forecasts and affect their judgments regarding them. As mentioned earlier, forecasting should be a team work because even accurate forecasts might not be achieved unless the management gains commitments from and acceptance of users. Interdepartmental discussions in formal and informal meetings will help in supporting the forecasting process; however, the organisational structure and management approach might interfere with the level of communication. As shown in Figure (8.2) page (218), there is some sort of agreement

between the three departments of finance, marketing/sales and supply chain regarding the sales turnover, targets, profits, expenses and costs.

As mentioned earlier in the literature review, there are many debates that support or contradict the judgmental influence on statistical forecasting. However, the supporters of judgmental integrations of the forecasts argue that the choice of data is part of the judgmental integration of forecasts as the data need to be evaluated by the forecasters or constructors of the forecasts (Bunn and Wright, 1991; Webby and O'Connor, 1996; Sanders and Manrodt, 2003).

Interviews with all respondents in this research emphasised the importance of interdepartmental communication, though respondents from different departments declared the variation in pressures by forecasts on the different users, and the conflicts between the judgments of the users. Moreover, the decreased knowledge of market and forecasting affect the users' judgments. These results match with Harvey and Fischer (1997) and Lim and O'Connor (1995, 1996) who concluded that users of forecasts cannot make adjustments to the forecasts since they lack understanding of the forecasting techniques as well as knowledge about the market. This will leave judgments to be dominated by the users who experience some psychological pressures that affect their judgments.

Despite that Goodwin and Wright (1994) and Webby and O'Connor (1996) argued that combining judgments with simple average forecasts through mechanical averaging between both methods would reduce the forecasting errors, the lack of sufficient market and forecasting knowledge by the users will affect the forecasting process and outcome (Harvey and Fischer, 1997), and, consequently, the accuracy of the final forecasts.

At the same time, due to shortage of knowledge, the reading of historical data might lead into inappropriate judgements by practitioners as mentioned by Carbone and Gorr (1985) and Angus-Leppan and Fatseas (1986). According to Lim and O'Connor (1995), people tend to give their judgements a very high weight in the forecasting process, which would contribute to increasing the depth of conflicts. Despite that Harvey and Fischer (1997) regarded skilled people with overconfidence to have a competitive advantage, they also saw that their judgments might create a suboptimal performance of forecasts.

Biasness of the produced forecasts commonly starts with the human information processing as explained earlier. Such biasness would clarify and rationalise the human belief revision (Edwards, 1982). Judgements depend on the experience or previous trainings that develop the skills and ability to judge; this experience and training will also add to the self-confidence of forecasters even when associated with minimal changes in performance (Harvey, *et al* 1987; Marteau *et al* 1989; Marteau *et al* 1990). People's confidence in overestimation or underestimation of certain facts is relative and subject to several factors as personal experiences and beliefs (Koehler and Harvey, 1997).

In the current research, the researcher found that the consequences of constructing the forecasts by marketing personnel would increase the biasness of forecasts because the achievement of these forecasts is pegged to performance. This case will lead to interdepartmental conflicts in forecasting management. It was very clear in the interviews that marketers and sales people never mentioned any troubles in forecasting management, whereas, finance and supply chain departments agreed that there are many problems in forecasting management that need to be addressed by management and through team work to decrease the percentage of failure.

Webby and O'Connor (1996) mentioned that the statistical methods in forecasting as more reliable and less subject to bias since they rely on the use of historical data. Such statistical forecasting methods are considered myopic despite that they can be justified by the forecaster. From another perspective, others researchers regarded integrating judgements and statistics in forecasts as practical and possibly leading to higher accuracy, even though, such an approach can sometimes bring about very unsuccessful results (Bunn and Wright, 1991).

The contradictions in judgments will have an impact on the compliance with the produced forecasts. Accordingly the departmental meetings and formal or informal discussions play an important role in forecasting management. These conflicts emerged during the interviews and were raised by many respondents. The finance department looks at forecasting as an instrument for calculating the future profits, preparing the budgets and paying the future payables, whereas, the supply chain department looks at forecasting as the starting point to plan the supply and accommodate the goods. Neither the supply chain nor the finance departments were concerned about the appraisal of performance measurements of forecasts

and their achievement because they had other appraisal of performance. However, the marketing/sales people were more concerned about the performance measurements, taking into consideration that those marketing/sales people were shown in this research as the constructors of the forecasts in order to show commitment to achieve those forecasts in front of the management. Having inconsistent departmental strategies and variations among the departments' appraisal systems is expected to cause more interdepartmental conflicts and individualism.

### 9.3 Objective Three: Variations in the management approaches on the forecasting management in the international pharmaceutical companies.

As mentioned earlier, Mentzer and Moon (2005) identified four management approaches that have an effect on forecasting management; these include the independent approach, the concentrated approach, the negotiated approach and the consensus approach. The majority of respondents mentioned that their management approach lies somewhere between the independent managerial approach and the negotiated managerial approach, and it has been noticed that the management's rewarding philosophy will have an effect on the behaviour and attitude of the users of forecasts. The independent managerial approach is that where each department has its own development process, independent of the forecasting process, whereas the negotiated managerial approach is where each department makes its own forecasts and then conducts a meeting to discuss the final forecasts.

This research showed that the managerial approaches in pharmaceutical companies could support the integration between departments within the organisation to transfer knowledge and information, taking into consideration that such integration will support organisational agreement, and, thus, reduce conflicts that might take place during the annual planning review and the setting of forecasts, leading to the production of more accurate forecasts. This was supported by Fildes (2010) who mentioned that communication between departments by formal and informal ways would contribute to enhancing the level of integration between departments.

It has been found that originator pharmaceutical companies have better functional integration than the generic ones, where such integration is likely to reduce the interdepartmental conflicts and support the collaboration and coordination between departments in such ways that lead to more commitment toward the produced forecasts. This is in agreement with

Mentzer *et al*. (1999) and Mentzer and Moon (2005) who mentioned that functional integration will improve the information communication between departments which would provide more confidence to the produced forecasts.

It has been found that the forecasting process might take place through down-top processes, top-down processes, or a combination of both. The generic international pharmaceutical companies mostly apply the top-down approach in order to push the sales and targets, whereas the international pharmaceutical companies mostly apply either down-top processes or a combination of both strategies. The top-down forecasting is built based on profits to satisfy shareholders whereas, in international pharmaceutical companies, the down-top or combination strategy will provide the opportunity to involve different persons in different departments. It has been found that shareholders are less interested to hear pessimistic reality and prefer the optimistic bias in management forecasts.

Based on this, the management could be either democratic/supportive or bureaucratic in their style (McClure, 2010). Originator companies were found to be more systemic and proactive in their management style, where they have been shown to be mostly democratic and their forecasting processes are mainly conducted using the down-top process or a combination of both processes. The generic companies, on the other hand, are more bureaucratic in their forecasting process, where forecasts are often pushed by the management in a certain direction in order to support the future plans and the decision making processes.

The performance measurement is directly related to the forecasting process (Mentzer *et al*., 1999; Mentzer and Moon, 2005). The findings of this research showed that the constructors of forecasts are mostly the marketing/sales department; the findings also showed that the constructors of forecasts in the marketing/sales department do not recognise any problems or issues related to forecasting management even though they are the constructors of forecasts and are responsible for achieving them. The finance and supply chain people stressed that the main issue that concerns them about the marketing/sales department is forecasting, especially that marketing and sales people are more knowledgeable about the market place. Despite that management is linking the appraisal system with forecasts achievements, the researcher found that there are no clear forecasting processes in pharmaceutical companies to fairly monitor the performance. The variations in priorities between the users of forecasts and the

links between the appraisal system and forecasts achievements will direct the forecasting process into biasness and departmental conflicts.

### 9.4 Objective Four: Forecasting assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities

Upon review of academic literature into forecasting, it was noted that there is hardly any literature on the assessment of the forecasting management process; rather, the focus of forecasting assessment in literature is on assessment of the accuracy of calculations and the produced forecasts. Such lack of research into assessment of the forecasting management process makes it difficult to discuss this objective in the context of relevant literature.

Therefore, this objective is unique as it sets a foundation for future research into assessment of the forecasting management process by proposing a forecasting assessment model to be used assessing the management of forecasting within the international pharmaceutical companies.

In this objective, the researcher linked the variables found in this research into a forecasting assessment matrix that can help pharmaceutical companies in evaluating the whole forecasting management process within their companies. These variables were extracted from the interviews conducted in this research. These assessment criteria can be anticipated in practice to increase the awareness of forecasting management and allow companies to create corrective measures for the future development of the forecasting management. The forecasting assessment model developed in this study has sixteen ranks in which each company can rate their forecasting process.

### 9.5 Chapter Summary

This chapter linked the findings of this research with the previous literature about the topic. Based on the data analysis in Chapter Seven and Chapter Eight, the research found that the assessment of the forecasting process can be evaluated through four main dimensions, which are the level of knowledge of forecasting, knowledge of the market, managers' celebrity that is usually related to experience and self-confidence, and interdepartmental communication that is related to the managerial approaches in international pharmaceutical companies.

Moreover, there are clear variations between companies and organisations based on their product line, i.e. generic or originator, in defining the forecasting knowledge, which might be

because of trainings and activities that involve different users of forecasts. The use of value based targets strategy does not help companies in developing their forecasting management process, as this strategy focuses on cash achievement rather than being accurate.

Judgmental integration of forecasts takes place mainly as a result of forecasting ambiguity and inability to predict the future accurately; these subjective inputs can lead to conflicts between departments that are using the forecasts. The international pharmaceutical companies need to rescue the forecasting process to properly plan the future of this industry. Though this industry is very profitable, the expiry of patents, the decrease in R&D innovations, and the shortage in new booming drugs will affect its future performance (Smith, 2011).

The development of the forecasting process can be done by starting to identify the rank of the company in order to make a plan that fills the gaps in practice. The four dimensions have been utilised to conduct an assessment matrix *"Haloub Assessment of Forecasting (HAF) Index",* which is one of the main contributions of the research. The next chapter will discuss this research's conclusions, contributions, recommendation, limitations and future research opportunities.

# CHAPTER TEN

# CONCLUSION, RECOMMENDATIONS, LIMITATIONS AND FUTURE RESEARCH

## 10.1 Conclusion

The uniqueness of the current research is that it aims to assess the forecasting management practices through addressing real and pressing management conflicts between the goals and objectives of the marketing/sales, finance and supply chain departments, and the impact that such conflicts could have on forecasting management. These inter-departmental conflicts have emerged as a result of the different interests between departments, and have, accordingly, led to variations in judgments and perceptions to forecasts. Moreover, this research has also studied the impact of the variations in management approaches, and provided suggestions of the assessment approaches and tools that can be utilised to assess the forecasting management performance. After conducting 18 interviews in 8 different international pharmaceutical companies, as described in Section (7.2) page (175), the researcher was able to reach the saturation level and discuss the research's four main objectives which are:

- Identify the level of knowledge about the forecasting techniques by the users and forecasters in pharmaceutical companies.
- Define the factors that affect the understanding and behaviour of each user of the forecasts and its managerial implications in the international pharmaceutical companies.
- Identify the effect of variations in the management approaches on forecasting management in the international pharmaceutical companies.
- Develop an assessment model through which the international pharmaceutical companies can evaluate their forecasting management capabilities.

Due to the nature of this research and the chosen methodology of Grounded Theory, the researcher examined the current relevant literature, but allowed the data to emerge from the interviews as required by the research methodology. The gaps in the literature review regarding the forecasting managerial process, in addition to the difficulty and high challenges of the pharmaceutical industry, have made this research very unique among other researches in terms of its conceptual framework, as shown in Figure (5.1) page (121).

The nature of the research methodology (Grounded Theory) the researcher let the theory and central phenomena of the research to emerge from interviews. This methodology provided sophisticated and deeper understanding of challenges in forecasting management in the pharmaceutical industry. The contribution of the current grounded research is to finding solutions and providing suggestions for forecasting management in the future. The Grounded Theory was found to be very useful in the building the consciousness about problems faced by the skilled professionals. Constant reflexive comparisons allowed intricate theory to emerge to explain real difficulties or certain phenomena to motivate researcher to glean hypotheses.

This chapter will provide the research conclusion in which the researcher will summarise the overall picture about the reality of forecasting management in international pharmaceutical companies. Moreover, this chapter will present the contribution to knowledge and practice, and explains *Haloub Assessment of Forecasting (HAF) Index*. This chapter will also present the research recommendations for practice, research limitations and the opportunity for the future researches. This chapter is divided into six sections; the first section is the conclusion, in which the researcher summarises the output of the research. The second section is the contribution to knowledge and literature, in which the researcher linked the output with the previous literature to support the future assessment of forecasting through dividing the companies' forecasting process into ranks of assessment. The third section is the recommendations to practice, the forth section is the research limitations and fifth section is the opportunities for the future researches based on the current research results, the last section is the chapter summary.

## 10.1 Conclusion

The first core category arisen in data analysis was the knowledge of the forecasting methods, and this was clarified in the research analysis as "forecasting ambiguity". The forecasting ambiguity in international pharmaceutical companies was clearly defined in this research, because the pharmaceutical companies suffer from shortage of knowledge about the forecasting management which lead to use of judgments more frequently, despite that judgments are important in forecasting process as mentioned by (Willemain, 1989; Wolfe and Flores, 1990; Flores *et al*, 1992), it may increase the forecasting errors because of human biasness.

As argued by Dilgard (2009), the managers who are involved in the forecasting management process within international pharmaceutical companies, do not differentiate between forecasting and planning. The high ambiguity in forecasting knowledge would leave the forecasting process to the personal judgments with minimum involvement of mathematical forecasting methods will engage different psychological pressure that affect people and contribute in biasness of forecasting output. The forecasting errors increase because of these psychological pressures (Filders *et al*, 2009). The integration of judgements into statistical forecasts was criticised by Sanders (1992), Harvey (1995) and Goodwin and Fildes (1999), as the integration of judgements into forecasts would decrease their accuracy due to confusion between statistics and managers' judgements that are based on the reality of the marketplace (Goodwin, 2002).

Despite that judgments are important in forecasting process as mentioned by (Armstrong, 2003); it may increase the forecasting errors because of human biasness. The forecasting constructors in pharmaceutical companies are the marketers and sales people, and this is because they are in direct touch with the market and at the same time, the managements in international pharmaceutical companies are looking for the sales and marketing commitments in achieving their promised forecasts. The increase in the forecasting ambiguity, increase the psychological forces that increases conflicts.

Based on the respondents, there were clear differences between companies in degree of forecasting ambiguity based on the nature of the organisations. It has been acknowledged by the researcher that originator companies have less forecasting ambiguity than the generic companies, which might be because of the level of investments in these companies. However, both types of companies (originators and generic) share the same issue of forecasting errors and biasness. The generic companies basically are using the "value based targets" in which the forecasts start from the value and then divided on the units (or SKUs).

From the other hand, the performance measurements also contribute into the judgemental process of forecasting. Because the constructors of forecasts are the same people who have to achieve these figures, the forecasting might be very biased and inaccurate (Fildes, 2006; Lawrence, 2000; Schultz, 1992). The effect of appraisal system is important in forecasting process, as the low knowledge of constructors of the forecasts (market and forecasting knowledge) will direct the other to integrate into forecasts by adding their judgments into the

final figures which was called in the data analysis as "*internal contamination*". Despite that the type of research methodology used the Grounded Theory in data collection and analysis; the researcher noticed the disagreements in the forecasting performance between the three departments; sales and marketing, finance and supply departments. The mostly all respondents from marketing department declared that there are no problems in the forecasting processes within their companies, however; the finance and supply people agreed that their main problems are found in forecasting as the constructors might not be qualified for forecasting because of shortage of their knowledge and experience in the field of the forecasting and market knowledge. Finance and supply people might not have the forecasting and market knowledge that qualify them to incorporate their judgements in the forecasting process, and this might lead to interdepartmental conflicts. Leaving the forecasting process to the personal judgments with minimum involvement of mathematical forecasting methods will lead to different psychological pressure that affect people and contribute in biasness of forecasting output. The forecasting errors increase because of these psychological pressures (Filders, *et al*. 2009). The forecasting knowledge and market knowledge are important to assess the identity of forecasts and describe the forecasting process. Moreover, due to the dynamics of pharmaceutical markets, it is hard to track changes in this industry due to innovation in R&D and regulatory changes (Smith, 2011); however, this obligated pharmaceutical companies to find experts in forecasting.

As examined in the research earlier, there are variations in values of forecasting users can be destructive or constructive conflicts, as each department has its own views of forecasts as was explained in figure (8.2) page (218). This research agreed with Mentzer, *et al.* (1999) that the departments that are involved in the forecasts are marketing/sales, finance and supply chain (or logistics). The priorities vary between departments, as the finance department looks at forecasting as an important tool to prepare the budgets, calculate the profits in the future and make sure to pay the future payables. On the other hand, the supply chain department looks at forecasting as the starting point to plan the supply and accommodate the goods. The forecasts achievement is not the main concern of both finance and supply chain people. However, the marketing/sales people were more concerned about the performance measurements, taking into consideration that those marketing/sales people were shown in this research as the constructors of the forecasts in order to show commitment to achieve those forecasts in front of the management. Having inconsistent departmental strategies and variations among the departments' appraisal systems is expected to cause more interdepartmental conflicts and

individualism. The consequences of constructing the forecasts by marketing personnel would increase the biasness of forecasts because the achievement of these forecasts is pegged to performance. This case will lead to interdepartmental conflicts in forecasting management. It was very clear in the interviews that marketers and sales people never mentioned any troubles in forecasting management, whereas, finance and supply chain departments agreed that there are many problems in forecasting management that need to be addressed by management and through team work to decrease the percentage of failure.

As mentioned earlier there are similarities between departments, but as explained the variations in the departmental priorities. The low forecasting and market knowledge contributes into departmental conflicts. The increase or decrease in conflicts might be minimised or initiated by the constructors' ability to sell the forecasts. As selling forecasts is important as conducting it (Johnson, 2005), the individuals' celebrity might be another factors in the assessment of forecast. The constructor's ability to sell the forecasts depends on the level of celebrity and his/her ability to convince others. Depending on the type of person and the pressures identified in setting the final forecasts, the produced forecasted might be misjudged by being undervalued or overvalued. The effect of the celebrity of individuals might be related to the shareholders' expectations about the future growth as pointed out by Sudarsanam, *et al.* (2002). The main concern about produced unrealistic forecasts is that they can have an effect on individuals' behaviour. The forecasts change behaviour and the behaviour of individual affects the success of forecasts.

It important to mention that organisational management approach might support or discourage the interdepartmental communication. The overlap between departmental duties and individuals' priorities are the main reason for increased conflicts and decreased level of departmental communication. There are some differences between types of pharmaceutical companies; the way the forecasts are being decided reflects the organisational management approach. It has been found that originator companies are more into down top direction in which sales and marketing are involved in the process of forecasting, whereas, in some generic companies the forecasts are usually top down and it is value based forecasts. The generic companies might face forecasting issues in which the interdepartmental conflicts are higher than in other originator companies because of forecasting processes.

The link between variables of the current research enabled the researcher to develop forecasting assessment matrix that will be hopefully used to rank companies based on the three variables; these variables are: level of forecasting knowledge (or level of forecasting ambiguity), level of market knowledge, interdepartmental communication and managers' celebrity or managers' ability to sell the produced forecasts. These assessment criteria can be anticipated in practice to increase the awareness of forecasting management and allow companies to create corrective measures for the future development of the forecasting management. The forecasting assessment model developed in this study has sixteen ranks in which each company can rate their forecasting process.

The development of the forecasting process can be done by starting to identify the rank of the company in order to make a plan that fills the gaps in practice. The four dimensions have been utilised to conduct an assessment matrix *"Haloub Assessment of Forecasting (HAF) Index"*, which is one of the main contributions of the research. The next section "the research contribution" will discuss this assessment matrix in details.

### 10.2 The Contribution to Knowledge

This section will highlight the contribution of this research to knowledge in order to justify the PhD level of this research. This research contributes to knowledge in three main areas including theory / academic literature, methodology and practice. The research adds more clarity to the process of forecasting in international pharmaceutical companies and the factors that influence the judgemental decisions of users in the forecasting process. Thus, this research begins to fill the gap in academic literature by proposing methodological developments into the process of forecasting. This was done following thorough investigation of the gaps in the forecasting process, which enabled the researcher to suggest ways of overcoming these gaps in order to enhance the forecasting process and minimise the errors associated with it. While current research focused on mathematical forecasting formulas and the ways by which judgemental forecasting takes place, this research focuses attention on factors that influence the judgemental forecasting process, and how the inter-departmental conflicts within organisations can impact the forecasts. In doing so, this research has helped to build understanding as to how gaps in the forecasting process can be minimised in order to achieve more accurate forecasts with lesser errors.

More specifically, this research fills the gap in literature that was raised by Fildes *et al.* (2009). Fildes *et al.* (2009) mentioned that the system of forecasting can be improved if the managers integrated useful judgments into the produced forecasts. Fildes *et al.* (2009) added that the system of integrating judgments into the forecasting process might be improved to

> *"Mitigate the pressures towards bias both personal and organisational, that exists in many companies.... This indicates the need for organisation based studies that use interpretive research methods to establish, at a deep level, the beliefs and values of managers engaged in forecasting. Such research would need to explore both the psychological processes that individual managers employ and the effects of interactions between managers within organisational contexts. The results of these studies should encourage the successful implementation of effective company forecasting processes"* (Fildes *et al.*, 2009:20).

This research answers the call for research by Fildes *et al.* (2009) as it tests the forecasting knowledge among the users in international pharmaceutical companies, white at the same time, explores the use of judgements and judgemental interference in forecasts. This research extends the use of judgements in forecasting based on the level of forecasting ambiguity, taking into consideration that the variations of forecasting knowledge in practice were studied by many researchers (e.g. Johnson, 2005; Armstrong, 2005; Fildes, 2006), but few studies evaluated the forecasting knowledge in one single business sector. Moreover, this research highlights the factors that cause pressures on the users of forecasts in the forecasting process.

From another perspective, this research identifies the effects of variations in the management approaches on forecasting management, which were introduced earlier by Mentzer and Kahn (1999), while considering the international pharmaceutical companies as a case study. This research also evaluates the impacts of organisational culture and structure on shaping the values and priorities of the produced forecasts to match with the companies' objectives. Through the application of a Grounded methodology, this research has managed to link the forecasting knowledge with the judgmental interpretations and the produced forecasts.

Consequently, this research contributes to the academic literature by identifying the forces that affect each user or manager of the forecasts, and the impact of these forces on the forecast values of each department within the organisation. These forces explain the users' judgments on the produced forecasts, and their impact on the personal satisfactions based on

values and priorities of the users of forecasts (as explained earlier in Chapter Eight, Section 8.2, page (217 – 218)). Moreover, this research evaluates the interaction between individuals and organisational contexts.

This research also fills the gap in the literature by suggesting a forecasting assessment matrix called (*Haloub Assessment of Forecasting (HAF) Index,* as will be explained in Figure (10.1), that can provide an appraisal system for companies based on the variables and assessment forecasting criteria, which were identified in the research and are related to forecasting management.

Additionally, the HAF Index offers a new contribution to practice through providing an assessment of the forecasting management process within companies, where companies can identify their weaknesses by using this matrix to improve forecasting of the future. This is an important contribution in laying a foundation for future quantitative research and practical evaluation of forecasting management. Furthermore, this research is the first research to assess the forecasting process in pharmaceutical industry, which is regarded as a very complex industry. Yet, the assessment criteria identified in this research are expected to support the forecasting decisions of the other industries in addition to pharmaceuticals.

Despite that the researcher's initial intentions did not involve a contribution to the methodology, the use of a well-tested and accepted model that matches with the research philosophy has contributed to increasing the trustworthiness of the data collected. This research is the first research that uses the Grounded Theory as a method and a methodology in research on forecasting management. So far, the majority of previous research has used quantitative research methods, mostly through case study approaches, to collect data. Moreover, the use of the conditional relationship and reflective code matrices in the data analysis has stretched the researcher's knowledge about the topic and enabled the researcher to collect the innermost private thoughts from the respondents in international pharmaceutical companies about forecasting assessment.

The four main factors that the research generates are the level of knowledge of forecasting (termed as forecasting ambiguity), the level of knowledge in the market, the celebrity of the constructors, and the interdepartmental communications. These four factors have led the researcher to the creation of a 16-rank matrix called *Haloub Assessment Forecasting (HAF) Index* as shown in Figure (10.1). This matrix contributes to practice by helping organisations

in assessing their forecasting management performance. The criteria in the index were assimilated based on the data collected in this research, in addition to the researcher's understanding and interpretation of the data collected.

According to Figure (10.1), the HAF Index considers 16 different ranks that comprise a combination of different situations. These situations take into consideration high and low forecasting ambiguity situations, high and low inter-departmental communication situations, high and low market knowledge situations, and high and low manager's celebrity situations. The different combinations of these situations have led the researcher to developing the suggested 16 ranks shown in Figure (10.1) including lucky shot, suspicious, agonized, contradiction, accepted, hidden risk, failed, bankrupted, superb, distinguished, individualistic, resisted, indeterminate, uncertain, hesitant, rejected. These ranks are shown in Figure (10.1), and explained in detail next.

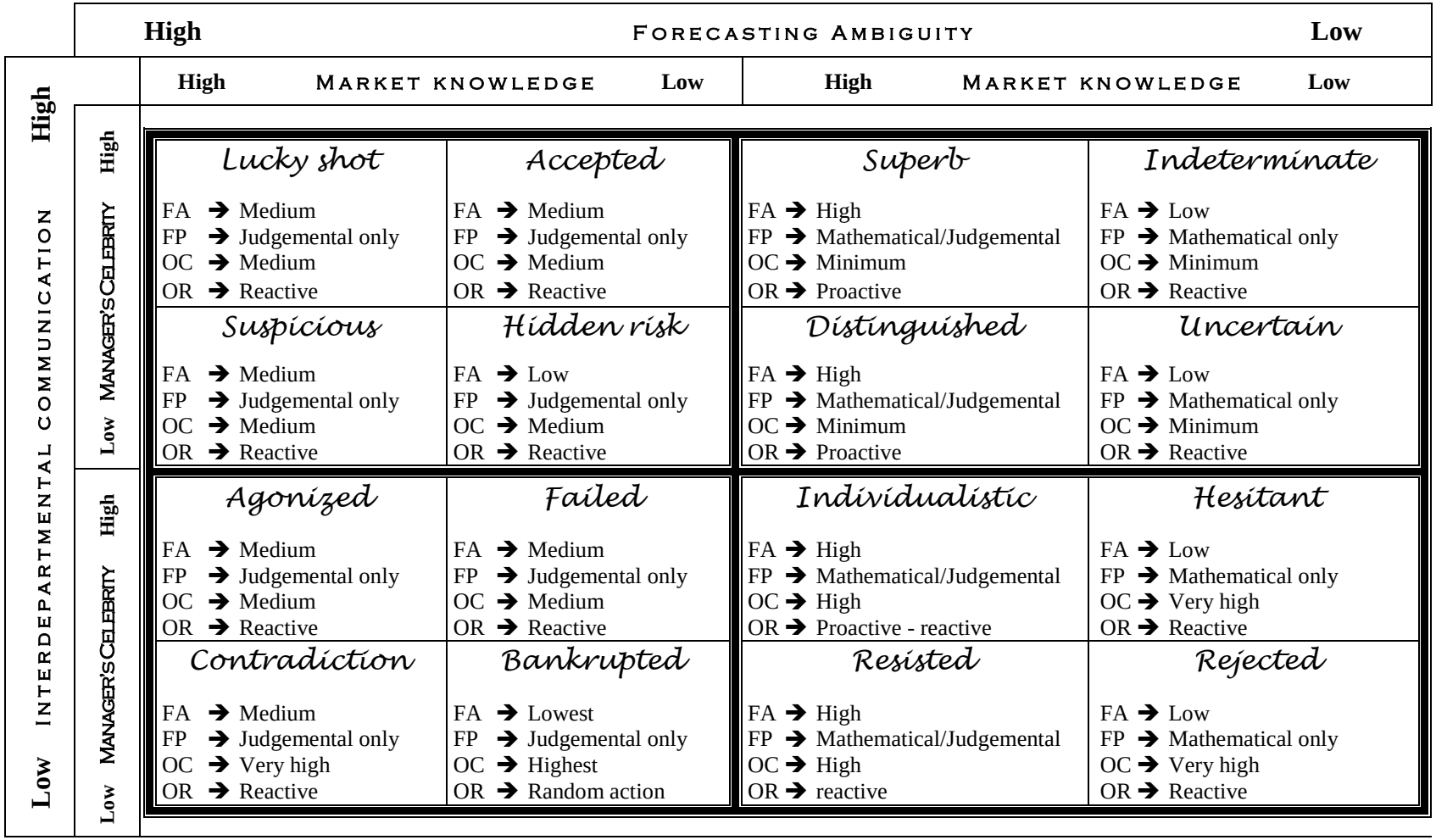



**Figure 10.1: the contribution of the research - Haloub Assessment of Forecasting (HAF) Index (Author's work, 2012).**

**FA** is Forecasting Accuracy, **FP** is Forecasting Process, **OC** is Organisational Conflicts, **OR** is Organisational Responses

The first four ranks of forecasts including lucky shot, suspicious, agonised and contradiction, are all characterised by the constructor's high level of market knowledge that is associated with high market ambiguity, thus, leading to medium accuracy of forecasts, in addition to organisational conflicts and reactive strategies. However, these ranks vary in their level of inter-departmental conflicts and manager's celebrity. Each of these four ranks is explained next.

***Rank One: The Lucky Shot***

The lucky shot is the stage at which the constructor or manager has high forecasting ambiguity of the forecasts, but high knowledge about the market. The forecasting accuracy is characterised to be medium, however, the forecasting process is judgmental. High interdepartmental communication would decrease the conflicts that are, in reality, initiated because of the reactive organisational responses. Accordingly, achieving the forecasts might be a lucky shot.

***Rank Two: Suspicious***

The suspicious rank is also a stage at which the forecasts are associated with high forecasting ambiguity, and high knowledge about the market. However, this rank is characterised by low celebrity of the constructor or manager, which lowers the level of acceptance of forecasts in the company, even in cases of high interdepartmental communication. Accordingly, this is likely to lead to suspicions about the forecasts making it hard for the manager or constructor to sell these forecasts to the company, thus, leading to a suspicious stage. Here, the forecasting accuracy is characterised to be medium, and the forecasting process is judgmental, but more conflicts are likely arise alongside a reactive organisational responses.

***Rank Three: Agonized***

This rank is characterised by high market knowledge alongside high manager's celebrity, but is associated with high forecasting ambiguity and low interdepartmental conflicts, leading to the forecasts to be agonized. The accuracy of the forecasts is likely to be average since these forecasts are associated with high market knowledge. The process of forecasting in this case will be judgmental, although associated with high organisational conflicts and a reactive strategy.

***Rank Four: Contradiction***

The contradiction rank is characterised by high market knowledge and low celebrity of the manager or constructor of forecasts, which are associated with low interdepartmental communication and high forecasting ambiguity. Thus, the consequences would include conflicts, and judgemental forecasts would be the only approach to forecasting due to the high forecasting ambiguity.

The following four ranks of forecasts including accepted, hidden risks, failed and bankrupted, are all characterised by the constructor's low level of market knowledge that is associated with high market knowledge, thus, leading to low or very low accuracy of forecasts, in addition to organisational conflicts and reactive strategies. However, these ranks vary in their level of inter-departmental conflicts and manager's celebrity. Each of these four ranks is explained next.

***Rank Five: Accepted***

The accepted rank is characterised by low market knowledge and high celebrity of the manager or constructor of forecasts, which are associated with high interdepartmental communication and high forecasting ambiguity. The forecasts will be accepted because of politics due to the manager's or constructor's has high celebrity and the high interdepartmental communication. The forecasting process is also judgmental and leads to a reactive company strategy.

***Rank Six: Hidden Risks***

Hidden risks might arise due to the shortage of knowledge of the constructs or managers about the market alongside the high forecasting ambiguity. This rank is associated with high interdepartmental communication that might support the forecasts by allowing quick adaptation to the market; however, the conflicts might be higher than in the case of accepted forecasts.

***Rank Seven: Failed***

The low market knowledge in this rank, alongside the low forecasting knowledge (or high forecasting ambiguity) and the low interdepartmental communication will definitely lead to failed forecasts and high organisational conflicts.

***Rank Eight: Bankrupted***

Rank eight and rank seven are very close to each other as the difference is the manager's celebrity as the celebrity it will not benefit the produced forecast. Moreover, in bankrupted forecasts the organisation might face random action and a very high level of organisational conflicts.

The following four ranks of forecasts including superb, distinguished, individualistic and resisted, are all characterised by the constructor's high level of market knowledge that is associated with low market ambiguity, thus, leading to high accuracy of forecasts. However, these ranks vary in their level of inter-departmental conflicts and manager's celebrity. Each of these four ranks is explained next.

***Rank Nine: Superb***

The superb rank is characterised by constructor's high market knowledge, low forecasting ambiguity, high manager's celebrity and high interdepartmental communication, which will lead to superb forecasts. This rank of forecasts is characterised by high forecasting accuracy, minimum conflicts and proactive organisational response. The forecasting techniques involved in this rank include both mathematical and judgmental forecasting processes.

***Rank Ten: Distinguished***

Distinguished forecast is very close to the superb forecasts, as it is also characterised by high market knowledge, low forecasting ambiguity, which are associated with high forecasting accuracy, and a combination of both judgmental and mathematical forecasting techniques; however, the manager's celebrity in the case of distinguished forecasts is low.

The high market knowledge and low forecasting ambiguity associated with superb and distinguished forecasts reduce the conflicts and create a proactive environment within organisations.

***Rank Eleven: Individualistic***

This rank is characterised by high market knowledge and low market ambiguity that are associated with low inter-departmental communication. However, since achieving forecast is not an individual effort, but rather a team work, this rank of forecasts is associated with high forecasting errors even though it is associated with high market knowledge, low forecasting

ambiguity and high manager's celebrity, since the forecasts are individual and not well-communicated with the other departments.

***Rank Twelve: Resisted***

Like individualistic forecast, resisted forecasts are characterised by high market knowledge and low market ambiguity that are associated with low inter-departmental communication. However, the resisted forecasts also come with low manager's celebrity, and, therefore, are likely to be resisted and associated with high organisational conflicts.

The last four ranks of forecasts including indeterminate, uncertain, hesitant and rejected, are all characterised by the constructor's low level of market knowledge that is associated with low market ambiguity. Thus, these forecasts have low accuracy and come with a reactive organisational response. However, these ranks of forecasts vary in their level of inter-departmental conflicts and manager's celebrity. Each of these four ranks is explained next.

***Rank Thirteen: Indeterminate***

Indeterminate forecasts are characterised by low forecasting ambiguity and low market knowledge. Therefore, the constructor of forecasts is more likely to use the mathematical forecasting techniques as the forecasting ambiguity is very low. These forecasts are associated with high manager's celebrity and high inter-departmental communication, which support the forecasting constructor in justifying the low accuracy forecasts. Thus, the organisational conflicts would be minimal, but a reactive organisational response is likely due to the low forecasting accuracy.

***Rank Fourteen: Uncertain***

The uncertain forecasts are very similar to the indeterminate forecasts, and even though the earlier are associated with low celebrity of managers, this is unlikely to have a significant effect since the market knowledge, in both cases, is low.

***Rank Fifteen: Hesitant***

These forecasts are characterised by low forecasting ambiguity, low market knowledge and low interdepartmental communication that would lead to hesitant forecasts. Despite that the low forecasting ambiguity might increase the rationale behind a scientific justification of these forecasts, especially that these forecasts are associated with high manager's celebrity,

the produced forecast are unlikely to be shared due to the low level of interdepartmental communication.

***Rank Sixteen: Rejected***

In this rank of forecasts, the market knowledge is low, the interdepartmental communication is low, and the manger's celebrity is low, thus, leading to forecasts that will be rejected and faced with organisational conflicts.

### 10.3 Recommendation

The recommendations in this piece of work can be summarised in five main areas including changing the performance appraisal system, investing in the forecasting department, supporting interdepartmental communication, providing forecasting training courses and evaluating the ranks of forecasting performance suggested in this research.

Regarding changing the performance appraisal system, this study showed that the users of forecasts are all involved in the forecasting process in pharmaceutical companies, however, appraisals focus on the responsibility of the marketing/sales department in achieving the forecasts. Despite that this appraisal system can have the advantage of increasing the responsibility of marketing/sales department to achieve the forecasts, by linking that achievement to their performance measures, this might lead to increasing the biasness of the produced forecasts as the other users of forecasts are not equally responsible for the achievements, thus, leading to more conflicts in the forecasting management process. Therefore, it is recommended to consider all the users of forecasts who participate in setting the final forecasts in the performance appraisal system in order to decrease the gaps between departments and support the forecasting process.

This research study also provides recommendation for placing more investment in the forecasting department. Such investments should be targeted to support the forecasting departments in ways that decrease the uncertainty about the future, and increase the forecasting knowledge within the organisation.

As for interdepartmental communication, pharmaceutical companies are recommended to conduct formal activities that support interdepartmental communication. This recommendation supported the consensus of the managerial approach by Mentzer and Moon

(2005), and was also highlighted by one of the respondents who mentioned that it would be beneficial for companies to set their forecast as an assigned group by involving a member from each department, where the constraints and issues related to the produced forecasts can be discussed and followed up between departments.

International pharmaceutical companies are also recommended to focus on training programs and courses that provide a common ground for all users of forecasts within organisations, where they could agree on certain issues to discuss when conducting the forecasts.

Another recommendation is to evaluate the ranks of forecasting performance by applying *Haloub Assessment of Forecasting (HAF) index*. This index should help companies identify the gaps in their forecasting process in ways that support the setting of corrective measures for future development.

### 10.4 Research Limitations

This section will talk about the limitations of the current research. One of the major limitations that faced the researcher in the current research is the access to pharmaceutical companies. Considering the fact that organisations face high challenges in forecasting management, some participates were unwilling to take part in the data collection process due to confidentiality reasons and the hypercompetition in the pharmaceutical industry. The researcher approached more than 90 international pharmaceutical companies in the UK and overseas. Only 18 participants from 8 different companies agreed to take part in this research, taking into consideration that the data collection process went on until the researcher was sure that the saturation stage is reached.

Furthermore, the timing of data collection of the research (2009 – 2010) during the economic recession did not support the researcher as well because of companies' downsizing that increased the pressure on the key respondents in these companies (marketing, finance and supply chain). The researcher overcame this limitation by participating in a number of group meetings and activities that were held in different locations in UK by different relevant institutions like the Chartered Institute of Marketing (CIM) and the National Health Service (NHS). Such meetings offered the researcher the opportunity to introduce himself and get the contacts for a number of potential respondents in different companies.

The international pharmaceutical companies who participated in this research refused to share internal data. So, instead of directly requesting the respondents to share such data, the researcher focused on the respondents' viewpoints to assess the existing forecasting management process, which added a greater value to the research. The majority of respondents agreed that there are detailed forecasting management processes and procedures, but there are some gaps facing the practical application of forecasting within the pharmaceutical companies.

The variations and differences between pharmaceutical companies on a product base (originator, generic, wide product line or niche) confused the researcher during the data collection and analysis, but it was useful in developing assessment criteria that will bridge the gaps in practice.

Due to the previous experience of the researcher in the field of forecasting in international pharmaceutical companies, the researcher's own background and experience might have influenced the data analysis and interpretation. However, it is well known that ultimate objectivity is not achievable in qualitative social research, which is seen as a limitation that could possibly influence the confirmability of findings. The researcher addressed this limitation by transcribing all the interviews; and even though nine respondents did not approve to have their interviews audio recorded, the researcher still worked on transcribing the interviews during the conversations with these respondents in order to document all their relevant comments. Furthermore, the researcher adopted the Grounded Theory as a method in the data analysis; this method involved constant comparison, as described in the Methodology Chapter, in addition to using direct quotes from respondents to support the findings in the Data Analysis Chapter.

Additionally, due to time and resources constraints, the researcher could not take the research a step further to confirm the findings through a quantitative study, where such a study would be valuable to test the forecasting assessment model suggested in this research. Nevertheless, this would open the door for future research to test the produced model.

Another limitation that is common in qualitative research is that related to the generalisability of findings. With reference to chapter six, the snowball sampling technique was used in this research in order to approach respondents in interviews that allowed the researcher to gain in-depth understanding about the forecasting assessment methods and the gaps facing it.

However, the researcher does not claim that the sample in this research is representative of the whole population, nor that the results are generalisable/transferable to the whole population, which is another limitation commonly associated with qualitative research. In order to minimise this limitation, the researcher rigorously applied the continuous comparison approach to compare the data in interviews with the literature, as part of applying the Grounded Theory as a method of analysis. This approach ensured that the researcher carried on with the data analysis until the saturation stage was reached.

### 10.5 Opportunities for Future Researches

Previous research has looked into the forecasting methods and the appropriate models to be used in the predication of forecasts, and according to Armstrong (1984), more sophisticated forecasting techniques will make a negligible increase in the forecasting accuracy. However, as pointed out in Chapter Two, the current literature lacks harmony between theory and practice (Flides, 2006) due to the of gaps in the practical understanding of the relationship between forecasting and operating performance (Smith and Mentzer, 2010), which, thus, adds to the value of the contribution of this research.

This research was conducted to assess the forecasting management process in the context of international pharmaceutical companies. Nevertheless, despite the value of this research to pharmaceutical companies, it will hopefully be valuable to test and assess the forecasting process in other industries in different developed and developing countries. Even though previous research has looked into the use of judgments in forecasting, it would still be valuable to investigate the priorities in judgments that were mentioned by Filders (2010), and the human expertise that was mentioned by Brown (2011), in order to develop a scoring forecasting system to evaluate the forecasting management process in different industries.

This research has highlighted factors that affect the forecasting management process, and future research might be able to measure the variations between companies by providing appraisal systems for companies by scoring their level of achievement in the forecasting management process based on this research output. This will help in bridging the gap between the reality and academic worlds. Such an assessment might give an indicator about the future performance by linking it to the R&D in addition to the other factors mentioned in this research.

## 10.6 Chapter Summary

This research has identified gaps in forecasting management that are being practiced in international pharmaceutical companies. The results that have achieved from the current research suggested the use of *Haloub Assessment of Forecasting (HAF) Index* to detect the forecasting process in companies. Moreover, this research identified the psychological pressures that affect the users' judgments in forecasting process, and the integration of these judgments is because of the weaknesses in forecasting knowledge.

Despite that the findings are relevant to international pharmaceutical companies but may have relevance to other industries. Hopefully the future researches can build on this research and being able to quantify the four dimensions and calculate the ranks based on a scoring system to appraise company's forecasting performance.

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# Appendices have been removed for confidentiality purposes