

SERVITIZATION FOR AUTOMOTIVE MANUFACTURERS IN THE MIDDLE EAST

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ABSTRACT

This dissertation is an investigation of servitization for automotive manufacturers operating in the Middle East. The central objective of the research is to assist automotive manufacturers in making a successful servitization transition by configuring a successful aftersales operation within their dealer network. The research triangulates the servitization phenomenon from three angles, the manufacturer, dealer network, and the customer. Hence, the overall objective is broken down into three related sub-objectives, which are addressed in three consecutive chapters:

The first objective is to provide a framework of the fundamental decision categories which confront the automotive manufacturers in the configuration of the dealer network service operation. This is addressed by developing the “aftersales service-focused servitization framework”, which captures the main operational decision categories that assist automotive manufacturers in configuring the aftersales service operation both internally and within the dealer network. The framework is built by expanding the ‘framework for production, product-centric servitized, and service operations’ as proposed by (Baines, Lightfoot et al. 2009).

The second objective is to provide automotive manufacturers with an assessment framework for measuring the performance level of the dealer network aftersales service operation. This is addressed by developing the ‘customer-focused performance measurement framework’ and its associated metrics. The framework is built by expanding the aftersales performance measurement framework proposed by Gaiardelli, Saccani et al. (2006), with specific reference to the automotive industry.

The third objective is to test the applicability of the service quality (SERVQUAL) scale and its dimensions empirically as a measurement instrument to assist automotive manufacturers in measuring the quality of the service provided by their dealer network. The outcome confirms the applicability of the scale and provides a suggestion to expand its dimensional factors.

The dissertation contributes to the literature on servitization and managerial practices. The contribution to literature is achieved through the extension of the notion of servitization by integrating the role of the manufacturer in configuring and supporting the service network and the role of the service network in achieving a successful servitization transition. The contribution to managerial practices is achieved by providing an integrated industry-level analysis of the automotive sector in the Middle East.

DECLARATION

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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DEDICATION

I would like to dedicate this thesis to the person who taught me never to give up and to keep on trying, my father; to the most important people in my life, my mother and sister for their continues support; my source of inspiration, my kids, Seif and Ziyad for everything they had to go through and sacrifice so I can reach this milestone; to Prof. Paul R. Jackson for his patience, guidance and wisdom; to my colleagues, for their continuous support and encouragement.

To all, I am eternally thankful.

CHAPTER ONE – INTRODUCTION

1.1. Overview

The trend of competing strategically based on service provision has been adopted by many manufacturing companies (Spring and Araujo 2009). Aftersales service plays a strategic role within the manufacturer's business as the first source of differentiation and an essential element to survive. Aftersales service produces higher profits than product sales (Cavalieri, Gaiardelli et al. 2007; Gaiardelli, Songini et al. 2014) and considered as a powerful marketing tool in establishing strong customer loyalty and brand promotion (Cavalieri, Gaiardelli et al. 2007). The shift in the focus of manufacturing organizations from selling the product to selling integrated product-related services and providing customer support is commonly termed as “servitization of manufacturing” (Lightfoot, Baines et al. 2013).

Servitization means that the role of the manufacturer does not end with the sale, but rather is extended to provide customers with aftersales product support services. This is now a widely recognized process adopted by many manufacturers globally to create value by adding service to products. This integrated combination of products and services provides numerous strategic benefits to the manufacturers, including improved customer satisfaction, higher profitability, and a more constant flow of revenue (Mathieu 2001; Oliva and Kallenberg 2003).

Manufacturers are experiencing the servitization transition by adapting various channels to support their customers. Generally, manufacturers do not directly own the sales or aftersales service channels but rather depend on a network of authorized dealers to represent the brand. The dependence of manufacturers on a service network is considered to be one of the contributing

factors in the success of the servitization transition (Chrisman, Bauerschmidt et al. 1998; Elfring and Hulsink 2003). Many studies have proved empirically that in the service network, the brand performance is based on the partner firm's performance (Morgan, Deeter-Schmelz et al. 2007). The competitive priority for the dealer network is thus to optimize customer satisfaction through a successful aftersales service operation and by providing a high level of service quality.

To control the quality of customer services, the manufacturers should apply some strong checks on the network partner (Goffin 1999). To achieve superior service quality level, the manufacturer must set efficient aftersales service operations within the dealer network. An efficient performance measurement system not only assists the manufacturers in evaluating the performance of service operations but also helps in the provision of quality services to the customers. This dissertation investigates servitization for global automotive manufacturers selling their products in the Middle East¹. The fundamental research objective is *“to assist automotive manufacturers in making a successful servitization transition by configuring a successful aftersales operation within the dealer network.”*

The literature review provides a basis for refining the research objective and breaking the fundamental objective into three related sub-objectives, which are addressed in three consecutive chapters:

- **The first research objective** is to develop a framework of the fundamental decision categories which confront automotive manufacturers in configuring aftersales service operations within their dealer network (see **chapter 4**).

¹ The Middle East region includes the following countries: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, and Yemen.

- **The second research objective** is to develop an advantageous aftersales service performance management framework that can assist manufacturers in measuring the performance of key aspects of the aftersales service operation within their dealer network (see **chapter 5**).
- **The third research objective** is discussed in **chapter 6** that is to evaluate the diagnostic abilities of the SERVQUAL scale in analysing how the customer perceives the quality of the service performed and the applicability of the scale dimensions in automotive aftersales services settings.

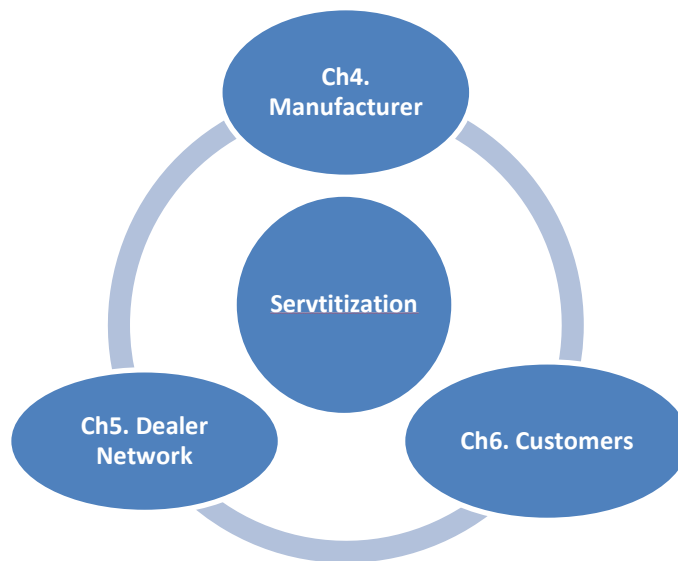


Figure 1: Relationship between three chapters and the central research objective

The research triangulates the servitization phenomenon from three angles, the manufacturer, dealer network, and the customer (Fig. 1). To achieve research objectives, the study starts with “chapter four” by establishing the categories of decisions that manufacturers must address to configure successful aftersales operations both internally and within the dealer network. The performance of a service network significantly influences the successful servitization and also

the consumer evaluation of OEMs. In chapter five, the study then proposes a performance management framework for measuring and managing the performance of the dealer network aftersales operation from the manufacturer's perspective. "Chapter six" investigates the use of the SERVQUAL scale (as one of the most widely used measurement scale) for measuring service quality from customers' perspective, and also offers recommendations about key contributing dimensions in enhancing service quality level.

1.2. Servitization and the Automotive Industry

The automotive industry has been facing a lot of pressure due to the economic recession, which has not only increased the competition between manufacturers but also decreased the profit margins from new vehicle sales. This situation has pushed the automotive industry towards servitization, similar to what has been advocated by scientific and managerial literature (Baines, Lightfoot et al. 2009). The aftersales service became a top priority for all automotive manufacturers and also an important factor in surviving and increasing profits (Verstrepen, Deschoolmeester et al. 1999; Gaiardelli, Songini et al. 2014).

The automotive value network has four components: parts suppliers, car manufacturers, dealer network, and customers (Basole and Rouse 2008). Automotive manufacturers do not directly own the sales or aftersales service channels but rather depend on a network of authorized dealers to represent their brand (Gaiardelli, Songini et al. 2014). The dealer network is an essential component in the value chain as it not only represents the manufacturer at the sales point but also acts as a source of continuous contact with the customer by providing aftersales services (Fraser, Watanabe et al. 2013). Aftersales services establish a relationship between the customer and brand, driving customers to the dealer network, gaining customer loyalty, and increasing profitability

(Verstrepen, Deschoolmeester et al. 1999; Baines, Lightfoot et al. 2009; Gaiardelli, Songini et al. 2014). Aftersales Services can impound the customers to the authorized OEMs network through long-term warranties, maintenance service contracts, or through the mandatory scheduled maintenance to continue the warranty validity (Gaiardelli, Songini et al. 2014). This can give ample benefits to both the manufacturers and the network.

The cost-of-ownership for a vehicle includes all the costs associated with the service and repair of the vehicle during the ownership lifecycle. Many brands offer service packages as an added benefit for value addition to differentiate their product and minimize the cost-of-ownership. Product warranty is also an essential aspect of the vehicle-ownership-lifecycle (Saidin, Mokhtar, et al. 2018). The market and competitive pressures, along with improvements in the manufacturing process, have prolonged warranty period and mileage for many brands. Customers now look for more extended and more customized warranty coverage contracts for extra peace of mind during the ownership lifecycle (Sabbagha, Ab Rahman et al. 2016; Saen and Nia 2019).

There are various definitions of aftersales service in the literature (Cohen and Lee 1990; Asugman, Johnson et al. 1997; Johansson and Olhager 2004). Building on these definitions and maintaining a general and comprehensive perspective of operational requirements in the automotive sector, the research proposes that automotive aftersales services can be defined as “the set of all activities which take place after the purchase of the vehicle and dedicated to supporting customers by creating a satisfactorily high level of product-support services quality.” This definition provides a holistic perspective of aftersales operations and will be adopted throughout this research. In line with this definition, the research identifies that the key services offered by the dealer aftersales service department include product warranty, preventive maintenance, and repairs.

1.2.1. The Automotive Business Landscape in the Middle East

In the Middle East, automotive manufacturers only have a single representative in each country known as “dealer” or “importer.” The terms dealer and importer are used interchangeably because both perform the same function of importing, selling, and providing aftersales service support for vehicles. The term “dealer” will be used throughout this study.

Historically, most contractual agreements between the manufacturer and the dealers were limited to a geographical area and for an unlimited period. The local laws in the Middle East facilitate such exclusivity agreements and prevent the manufacturer from appointing a new representative in the same country. These factors allowed the 'official' dealer to enjoy local monopolies such as the sole source of all customer services, and any outsourced maintenance service will be strictly prohibited and even a single contact violation cost in loss of vehicle warranty. In recent years governments are taking some steps to limit this exclusivity agreement and allow more than one representative in the same country, and this is believed to increase competition, improve service levels, and thus benefit customers.

Manufacturers are now establishing regional offices to check the relationship with their dealers and oversee their servitization transition. All regional offices covering the Middle East region are located in Dubai (UAE), and the existing situation demands to have a second regional office in Saudi Arabia due to the market potential of that country. Depending on how manufacturers structure their operations, at one end of the spectrum, the regional office can be a simple representative office, and most of the support functions controlled by the headquarters. In such cases, the regional office does not have a large staff, and employees are merely a channel through which the manufacturer coordinates matters with the dealers. At the other end of the spectrum, the regional office can have a significant role in managing the whole dealer network;

they have the necessary staff and the capabilities, they are separate profit centres, and all employees are accountable for individual targets.

The dealers are responsible for building the facilities, hiring employees, and raising funds needed for the operations; dealers are financially independent of the manufacturer. One important thing that stands out is that most dealers in the Middle East are part of a larger group of family-owned companies. It is also rare for a manufacturer to terminate the dealer agreement, and for a brand to change hands, therefore, most dealers have had their franchises for a long time. Vehicles are bought from manufacturers through credit facilities provided by either the manufacturer's finance department or the dealer's bank. To buy the required spare parts, dealers need to pay upfront, and along with the service facility, these are the two main tangible assets owned by the dealer aftersales department.

The level of sophistication in the operations within the dealer network is evident from the variance in services that can be observed across a dealer network representing the same brand, and between different service locations of the same dealer. Traditionally the dealer facility deals with the sales, service, and spare parts (3S) functions, and depending on the geographical coverage, a dealer may have more than one 3S facility. Depending on the size of the dealer's operation, the main parts' warehouse may be placed within the 3S facility or may be located independently and becomes the main Parts Distribution Centre (PDC).

A central 3S facility is considered the main service facility that opens for long working hours to facilitate customers and performs all types of repairs. In addition to these main facilities, there are also satellite service facilities, which can perform periodic services and small repairs. These satellite locations provide optimal geographical coverage, customer convenience, flexibility, and scalability.

1.3. Research Methodology

To examine the servitization process on different levels and from different angles, and to get a complete comprehension of the complex elements involved in the servitization process, a mixed-methods approach utilising both qualitative and quantitative approaches is adopted in this study. The research adopts an exploratory case study design. The qualitative data for the first and second research objective was collected through semi-structured interviews and analysed using the thematic analysis technique. The quantitative data for the third research objective came from secondary data (archival sources) from a survey, and it was analysed using statistical techniques.

The overall unit of analysis of this dissertation is the servitization process for automotive manufacturers operating in the Middle East. As the dissertation has three objectives articulated through the three-research question, each has an individual unit of analysis:

R.Q1 unit of analysis: The decision categories for successful servitization (qualitative data).

R.Q2 unit of analysis: The components of an aftersales service performance management system for managing a dealer network (qualitative data).

R.Q3 unit of analysis: The measurement of service quality within the dealer network (quantitative data).

Purposeful sampling is used in qualitative research to select the company and the participants purposefully. As the choice of the company was critical, strict guidelines were set to choose the company in terms of presence in the Middle East, structure, access to information, aftersales service operations, and service offers. Similarly, strict guidelines were set in choosing participants in terms of experience in the automotive sector. The sample was made up of a homogeneous and heterogeneous group allowing in reaching the required level of data saturation.

Secondary data were collected through a customer survey that is based on a probability sampling design. A total of 1,210 responses were collected, analysed, and the data meets all three requirements in terms of reliability, suitability, and adequacy.

The following section will present each of the three chapters and how they participate in achieving the research objectives.

1.4. Research Chapters Overview

1.4.1. Chapter Four- Decision Categories for Successful Servitization in the Automotive Industry

This chapter presents a framework that captures the key decision categories needed for successful servitization. The identification of appropriate framework decision categories started from reviewing the existing classification systems in the manufacturing and service operations literature. There are some classifications, with little suggestion that any one of them is more rigorous and complete than any other (Baines, Lightfoot et al. 2009). The frameworks available are mostly targeted at manufacturing operations and at identifying their characteristics, with a limited number focusing on service operations. Most of the available manufacturing classification systems divide the decision categories into structural and infrastructural categories. These manufacturing frameworks were built mainly on the work of Hayes and Wheelwright (1984).

The framework chosen as a starting point for this research was the “framework for production, product-centric servitized, and service operations” developed by Baines, Lightfoot et al. (2009). The reason for choosing this framework was that it was built on the combination of production operations management and service operations management through an in-depth case study, suggesting the principles, structures, and processes required for a servitization transition. However, it was only a starting point for this study, as, even though it attempts to combine

manufacturing and service operations, but it had a limitation of biasedness towards manufacturing rather than service operations (Baines and Lightfoot 2013) This review of the manufacturing operations literature suggested the first knowledge gap:

Knowledge Gap 1: available frameworks for servitization are mainly manufacturing production-oriented frameworks, which lack the consideration of customer relationships that are present in other service operations frameworks.

To fill this gap, the service literature was reviewed to identify service categories that can be combined with the framework of Baines, Lightfoot et al. (2009) to broaden it. This study has examined the domain of service research and the main classifications available in the literature and how they apply to the automotive industry. Specifically, this study analysed the classifications proposed by Chase and Tansik (1983); Lovelock (1983); Schmenner (1986); Cunningham, Young et al. (2004); Chase (2010); Salegna and Fazel (2013) to identify their main dimensions and how they might be applied to automotive service operations.

The service operations consist of two fields of activity, the first of which is the “service encounter,” or the encounter between the customer and the service organisation, which involves face-to-face interaction between a service provider’s frontline personnel and a customer. The second field comprises the activities that happen behind the scenes and is not seen by the customer, who are aware only of the outcomes. These include internal interactions between the front-line and back-office staff and processes inside the workshop and parts department. This field is connected through the operational process, and the customer witnesses the efficiency of the process as the quality of the service performed. It is proposed that the two dimensions of customer contact and the level of quality of the operation process are an adequate basis for classifying automotive service.

The classification of automotive aftersales service in the literature refers to it as auto repair; this positions it as medium/moderate in terms of customer contact. Little importance is also attached to the quality of the operation process as a classification dimension.

The research argues that available classifications are outdated and does not capture the holistic picture of aftersales service operations, but focuses only on the repair side of the service operations rather than the whole service experience. Furthermore, the dimensions proposed in this study are aligned with a view of servitization as being focused on achieving customer satisfaction through an operational process that results in service–quality. This constitutes the second knowledge gap in the literature:

Knowledge Gap 2: there is a lack of service classification schemes that can capture the nature of aftersales service operations in the automotive industry.

To fill this gap, this study, therefore, proposes a two-dimension automotive aftersales service classification scheme based on both customer contact and the operation process. The classification axes are:

The **X-Axis** shows characteristics of the customer interface, describing the interaction between service providers and consumers;

The **Y-Axis** shows characteristics of the service operations process, i.e., the process connecting the front and the back office and directed towards serving the customer. The service provider's viewpoint presents this process.

It is proposed that customer interaction should be classified as high to reflect the actual importance of service personnel in creating value through their communication with the customer and creating the customer experience and places customer satisfaction as a competitive strategic

priority for the aftersales service operations. The research also proposes classifying the required level of the operational process as high to ensure a high service quality level.

The two-dimensional classification is appropriate for automotive aftersales service operations. The literature review identifies several areas that organisations need to take into account. They need to take into consideration the characteristics of the customer interface by ensuring that the attitudes and skills of service personnel meet customer expectations. They also need to focus on the design of the service facility to ensure that it is convenient for customers and has the required capacity and that the characteristics of the service process ensure that the work of the front and back office is coordinated in a smooth operation that results in the required service quality as per customers' expectations.

This means that the essential elements in the decision categories for an aftersales service operation can be identified as Capacity (to manage and control demand); Facility (including tools, equipment, location, looks, etc.); Employee skills; Service quality; and, performance measurement system.

The next step was to combine these new service categories with the main categories in the Baines, Lightfoot et al. (2009) framework. The final categories chosen for the fieldwork were divided into two spheres: structural (Process and technology, capacity, facility, vertical integration, planning, and control) and infrastructural (human resources, quality control, product/service range, Process and technology, supplier relations, customer relations, and service process).

Through a series of semi-structured interviews and analysis of the data revealed two levels of decision categories that are important for successful servitization. The first level is the “dealer network-service delivery system” and includes decision categories that are directly related to the dealer network after-sales service system. These are considered essential to the success of the aftersales service operation within the dealer network. The second level is the ‘manufacturer-

service support system” and includes decision categories that are directly related to the manufacturer. These relate to the support system provided by the manufacturer to the dealer network. The combination of the two spheres represents the research proposed “Service-focused servitization framework.”

1.4.2. Chapter Five - Business Performance Measurement System for Managing the Automotive Aftersales Service Dealer Network

Having a performance management system that assists manufacturers in managing their dealer network is one of the critical success factors for successful servitization (Cohen, Agrawal et al. 2006; Baines and Lightfoot 2013).

The literature on performance measurement systems provides various frameworks to be applied by organisations. Initially, the frameworks were focused on financial measures, but later on, coupled with financial and non-financial and long-term and short-term measures. More advanced frameworks integrate new dimensions of performance, including corporate social responsibility and sustainability, intangibles, and the supply chain. Despite this, there is a little discussion that considers after-sales service (Gaiardelli, Saccani et al. 2006; Saccani, Songini et al. 2006), with most aftersales frameworks in the literature focusing on the supply chain, spare parts inventory, and distribution management. The research argues that within an aftersales service system, the supply chain and inventory constitute only one element and not the whole of the aftersales service operation. The available frameworks thus do not take a holistic view of the aftersales operations but rather focus on a specific operational area. The review of the literature revealed the following knowledge gap:

Knowledge Gap 3, there is limited availability of holistic aftersales service performance measurement frameworks in the literature, with available frameworks being biased towards the supply chain and logistics.

To fill this gap, the literature on business performance measurement systems was examined. The frameworks suggested in the literature are in themselves insufficient to provide a complete and detailed assessment model of the integrated services delivery system in a customer-centric servitization context, and of how a manufacturer can measure the performance of the service delivery system, either within their service network or through their dealers. Nevertheless, the literature does assist in defining how to capture and measure the main performance dimensions relevant to aftersales services by specifying the levels that can be applied to evaluate them (Gaiardelli, Saccani et al. 2006).

This research is built on the aftersales performance measurement framework proposed by Gaiardelli, Saccani et al. (2006); and on the findings of Chapter 4, which presents the critical strategic decision areas in a service delivery system. The research first critically reviewed the levels proposed in the Gaiardelli, Saccani et al. (2006) framework and examined the application of each level to the automotive business. A reappraisal of the decision categories followed this in the Chapter 4 framework but from the perspective of the research objectives of Chapter 5 and the Gaiardelli, Saccani et al. (2006) framework. Each decision area is examined to determine the essential measurement metrics for the manufacturer to measure the performance of the dealer network.

The outcomes of these two steps were then combined to create a theoretical research guide for the fieldwork. A series of semi-structured interviews were conducted, and documents were examined to analyse the systems currently used as part of the case study of an organization. The research then presents a ‘customer-focused performance measurement framework’. This

framework incorporates the four levels suggested by the literature, but each level has a different composition. The research also presents the suggested KPIs for each area in the framework and a sample calculation for each KPI (see Appendix I).

1.4.3. Chapter Six - Measuring Service Quality in the Automotive Aftersales Service

Servitized manufacturing organizations need to provide superior service quality. Parasuraman, Zeithaml et al. (1988) argued that delivering excellent quality is an essential element for organizational success and survival. The term quality was defined broadly by Zeithaml (1988) as ‘superiority of excellence’, or in other words, the customer’s judgment of the overall excellence or superiority.

Service quality has been recognized as a critical success factor in a firm’s endeavours to differentiate itself from its competitors; good service quality leads to increasing customer retention, attracting new customers, reduced costs, enhancing the image of the organisation, expanded word-of-mouth recommendations and improved profitability (Zeithaml 2000; Kang and James 2004).

One of the best known and most widely used scales for measuring service quality is the SERVQUAL instrument initially proposed by Parasuraman, Zeithaml et al. (1985). The scale is based on the idea that customers evaluate service quality by comparing expectations with perceptions on five dimensions, which are reliability, assurance, tangibles, empathy, and responsiveness.

The focus of this research is to test the diagnostic abilities of the SERVQUAL scale to capture how the customer perceives the quality of the service performed, as well as the applicability of its dimensions to the automotive aftersales services. Measuring service quality and understanding the dimensions that contribute towards enhancing quality allows manufacturers

and dealer management to identify the priorities for improvement in a strategic context to get involved and make necessary changes.

The data was collected through a customer satisfaction survey instrument, which was built on the SERVQUAL instrument and used by an automotive manufacturer. Questions from the survey were identified, which coordinated the five dimensions of the SERVQUAL instrument and represented the independent research variables. The dependent variable represented the questions measuring the overall customer perception of the quality of the service performed. A total of 1,210 completed surveys were analysed.

Various statistical procedures were used to perform the analysis, such as descriptive statistical analyses of demographic factors (age, gender, and education), factor analyses to reduce the number of variables, and multiple regression analysis between the reduced variables and service quality. The findings support the trenchant criticism of the SERVQUAL scale regarding the number of dimensions, the loading, and composition of items, and variance extracted.

The factor analysis reduced the independent variables into four factors. The first of these is 'Assurance', which represents the factors that front-facing service personnel can control by direct communication with the customer. 'Reliability' is the output of the service visit or whether the vehicle was fixed right at the first time or not. The third is 'Empathy', which represents factors related to the process in place. 'Responsiveness', finally, is the delivery process of the vehicle. The MLR analysis between the four factors and the dependent variable showed that that the four factors can predict 61% of the perception of service quality overall, which indicated that more factors need to be considered to explain the customer perception of service quality fully.

1.5. The Significance of this Research

This dissertation contributes to the body of literature on servitization and provides an integrated industry-level analysis of the automotive sector in the Middle East. It expands the traditional notion of servitization by integrating the role of service network as a necessity and one of the contributing factors in the success of the servitization transition for manufacturers. It highlights the role of manufacturer in configuring the service network by presenting the “Service-focused servitization framework,” which identifies the fundamental decision categories that helps automotive manufacturing firms configure their service operations within their dealer network for a successful servitization transition. The research also highlights the role of manufacturer in managing the performance of the network to assure a successful servitization transition and provides the “customer-focused aftersales performance measurement framework” and metrics that assists automotive manufacturers, in managing their dealer network. The research finally provides conformity on the applicability of the SEVQUAL scale dimensions to the automotive aftersales services setting and improvement recommendations to the scale. The practical contribution of the research is believed to enhance managerial practices in various operational areas.

1.6. The Contribution of this Research beyond the Automotive

Industry

In the case of durable manufactured products such as capital equipment, durable consumer goods, trucks, machinery, light machinery and so on, the customer purchases an asset that is set to use, and which requires aftersales servicing as it advances through its lifecycle. These products thus have costs of ownership beyond the purchase price (spare parts, maintenance, etc.). These

industries have the same basic structure as the automotive industry that the manufacturers also depend on a dealer network to provide the required customer support.

The categories proposed in the "service-focused servitization framework" form a foundation for successful servitization across these industries. The same is true of the 'customer-focused aftersales performance measurement framework', whose four levels are being applied in the same way across these industries. The metrics may need some adaptation to accommodate specific differences within each category arising from the type of product and the customer support required.

Finally, Chapter 6 confirms the applicability of the SERVQUAL scale to aftersales services; it can be used across these industries to capture the quality of the service performed by modifying the composition of the items in each dimension.

1.7. The organisation of this thesis

The thesis has a total seven chapters from which the first chapter is the "introduction". Chapter two presents the review of the literature to set the academic research foundation; chapter three presents the research methodology and chapter four presents the service-focused servitization framework. Chapter five presents the customer-focused aftersales performance measurement framework and the associated measurement matrices. Chapter six presents the statistical evaluation of the diagnostic abilities of the SERVQUAL scale, and finally, chapter seven presents the conclusion.

1.8. Conclusion

The objective of this dissertation is to assist automotive manufacturers in making a successful servitization transition with a focus on customer satisfaction and service quality as

strategic objectives. The dissertation has achieved this objective by combining the elements from academic literature and research with actual practice.

The research triangulated the aspects of servitization to assist manufacturers in making a successful servitization transition. Chapter four recommends the categories of the decisions involved in configuring the aftersales operations. Chapter five offers a performance measurement system for measuring the performance of the dealer network after-sales operation, and chapter six confirmed the applicability of the SERVQUAL scale to the automotive aftersales service and identified the most contributing dimension toward improves service quality.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

The majority of past studies in the field of servitization suggest that the integrated combination of products and services provides more strategic benefits to manufacturing firms, including improved customer satisfaction, higher profitability, and more constant flows of revenue (Mathieu 2001; Oliva and Kallenberg 2003). This chapter presents the relevant literature in the context of the research objectives to provide the academic platform for the research. This is done by presenting relevant literature on servitization, service dealer network, performance management and quality in relation to servitization. .

2.2. Theoretical background - the servitization landscape

In this section, we present the available standard definitions of servitization, major research streams investigating the servitization phenomena, motivation, and benefits of servitization, and the servitization paradox.

2.2.1. Servitization definitions

The term ‘servitization’ was introduced by Vandermerwe and Rada (1988), who defined it as “the increased offering of fuller market packages or ‘bundles’ of customer-focused combinations of goods, services, support, self-service, and knowledge in order to add value to core product offerings.”

There are a variety of definitions of servitization in the wide-ranging literature. Servitization is a trend in which manufacturing firms adopt more and more service components in

their offerings (Desmet 2003); the emergence of product-based services has blurred the difference between manufacturing and traditional service sector activities (White, Stoughton et al. 1999); adding extra service components to core products (Verstrepen, Deschoolmeester et al. 1999); integrating both goods and services in a bundle (Robinson, Clarke-Hill et al. 2002); a strategy that seeks to change how a product functionality is delivered to its markets (Lewis, Portioli Staudacher et al. 2004); increasing the range of services offered by a manufacturer (Ward and Graves 2005); a change process wherein manufacturing companies embrace service orientation and/or develop more and better services, with the aim to satisfy customer's needs, achieve competitive advantages and enhance firm performance (Ren and Gregory 2007); and the innovation of an organizations' capabilities and processes to shift from selling the product to selling an integrated product-service system, where a product-service system represents an integrated product and service offering that delivers value in use (Baines, Lightfoot et al. 2007). In their work Baines, Lightfoot et al. (2009) have argued that most of these definitions add little to the original definition provided by (Vandermerwe and Rada 1988), except the definition by (Lewis, Portioli Staudacher et al. 2004), that refers to the idea of functional products.

This research will utilize the definition provided by Baines, Lightfoot, et al. (2007), and will view the servitization of manufacturing in its simplest form as something that can be stated like *“manufacturers shift from selling the product to selling integrated product-related services and provide customer support in a way that achieves a competitive market position.”* This definition is also aligned with the definition of automotive aftersales service (presented in section 1.2) that is “the set of all activities that take place after the purchase of the vehicle and are dedicated to supporting customers by creating a satisfactorily high level of product-support services quality”.

2.2.2. Servitization research: a literature review

Since the introduction of the term ‘servitization’ by Vandermerwe and Rada (1988), there has been a significant research growth in this field as numerous scholars are seeking to understand the methods and implications of service-led competitive strategies for manufacturing organizations (Baines, Lightfoot et al. 2009). Servitization has gained attention from a broader range of academic researchers with different backgrounds, and provide a complementary perspective on its rationale, design, and delivery (Oliva and Kallenberg 2003; Slack 2005). Most studies have come from academic researchers working in four fields, namely product-service systems (PSS) (Meijkamp 1998; Goedkoop, Van Halen et al. 1999; Mont 2000; Manzini and Vezzoli 2003; Baines, Lightfoot et al. 2009), service operation management (Chase 1978; Chase 1981; Chase and Erikson 1988; Chase and Hayes 1991; Chase and Apte 2007; Voss, Roth et al. 2008), service science (Chesbrough and Spohrer 2006; Maglio and Spohrer 2008; Spohrer and Maglio 2010; Spohrer, Demirkan et al. 2011) and service marketing. Each of these fields has valuable contributions in making our understandings about servitization. Despite the difference of opinions in many aspects of their research work, they shared a common interest in the conceptualization of product-service differentiation, competitive strategy, customer value, customer relationships, and product-service configuration (Lightfoot, Baines et al. 2013).

The systematic literature review is done by Lightfoot et al. (2013) on the “servitization of manufacturing” found that over 50 years (1960-2010), there had been an increase in research activities among all communities. In the first two decades of this period, contributions came from services marketing and service management. In the late 1980s, work from the operations community started to increase, followed in the mid-1990s by the PSS community, and then the service science community around the turn of the century. Most of the work which is directly

relevant to the servitization of manufacturing traditionally came from the field of operations management with a focus on the competitive strategies associated with servitization whereas available multi-theme literature review is mainly focused on operations journals. The literature in recent years has evolved significantly in recent years with increasing and diverse coverage across research streams (Raddats, Kowalkowski et al. 2019).

The review on the literature over thirteen years from 2005 to 2017 done by (Raddats, Kowalkowski et al. 2019) has identified that the servitization research identified five main themes: service offerings; strategy and structure; motivations and performance; resources and capabilities; service development, sales, and delivery.

2.2.3. Major Research Streams of Servitization

The field of **service management** has evolved primarily from conventional operations and strategy domains. It is considered to be a sub-discipline of manufacturing operations strategy, and its ideas and concepts originated in manufacturing processes without a depiction of other disciplines such as service marketing. During the 1980s, service management recognized as a driving force in the development of management thinking by contributing to both basic and applied research (Gummesson 1994).

The classification, positioning, and delivery strategy of services have been the focus of attention of many researchers. Several authors have addressed the classification. For example, Chase (1981); Chase and Tansik (1983), have examined the service delivery and the level of customer interaction, and also suggested the customer contact model. Schmenner (1986) proposed a service matrix by classifying the degree of customer interaction and customization on one axis and the degree of labor intensity on the other.

Chase and Erikson (1989) have developed the concept of “service Factory” in the operations management literature, that is seen as a key contributor in overturning the trends in the operations management, and focused on manufacturing-related concepts in a services environment (Voss 1992). Service management research is closely related to operations management research (Machuca, González-Zamora et al. 2007).

Services science is the study of service systems and value propositions. It is the integration of many service research areas and service disciplines, such as service economics, service marketing, service operations, service management, service quality (especially customer satisfaction), service strategy, service engineering, service human resource management (especially in a professional service firm), service computing, the service supply chain (especially sourcing), service design, service productivity, and service measurement (Resta and Gaiardelli 2017). Service science is the interdisciplinary study of service systems, particularly the study of how complex configurations of resources create value within and across firms (Maglio and Spohrer 2008).

The origins of **product-service systems** (PSS) can be traced back to Scandinavian scholars and researchers. It is built on the principle of integrating the product and service offering to deliver value (Baines, Lightfoot et al. 2007). PSS researchers have focused on product-service combinations to improve social, economic, environmental, and industrial sustainability and the reduction of environmental impact. It is also considered to be a particular case of servitization, which is focused on asset utilization and efficiency rather than on ownership (Dombrowski and Malorny 2016).

Although PSS and servitization emerged from different perspectives, both suggest that manufacturing companies should focus on selling an integrated solution or PSS (Tukker and

Tischner 2006). The differentiation benefit of combining the product and service is the value provided to the customer (Baines, Lightfoot et al. 2009).

Research in the field of **service marketing** mostly evolved from the perspective of the exchange and distribution of manufactured products and has a foundation in economics. By the early 1960s, with the introduction of the '4 Ps' of product, price, place, and promotion by (Kotler 1967), marketing became well-known as a decision-making activity focussed at satisfying the customer's needs, earning profits by targeting a market, and making optimal decisions based on marketing mix. This directed organizations towards products and services that satisfy customers' needs and wants, and also facilitated the independence of market forces.

In the 1980s, new concepts have emerged, such as relationship marketing, quality management, value chain management, resource management, and networks, with many new trends that have diverted the focus from the idea of '4 Ps' and the traditional macroeconomic paradigm. This represented a shift in the marketing view from transactional to relational exchange and also an acknowledgment that goods and services need to be treated differently. This change in trend has led to the development of services marketing as a sub-discipline within the marketing field (Vargo and Lusch 2004; Lightfoot, Baines et al. 2013). The service dominant (S-D) logic introduced by Vargo and Lusch 2004 represents a perspective that introduced an alternative view of exchange and value creation, it is compared with goods-dominant (G-D) logic to provide a framework for looking into service and its role in exchange and competition (Lusch, Vargo et al. 2007). This was reflected in having two strands of servitization, the first considered as an extension of operational research adapting a goods-dominant (GD) and the second adapting the service-dominant (SD) logic.

2.2.4. Two Strands of servitization

Green, Davies et al. (2017) argued in their thematic analysis on servitization that the servitization literature covers two parallel streams of literature, the first is considered an extension of manufacturing research adapting a goods-dominant (GD) logic which represents the traditional servitization, and the second stream of literature adapting the service-dominant (SD) logic and represents the customer co-created servitization (CCoS).

Traditional servitization means that the value creation comes from the physical good as services were assumed as an add-on to products (Baines, Lightfoot et al. 2009) that makes the value hampered in the physical product and the services are created and determined as an “add-on” by the firm. The CCoS, on the other side, places more emphasis on the customer’s framework. The value is derived by functioning through a mutual integration of both firm and customer resources (Green, Davies et al. 2017). While both streams focus on value, and moved from exchange to usage of products and services. This represents a shift from a traditional transactional exchange between the firm and customer, to a longitudinal relationship focused on hybrid product service offerings (Smith, Maull et al. 2014).

From the resources perspective, Vargo and Lusch (2004) divide resources into two types: *operand*, those that require some action to be performed on them to have value (e.g., natural resources) and *operant*, those that can be used to act (e.g., human skills and knowledge). The goods-dominant logic is based on tangible products as units of output (may also include intangible services), making the GD-logic similar to operand resources, including the firm's products. In the service-dominant (SD) logic, “service” is the primary purpose of economic exchange and is how customer value is created, making it analogous with operant resources including the knowledge and skills of the firm's employees (Vargo and Lusch 2014). the central concept in SD logic is the

utilization of resources through continuous integration intended to benefit another party, though the service provider requires the combination and integration of resources driven by operant resources (Vargo and Lusch 2004).

From a customer perspective, the customer role in both streams is different. In the context of the traditional servitization, the direct service activities are referred to as value-added activities, where the value provided is impeded in both the physical product and the service activities created by the firm for the customer's use. This makes the focus of a servitization strategy on the reliability of the firm's performance in delivering the value created by the firm to be used by the customer (Green, Davies et al. 2017). This position depicts the customer as a passive 'receiver' of value in its use (Prahalad and Ramaswamy 2004).

The CCoS considers the customer to be an integral part of the value-creating process of use or experience with both the physical product and its corresponding service activities (Prahalad and Ramaswamy 2000). This follows the S-D logic, where value is only created in using or experiencing a service and considers the customer to be the co-creator of value (Maglio, Vargo et al. 2009). Manufacturers offer the value proposition but the acceptance of that allows the value to be created and determined by the customer (Vargo, Maglio et al. 2008).

Organizations focusing on efficiency usually have rigid offerings that have a low tolerance for multiplicity and tend to adopt the traditional servitization goods-dominant (G-D) logic that represents the traditional servitization. Whereas organizations focusing on effectiveness with flexible offerings that has high tolerance for multiplicity and have a tendency to adapt the S-D logic (Green, Davies et al. 2017).

The mind-set of an organization can be endorsed to the motivation behind servitization. Studies have suggested three main motivations or drivers of servitization: competitive motivations, demand-based motivations, and economic motivations (Oliva and Kallenberg 2003; Baines, Lightfoot et al. 2009). Competitive motivations are mostly driven by the need to differentiate the tangible product offering, while demand-based motivations are primarily driven by the need to improve the quality of customer relationships (Fischer, Gebauer et al. 2012). Economic motivations are driven mainly by the need to have a sustainable and constant revenue stream against fluctuation in sales cycles.

The study of Raddats, Baines et al. (2016) provided a deeper understanding of the motivations for servitization by examining the relationship between the complexity of the product offering and the motivation for servitization. The study shows that the competitive motivation is more relevant to suppliers of non-complex products, while economic motivations are more relevant to suppliers of complex product-service systems; and demand-based motivation is common with manufacturers offering complex products aiming to improve service quality and decrease costs especially when activities are outsourced.

2.2.5. Benefits of Servitization

The literature on servitization and firm performance has identified several ways in which manufacturing firms can benefit, with several authors and researchers presenting contradictory evidence of the servitization benefits (Visnjic and Van Looy 2009). Servitization can enhance and strengthen the firm's competitiveness by offering unique and incomparable services (Li, Lin et al. 2015). The study of Neely (2008) found that firms offering services have higher profit rates than those offering only manufacturing.

Based on the results of a longitudinal study including panel data from 414 companies in the German mechanical engineering industry collected over five years, Eggert, Hogreve et al. (2011) provide empirical evidence for a causal link between innovation in service combination strategies related to servitization and manufacturers' profits.

The study of Crozet and Milet (2017) used a large dataset containing detailed balance sheet information for more than 50,000 serviced and non-servitized French manufacturing firms over eleven years (1997–2007), they concluded that servitization is positively correlated with both higher profitability and employment. The economic benefits of service can provide substantial revenue due to the higher margins/rent paid as compared to selling products (Anderson, Fornell et al. 1997), leading to higher profit rates than pure manufacturing and selling the product only (Neely 2008). Service can also provide a stable source of revenue, as it is less vulnerable to the economic cycles which affect the purchase of new products (Quinn 1992).

The availability of service is not only beneficial to the organization but the customer as well. It builds a strong relationship with customers as it reassures them that their needs have been understood and can be fulfilled (Velimirovic, and Duboka, et al. 2016). This relationship is also reflected in the fact that companies can offer specific service products that are customized to the needs of their customer in the form of industry-specific solutions, which can compete with those of other manufacturers that are not usually available (Galbraith 2002; Davies, Brady et al. 2006; Tukker and Tischner 2006; Davies, Brady et al. 2007). The examples for this include the offering of fleet owners extended service or extended warranty plans, which are more comprehensive than those offered to typical customers. Offering sale with service works as a complement to the product through the availability of a service department (which could be owned by the manufacturer, their dealer or a third party), which gives confidence to the customers to purchase the product (Oliva and Kallenberg 2003; Balasubramanian, Raghunathan et al. 2005; Cusumano, Kahl et al. 2015).

2.2.6. The ‘Servitization Paradox’: Failure and Deservitization

Despite the benefits of servitization, there is an ongoing debate in the literature on the financial consequences of the decision to servitize. Many firms also choose to reduce or to abandon adding service to their products and to de-servitized (Finne, Brax et al. 2013; Kowalkowski, Windahl et al. 2015; Kowalkowski, Gebauer et al. 2017). The process of moving back of organizations from shifting toward service or retreating from certain service initiatives is referred as de-servitization (Kowalkowski, Gebauer et al. 2017).

Failure in servitization represents the failure of a firm in developing a profitable service business to complement its product (Valtakoski 2017). Gebauer, Fleisch et al. (2005) observed that extending the service business in manufacturing companies often leads to a service paradox, as the companies that invest heavily in extending their service business and increasing their service offerings incur higher costs. However, this does not provide the expected higher returns, with increasing costs, and a lack of growth in service revenue fails to meet its intended objectives.

Several researchers have investigated this to understand why it happens. Fang, Palmatier et al. (2008) evaluated data of 477 publicly traded manufacturing firms, which transitioned between 1990 and 2005. They found that the impact of a firm's transition to services is its value (as measured by Tobin's q)² that remains relatively flat or slightly negative until it achieves a significant mass of service sales (20% – 30%), where it has an increasingly positive effect. They identified four significant mechanisms through which a firm's value is affected when it starts to offer services, that are, leverage of knowledge and resources, increased customer loyalty, loss of strategic focus, and organizational conflict. The first two mechanisms guide the company in a

²Tobin's q , or the q ratio, is the ratio of the market value of a company's assets (as measured by the market value of its outstanding stock and debt) divided by the replacement cost of the company's assets (book value)

positive direction and support the positive effect of service transition strategies on the overall value of the firm, while the other two have a negative impact on this relationship.

The quantitative study conducted by Benedettini, Swink et al. (2013) analysed the performance of 46 servitized firms that declared bankruptcy (i.e., unsuccessful servitized firms), and 146 non-bankrupt (i.e., successful servitized firm). Their research confirms that larger firms have an advantage over smaller ones, older firms may perform better than newer ones, and firms that did not go bankrupt consistently displayed a higher diversification of production activities and offered a smaller number of service types (service breadth).

Similarly, a comprehensive study of (Neely 2008) that was conducted on listed manufacturing companies from 25 countries found that there is a risk associated when manufacturing firms add service to core product offerings as they could perform less well than conventional manufacturing firms who stick to pure product offering while manufacturing firms that provide services achieved higher sales revenue than pure manufacturing firms. The profit to revenue ratios for servitized firms was lower than the ratios of the pure manufacturing firms. (Neely 2008) anticipated that this may be caused due to higher labour costs and working capital costs required by the servitization transition, especially for larger firms that would require a more significant investment.

Empirical research has shown mixed results due to the challenges of formulating and implementing service business models. Some empirical studies proved the negative effect of servitization on profitability while other extensive studies have identified a U-shape relationship between servitization and performance, where positive results re-appear only once when a critical scale of services is achieved (Fang, Palmatier et al. 2008).

To investigate this phenomenon, the process of servitization was divided by (Kastalli and Van Looy 2013) into three stages and explained the possible reasons behind the paradox. They

suggested a cubic relationship where the servitization process is divided into three phases and explained the possible reason behind the paradox. They pointed out that when the scale of service is low, the service provider can quickly harvest the benefits; this phase is described to have a little investment in staff and organization, such as having a high proportion of spare parts and limited-service offers, which achieve the high-profit margins. When benefits of this phase have been harvested, the firm takes a deliberate move to the second phase by increasing the investment in service activates moderately which pushes the curve upwards but the benefits are absorbed with the increased investments in a service organization that brings the curve back down. It is during the third phase with the increasing investment and scale of operation that the firm achieves the required economies of scale between the service scale and profit margins, in which the curve makes another turn and heads upward again (Kastalli and Van Looy 2013).

Servitization can also fail due to offering a solution that is not what the customer needs, or by failing to create sufficient value for the customer. To avoid such situations, the manufacturer needs to understand the customer needs and how the solution will create value to the customer (Valtakoski 2017).

Many scholars have highlighted the difference between service and manufacturing by exploring the four distinctive characteristics of service that affect its quality: intangibility, heterogeneity, perishability, and inseparability. These four characteristics have been recognized as significant in developing the constructs of service quality (Parasuraman, Zeithaml et al. 1985; Ladhari 2009). This contradicts the manufacturing characteristics of tangible output, inventory of goods consumed later on, and standardization (Bowen, Siehl et al. 1989).

Manufacturers can adopt several service strategies, the most wide-spread strategies reported in previous empirical studies, specifically, after-sales service providers, customer support

service providers, and development partners (Gustafsson, Brax et al. 2010; Lightfoot and Gebauer 2011).

Servitization requires the manufacturers to look at the value chain through customers' eyes and make the customer centricity the focus of the servitization transition (Oliva and Kallenberg 2003; Baines, Lightfoot et al. 2009; Smith, Ng et al. 2012) through concentrating on the term “value-in-use”. Adopting a customer-centric approach involves focused efforts on making the physical product, selling, and delivering it with a detailed understating of the customer's actions while using and operating a product through its life cycle (Davies 2004). It requires a commitment towards improving customers’ value by assuming greater responsibility of the overall value-creating process as compared to the traditional product-centric, transactional-based business model (Kowalkowski, Gebauer et al. 2017). Offering a solution means solving a customer problem rather than selling a product. Companies must also address a whole new set of customer needs, from a customer perspective.

The transition from product-based to service-based competition requires key organizational and strategic changes by the manufacturer. The transformation requires that the organization is structured around customers (Galbraith 2002; Oliva and Kallenberg 2003) and to obtain or reconfigure their capabilities (Ceci and Masini 2011). Manufacturers' core capability is developing and producing the products.

Delivering services requires different operating processes, capabilities, platforms, accountabilities and orchestration of resources that differ from those commonly used to deliver products (Eloranta and Turunen 2016) as customers select from a state of pre-existing offering which is developed to address customer requirements through the different stages of the product life. Investing heavily in increasing service does not necessarily bring the desired revenue or

profitability (Li, Lin et al. 2015). Offering the correct value to the customer is a determinant of success.

Moreover, having insufficient capabilities can result in a solution that is costly to implement or does not generate the expected value. Offering advance or integrative service solutions that require integration of capabilities from different sources may not be functional or perform below the expected level. This situation happens when the required knowledge of service components is distant from the current knowledge of solution provide (Valtakoski 2017).

2.3. The Aftersales Service Dealer Network

In this section, we discuss the servitization aftersales dealer network, types of the service dealer network and their relationship to the type of service, and the importance of the way the dealer network is managed.

2.3.1. Types of Network Structure

Manufacturers of capital assets that require aftersales maintenance might not be capable of mastering all the service activities to support their customers. Based on cases studies, Goffin (1999) identified five different distribution channels that can be used by manufacturers to support their customers: 1) direct from factory, (2) by manufacturer-owned (direct) field support organizations, (3) via approved dealers (indirect), (4) using customers' resources (trained engineers) and (5) a combination of some or all of these.

A firm that exports its products to different countries and are required to provide aftersales service, it is not economically viable to provide direct service from the factory or have their field support organizations in each country. As a solution to this problem, they rely on a service network. Networks are considered to be one of the most common success factors for manufacturers

(Chrisman, Bauerschmidt et al. 1998; Elfring and Hulsink 2003). Independent service organizations mainly provide the service network infrastructure due to the cost involved in building such infrastructure (Story, Raddats et al. 2017).

The service network value chain is composed of vertical and horizontal dimensions. The vertical dimensions cover upstream and downstream service activities, where the downstream activities are those in which customers have interacted directly, and upstream activities are those with suppliers, e.g., sourcing spare parts or specific components for the products provided. The horizontal dimension, on the other hand, involves firms which are on the same level but part of different value chains, for example in the case of companies that have the option of covering the value chain activities for their products alone or products offered by competitors and complementary products (Raddats and Easingwood 2010).

Upstream and downstream service activities reflect the vertical dimension of the value chain, where the actors are part of the same value chain but collaborating to cover different hierarchical levels in the value chain, whereas the term horizontal refers to firms on the same level, but are parts of different value chains. The Horizontal dimension covers the additional services components where companies have the option of including their product value chain service activities or for products offered by competitors (Raddats and Easingwood 2010).

Various types of networks have been proposed by researchers, with each having its characteristics and operational capabilities. Based on multiple case studies, Gebauer, Paiola et al. (2013) proposed four emerging network types, two vertical and two horizontal. The four network types are:

A) Vertical aftersales service networks: the actors perform upstream and downstream activities focussed on the product usage. When companies invest in dealer network to provide sales and

service for its products to the customers, this is a form of vertical integration (Cusumano, Kahl et al. 2015).

- B) Horizontal outsourcing service networks: the actors focus on outsourcing services for various types of original equipment.
- C) Vertical life-cycle service networks: the activities cover the whole life-cycle of the equipment, starting with the development, design, and construction phases and ending with the product usage phase.
- D) Horizontal integration life-cycle service networks: these cover the design, manufacturing, and maintenance of the equipment in question. Manufacturers also offer services for third-party products.

The service delivery network includes dealers, distributors, service partners, and branches that act as a mediator to provide the downstream and upstream activities.

2.3.2. Servitization network

The choice by an original equipment manufacturer (OEM) and the type of network to implement servitization depends on the characteristics of the buyer-supplier relationship and is related to the type of service that is necessary to offer to the customers.

The study of Saccani, Visintin et al. (2014) summarizes the categorisation of different service types:

- The first type, ‘product support (PS) services’ provides product lifecycle services (PLS), i.e., a range of services offered to the customer to ensure that the product functions appropriately during all stages of its life cycle. This includes preventive maintenance and repairs (Ulaga and Reinartz 2011).

- The second type, ‘customer support’ (CS) consists of services that are required in training the end-user of the product and facilitating their interaction with the product. Such service involves interaction between the customer and a service provider, thus supporting the customer’s actions concerning the supplier's product (Mathieu 2001).
- The third type, ‘process-related (PR) services’, aims to improve or optimise the customer's processes and includes professional services such as consultancy, design, engineering, and construction services.
- The fourth type termed ‘operational services’ by (Oliva and Kallenberg 2003; Gebauer 2008), or ‘process delegation services’ by (Ulaga and Reinartz 2011), includes services that go further in terms of the value chain by taking over the responsibility of operating the product or business on behalf of the customer.

The most common type of service is product support (PS) services, which is mentioned explicitly in many research studies. This type of service requires a vertical aftersales service network.

The vertical aftersales service network includes the OEM as the focal firm of the network with logistics service providers and parts suppliers as the upstream suppliers, and the actors producing and delivering aftersales actions are known with well-defined service activities. This type of aftersales sales network is representing a well-defined value system, with well-known specified value activities, actors, and business processes that are directed towards supporting the product usage (Gebauer, Paiola et al. 2013). The upstream relationship with suppliers delivering such services is critical for providing the intended level of service to downstream customers.

2.3.3. Service value network

Service value network can be defined as “the business network that offers value through agile and market-based composition of complex services” (Blau, Kramer, et al. 2009). The organization exists in a network and that it is not stand alone and can perform all the functions in the value chain is based on the premise that it does not merely operate in dyadic relationships, but are parts of complex economic systems that comprise numerous inter-organizational links (Easton 1992). This replaces the traditional view of creating value through the value chain introduced by (Porter and Advantage 1985) and is rooted in the industrial age production line model that believes that the value flow is linear where resources flow in dyadic relationships from raw material providers to manufacturers to suppliers to customers. The model of the value network has superseded this model as organisations do not merely operate in a dyadic relationship, Porter model does not adequately cover the complexities and multidirectional relationship in the current business-to-business (B2B), business-to-consumer (B2C), and emerging consumer-to-consumer relationships (C2C) (Basole and Rouse 2008). The value chain has evolved to value network that is characterised by a complex direct or indirect tie between various actors delivering value either to their immediate customer or the end consumer (Allee 2000; Kothandaraman and Wilson 2001).

The value network approach assumes that organizations are a part of a more extensive network of organizations that together create value (Allee 2000). This shifts the focus of a resource-based view to resource dependency, transaction costs, and actor-network relationship (Basole and Rouse 2008). The value is co-created in the service network by different actors, such as suppliers, original equipment manufacturers (OEMs), service providers, and customers (Kothandaraman and Wilson 2001).

The literature shows that problems of service network are covered in the literature of service marketing or the literature of services systems/service science (Henneberg, Gruber et al. 2013) with the terms “services networks” and “service systems” being used interchangeably (Agarwal and Selen 2011). The literature of service systems and service science provides a better focus on the essential nature of phenomena despite applying a different perspective (Henneberg, Gruber et al. 2013).

Service marketing traditionally focuses on researching the service interactions between the customer and the service provider (Tax, Smith et al. 2011). Thus, it does not reflect the complexity of all service relationships (Morgan, Deeter-Schmelz et al. 2007) or necessarily clarifies what the essentials of a service network are (Scott and Laws 2010).

The “Value-creating network “model by (Kothandaraman and Wilson 2001) uses three core concepts of value creation, explicitly the superior customer value, core capabilities, and relationship. The starting point of the model is to create excellent customer value, where the extent of the value created is influenced by the core capabilities of the member firms. As each firm adds to the value based on its core capabilities, the nature of the relationship the firms have between themselves is fundamental to facilitate the creation of the value. The value of each member in the network is also dependant on diverse core capabilities that are valued by the network; firms develop relationships with other firms with capabilities other than the ones they have to complement each other, the strength of firms’ position in the network is dependent on its added value through its capabilities that also strengthen the quality of the relationship between the members.

The integration of resources and activities represents a new value proposition to the customer, compared to the resources available from the individual actor. It involves processes within organizations, in the relationship between actors, and within a network of actors (Jaakkola

and Hakanen 2013). Networks allow all actors to have access to resources and capabilities that they do not have. The success of servitization success may well be partially based on the complementarity of manufacture/intermediary capabilities, highlighting a need to understand how the manufacturer and intermediary capabilities might be combined (Story, Raddats et al. 2017). (Jaakkola and Hakanen 2013) argue that previous studies focused only on the importance of servitization, but their study highlights the importance of integration and access to resources develop the potential to offer a customer more extensive value propositions, and thus deepen their relations and linkages with the customers, which enable more resource contributions from the customers.

The required capabilities of manufacturers surpass the traditional capabilities of just producing the products. The network leverage approach and to enjoy the benefits of this, manufacturers need to have the capability of managing and orchestrating a complicated inter-organizational relationship that starts by implementing a product/service-oriented culture within their organisation and their dealer network (Eloranta and Turunen 2016). Manufacturers with independent service networks face the challenges linked with supporting and managing vertically integrated complex service networks all over the world (Gebauer, Paiola et al. 2013). The distance between the manufacturer/supplier and the service delivery network affects the system supply chain and results in increased costs and lead-times; this will ultimately affect the customer. As the focal of the value chain, manufacturers need to have an excellent level of supply-chain capabilities. Manufacturers are also required to have the capability to spread knowledge across the network, manage the service personnel, and be explicit on the degree of standardisation of the service offers across the different markets (Oliva and Kallenberg 2003).

2.3.4. Managing the Dealer Network

Dealer networks are considered to be one of the most common success factors for manufacturers (Chrisman, Bauerschmidt et al. 1998; Elfring and Hulsink 2003). As the service network represents the manufacturer's brand image and thus affects its reputation - perhaps its most valuable intangible asset. Service network shapes people's perceptions about reputation and image of the company, which is built over time and based on the company's identity program, performance, and how people perceive its behaviour (Argenti and Druckenmiller 2004). Firms with an excellent reputation have a higher chance to sustain superior performance over time (Roberts and Dowling 2002). Manufacturing firms thus need to protect their reputation by having control over the service network.

Service networks do not evolve organically, but rather are developed intentionally (Möller, Rajala et al. 2005) and are managed by depending on their value creation logic (Möller and Rajala 2007). To ensure that customers receive the required level of support from the network, manufacturers need to select and manage their distribution network effectively (Goffin 1999). To develop an efficient service delivery strategy, the firm must study and evaluate alliances and networks in different countries or regions (Kumar and Kumar 2004). Shaping distribution channels is a crucial factor in achieving the desired outcome, and so the manufacturer needs to have a significant control over the network to ensure that the required level of service quality is delivered to customers (Goffin 1999). Managing an aftersales network is not an easy task: the network needs not only to support new products but also to supply all the required parts for older models. Manufacturers need to create networks with partners who offer good performance (Bikfalvi, Lay et al. 2013).

The new paradigm developed by Cohen, Agrawal et al. (2006) for managing services networks that involves six steps:

- 1) Identify which products to cover, including whether to cover all products or a selection;
- 2) Create a portfolio of service products and position them according to response times and prices;
- 3) Select a business model to support service products according to the products and their life-cycle stage;
- 4) Develop the aftersales organizational structure to provide visibility, incentives and the required focus on service;
- 5) Design and manage the aftersales service supply chain by deciding the allocation of resources, prioritizing resource utilization and planning for contingencies;
- 6) Monitor performance continually by evaluating it against set standards and customer feedback.

Having a performance management system that assists manufacturers in managing their dealer network is a critical success factor for successful servitization (Cohen, Agrawal et al. 2006; Baines and Lightfoot 2013). Organizations should focus on establishing a structured business performance management system for the aftersales business. Furthermore, since there are many operational groups in the aftersales function, an integrated and multi-attribute set of measures needs to be designed and implemented to provide a holistic reflection of performance (Mahut, Daaboul, et al. 2017).

The literature on performance measurement systems identifies various frameworks. Early frameworks focused on financial measures, and this was followed by ones that coupled financial

and non-financial and long-term and short-term measures. More advanced frameworks integrate new dimensions of performance, including corporate social responsibility and sustainability, intangibles and the supply chain. Despite this, there is a little discussion that considers after-sales service (Gaiardelli, Saccani et al. 2006; Saccani, Songini et al. 2006). The next section will present the literature related to performance management systems as a theoretical foundation for building the research framework and the associated matrices.

2.4. The Performance Management Context

This section discusses the literature on business performance measurement systems by presenting their evolution from an operational to a strategic focus and from measurement to management. This provides a basis for establishing a set of general criteria for a performance management system, which is an academic contribution of this research.

2.4.1. Performance Management Measurement

Organizations give a lot of attention to the formulation of strategies. However, it is estimated that effectively formulated strategies are successfully implemented between 10% and 30% of the time (Raps 2005). To implement strategies, organizations adopt various control systems and tools, many of which, if not all, include the use of business performance management systems.

The measurement of business performance has evolved over the last few decades; it has shifted mainly from capturing only organizational performance information to a more integrated approach that also manages organization performance. New and enhanced frameworks have been introduced by researchers and business practitioners to facilitate this transformation.

Due to the multidisciplinary nature of the field, different measurement techniques have been developed in parallel. However, the revolution in this field can be traced back to the end of

the 1970s and the early 1980s in the field of accounting. During this period, the field was criticised for being backward-looking and for its inability to account for intangible assets (Johnson 1987; Kaplan and Norton 1992).

While it is acknowledged that there have been evolutionary phases, there is no general agreement on the classification of those phases. A review of the work of various researchers indicates that two main phases can be identified. The first is the transition of performance measures from having an operational focus and measuring performance from a financial perspective, to become strategically focused (Kaplan and Norton 1992; 1993). This transition will be labeled ‘from operational to strategic’.

This transition meant that organizations started to realise that corresponding measures with strategic objectives can assist in implementing strategies (Neely 1994). However, the move from measurement to implementation can only happen when there is a management process in place. Having feedback from a measurement system does not guarantee the achievement of organisational goals: the feedback can show only what happened, but not explain why it happened or what course of action managers should take (Bititci, Carrie et al. 1997; Amaratunga and Baldry 2002). To get benefit from the feedback, the organizations should made natural progression towards a transition from the measurement phase to the management phase. This will be classified as the second shift in the field, and will be labelled as “from measurement to management”.

2.4.1.1. From Operational to Strategic

Due to the increase in global competition, uncertainty, and complexity in the business environment, the time-consuming competition between organisations to improve operational effectiveness ended with diminishing returns. Increased competition also shifted the productivity frontier outward, which further raised the level of competitiveness for everyone, and firms were

now forced to stop considering the product capacity driven by operational effectiveness as their main competitive advantage, and instead seek to be strategically positioned. This can be achieved by purposefully choosing a different set of activities to deliver a unique mix of values (Porter 1996). Firms had to shift from the cost phase to the value phase and start adopting a strategic planning approach for long-term survival (Ittner and Larcker 2001).

Atkinson (1998) argues that with the increasing interest in organisational strategy triggered by the studies of (Porter 1980; Porter and Advantage 1985), and the field of management accounting shifted towards measuring the strategic choices made by organisations and their contribution to its success. Atkinson (1998) proposes that strategic performance measurement defines the focus and scope of management accounting. The benefits of using such measures are that they provide a way of focusing on the efforts of the decision-makers in the organization, most important to define the organization's objectives in a meaningful way, and provide a basis for accountability and compensation, thus achieving organizational objectives by systematically collecting the required data.

Organizations thus started to realise that intangible asset such as customer relationships, innovative products, services, and operating processes, skills and knowledge, high-quality workforce, and responsive performance all represented a new source of competitive advantage (Kaplan and Norton 2000). A need emerged for a set of integrated performance measures that were more strategic to support business objectives and achieve a balance between short-term and long-term growth (Srimai, Radford et al. 2011). Traditional financial measures have long been criticised for their inability to provide the required insight into the performance level in these new areas (Kaplan and Norton 1992). They were one-dimensional, focusing on operational and production efficiency (Neely 1994), and were short-term indicators (Kaplan and Norton 1993). Furthermore, they could not assist managers in the decision-making process (Atkinson, Waterhouse et al. 1997).

Consequently, it was felt that the operational techniques such as Total Quality Management (TQM) and World-Class Manufacturing (WCM) that were widely used during the 1980s had failed to provide the required information, as they captured information mainly on costs, quality and productivity. Their coverage was limited and focused only on a small area of the organisation's total activities (Srimai, Radford et al. 2011). This required a shift from considering financial figures as the sole gauge of performance to considering them as one of a broader set of indicators³. The scope of the measures was extended to capture both financial and non-financial measures (Eccles 1991).

How to measure intangible assets is a challenge. While cause-and-effect links to financial results such as revenue and profit can be found for measuring tangible assets, such links for intangible assets are sometimes hard to find. In summary, the need for an integrated set of performance measures that supports rather than contradicts business objectives is now clearly established (Bititci 1994).

It is essential to mention that non-financial measures such as customer satisfaction, market share, new product development, quality, the environment, and employee performance have been measured for years, but the argument is that they were never given the same weight in areas such as strategy (Eccles 1991).

2.4.1.2. From Measurement to Management

“What gets measured gets done” is a famous saying that is often attributed to Peter Drucker and is widely used in the management area. The meaning of the above-mentioned quote gives a

³The first documented attempt to shift from traditional financial measures was made in the 1950s when General Electric initiated a project to develop performance measures for its decentralized business units; the recommendation was to measure divisional performance by one financial and seven non-financial metrics. The recommendation was never integrated into the management system.

clear picture of reality and assists the business to formulate an efficient future strategy (Catasus et al., 2007). However, this is only partly accurate, as there is little point in measuring something if it will not be managed. A measurement system is a tool that provides the information needed by an organisation to progress towards its objectives. It assists by revealing strengths and weaknesses that managers can respond to (Amaratunga and Baldry 2002). When it is appropriately designed, it can communicate how far the desired results have been achieved, and also enhance motivation and provide feedback on past performance. The management process is a proactive closed-loop control system that shows how different systems within the organisation are integrated and utilised to manage performance (Bititci, Carrie et al. 1997).

To achieve this closed-loop, a management system needs an information system that collects all the relevant financial and non-financial measures as a basis for managing performance. Research by Bititci and Swenson (1993) indicates that for the measurement system to perform its functions, two critical factors must be considered: (1) integration, or the ability to integrate the various areas of the business, and (2) deployment, which refers to the ability to communicate the different targets across the organization.

To summarise, the main functions of a management system are that it must:

1. Assist in setting organisational targets and in developing plans for their implementation;
2. Communicate these objectives throughout the organisation;
3. Monitor the implementation of the plans and provide feedback on the targets achievement status;
4. Assist management in the decision-making process.

The study of Bourne, Mills et al. (2000) proposes that performance management should involve the use of a multi-dimensional set of measures that cover both financial and non-financial

factors. It would include both internal and external measures of performance, and often include both measures that quantify what has been achieved as well as measuring tools that are used to help in predicting the future. Neely, Gregory et al. (1995) define it as the process of quantifying the efficiency and effectiveness of actions, while for Forza and Salvador (2000), it is an information system that facilitates communication between organisational units and collects information about performance.

According to Atkinson, Waterhouse et al. (1997), the function of performance management helps to evaluate the 'value received' from suppliers and employees, and the 'value provided' to the stakeholders. Therefore, the role of the performance management system relates to the company's strategy and structure, as this defines its benefit to all stockholders.

Franco-Santos, Kennerley et al. (2007) conducted a systematic literature review and evaluated over 300 documents (including journal articles, books, conference papers, and working papers), they identified 17 main definitions of business performance concepts but found that there was little agreement about the characteristics of BPM. However, they found consensus regarding five roles of BPM systems: 59%, which are "strategy implementation/execution"; 41% on "focusing attention/providing internal alignment", "communication", "and performance evaluation", and 35% on "progress monitoring".

It can be seen that the field of performance management has shifted from being based on traditional accounting systems to being based on company strategy, from being short-term to long-term in its orientation, from being profit-oriented to being customer-oriented, and from aiming merely to aiming, from evaluating performance to improve performance continuously.

A performance management framework should be able to:

1. Assist in the implementation and execution of the organisation's strategy;

2. Capture the performance of different levels of the operation, and integrate the performance of different areas as needed;
3. Communicate the objectives of each department through the organisation;
4. Achieve a balance between capturing measurements which accurately reflect the performance of the organisation and presenting an over-detailed picture;
5. Capture different dimensions of performance, including financial and non-financial and short-term and long-term dimensions.

As delivering a high level of service quality is one of the strategic differentiators of servitization, the following section will discuss service quality concerning servitization.

2.5. Quality in Relation to Servitization

Service quality has been recognized as a critical success factor in a firm's endeavours to differentiate itself from its competitors and to achieve a competitive service advantage. Manufacturing organisations that are going through servitization are required to provide superior service quality for success and survive (Parasuraman, Zeithaml et al. 1988). Excellent service quality increases customer retention, attracts new customers, reduces costs, enhances the firm's image, increases word-of-mouth recommendations, and enhances profitability (Zeithaml 2000; Kang and James 2004), and thus constitutes a dramatic shift towards customer-focused service (Galetzka, Verhoeven et al. 2006).

Many empirical studies have confirmed that organizations which have adopted a quality-oriented strategy have achieved improved productivity, higher customer satisfaction, increased employee morale, improved management-labor relations and higher overall performance (Brah,

Li Wong et al. 2000; Longenecker and Scazzero 2000; Zeithaml 2000; Klefsjö, Bergquist et al. 2008; Sharma and Kodali 2008; Kumar, Choisine et al. 2009; Fraser, Watanabe et al. 2013).

The term quality in the manufacturing context is mainly related to product quality, while in a service context, it is related to service quality. The terms product and service are intrinsically linked to servitization; the manufacturer first produces the product, which is defined as a tangible commodity, and then offers the service for the product, which is maintenance and repair.

Manufacturing quality is different from service quality. At the most basic level, manufacturing quality involves three principal elements: (1) quality design and engineering, or the incorporation of quality into the design of the product and manufacturing process, to predict potential quality problems before manufacturing and delivering the goods; (2) quality control, which involves stipulating the use of specific processes and materials, ensuring that workers are qualified and that equipment is in good order, and making a series of planned measurements to determine if quality standards are being met; (3) quality management, which is the planning, organisation, direction, and control of all quality assurance activities. If all these elements are in place, the customer will be able to see the quality of the final product, and manufacturers will be able to anticipate the level of quality perceived by the customers (Opazo-Basáez, Vendrell-Herrero, et al. 2017).

This is not the case with service quality, as the quality perceived by the customer could be different from the objective or actual quality desired, and this can be attributed to the characteristics of services. There are four distinctive characteristics of service that affect its quality: intangibility, heterogeneity, perishability, and inseparability. These four characteristics have been recognised as significant in developing the constructs of service quality (Parasuraman, Zeithaml et al. 1985; Ladhari 2009). Service quality is intangible because services are performances rather than objects, which cannot in most cases be counted or measured, and this intangibility makes it hard for

organisations to understand how consumers perceive their services and evaluate service quality (Parasuraman, Zeithaml et al. 1985). Services are heterogeneous, as they involve human interaction, and the behaviour of service personnel is challenging to guarantee: as the intended service may diverge from what the customer receives. The performance varies and can differ from day to day, from place to place, from producer to producer and from customer to customer (Opazo-Basález, Vendrell-Herrero et al. 2019).

Moreover, the involvement of the customer in the production of service can make its quality hard to control, especially within services where the consumer's participation is high. Services are perishable because they cannot be stored and/or sold on another day. Finally, they are inseparable because many services are produced and consumed simultaneously.

These four distinctive characteristics make it harder to guarantee the quality of the service than the quality of a tangible product. The overall evaluation of service quality by the customer does not depend only on the outcome, but rather on the process of service delivery (Green, Davies, et al. 2017). For consumers to evaluate the service quality, they compare their expectations with actual service performance. Service quality can thus be conceptualized as the gap between what consumers expect of what the service should offer and their perception of the actual performance of the service (Parasuraman, Zeithaml et al. 1985).

The servitization transition of a manufacturing organisation from pure product-provider to a product-service provider by adding product-related services makes it essential that the organisation understand and takes into account the characteristics of the service that they are required to deliver to their customers (Di Serio, de Mattos, et al. 2017). Manufacturers need to have a deep understanding of their customers' expectations to (1) design the most appropriate service system and service process for delivering the service to the customer, and (2) develop a service offer that meets customers' requirements.

2.5.1. Service Quality

The term quality was defined extensively by Zeithaml (1988) as ‘superiority of excellence’ - in other terms, the customer’s judgment of the overall excellence or superiority of a product or service. Research in service quality has been based on the foresight of consumer behaviour and the confirmation/disconfirmation paradigm (Grönroos 1984). Studies in this field proposed that consumers evaluate service quality by comparing their perception, or the actual performance, with their expectation, which is what they believe should have been the performance (Parasuraman, Zeithaml et al. 1985; Zeithaml 1988).

Organizations need to understand their customers’ expectations so that they can understand how their services will be evaluated. Understanding expectations is a critical element in the process, as it allows organisations to design an appropriate service process to meet them and to use customers’ perception of the service performed to adjust and enhance the process in a continuous way. This correction process requires that organisations must have a service quality measurement system in place. The next section discusses the measurement of service quality.

2.6. Discussion of the Literature - Servitization and the Automotive Industry

Servitization represents a shift from selling the product to selling integrated product-related services and providing customer support (Lightfoot, Baines et al. 2013). The value system of the automotive industry includes part suppliers, car manufacturers, dealer network, and buyers (customers). In the automotive sector, manufacturers depend on their dealer network to deliver service to their customers. Networks are considered to be one of the most common success factors for manufacturers (Chrisman, Bauerschmidt et al. 1998; Elfring and Hulsink 2003). The dealer

network is an essential component, as it not only represents the manufacturer at the point of sale but also acts as a mean of continuous contact with the customer after the sale of a new vehicle (Fraser, Watanabe et al. 2013).

The automotive dealer network provides product life-cycle services (PLS), i.e., the range of services offered to the customer to ensure that the product functions correctly through all the stages of its life-cycle. This includes preventive maintenance and repairs. The responsibility for providing a high level of service quality falls on the dealer network, which requires an efficient service delivery strategy (Kumar and Kumar 2004) with a degree of control from the manufacturer on the network operations (Goffin 1999).

The automotive network structure follows a vertical aftersales service network structure. In this structure, the manufacturer is the focal firm in the network, and the actors cover upstream and downstream activities by producing and delivering aftersales services. The downstream activates the actors for producing and delivering aftersales activities, e.g., activities that face the customer directly. The upstream enables the actions needed to provide these services, e.g., sourcing of the spare parts from the suppliers, logistics service. By conducting a service-portfolio analysis Gaiardelli, Songini et al. (2014) investigated 29 automotive brands operating in Italy between 2010 and 2012 (Alfa Romeo, Audi, BMW-Mini, Chrysler, Citroen, Daihatsu, Fiat, Ford, Honda, Hyundai, Infiniti, Jaguar, Lancia, Lexus, Maserati, Mazda, Mercedes, Nissan, Opel, Peugeot, Porsche, Renault, Skoda, Subaru, Suzuki, Seat, Toyota, Volkswagen, and Volvo). The research established the level of servitization and investigated its impact through the lens of the service portfolio.

The services portfolios of all the brands were analysed, resulting in a list of 44 types of service offered. It was found that 20 of the 44 types of service (45%) were offered by more than

90 % of the brands, these being mainly services targeted towards product support, while six services (14%) were offered by only one or two brands, and were customer-oriented (both the transaction-based and the relationship-based categories). Although carmakers seek to differentiate themselves through the diversification of their service portfolio, the emphasis on tangible elements remains essential (Gaiardelli, Songini et al. 2014).

Most car makers offer transactional services for product support such as maintenance and repair, and advanced manufacturers offer relationship-based services for product support such as extended warranties and service contracts (long-term contracts for repair and maintenance). To achieve differentiation, they need to focus on relationship-based services for customers such as payment by credit/debit card, financing schemes for product repair services, fleet management training and consultancy, support for maintenance activities and spare parts management (consultancy/training) for customers who own workshops, and web-based community services (apps, social network, etc.).

The automotive after sales industry widely follows two strategies “After-sales service providers” to ensure the functionality of the product through a set of pre-defined preventive maintenance schedules, providing repair and warranty. Second, advanced level follows “Customer-support service” which focuses on increasing customer efficiency and effectiveness through a comprehensive range of maintenance services such as tailoring and providing service contracts and a warranty extension to the customers (Micka, 2019).

There are various reasons why companies pursue servitization, including improving the sales of new products, improving their position in the market, and the economic benefits of the revenue which can accrue. Despite this, however, there is an ongoing debate in the literature on servitization, and specifically about the financial consequences of the decision to undergo a servitization transition (Garcia Martin, Schroeder, et al. 2018). The literature suggests that there

are many factors, such as the lack of a proper service strategy, the size and age of the company (Woo and Seo 2016; Ruiz-Alba, Soares, et al. 2017).

There could be several reasons for poor financial performance. For the automotive industry in specific and the durable manufactured products in general, the size and age of the company are not seen as a contributing factor, but rather as something which contributes to the initial decision to buy the product and the level of customer trust in the brand. What can be seen as a contributing factor to low financial returns for a service organisation is the lack of a service strategy which focuses on customer needs and provides the customer with the appropriate service portfolio. The research shows that all successful companies have a clearly defined service strategy (Gebauer, Fleisch et al. 2005). A successful service strategy requires a comprehensive and deep understanding of the customer requirements and expectations to create the right service offering; successful companies build a service delivery system that fits customer requirements. Additionally, a clearly defined service strategy should take into account the competitive strategy the firm wants to pursue and how it intends to differentiate itself from competitors who also offer services. This will then be translated into operational reality by allocating adequate resources (Silva, Viagi, et al. 2018).

Offering the right service portfolio creates a connection between customers and the brand, building brand loyalty and generating repurchase intent (Wang, Kosaka, et al. 2016). Having a strong portfolio of service offers also acts as a switching barrier and can lock customers into the authorised manufacturer's network. The literature has shown that having a significant number of offers is not always the best way; also, having service offers, which neither add value for the customers nor enhance the firm's competitive position will not have the desired effect (Kowalkowski, Gebauer, et al. 2017).

Relationship-based services for product support such as extended warranties and service contracts (long-term repair and maintenance contracts) are currently the competitive frontier for most manufacturers and have proven to add the required customer value and improve the competitive edge of manufacturers.

The literature suggests that automotive organisations undergoing servitization require the following for a successful transition:

- 1) A well-defined service strategy
- 2) A vertical after-sales network to provide product support services
- 3) A deep understanding of customer expectations
- 4) A service system which is built and based on customer expectations
- 5) Product support offers that add value to the customers
- 6) Relationship-based services which are based on customer requirements

CHAPTER THREE: METHODOLOGY

3.1. Introduction

This chapter presents the critical decisions and choices made regarding the research design and the methods used for data collection and analysis. It starts by outlining the philosophical stance (i.e., ontology and epistemology), which underlies the chosen methodology and how it provides a context and grounding for the process and the criteria applied. This is followed by an account of the strategies of inquiry and the choices made regarding the approach to the research design, and then an explanation of the methods used for data collection and analysis. The chapter concludes with a reflective account of the methodology and a discussion of ethical considerations.

3.2. Philosophical Orientation

The relevant debates among philosophers focus on ontology and epistemology, and there is no absolute distinction between ontological and epistemological issues (Crotty 1998; Easterby-Smith, Thorpe et al. 2012). Ontology is concerned with the nature of reality and existence, while epistemology is concerned with ways of enquiring into the nature of the world (Easterby-Smith, Thorpe et al. 2012). What is considered the main ontological and epistemological views are presented later, and this is followed by a rationale for taking a pragmatic approach.

Ontology is the study of being: it is concerned with ‘what is’, with the nature of existence and the structure of reality. The two main ontological positions are realism and relativism. Realism is based on the view that “the world is concrete and external, and that science can only progress through observations which have a direct correspondence to the phenomena being investigated”

(Easterby-Smith, Thorpe et al. 2012). Relativism argues that scientific laws are not merely there to be discovered, but that they are created by people (Latour and Woolgar 1979).

Epistemological assumptions are concerned with how knowledge can be created, acquired, and communicated: in other words, what it means to know. There is a range of epistemological positions, with a focus on two contrasting views of how social science research should be conducted. The two main views are positivism and social constructionism. Positivism holds that “the social world exists externally, and that its properties should be measured through objective methods, rather than being inferred subjectively through sensation, reflection or intuition” (Easterby-Smith, Thorpe et al. 2012).

Social constructionism posits that reality is not objective and external, but is socially constructed and given meaning by people. It focuses on how people make sense of the world, mainly through sharing their experiences with others through the medium of language (Easterby-Smith, Thorpe et al. 2012). The constructionist position is that there may be many different realities, as ‘reality’ is determined by people rather than by objective and external factors, which requires the researcher to gather multiple perspectives through a mixture of qualitative and quantitative methods and to gather the views and experiences of different individuals and observers. This is sometimes described as triangulation.

This review has covered the fundamental philosophical positions which underlay the practice of management research and its worldview. However, within management research, there are several discrete philosophical frameworks which constitute relatively coherent ways of thinking such as critical realism, critical theory, feminism, hermeneutics, postmodernism, pragmatism, and structuration theory (Easterby-Smith, Thorpe et al. 2012), of which the most interesting in this context is pragmatism (Russill, 2016; Tebes, 2017).

Those who take a pragmatic worldview, focus on the outcomes of the research. Pragmatism is not committed to any one system of philosophy or view of reality but allows the researcher to choose the methods, techniques, and procedures which best meet the needs and purpose of the research (Creswell 2014). As an alternative paradigm, pragmatism sidesteps the contentious issues of truth and reality and accepts philosophically that there are singular and multiple realities that are open to empirical inquiry and orients itself towards solving practical problems in the real world (Creswell and Clark 2007).

The starting point for researchers is to take a position regarding their perceptions of how things are and how things work. This position is based on the researcher's own ontological and epistemological assumptions (Shields and Whetsell, 2018). Different positions will exhibit different ontological and epistemological views, which involve different assumptions about reality and knowledge to strengthen the particular research approach and methodology (Steiner et al. 2018).

This study is based on the view that there is a continuum between two extreme positions and is located at a mid-point between these extremes. It takes a pragmatic worldview and focuses on outcomes. Pragmatism should not be understood as a philosophical position, but rather as a set of philosophical tools that can be used to address problems. The purpose of considering different philosophical approaches is thus to address issues (Biesta 2010). The worldview of pragmatism underpins this study, and this is reflected in the choice of research methods, as will be explained in the following sections.

3.3. Research Approach

A research approach is a strategy of inquiry used to move the research from its underlying philosophical assumptions to selecting a research design and subsequently deciding appropriate

research methods and tools used to collect, analyse and interpret data (Myers and Avison 2002). Researchers can acquire data through qualitative and quantitative approaches.

A quantitative strategy involves complex numerical investigations where the researcher specifies hypotheses and engages in collecting data that either support or refute these hypotheses (Brannen 2017). Qualitative strategies are where the researcher seeks to discover the multiple meanings of individual experiences, i.e., meanings which are socially and historically constructed (Creswell 2014).

According to Denzin and Lincoln (2011), qualitative research considers the socially constructed nature of reality. There is a close relationship between the researcher and “what is studied, as well as situational constraints that shape the inquiry”. In the extreme form of constructivism, qualitative research can often rely on a shared construction of reality as it seeks answers to questions about how the social experience is created and given meaning. In contrast, quantitative research is concerned with the measurement and analysis of causal relationships between variables and not with the process (Goertzen 2017; Gray 2019).

There are various reasons for using qualitative and quantitative research, as outlined by (Creswell 2007). Qualitative research can be used (1) to gain a detailed, complex understanding of an issue, (2) to understand the contexts or settings in which the participants in a study address a problem or issue, (3) to solve problems which cannot be dealt with by quantitative measures and statistical analyses, and (4) to follow up quantitative research and help explain the mechanisms or linkages in causal theories or models.

Similarly, there are various reasons for using quantitative research: (1) larger sample sizes can be used, which makes the conclusions from quantitative research generalizable; (2) it allows systematic, standardized comparisons; (3) the use of statistical analysis means that the analysis is considered reliable (Walliman 2017).

A quantitative approach employs strategies of inquiry such as experiments and surveys and uses predetermined instruments that yield statistical data. A qualitative approach, on the other hand, employs strategies of inquiry such as narratives, phenomenological inquiries, ethnographies, and grounded theory studies or case studies (Creswell 2007).

In qualitative research, the researcher collects open-ended and emerging data with the primary intent of identifying patterns or themes; the final report includes the voices of the participants, the reflexivity of the researcher, and an elaborate description and interpretation of the problem (Creswell and Inquiry 2007).

The research questions in this study require a flexible research approach that allows all aspects of the phenomenon of servitization to be explored within its natural setting. The research involves different research questions, and to answer all of them, a mixed-methods strategy is employed, which combines qualitative and quantitative methods.

Mixed methods are considered as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study (Johnson and Onwuegbuzie 2004). The data can be collected concurrently or sequentially, it can be given equal or more priority, and data integration can happen at one or more stages in the process of research (Tashakkori and Teddlie 2010).

In the mixed method, the research question is fundamental; the used research methods should follow the research questions in a way that offers the best probability of answering the question (Johnson and Onwuegbuzie 2004). Mixing methods extends the breadth and range of the inquiry by using different methods for different components of the inquiry (Greene, Caracelli et al. 1989). Mixed methods research can plug a gap by using quantitative methods to measure some aspects of the phenomenon in question and qualitative methods for others. The use of such multiple methods of data collection can compensate for the limitations of one particular method in

comparison to others and provide insights that are not available from one method by using others (Tashakkori and Teddlie 2010).

There are several benefits of using qualitative and quantitative approaches together to answer the research question. The use of a qualitative approach makes it possible to (1) examine the servitization process on different levels and from different angles, (2) capture the richness of the organizational context and the complex elements involved in the servitization process, and (3) use a flexible design for the different phases of the research to collect data from multiple sources, inductively organize the data into patterns and themes, and take a holistic view of the research question (Creswell and Clark 2017). The use of quantitative tools makes it possible to answer the different research questions and to develop a more comprehensive picture. In this study, the use of a large sample of data from a secondary source provides a basis for exploring the service quality measures used by the manufacturer. It is hoped that this approach contributes to knowledge and provides a better understanding of the issues investigated, and thus stimulates further research.

3.4. Research Design

Research design is the logical plan and systematic process which gets the researcher “from here to there” (Yin, 2009: 26). It involves organizing all the research activity, including the collection and analysis of data in a way which is most likely to achieve the research objectives (Easterby-Smith, Thorpe et al. 2012). The philosophical views usually inform the researcher about research design (i.e., positivist vs. constructivist, etc.), the research approach (i.e., quantitative vs. qualitative), and the type of questions being asked (i.e., why, how and what).

This study derives its underpinnings from pragmatism, and it is pragmatism that provides the logic of inquiry for mixed methods research. Pragmatism allows qualitative and quantitative research to be combined into a workable approach. The important idea is that the research

approaches should be mixed in ways that offer the best opportunity for answering the important research question (Johnson and Onwuegbuzie 2004).

Quantitative and qualitative methods can be mixed across the stages of research. The researcher can decide (1) whether to give equal status to the quantitative and qualitative components of a mixed study or to give one element a dominant status; (2) the time ordering of the qualitative and quantitative phases, i.e., whether they can be carried out sequentially or concurrently; (3) the way the methods are mixed, as a continuum or as thoroughly mixed methods; (4) the elements of the study which are mixed, i.e., the objective[s], the methods of data collection, the research methods, or in the way the data is analysed or interpreted (Johnson and Onwuegbuzie 2004).

In this research, qualitative (primary) data is predominant, and this was collected via semi-structured interviews. The quantitative data is from archival sources and is secondary data as it was collected from a customer survey that was used to present a more comprehensive picture of the research area. The quantitative data was used only for statistical analysis. The research starts with qualitative methods in chapter four and five, and quantitative methods follow this in chapter six; the qualitative method is, therefore, the dominant method in the research. Qualitative methods are used in Chapter 4 to establish the categories of the decisions that must be made for successful servitization, and in Chapter 5 to design a performance management system to measure the performance of the operations within the dealer networks. Chapter 6 uses quantitative methods to explore the use of the SERVQUAL measurement scale. To collect qualitative data, the case study approach was selected, while quantitative data was collected through a survey instrument. When two phases of data collection take place simultaneously, the data can be reported and analysed separately (Tashakkori and Teddlie 2010). The different phases are also presented separately in the following sections.

3.4.1. Qualitative Design (Chapter four and five)

There are several research designs available for qualitative research, including narrative research (the exploration of stories told by individuals); phenomenology (the study of direct experience without allowing the interference of existing preconceptions), grounded theory (the development of theory grounded in data from the field), ethnography (the study of individuals' stories within the context of their culture-sharing group) and case studies (the use of a case or multiple cases to develop an in-depth description and analysis). The two most widely known designs are grounded theory (Glaser and Strauss 1967) and case studies (Yin 2009).

The grounded theory approach was first introduced by Glaser and Strauss (1967) as a new methodology for discovering theory from data. It was further developed by the originators when they took different directions, which resulted in the emergence of two distinct versions of grounded theory by the early 1990s (Thornberg 2012). A third version, referred to as a constructivist grounded theory, was also developed, and uses the strategies of traditional grounded theory but within a constructivist paradigm. As described by Charmaz (2000), the emphasis in this approach is on the interaction between the researcher and participants and on keeping them close and keeping their words intact in the process of analysis. Constructivist grounded theory is constructed by the researcher's interaction with the interpretation of data (Thornberg 2012). Although the grounded theory has established itself as a valid research design, the choice for this research was the case study approach, which is further elaborated below.

3.4.1.1. Case Study

A case study is considered to be a qualitative approach and is a strategy of inquiry in which the researcher explores a bounded system representing a case, or multiple bounded systems representing multiple cases over time, and in which detailed data is collected from multiple sources

(Creswell 2007). According to Yin (2009), the evidence collected in a case study may come from six sources: documents, archival records, interviews, direct observation, participant observation, or physical artefacts. Yin (2009) also suggests that the data collected in a case study (which is words and meanings) can be supplemented by data collected by quantitative methods (i.e., numbers and measurements).

As proposed by Benbasat, Goldstein et al. (1987), there are three reasons for using the case study as a research strategy:

1. The case method allows phenomena to be examined in their natural setting, especially when there is no strong theoretical base for a phenomenon and the natural environment provides a rich context for generating theories by observing actual practices;
2. It allows the researcher to answer ‘how’ and ‘why’ questions by developing an understanding of the nature and complexity of the phenomena;
3. It is an appropriate way of researching an area in which few previous studies have been carried out, and in which the phenomena are not fully understood.

Yin (1989) agrees that case research is an appropriate method of answering the ‘why’ and ‘how’ questions and one which enables a focus on contemporary events. He adds that it is also appropriate when there is no control over the behaviour of the observed phenomena. Stuart, McCutcheon et al. (2002) argue that case research is a scientific approach that closes the gap between theoretical concepts and reality and, at the same time, contributes to theory building in operations management when the phenomena have not been empirically tested (Yin 2017).

3.4.1.2. Case Study Design

The design of a case study is defined basically as “the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions” (Yin 2002:

20). The researcher needs to select the design which provides the maximum instrumentality to answer the research questions while considering the strengths and limitations of each design as well as the pitfalls to be avoided in its implementation (Yazan 2015).

As suggested by Yin (2009), there are four types of design which case study researchers can make use of: (1) single-case (holistic) designs with a single unit of analysis, (2) single-case (embedded) designs with multiple units of analysis, (3) multiple-case (holistic) designs with a single unit of analysis, and (4) multiple-case (embedded) designs with multiple units of analysis. The main difference between holistic and embedded case studies is that a holistic design requires one unit of analysis, whereas embedded designs require multiple units of analysis. The same single-case study may involve more than one unit of analysis. Holistic designs occur when single case attention is also given to a sub-unit. Such designs are preferable to embedded case studies when the relevant theory underlying the case study is holistic.

This research uses a single-case design as it explores the servitization phenomenon within a single organization but involves several units of analysis to answer the different research questions.

According to Yin (2009), there are three types of case study: exploratory, descriptive, and explanatory. The research method used for Chapters 4 and 5 is the exploratory multiple-case study design. This design was chosen for the following reasons:

- The research is exploratory, as it seeks to answer the ‘how’ question (how can automotive manufacturers successfully implement servitization in the Middle East?); exploratory case studies are the preferred tool for answering the ‘how’ or ‘why’ questions (Yin 2009);

- The research investigates servitization in a real-life context; case studies are preferred when the researcher has little control over events, and when the focus is on a contemporary phenomenon within some real-life context (Yin 2009);
- The central research question is answered through three sub-questions that are linked and need to be investigated within the same organization, which suggests the use of a single case (embedded) design with multiple units of analysis.

3.4.1.3. Case Study Units of Analysis

A significant step in designing and conducting a single case is defining the unit of analysis (or the case itself). The unit of analysis is the ‘what’ or ‘who’ that is being studied. The overall unit of analysis of this dissertation is the servitization process for automotive manufacturers operating in the Middle East. As the dissertation is divided into three connected chapters articulated through three research question, each paper has an individual unit of analysis:

R.Q1 unit of analysis: the decision categories for successful servitization (qualitative data);

R.Q2 unit of analysis: the components of an aftersales service performance management system for managing a dealer network (qualitative data);

R.Q3 unit of analysis: the measurement of service quality within the dealer network (quantitative data).

3.4.1.4 Selecting the Case

The concept of purposeful sampling is used in qualitative research to select information-rich cases purposefully. This means that the researcher selects individuals and sites for the study, which can inform and provide an understanding of the research problem and the central

phenomenon under study. The selection of the case must be justified by the researcher (Cresswell and Inquiry 2007).

The choice of the company was critical to this study: it had to be a manufacturer that has a significant presence in the region and provides a portfolio of product-related services. The manufacturer chosen has a dedicated regional office in the Middle East with full representation and a designated team which handles all aspects of sales, marketing, and service, a technical team which supports dealers across the region, an R&D team for product testing before the launch of new products, and a regional spare parts distribution centre. Any necessary additional support is provided by a team based in the headquarters. Additionally and most importantly, the company offers one of the strongest service offerings of all the manufacturers in the region through their service contracts and extended warranty plans. Their main facility is in the UAE and covers the region as a whole, and there is a facility in Saudi Arabia, which serves only the Saudi market.

3.4.2. Quantitative Design (Chapter six)

Quantitative research involves the collection of quantifiable data and analysing it using statistics. The emphasis is on collecting and analysing data in the form of figures. It tends to be based on numerical measurements of specific aspects of phenomena, and the figures can represent scores measuring distinct attributes of individuals or organizations (King, Keohane et al. 1994). There are broadly speaking two sources of data in research: (1) data which is collected by the researcher him/herself (primary data), and (2) secondary data, or that which has already been collected and is stored in archival databases. The data can be collected through surveys, observational methods, or from secondary sources (Easterby-Smith, Thorpe et al. 2012). The quantitative data used in this study are secondary data collected through surveys. The secondary data source is briefly discussed below.

3.4.2.1. Surveys

Surveys are considered to be an excellent way of collecting data about the opinions and behaviour of a large number of people, as long as they are done well (Easterby-Smith, Thorpe et al. 2012). Surveys can take the form either of self-completion questionnaires or questionnaires administered by interviewers face-to-face or over the telephone. Many factors influence the choice between these methods, and there is no single best way (Easterby-Smith, Thorpe et al. 2012).

Self-completion surveys are where respondents record their answers and can be completed as a questionnaire, which is sent to the respondent by mail and then returned in the same way. They may also take the form of a web-based survey administered via the internet.

In this case, each respondent is sent the web address needed to access the questionnaire. The survey is then completed online, and responses are stored directly in an online database for subsequent statistical processing. Interview-administered surveys require the interviewee to complete the survey in person while the interviewer is present. Another form is telephone interviews, in which respondents complete the survey on the phone while the interviewee records the answers.

The data for this research was collected by a combination of web-based surveys and phone surveys. In the first case, customers received an email with a link to the survey which they were invited to complete, and once they had completed the survey, the responses were stored in the database. Other customers received a phone call in which they responded to the same questions in the same sequence as in the online survey.

3.4.2.2 Secondary Data

Secondary data refers to data that is already available because it has been collected by someone other than the researcher, and it may be either published or unpublished data (Kothari

2004; Easterby-Smith, Thorpe et al. 2012). Researchers using secondary data are not confronted with the problems associated with the collection of the data, but need to investigate three characteristics, namely reliability, suitability, and adequacy (Kothari 2004):

Reliability: this has to do with who collected the data and any bias on their part, the source of the data, whether the methods used to collect it were appropriate methods when it was collected, and whether it has the level of accuracy desired;

Suitability: the researcher should scrutinize the definitions of the various terms and units of collection used when the data was collected, and compare these with the objective, scope, and nature of the inquiry in hand. If there are discrepancies between these, then the data is unsuitable and should not be used;

Adequacy: if the level of accuracy in data is found inadequate for the research, then it should be considered inadequate and should not be used by the researcher.

The data used in chapter 6 was investigated and found to meet all three requirements and fulfilling to the research requirements.

3.5 Research Methodology and Techniques

Methods and techniques are the instruments and processes used for gathering research data, analysing it, and drawing conclusions from it. There is a wide range of methods and techniques available for researchers to choose from (Easterby-Smith, Thorpe et al. 2012). The following section presents the qualitative and quantitative methods and techniques used in this research.

3.5.1 Qualitative Methods and Techniques (Chapter four and five)

3.5.1.1 Data Sources

The use of case studies allows the use of a variety of data sources. This research collected primary and secondary data from the following sources:

Primary Sources:

- semi-structured interviews

Secondary Sources:

- archival sources
- training completion reports
- a monthly Service Excellence report
- a yearly Service Excellence accreditation audit report
- a process audit report
- monthly customer viewpoint reports

3.5.1.2 The Sampling Context

Saunders (2012) argues that the choice of research participants should be determined by the focus of the research to enable the researcher to meet the research aim and answer the research question. He identifies four main considerations in choosing participants: (1) gaining access, (2) the need for the sample to enable the collection of appropriate data, (3) the use of different non-probability sample selection techniques, and (4) the number of participants needed. Each of these criteria is discussed below.

Qualitative research is dependent upon gaining access to data, and so one of the key decisions for choosing this case study was the issue of gaining access to the organization. As the

researcher himself is part of the management team of the organization, the idea was discussed with other members of top management, and consent was given to use the data from the organization as a research subject. Top management was open to the aims of the research, and consented to participate and agreed that the research findings could be shared to improve management practices.

Identifying participants and choosing the sample is based on the question of whether the selection will make it possible to collect appropriate data and meet the research objectives (Saunders 2012). Participants can be selected using non-probability (non-random) or probability (random) sampling techniques.

If the non-probability sampling technique is used, the choice of participants is based on the researcher's judgment about the characteristics of the population, which are important for addressing the research questions (Brinkmann 2014). There are four non-probability sampling techniques: quota sampling is used as a substitute for probability sampling to select participants when a sampling frame is not available; purposive sampling involves choosing participants based on judgment; snowball and self-selection sampling are techniques where participants volunteer to be part of a sample; in haphazard sampling, participants are included for convenience. Purposive samples are the most frequently used form of non-probability sampling in qualitative research.

For this research, non-probability purposive sampling was employed. A condition for selection was that all the participants in the study should have experience in the automotive sector, and all those who were interviewed held positions with regional responsibilities where they had the exposure to directly overlook or work within service organizations in more than one country.

To ensure the **generation of appropriate data**, the design of the research included defining the profile of the participants within the target organizations. The sample was made up of a homogeneous and a heterogeneous group. The individuals within the homogenous group were

chosen based on experience and accessibility. The group consisted of executives working for the same manufacturer who all had regional responsibilities for multiple service organizations in the Middle East. The heterogeneous group consisted of managers and business consultant working for several organizations both in the Middle East and elsewhere.

3.5.1.3 The Number of Participants Required

A small sample restricts the extent to which it is possible to generalize about a population. Statistically, however, it is still possible to generalize, providing the participants chosen are appropriate for the research aims (Saunders 2012).

Having a diverse selection helps to determine whether the information collected from the first homogeneous group was affected by the culture of the organization and its business objectives. The different informants in the heterogeneous group and the different data sources drawn on allowed for triangulation to check the internal consistency of the data. The information provided from the interviews made it possible to reach the level of data saturation required.

3.5.1.4 Data Collection: Interviews

Interviews are considered to be one of the most important qualitative data collection methods and have been widely used in field studies (Qu and Dumay 2011). Interviews are used to collect data from organizational members as natural language data (Easterby-Smith, Thorpe et al. 2012). The interview aims to enable the researcher to see the research topic from the perspective of the interviewees, and to understand how and why they come to have this particular perspective (King 2004).

There are important differences in the philosophical assumptions underlying different approaches to interviewing methodology. Given the pragmatic position adopted in this study, the

interviews focus on the constructive nature of language. This meant that the interviews were loosely structured, and probing questions were used to follow up points of interest.

In qualitative research, an interview is deemed to be structured when the interviewer asks interviewees a series of pre-established questions and allows only a limited number of response categories. Interviews are considered to be unstructured when the interviewer moulds the interview to the individual situation and context to avoid making the interviewees feel that they are being assessed or semi-structured when the interviewer asks interviewees a set of prepared questioning, which are guided by identified themes. The format used in this research is the semi-structured interview.

Semi-structured interviews are considered a useful and convenient means of gathering information. They are characterized as being flexible, accessible, and intelligible, and they allow the disclosure of important and often hidden facets of human and organizational behaviour (Brinkmann 2014).

The semi-structured interview consists of a set of prepared questions guided by purposefully selected themes, with probes designed to elicit more elaborate responses. The interviews in this research were conducted using an interview guide incorporating a series of broad themes to be covered during the interview, and the interview guide was used to direct the conversation towards the topics and issues on which the research needed to collect data.

The interview guide in qualitative research reflects the philosophical assumptions underlying the research. Realist interview guides tend to be structured, with defined topics for discussion; at the other end of the scale, interview guides based on the premises of social constructivism offer flexibility, so the interview is not based on a list of questions that should be asked word-for-word in a specific order. As suggested by King (2004), the qualitative research interviews generally use an 'interview guide' comprising the topics to be covered by the

interviewer during the interview and suggest probes that could be used to follow up responses and to elicit greater detail from participants.

Depending on the type of interview, the guides vary from being highly scripted to relatively loose. However, all guides have in common the fact that they serve the same purpose of ensuring that the same thematic approach is applied during each interview (Qu and Dumay 2011).

The development of the interview guide can be an ongoing process, and thus may not be complete at the start of the first interview. It can be modified through changing the questions, adding probes, or adding topics that were not in the initial list but which emerged from the interviews. It allows topics to be dropped or re-formulated if they are incomprehensible to participants or consistently fail to elicit responses that are in any way relevant to the research question(s).

The research guide for Chapters 4 and 5 started with a set of topics derived from the literature review and theoretical frameworks chosen, and all the questions were open-ended. After two pilot interviews, the initial question list was modified by changing some of the questions and the terminology to bridge the gap between academic language and that used by practitioners. The guide was continuously reflected ahead, and the research adopted an open approach, and added probes emerged as the need for them. As the researcher was himself a member of the organization, it was possible to conduct follow-up interviews on emerging topics. See Appendix A for the Chapter 4 interview guide and Appendix G for the Chapter 5 interview guide.

The same interview **procedure was followed throughout**. All the interviews were one-to-one and ranged from 1 hour 15 minutes to 2 hours. The respondents were first asked open-ended questions. The purpose of the open questions was to give the participants the freedom to pursue the themes they deemed important. These questions were followed by ‘probing pre-defined sub-questions’ which were based on pre-interview inquiries, and other probing questions which

emerged spontaneously from participant responses to cover needed topics or to clarify emerging topics. The interviews were audio-recorded for transcription.

Interviewing started with two **pilot interviews**. A shortlist of open-ended questions that aimed to elicit participants' opinions on each topic initially guided these interviews. The participants for the pilot interviews were selected based on convenience of access, geographic proximity, their experience of the areas being researched, and their availability for a further interview if needed. These two interviews helped to shape the language to be used in the questions and opened up new topics. The set of questions was refined and modified to focus more narrowly on the central issues.

Further interviews were conducted following the same steps, with the flexibility to improve and add questions continuously. The refined set of questions demonstrated validity and helped in the process of analysis.

3.5.2 Quantitative Research Methods and Techniques (Chapter Six)

Surveys are considered the right way of collecting data about the opinions and behaviour of large numbers of people (Easterby-Smith, Thorpe et al. 2012). Data were collected from a customer satisfaction survey that was administered by the manufacturer. The survey was designed to capture customers' perceptions about all aspects and areas of the service performed by the dealer. The survey includes several measures from the SERVQUAL scale that covered all five dimensions. It also consists of a question measuring customers' perception of the overall quality of the service performed.

3.6 Analytical Strategy

This section presents how the qualitative and quantitative data were analysed.

3.6.1 Qualitative Data Analysis (Chapter four and five)

Qualitative data analysis involves organizing, justifying, and explaining the data. It makes sense of the data from the perspective of how the participants' define the situation, noting patterns, themes, categories, and regularities. (Cohen, Manion et al. 2013). Various methods can be used to analyse qualitative data, chapter four adapts Thematic analysis is a method for identifying, analysing, organising, describing, and reporting themes found within a data set. Rigorous thematic analysis can produce trustworthy and insightful findings (Braun and Clarke 2006)

Boyatzis (1998) describes thematic analysis as a process to be used with qualitative information for encoding to fulfil five purposes: it is a process of (1) seeing, (2) finding relationships, (3) analysing, (4) observing a case systematically, and (5) quantifying qualitative data.

The method chosen in chapter five was a hybrid mix of qualitative methods of thematic analysis using the template analysis technique. Template analysis is a form of thematic analysis which balances a relatively high degree of structure in the process of analysing textual data with the flexibility to adapt it to the needs of a particular study (Symon and Cassell 2012), and forces the researcher to take a systematic and well-structured approach to handling the data

3.6.2 The Phases of the Analysis

3.6.2.1 Familiarization with the Data

The first step after every interview was to transcribe the interviews from audio recording to written text. The transcription process is, in itself, considered a data analysis procedure (Brinkmann 2014). All the interviews were transcribed word for word. Although this was a time-consuming process (four to six hours for each hour of recording), it allowed the researcher to become fully familiar with the data and reflect on the context of each interview. This was followed

by a validation process of listening to each interview once again and going through the transcripts line by line to seek any discrepancies and editing the text accordingly.

As well as transcribing the interviews, field notes for each interview were written up while the experience was still fresh in the researcher's mind, and these were used as a journal to reflect on what had been recorded. Once the transcription and editing process was completed, the researcher immersed himself in the data to find meanings and ideas, highlight interesting topics, and identify emergent ones, as well as to form initial thoughts. As the strategy used was flexible, there was a focus throughout on assessing the applicability of the codes already selected and identifying emergent ones.

3.6.2.2 Generating Initial Codes

Coding is a process of reflection and a way of thinking about data; it simplifies and highlights specific characteristics of the data. Codes are used to build knowledge about the data, leading to the identification of themes (Savage 2000). This phase focused on the generation of initial codes from the data. Codes are “the most basic segment, or element, of the raw data or information that can be assessed in a meaningful way regarding the phenomenon” (Boyatzis 1998). A constantly comparative method of data analysis was used to look for emerging categories and refining the interview questions to focus on the central category and confirm coding decisions.

A decision was taken not to count codes or words in the coding process. That is; the number of times codes or words appeared in the interview transcript was not calculated to provide an indicator of frequency of occurrence; instead, the researchers adopted the recommendation of (Creswell 2007) to look at the number of passages associated with each code as an indicator of the respondents' interest in the code and identify a central core of the research.

3.6.2.3 Searching for Themes

This phase starts after all the data has been initially coded, and a list of different codes has been generated. It involves sorting and assembling all the potentially relevant coded data extracts into themes (Braun and Clarke 2006). A theme is defined by (DeSantis and Ugarriza 2000): as an “abstract entity that brings meaning and identity to a recurrent experience and its variant manifestations” as such, a theme captures and unifies the nature or basis of the experience into a meaningful whole”. The significance of a theme is not dependent on a quantifiable measure, such as how many times it appears in the data or its frequency in comparison with other themes, but rather on whether it captures something important about the overall research question (Braun and Clarke 2006).

According to King (2004), the best way to start searching for themes is to have predefined codes that help guide the analysis. As our research guide pre-set questions represented actual codes, the coding process started with predefined codes. The composition of themes and the addition of new ones was not an outcome of the interviews; rather, every code was investigated in-depth, and themes were identified, which were most relevant to providing an understanding of the phenomena.

3.6.2.4 Reviewing the Themes

This phase was to refine the themes that had been identified. The coded data extracted for each theme was reviewed to consider whether it appeared to form a coherent pattern and accurately reflect the meanings evident in the data set as a whole (Braun and Clarke 2006).

3.6.2.5 Defining and Naming Themes

During the fifth phase, the researcher determines what aspect of the data each theme captures and identifies what is of interest about it and why naming the theme makes it necessary to write a detailed analysis and identify the story of the theme (Braun and Clarke 2006). It is important to consider the ‘essence’ of what each theme is about (as well as the essence of the themes overall) and determine what aspect of the data each theme captures, as well as how each story fits into the broader overall story of the data and the research question and objective (Braun and Clarke 2006). As suggested by King (2004), outside experts were used as consultants to determine whether the themes were sufficiently clear and comprehensive to make modifications unnecessary.

3.6.2.6 Producing the Report

The final phase begins once the researcher has fully established the themes and is ready to start the final analysis and write up the report (Braun and Clarke 2006). The report provided a clear description of the analysis process and the codes, themes, and outcomes. Following the suggestion of King (2004), it included examples of direct quotes from participants to aid in the understanding of specific points of interpretation and demonstrates the prevalence of the themes.

3.6.3 Quantitative Data Analysis

Many statistical procedures were used in chapter six. The first was a descriptive statistical analysis of demographic factors (age, gender, and education), and this was followed by factor analyses to reduce the number of variables and allow a multiple regression analysis to be carried out between the reduced variables and service quality. The chapter presents at length every step of the statistical analysis and the decisions taken during the analysis.

3.7 Reflective Account of the Research Methodology

In qualitative research, the researcher is a research instrument and is expected to take an active role in the data collection and the construction of meaning (Denzin and Lincoln 2011). There is, therefore, a need to acknowledge that the researcher can influence the collection, selection, and analysis of the data. Reflexivity is the process through which the researcher becomes conscious of the biases, values, and experiences he will impose on the qualitative research study (Creswell 2007).

In this section, I present my reflections on the research journey and how I have managed to prevent the subjective views arising from my personal experience and professional positioning from affecting the research.

Firstly, reflecting on my background as a researcher, I have both professional and academic experience in the field of automotive and service operations management: I have carried out nearly all the job roles available within the dealer operations, starting from technical jobs such as using wrenches on cars to management roles.

My role while conducting the research fieldwork was with the regional office of a leading multinational automotive manufacturer operating in the Middle East. In this role, I had full responsibility for aftersales service operations on a regional level and was responsible for managing all aspects of the aftersales service operation for multiple countries. This experience helped me to gain a practical understanding of aftersales operations, as well as to recognize the challenges and opportunities involved in directing a successful and well operating aftersales operation.

Academically, my immersion in the different areas of the literature and research helped me to develop a sound understanding and familiarity with the development and limitations of the various fields relevant to aftersales service operations. I became knowledgeable enough to develop

my analysis of the current state of play and my insights into some of the challenges it faced. I, therefore, acknowledge that my current role and experience in the field have subjected me to the risk of being influenced by my suppositions, assumptions, and understandings of aftersales operations. Hence, bringing my own experience and knowledge to the interpretation and analysis of data. Furthermore, due to my experience, I was considered to be 'the subject expert' in my organization when it came to the aftersales operation, which constituted a further challenge as many of the participants could have the perception that the questions are intended to evaluate their level of experience and business knowledge.

To mitigate this risk, I set myself several rules to follow in conducting the interviews: I should (1) make sure I did not impose my views on either the collection or analysis of the data; (2) maintain a neutral role and never project my views on participant's responses during the interviewing process; (3) allow responses to flow freely and without interruption, unless there was a need to probe points which were interesting or unclear; (4) maintain an agnostic position, with the focus on collecting data rather than passing judgment; (5) maintain a friendly attitude and make it clear to interviewees that their observations would be used for analysis and that no attempt would be made to evaluate them.

After every interview, I made sure to spend some time to note my reflections and feelings about how the interview was conducted as well as any findings that were based on my observations. I reflected on these notes as I was transcribing the interviews and listening again to my conversations with the interviewees.

During the data analysis phase, I made sure that coding and other decisions were based on the transcripts alone, without changing anything. If I did feel any doubt that my experience and understanding of aftersales operations might have influenced how I made sense of the findings, I made a note and would go back and asked the participants for clarification if possible.

Finally, it is important to acknowledge that being part of the management team in the organization facilitated access for me. Having professional and robust working relationships within the organization allowed me to get access to the people and information needed. I, therefore, made sure that it was clear to all participants that whatever they chose to share would be used only within the context of academic research, and assured them that everything they said would remain completely confidential and that no reference would be made to their professional or personal identity (see also next section).

3.8 Ethical Considerations

In this research, the following ethical considerations were addressed throughout the different phases of the study:

- Before the interviews, participants were provided with a research brief which explained the purpose and objectives of the research and outlined their role in the study;
- In order to gain access, the research was discussed with both the Managing Director and the Service Director of the company, who were given full details of the research objectives, expectations, and anticipated outcomes;
- Participation in the study was voluntary, and no pressure was used in any way to force interviewees to take part in the study. The objectives, expectations and anticipated outcomes of the research were discussed with the participants beforehand, and the process started only after they had agreed to participate;
- Any sensitive information shared during the interviews was used very carefully;
- The research findings were reported without falsification, misrepresentation, fabrication, or bias, and none of the evidence was suppressed. The analysis was conducted rigorously, the

outcomes were shared with the participants, and a peer review was conducted to validate the outcomes.

3.9 Conclusion

This chapter presents the decisions and choices made regarding the research design and the methods used for data collection and analysis. It starts by introducing the philosophical views available for conducting research and a rationale for pragmatism as the underpinning philosophy. It then outlines the choice of the qualitative and quantitative approaches in the research in a mixed-methods approach and how this provides a basis for answering the various research questions by developing a more comprehensive picture of the servitization phenomenon. The research used a case study design, or more specifically, an exploratory multiple-case study design, to address the research questions for chapters 4 and 5. The data for Chapters 4 and 5 were collected through semi-structured interviews. The data were analysed using the thematic analysis technique. Chapter 6 was based on secondary data from a survey and was analysed by the use of statistical techniques. The final sections of the chapter present the researcher's reflexivity as well as reviewing ethical considerations.

CHAPTER FOUR – DECISION CATEGORIES FOR SUCCESSFUL SERVITIZATION IN THE AUTOMOTIVE INDUSTRY

4.1 Introduction

The objective of this chapter is to investigate the operational decision categories confronting automotive manufacturers.

- **The first research objective** is to develop a framework of the fundamental decision categories which confront automotive manufacturers in configuring aftersales service operations within their dealer network.
- **The first research question is:** What are the operational decision categories that need to be considered by automotive manufacturers to configure a successful aftersales service operation within their dealer network?

The chapter achieves the research objectives and answers the research question by starting first with a review on the various servitization frameworks proposed in the literature along with a review of the service literature, this is followed by presenting the methodology adapted, data analysis, and followed by presenting the research proposed service-focused servitization framework. The chapter is then concluded by presenting a summary of the research, together with a discussion of its contribution and limitations.

4.2 Structuring the Service-Focused Servitization Framework

The objective of this section is to present the theoretical foundation utilised to build the research framework. An indication of the decision categories available can be provided by reviewing existing classification systems for manufacturing and services, which describe several systems with little suggestion that anyone is particularly rigorous and complete (Baines, Lightfoot

et al. 2009). The frameworks available are mostly targeted at particular aspects of production operations and at identifying their associated characteristics, and there is a limited number of frameworks that focus on services.

The development of a service-focused servitization framework will require a blend of service and manufacturing frameworks. This first section presents categorisations for manufacturing operations and our chosen research framework. The second section presented the classification of service operations and suggested service decision categories. Two knowledge gaps are identified in the manufacturing and service literature, which this research attempts to fill in the first two sections. Thirdly, a framework is presented which blends both manufacturing and service operations categories, and this is then used as a theoretical foundation and as a research guide for the fieldwork.

4.2.1 The Categorisation of Manufacturing Operations Frameworks

There are several classification systems for manufacturing in the literature, and these are, for the most part, broken down into structural and infrastructural categories. The literature is vast, and it focuses mainly on manufacturing frameworks building on the work of Hayes and Wheelwright (1984). The two central ideas in the framework are firstly the priorities of the competitive strategy and the categories of the decisions made on the basis of the manufacturing strategy, and secondly that the success of the manufacturing strategy depends on these areas (Hayes and Wheelwright 1984). Although the Hayes and Wheelwright framework was developed in 1984, it is still used in the research (Boyer and Lewis 2002). There is general agreement that the effectiveness of an operations strategy is determined by the degree of consistency between stated competitive priorities and corresponding decisions regarding operational structure and infrastructure (Leong, Snyder et al. 1990).

The manufacturing operations literature shows a high degree of agreement on cost, quality, and flexibility as the critical competitive priorities (Dangayach and Deshmukh 2001). There is some debate about additional elements of competing priorities for manufacturing frameworks, as some have proposed service-related variables to more fully reflect the competitive environment (Giffi, Roth et al. 1990; Miller and Roth 1994; Frohlich and Dixon 2001). Nevertheless, manufacturing-oriented frameworks lack the considerations of customer relationships that are present in service frameworks.

Competitive priorities represent the capabilities that the single function can develop to achieve a competitive advantage in the market; decision categories represent a group of decisions that are made to complete a single task. Competitive priorities and decision categories have both been thoroughly studied in the manufacturing context.

The essence of an operations strategy could be characterised as a consistent pattern of decisions affecting the ability to meet long-term objectives and market requirements and to complete the manufacturing task. The decision categories included in the operations strategy differ somewhat between authors, generally ranging between six and ten (Rudberg and Olhager 2003). These decisions are usually divided into structural and infrastructural categories, as proposed by (Hayes and Wheelwright 1984).

This discussion builds on and extends the work of Baines, Lightfoot et al. (2009), that proposed the “framework for production, product-centric servitized and service operations,” as this offers a valuable starting point for the current research. Their work blends elements from the production operations management and the service operations management literature. To develop the theoretical framework, Baines, Lightfoot et al. (2009) conducted an in-depth case study to help manufacturing firms configure their internal production and support operations in a way that should enable the effective and efficient delivery of products and the closely associated service

operations. Table 4.1 presents the framework categories and characteristics of each. The framework proposes 12 primary categories, divided between the structural and infrastructural areas:

- **Structural Decision Area:** process and technology, capacity, facilities, supply chain positioning, planning and control;

Infrastructural Decision Area: human resources, quality control, product/service range, new product/service introduction, performance measures, supplier relations, customer relations.

Although the framework is intended to capture categories for both product-centric servitized and service operations, it has limitations that it is biased towards manufacturing/production rather than service operations. The review of the literature presented the first knowledge gap in existing frameworks related to servitization:

Knowledge Gap 1: Available frameworks for the delivery of product-centric servitization are mainly manufacturing production-oriented frameworks, which lack the consideration of customer relationships that are present in other service operations frameworks.

Table 4.1 The Characteristics of the Decision Categories in the Framework for Production, Product-Centric Servitized, and Service Operations

Characteristics of operations:	Product-centric servitized operations
<i>Structural</i>	
Process and technology	Tend to exploit a range of technologies, throughout operations, to achieve efficiency in production and effectiveness in service delivery
Capacity	Tend to experience varying demand signals at multiple customer “touch points” and so need to operate with differing levels of capacity utilisation
Facilities	Tend to combine both centralised manufactures, but mainly focusing on product final assembly and test, along with multiple field facilities for maintenance and repair located close to market
Supply chain positioning	Tend to retain vertical integration in product manufacture and a range of closely integrated partners to deliver services
<i>Infrastructural</i>	
Planning and control	Tend to focus on the optimisation of product availability
Human resources	Tend to need workers with high levels of product knowledge and relationship development capability
Quality control	Tend to use product assurance methods combined with customer satisfaction assessments
Product/service range	Tend have limited range combined with “bundles” of supporting services
New product/service introduction	Tend to used centralised capabilities for product design, taking particular account of maintenance and repair and that complement services co-created with the customer
Performance measurement	Tend to use product availability, response time and customer satisfaction
Supplier relations	Tend to integrate internal and external supply chains into the delivery process to achieve cost-effective flexibility in supply
Customer relations	Tend to have a strong interaction with customers through relationships based on product availability and performance

To fill this gap, the service literature was researched to identify service categories that can be combined with and to enrich the framework. These categories were evaluated in terms of how they might apply to the automotive industry. The classifications considered are those proposed by (Chase and Tansik 1983; Lovelock 1983; Schmenner 1986; Cunningham, Young et al. 2004; Chase 2010; Salegna and Fazel 2013). The main dimensions were evaluated in terms of how they might apply to the provision of services in the automotive industry. The next section discusses

existing service frameworks and the associated literature related to service research and service classification.

4.3.2 The Categorisation of Service Operations Frameworks

This section aims to identify the characteristics of different categories of service operations, and the first step was to review existing classifications in the literature and apply them to the automotive business. However, it was found that most classifications of automotive aftersales service in the literature referred to it as auto repair and positions it as medium/moderate in terms of customer contact, this does not provide a holistic picture of aftersales service operations, but focuses mostly on the repair side of the operations, and thus does not reflect the complete service experience. The second knowledge gap found in the literature is thus:

Knowledge Gap 2: there is a lack of service classification schemes that can capture the nature of aftersales service in the automotive industry.

To fill this gap, a dedicated automotive aftersales service classification scheme will be proposed. The purpose of such classification is to facilitate analysis of service decision categories rather than developing a new typology of services. The following section will present the research on services, classifications of services, and their applicability to automotive service. The research proposed a service classification scheme, and finally, our proposed service decision categories.

4.3.2.1 Service Research

The academic literature on services comprises work by scholars from a wide range of backgrounds and disciplines, including marketing, economics, sociology, industrial engineering, information systems, and operations management. This has resulted in a wide range of perspectives being brought to bear, and there are consequently a large number of often diverse theories (Cook, Goh et al. 1999; Maglio, Kieliszewski et al. 2010; Spohrer and Maglio 2010). This inherent

diversity means that the subject stretches beyond the bounds of any single discipline (Maglio, Kieliszewski et al. 2010).

Nevertheless, attempts have been made to create a ‘unified theory’ which draws on different disciplines and to find commonalities between the domains to establish a service science. Examples of such attempts are the service-dominant logic (Vargo and Lusch 2004; Vargo, Lusch et al. 2010), the unified theory of service (Sampson and Froehle 2006), and the service system (Spohrer and Maglio 2010). Other scholars such as Chase (2010) argue that such attempts will not add value since it is not possible to combine all the different categories of business activity in one classification and see them as ‘services’ to create a theory; nor would such an approach be of much value to practicing managers (Chase 2010).

There has been an ongoing debate among scholars about how a service can be defined, and Cook, Goh et al. (1999) argue that no single definition of service is capable of encompassing the full diversity of services and the complex attributes that accompany them. The concept of service is very comprehensive and diverse.

Researchers in the area of service seem to focus on either customer, from a marketing perspective, or on providers, from an operations perspective. This can be attributed to the way that academic institutions are structured into disciplines and sub-disciplines (or areas of study). Although often addressing similar matters, each discipline or department usually has a particular set of interests, paradigms, and methodologies.

The modern meaning of service is value-co-creation that involves both products and services. Value is co-created through the service encounter. The service encounter is the face-to-face interaction between a service provider’s frontline personnel and a customer. The service encounter in the broader context of supplier-customer interaction includes customers interacting among themselves (customer-to-customer, or C2C) during service delivery, interaction with the

‘service scape,’ and its physical objects, and interaction with the overall service system. The service system further includes internal encounters between frontline and back-office staff and management, as well as encounters with society in general and its infrastructure, and with competitors in the market.

In its broadest sense, a service system is considered to be a configuration of resources, including both structural and infrastructural elements. This configuration is designed to deliver a value proposition. According to service science, a service system could be a useful starting point for research, and this seems to be a current trend.

4.3.2.2 The Classification of Services

Classification schemes are developed to structure and establish order in a research area, to find commonalities between distinct but similar phenomena, and to support research development (Cook, Goh et al. 1999). Despite a common understanding of service management and marketing, there is little consensus on how to classify services (Baida, Akkermans et al. 2005). The service classification schemes developed by early researchers were built on the assumption that services are fundamentally different from physical goods. Due to the diversity of services, it is difficult to find one general principle underlying operations management and marketing practices in service organizations, and so the way around this problem is to classify services along suitable dimensions as a basis for offering practical managerial guidelines (Chase and Apte 2007).

Classifications have been investigated as a phenomenon in their own right. In their work, Becker, Böttcher et al. (2011) analysed academic work from the period 1923 to 2011, finding a total of 81 instances of classification. They argue that four types of classification can be found:

- 1) Enumerative classifications: these are usually established by standardization bodies to enable automatic service trade; like enumerative definitions, such classifications are inherently never complete and must be adapted for new service types;
- 2) One-dimensional classifications: these focus on a distinctive characteristic of the service and position it on a continuum; one-dimensional classifications are not powerful enough to differentiate service types;
- 3) Two- dimensional classifications: this positions a service in a matrix of two dimensions; using a two-dimensional classification is seen as a good compromise between comprehensibility and expressiveness;
- 4) Multi-dimensional classifications: very few such classifications exist.

A system of classification can also be established on the basis of the purpose for which it is to be used, as they usually focus on one or more specific application areas; in the current context, a significant number of classifications focus on the competitive and marketing strategies recommended (Becker, Böttcher et al. 2011).

Various attempts at the **classification of services** have been made by researchers in the fields of both marketing and operations, but the heterogeneity of the service sector means that it is not possible to develop one universal approach. Several different classifications of services have thus been established in academic literature (Becker, Böttcher et al. 2011). Service classification is a valid approach toward handling the heterogeneity of services by limiting the scope on more specific sub-areas.

To be useful, a classification system should (1) have features that enable service engineers to design interactions with the same accuracy as industrial engineers design physical processes, (2) guide managers in deciding on economic trade-offs, and (3) facilitate service innovation (Chase

2010). The following section will present some of the main classification systems and their application to automotive service organisations.

In his seminal work, (Lovelock 1983) proposed five schemes for classifying services from a perspective that transcends narrow industry boundaries and which is different in degree and kind from the categorisations applied to manufactured goods. The five classification schemes were proposed on the basis of how they affect the way marketing and management strategies are developed and implemented:

- 1) the nature of service act,
- 2) the relationship between the service organization and the customers,
- 3) the degree of service customization and judgment on the part of the service provider,
- 4) the nature of the demand and supply for the service,
- 5) the service deliverer.

As argued by Lovelock (1983), these five factors can assist marketing managers in gaining a better understanding of the nature of their products, the type of relationship between their service organisation and its customers, the reasons for demand fluctuations, and of the characteristics of their service delivery systems. Having such an understanding firstly assists managers in identifying the marketing problems and opportunities which affect the nature of the marketing task. Secondly, when marketing managers understand the characteristics which their service shares with other services, they can look beyond their competitors and learn how to resolve their problems.

The 'customer contact model' proposed by Chase (1978), is one of the most widely cited theoretical constructs in service operations research. This model places customer contact with the service system along a continuum from high to low, and it proposes that the efficiency of a service system is a function of the degree of customer contact, i.e., that the higher the customer contact,

the lower the system will operate efficiently due to the customer involvement. This framework also places the service organisation on a continuum from 'pure services', which is characterised as being high in contact, through 'mixed services' characterised as involving medium contact, to 'quasi-manufacturing', characterised as being low in contact.

The two-dimensional classification proposed by Schmenner (1986), characterized service as being either 'high' or 'low' in terms of client interaction and customisation. He proposed a service matrix that defined the degree of customer interaction and customisation on one axis and the degree of labour intensity on the other. This classification has a more significant emphasis on the production of service than the customer contact model (Johansson and Olhager 2006).

In their work, Cunningham, Young et al. (2004) examined how US and French customers perceived and classified a set of 13 services based on a multidimensional scale. The results suggest that two underlying dimensions can explain between 78 and 83 percent of the total variance. The first of these is personalisation versus standardisation, which relates to the level of customer contact, while the second has to do with the presence of physical products as part of the service, indicating how far the service is physical.

The products offered by a service organization can be tangible or intangible services. In their work, Becker, Böttcher et al. (2011) propose a 'service classification matrix' model that applies to the classification of service for all service providers, as it is not limited to cases in which the primary product is intangible. This model to a large extent is an integration of the dimensions used in the classification schemes of Chase and Aquilano (1989) and Schmenner (1986), and in addition to the service dimension of product-mix, explicitly incorporates the degree of tangibility/intangibility of the product offering (Cunningham, Young et al. 2004).

The application of service classifications to automotive service organizations requires an understanding of the customer service process to be investigated. In simple terms, the customer

goes through three processes, the first and third of which are to initiate and then terminate the service transaction by delivering the vehicle and then picking it up again, without his physical presence being required in the other process. When the customer drops the vehicle off for service, the first interaction with the service organization takes place, and the customer can then leave the service facility or stay until the service is completed. However, whichever option is chosen, the customer does not influence what happens, and what happens is an internal interaction between the front and back-offices of the service organization. Once the service is completed, the customer again interacts with the service organization as he picks up the vehicle.

The customer's vehicle is a tangible asset, and so following Lovelock's classification, the service performed is a service directed at goods and other physical possessions. The customer can also deliver the vehicle by other means, such as recovery/towing, but this does not eliminate the influence of the customer on the service required: while it might eliminate the need for his physical presence, the input from the customer is necessary to initiate the service, and interaction with a member of service personnel is essential to communicate the required service. Such situations are rare; however, the normal practice is for the customer to have a face-to-face interaction with the service personnel in the service facility.

The relationship between the service organization and the customer can be seen as a 'membership' relationship that involves repeated delivery of service, as the customer will always need to service the vehicle. In the Middle East, automotive dealers have a monopoly on the brand, and the warranty is voided if customers do not service their vehicles at the dealers, which creates a switching barrier for customers during the warranty period.

Having a member relationship with the customer allows the organization to know its customers and what they require. Service organizations have customer records and information, and these can be analysed so that customers can be targeted with offers or additional services.

Automotive service can be classified as 'low' in terms of the extent to which the service delivered can be customized. Customers interact with their service organization mainly for regular maintenance or any repairs required, which they either pay for or which are done under warranty, and neither of which allows a high level of customisation. However, organisations with a high level of service do try to customise service delivery by offering customers exclusive deals such as a set of accessories for their vehicle.

Service can be analysed in terms of what an automotive service organization has to supply to meet demand. Two main factors need to be considered, the first of which is workshop capacity, or what Lovelock (1983) calls 'productive capacity', which is the availability of the time required to perform a service. Service capacity is calculated mainly on the basis of the hours available to sell, which is a factor of the number of technicians and available working hours. The second is the demand fluctuation, which can be predicted to some extent, as it varies according to the time of day and the day of the week. Service organizations whose working hours are convenient for customers, attract more customers. The underlying cause of fluctuations can be attributed to the fact that customer behaviour varies between weekends, working days, and school vacations. Automotive service organisations use different strategies to smooth such fluctuations by using appointment systems to encourage customers to utilize the available capacity. According to Lovelock (1983), the appointment system "inventories demand rather than supply". This strategy of inventorying demand is feasible because the service is performed on tangible assets. Hence the extent of demand fluctuation over time can be classified as 'wide', with peak demand usually met without a significant delay.

Service organisation delivers services through one or multiple outlets. All service organisations in the Middle East have more than one outlet for the convenience of customers, as direct contact between the customer and the service organisation is mandatory. The main point to

be made about customer contact is that the presence of the customer affects virtually every operating decision of the service firm. Automotive service was classified along the continuum of customer contact proposed by Chase (1978) under 'mixed services', which typically involve medium contact. However, it is important to distinguish between the three phases of the cycle: at the start and end of the process, customer involvement is crucial and can be classified as high contact, while in the middle process or the 'manufacturing phase', there is no contact.

What is noticed is that automotive aftersales service refers to auto repair and position as medium/moderate in terms of customer contact, which does not consider the full aftersales service operations. Chase (2010) proposed that there are seven factors in high contact interaction which affect design decisions:

- **Facility Location:** in high contact settings, operations are typically closer to the customer than in low contact. In automotive service organizations, the location can make a big difference: having a service facility that is far from customers might prevent them from coming to the service facility. Many service organizations adopt a policy of having one main facility which can perform all the types of work as well as what is called 'satellite/small locations' that offer primary services such as preventative maintenance and ordinary repairs. Such facilities are conveniently located for the customer;
- **Facility Layout:** In high contact operations, the layout needs to accommodate the customer's physical and psychological needs. The fact that customers will visit a service facility means that it needs to be of a certain standard and to emphasise brand identity;
- **Worker Skills:** High contact workers have an important role and must be able to interact with customers. This is crucial at the beginning and end of the process;

- **Quality Control:** A well-defined and executed process provides the required service level to the customers;
- **Capacity Planning:** A peak in demand will be encountered in high contact systems. Service organisations should, therefore, use appointment systems to smooth demand and distribute it across the available capacity;
- **Product Design:** High contact operations must include the environment of the service and hence has fewer attributes than low contact operations;
- **Process Design:** In high contact operations, the process is most valuable, as it has a significant effect on the customer, while in low contact systems, where the customer does not participate or get involved, the process has little effect.

4.3.2.3 A Classification Scheme for the Automotive Industry

From the literature review presented above, it can be argued that available classifications are outdated and do not offer a holistic picture of aftersales service operations but focuses only on the repair side of the operations rather than the whole service experience.

This study, therefore, proposes a two-dimensional dedicated automotive aftersales service classification scheme, as the use of only one dimension is insufficient for the automotive service to be positioned in a matrix. A two-dimension classification scheme is therefore proposed, which focuses on both customer contact and the operation process.

It is observed that using customer contact and the intensity of the process, as dimensions are sufficient to classify automotive services. In the literature, most previous classifications of automotive services are referred to auto repair and classify services as a medium to moderate in terms of customer contact. It is also found that little importance was given to the process as a dimension of classification.

What is more, the dimensions proposed here are entirely in line with servitization as a strategy for gaining a competitive advantage. First of all, a high level of customer interaction is likely to generate customer satisfaction. Secondly, the high level of the operation process within the service department is manifested in service quality, both of which are critical competitive priorities.

The proposed classification scheme poses customer interaction as high, thus allowing service personnel to co-create value (see Figure 4.1) and highlighting the importance of service encounter personnel and their leading role in creating the customer experience. This depends on a coherent service process that is in place to ensure the required outcome. In product-focused organisations such as manufacturing, the emphasis is on *what* the customer buys, while in a process-focused business, the emphasis is on *how* the customer buys, which is the way the service is delivered (Silvestro, Fitzgerald et al. 1992). The proposed classification axes are presented below:

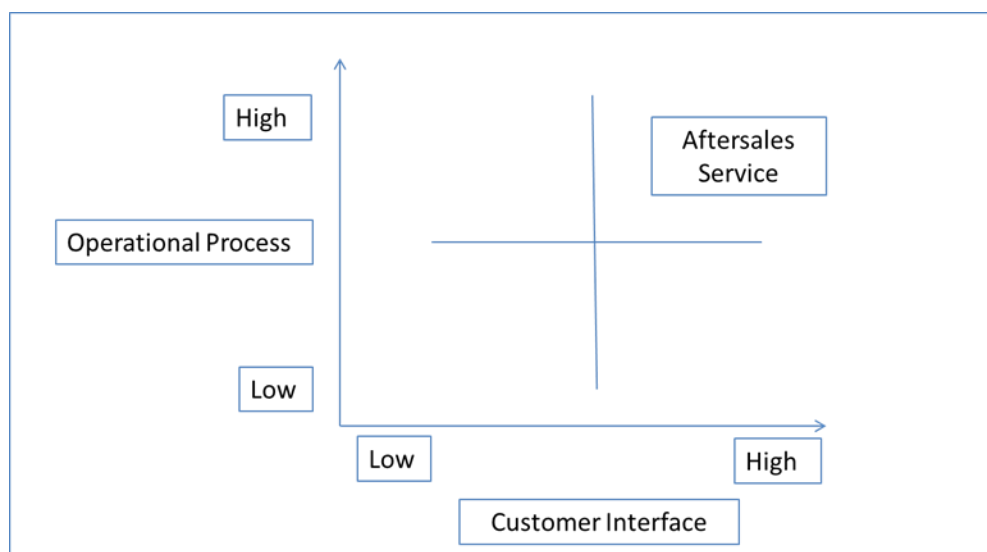


Figure 4.1 Automotive Service Classification Scheme

The **X-Axis** shows characteristics of the customer interface, describing the interaction between service providers and consumers;

The **Y-Axis** shows attributes of the service operations process, i.e., the process of connecting the front and the back office and directed them towards serving the customer. This process represents the provider's viewpoint. Customers usually do not notice these characteristics, but do see the outcome.

It is argued that this classification scheme would apply beyond the automotive industry. Any industry which provides aftersales services and involves customer interaction should start focusing on the level of communication with their customers and the benefits of having a close relationship with them. Organisations producing durable manufactured products such as capital equipment, durable consumer goods, trucks, heavy or light machinery, provide aftersales service to the customer, and interaction takes place regardless of whether the customer is a business-to-business (B2B) or a business-to-customer (B2C). If they wish to modify their relationship with the customer, they need to classify customer interaction as high and start building a service delivery system to provide the required customer experience.

4.3.2.4 Service Categories for the Automotive Industry

It is argued that any form of classification appropriate for an automotive service organisation needs to account for the characteristics of the customer interface with the organisation and the operational process in place. This includes the attitude and skills of the service personnel and the process followed to ensure that they meet customer expectations, as well as the design of the service facility so that it can accommodate customers and is convenient for them. It also needs to account for a process that facilitates smooth cooperation between the front and back-office staff so that what is delivered is the quality of service and the outcomes expected by the customer. These considerations suggest the following as critical decision categories for an automotive operation (see also Figure 4.2):

- 1- Capacity (to manage and control demand)
- 2- Facility (including tools, equipment, location, layout, etc.)
- 3- Employee skills
- 4- Service quality
- 5- Performance measurement matrices
- 6- Service process

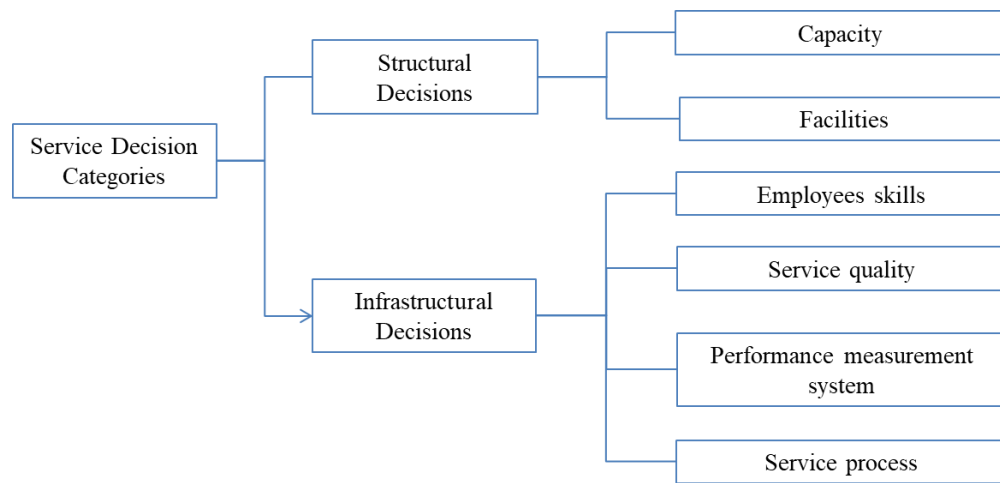


Figure 4.2 Service Decision Categories

The next step is to match these decision categories against existing research frameworks.

4.3.3 A Framework for Product-Centric Servitization

In this section, the service categories proposed above are matched with the main categories in the Baines, Lightfoot et al. (2009) model and one additional proposed category. Table 4.2 shows the proposed decision categories for the fieldwork.

Table 4.2 Fieldwork Research Decision Categories

Preliminary categorization and decision areas	propositions of Baines et al. (2009a) for a Product-centric servitized operations	Proposition from service categories	Principal categories for field work
<i>Structural</i>			
Process and technology	*		*
Capacity	*	*	*
Facilities	*	*	*
Vertical integration	*		*
Planning and control	*		*
Infrastructural			
Human resources	*	*	*
Quality control	*	*	*
Product/Service Range	*		*
New product/service introduction	*		*
Performance measurement metrics	*	*	*
Supplier relations	*		
Customer relations	*		*
Additional service operations	*		
infrastructural categories			
Service process		*	*

The 13 principal categories identified here formed the foundation for the empirical research to be undertaken and were used to build the questions guide for the interviews conducted to assess these decision areas as part of the case study investigation.

4.4 Step Three: Methodology

The following sections discuss the design of the research, including the choice of research method and the sampling, data collection, and data analysis techniques (chapter 2 detailed the analytical research choices).

4.4.1 Research Method

The research method that best fits the purpose of this research is qualitative research and takes the form of a single case study.

4.4.2 Data Collection

Case studies allow the use of a variety of data sources. For this paper, the primary source of data was semi-structured interviews. Secondary data were collected from archival sources

including, service excellence monthly performance metrics, yearly service excellence accreditation audit reports, process audit reports, training completion reports, and monthly customer viewpoint reports.

4.4.3 Interview Guide

Interviews followed an interview guide consisting of a set of broad but clearly defined open-ended questions that cover the fieldwork strategic decision categories presented in Table 3.2. The development of the interview guide did not end at the start of the first interview, but continued to be modified through use by adding probes and whole topics which had initially not been included, but had emerged spontaneously in discussions, and dropping or re-formulating questions which were incomprehensible to participants or consistently failed to elicit responses which were in any way relevant to the research question(s).

As an aid for clarifying relevant topics, a set of service definitions was devised for each of the strategic decision areas. These were based on the service literature concerning the automotive sector and formulated in the language of the industry. This was designed to be used with participants in two ways. Firstly, the definitions encapsulate the essence of the strategic category and thus facilitate the use of a common language and aid in developing codes. Secondly, the definitions were available to show any participants who required clarification. These definitions are presented in Appendix A: Interview Guide and Questions.

4.4.4 Sampling

Purposeful sampling was used to select the participants. A total of 19 interviews were conducted with 15 managers, two of whom were interviewed more than once and provided valuable support throughout the research process. The sample included both a homogeneous and a heterogeneous group. The homogeneous group was made up of 10 members of the aftersales

management team working with the same manufacturer; the heterogeneous group consisted of two consultants who worked with various service organizations both within the Middle East region and outside, two managers who had responsibility for the service operations within two separate dealers, and one manager who worked for other manufacturers and had regional responsibilities, as well as previous experience of working with dealers. Appendix B presents a list of interviews.

4.4.5 Analysis Phases

Various methods can be used for analysing qualitative data; the method chosen for the current research was thematic analysis. The analysis went through the following five phases:

Phase 1: Familiarization with the Data

The first step after every interview was to transcribe the interviews from audio recording to written text. This was followed by a validation process that involved looking for any discrepancies and editing the text.

Phase 2: Generating Initial Codes

As the theoretical foundation of the research was an existing model, a set of ‘prefigured’ codes or categories was used in the initial coding stage. However, in order not to limit the analysis to these prefigured codes, the coding process adopted an open approach, allowing additional codes to emerge during the analysis to reflect the views of participants in the traditional qualitative way.

In the initial coding phase, the transcripts of all the interviews were examined to identify the main categories of information. The 13 principal categories identified previously were considered along with any new ones; we started with 13 code, which led to a total of 26 code. The second round of coding involved reviewing the transcript of each interview. The 26 codes were reduced to 14 codes, with many ending up as sub-codes. The third round of coding reduced the number to 8, which are presented in the final model. See Appendix C for the list of codes generated

from the first and second rounds of coding, and Appendix D for samples of how the responses were attached to codes for facilities and process.

Phase 3: Searching For Themes

The first step in this phase started by collecting the potentially relevant codes together. The first 13 codes identified from the principal categories were classified under structural or infrastructural categories. After the in-depth investigation of each code and the emerging codes, it was found that some of the initial codes could be merged, while some did not seem to fit into any broader category. Two themes started to emerge from the data, resulting in the codes being grouped under two themes. The first theme was the elements of a service delivery system and was related to the operations within the dealer network. The second theme contained codes for decision areas that are under the direct control of the manufacturer, and represent the support system provided by the manufacturer to the dealer network.

Phase 4: Reviewing the Themes and Research Triangulation

Sufficient data was found to support the two themes identified, which fell into two separate but related fields. There was, therefore, no reason to merge any of the themes or to develop further themes. To validate the result, the findings and themes were shared in further meetings with two of the staff interviewed previously; their feedback was collected, and some modifications were made.

Phase 5: Defining and Naming Themes

In the previous phase, informants were consulted on some of the names allocated to the themes, and once modifications based on their feedback had been made and the data had been re-examined, the names of the themes were finalised.

4.5 Step 4: The Service-focused servitization framework

The proposed framework aims to assist automotive manufacturers operating in the Middle East to deliver effective and efficient customer-focused servitization. The framework captures the main service operation decision categories required to configure aftersales service operations within their dealer networks.

Analysis of the data revealed two spheres of decision categories that are important for successful servitization (see Figure 4.3). The first sphere is labelled as ‘Dealer Network - Service Delivery System’ and contains decision categories that are directly related to the dealer network aftersales service system. Decisions here are considered essential to the success of aftersales service operations within the dealer network. The second sphere is labelled as ‘Manufacturer - service support system’, and contains decision categories which are directly related to the manufacturer. These categories relate to the support system provided by the manufacturer.

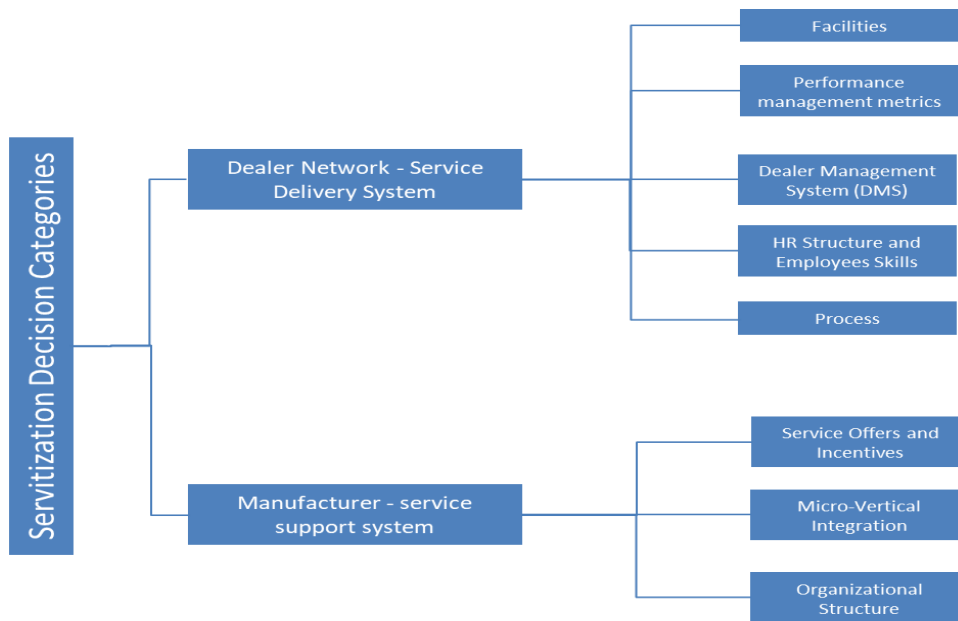


Figure 4.3 Service-Focused Servitization Framework

4.5.1 Service Delivery System Decision Categories

This first sphere has five decision categories, which are the performance management metrics, facilities, the dealer management system (DMS), employee skills, and process. Each of these will be discussed in turn.

4.5.1.1 Performance Measurement Metrics

The first category of decisions includes those which relate to how dealers should measure the performance of their operation. They assess how far the dealer can use proper data management tools to manage all aspects of the business. Various types of performance indicators are needed. The performance measurement metrics provide a basis for accountability and compensation and thus for achieving organisational objectives. There are two categories of performance measures, customer-facing measures and operations measures (workshop and parts).

Customer-facing measures assess the interface between the customer and the service operation. These measures indicate how the customer perceives the performance of the service provided; for the dealer and manufacturer, they reflect the outcome of the service provided.

Operations measures evaluate the performance of individual components in the delivery system. For the manufacturer, they show how the dealer can implement and manage the service delivery system (process performance).

Data must be transparent, meaning that it needs to be cascaded to the right people. For example, financial information should be communicated to section/departmental managers so that they can manage this aspect of their responsibilities, especially if costs are charged to their account. Staff at lower levels, such as service advisors do not need to know bottom-line figures, but only those over which they have some control.

Information flows need to be managed because if the right people are informed and empowered, they will be able to deliver and improve. If there are no metrics in place, it will be challenging to manage and improve.

All measures should be looked at in conjunction with each other, which implies taking a holistic approach when assigning the matrices and understanding cause-and-effect relationships between the measures. Measures cannot be seen in isolation but must be viewed from the perspective of what they mean in the overall context of the enterprise.

4.5.1.2 Facilities

The second decision area has to do with facilities. A manufacturer needs to promote its brand image through the facilities of the dealer network, regardless of the size or location of the facility. Specific guidelines should be in place to ensure that the brand is properly presented. The service facility for customers is the place where they go for all the services, either maintenance or repairs of their vehicles. The facility needs to demonstrate value in the eyes of the customer by presenting themselves as well-organized and competent. The facility demonstrates to the customers that the brand is capable of delivering the required service through its layout and brand image. There are many individual elements which contribute to this in any service facility:

- **External and internal appearance:** dealers need to use the manufacturer's brand color schemes and logos. External appearance is how a facility overall looks from the outside, including elements such as the brand logo, the surrounding landscape, and the entrance to the site. The internal appearance is how it seems from the inside, which again should involve the manufacturer logo's, as well as staff wearing a company uniform;
- **Parking Areas:** adequate car parking needs to be available for the convenience of customers;

- **Signage:** clear signage makes it easier for customers to find what they want, whether that is parking outside, or seeing what they want when they are in the building;
- **Reception area:** this is where the customer interacts with the service team. The service reception needs to provide a comfortable ambiance for customers, with easy access to the service team, seating areas, displays showing the company heritage, and accessories, merchandise, drinks, company values, and a children's area;
- **Workshop layout:** this is where the technicians work on the vehicles. These areas need to be designed in a way that leaves sufficient space for vehicle circulation. Safety needs to be communicated, with vehicle flows shown clearly. Proximity to the service reception area is required to facilitate the flow, and to the parts, department to reduce the time taken to deliver parts;
- **Washing area:** this is needed so that vehicles can be cleaned for the customer after the work is completed;
- **Location:** the choice of the location of a facility is strategically vital for customers; proximity to the customer makes the visit more convenient for them. Facilities that are close to customers help to create and sustain a strong relationship with customers for day-to-day operations.
- **Tools and equipment:** all service facilities need to be fully equipped with everything technicians need to perform their job, including lifts, diagnostic equipment, hand tools, and other essential items.

The delivery of service requires that services are delivered to customers where they need them; this requires service infrastructures that are close to the customer. This capability was named by (Story, Raddats et al. 2017) as “localized service delivery”. Offering services over a large geographical area possess a challenge for many manufacturers; to overcome this

challenge, they utilize intermediary that invest in service infrastructure provision and can provide the service to customers where they need them. One of the effective capabilities that intermediaries should have to maintain their position in the value network is their ability to have the adequate service infrastructure facilities that provide the required service to customers in the right place (Story, Raddats et al. 2017).

4.5.1.3 The Dealer Management System (DMS)

The third decision area is the dealer management system. Manufacturers traditionally use systems such as Manufacturing Resource Planning (MRP II) and Enterprise Resource Planning (ERP); such systems are tools for the effective planning of all the resources of a manufacturing company. They can provide improved design control, better quality control, better control of inventory, improved scheduling, and so on. Almost every MRP II system is modular in construction. For example, it may include modules such as Master Production Schedule (MPS), Item master data (for technical data), Bill Of Materials (BOM) (for technical data), Production resources data (technical manufacturing data), Inventories and orders (inventory control), Purchasing management, Material Requirements Planning (MRP), Shop Floor Control (SFC), Capacity Planning or Capacity Requirements Planning (CP/CRP), Standard costing (cost control), as well as Actual or First In First Out (FIFO) costing, Weighted Average costing and Cost reporting/management.

The dealer network, on the other hand, is not involved in the production process, so the manufacturer and the dealer use separate systems with separate functions. Manufacturers find it extremely difficult to integrate their system with that of the dealers. Manufacturers need to make sure that dealers have an adequate operating system. In some countries, manufacturers use system developers to create a system for their dealers and require dealers to use it. BMW, for example,

has a tie-up with the Autoline Dealer Management System provider and work together to develop dealer operating modules. This collaboration enhances the integration between the manufacturer's operating systems and the dealer systems.

A dealer management system (DMS) should ensure that the critical requirements of each department within a dealer are met. The DMS is also modular in construction, but the focus of each model is different from those for manufacturing.

The aftersales module should assist in maximizing the efficiency of the operation by offering real-time visibility and analysis of performance across all areas. Parts modules should improve stocking and reordering by using structured order processes. The service reception module should facilitate the provision of excellent service to every customer, and the marketing module should allow the development and monitoring of marketing campaigns. The critical functions that should be available in an automotive DMS include:

- streamlining and connecting all departments (after sales, marketing, finance, IT, administration, management, sales);
- supporting communication with customers (i.e., generating service reminders, communicating new service offers);
- tracking progress through to completion and continuously monitoring the success of all marketing activities;
- managing workshop staff, allowing workshop capacity planning and enhancing workshop utilization;
- providing real-time vehicle repair progress reports;
- streamlining service department operations (appointments, reception, workshop, parts);
- streamline the parts department (orders, receipt of parts, sales);

- improving efficiency and reducing administration processing and overheads;
- monitoring the performance of all activities and providing real-time reporting (tracking and controlling day-to-day performance and generating comparisons and any required reports);
- analysing customer information.

4.5.1.4 HR Structure and Employee Skills

The fourth decision area in this cluster is the HR structure and employee skills. The skills required in a manufacturing organization are different from the ones needed for a service organization. Although manufacturing operations have seen an evolution in the organization and the skill set of workers, the previous direction in manufacturing was de-skilling the tasks of assembly line workers through the sub-division of labour processes by breaking work down into small repetitive tasks in a strictly defined and controlled production routine. Manufacturers have skills in design and other areas that are different from those required for a dealer network. The service operation literature emphasises the need for skilled and trained employees, as value tends to be delivered through skilled workers who have good teamwork and communication abilities, and this is especially the case in organisations offering services that are considered to involve high customer contact.

In service organisations, there is a wide range of skills and attributes which interact together and are necessary to offer a high level of customer service. Successful servitization requires appropriate HR policies, qualified management with the right management skills and abilities, and functional staff who are trained, motivated, and empowered. It is the full facade of employee and HR structure; without having the right people with the right tools and motivation in the dealer, the organization will never provide the required level of service.

The skill-sets that underpin the behaviour of the people on the frontline of service delivery is a significant factor in the success of the operation. The skills required vary across the network according to individual roles and the skills required need to be identified for each role, together with the associated behaviour. Skills and behaviour can be enhanced through training and coaching. Manufacturers need to provide the skill training required for every role. Additionally, they can provide ‘soft skills’ training to shape behaviour.

Technical knowledge related to service, maintenance, and repair is essential for dealers, and manufacturers need to provide technical training, workshop manuals, and lists of the necessary special tools. Manufacturers can work with the network to set appropriate tests and interview procedures to identify the behaviours and technical skills needed for each role. Based on a quantitative study of 155 UK manufacturers, Raddats, Burton et al. (2015) identify resource configurations enabling the delivery of services, highlighting the statistically significant contribution of developing ‘leaders and services personnel’ and ‘services methods and tools’ to the success of services.

Frontline expertise and the utilization of trained, skilled human resources is an important determinate in the success of service production and delivery; frontline expertise does not only include the technical skills but also includes customer-focused attitudes. This is considered as a key issue in the service delivery, companies need to achieve a resource fit between the customer needs and the frontline attitude, skills such as listening and communication skills are essential for the understanding of individual customer needs, strong technical skills and resources cannot cover for the lack of customer-focused attitude (Lightfoot and Gebauer 2011)

The requirement to interact with customers means that staff in the dealer network have to be aware that people have different needs in different situations. This requires them to have what can be called “cognitive awareness”, which incorporates the following skills:

- **the ability to communicate:** providing a service implies the need to be able to communicate clearly with customers; this should be done sensitively while taking into account cultural, ethnic and linguistic differences;
- **flexibility and responsiveness:** staff must be able to adapt to change, which may include changing working routines, to meet customer requirements and remain effective;
- **empathy:** Staff must be able to understand and deal with customers' feelings;
- **problem-solving:** it may sometimes be necessary for staff to improvise solutions, which may mean going beyond their routine and scope of responsibility;
- **technical knowledge:** how far these skills are required depends on the particular situation and the role, but each role needs to have the required level of technical knowledge and skills.

4.5.1.5 Process

The fifth and final decision category relates to the process, which is considered the backbone of the operation. The process is a fundamental element in any service system; it is what combines all the other elements to ensure that the flow of work appears seamless to customers.

The main difference between a manufacturing process and a service process is that the manufacturing process is pro-active while the service process is reactive. Service processes have to react to customer needs or product failure. The process needs to be designed to ensure that the highest quality of service is provided by fulfilling customer requirements.

A successful process requires trained and empowered employees to implement it. The process should be flexible enough for employees to be able to handle non-routine customer concerns up to a certain limit so that consulting a supervisor should not be the first line of defence. Employees should be empowered, trained, motivated, and capable of dealing with 75% of the

objections they get from customers. For the occasions when they cannot resolve the issue themselves, there should be a clearly defined process for passing it up to the next level of authority or management so the concern can be dealt with there. All staff should be aware of this, and it should be published and seen by everyone.

Many manufacturers now have a standard process covering the life-cycle of the customer within the service facility to ensure the efficient use of resources. Dealers now start to take such a process into account as early as the design phase of the facility. For example, some manufacturers have a standard process that requires checking every vehicle with the customer when they bring it in for service. This requires the vehicle to be lifted up on a hoist and checked in the presence of the customer. This is a break from the traditional idea of having a reception area as the place where customers meet the service team while their vehicles are parked somewhere else, towards a more interactive reception area that customers drive into so that all necessary checks are done together. However, this requires a capital investment on the part of the dealer to allocate the space needed for the reception area and provide the necessary equipment such as a hoist.

The full-service process cycle should be designed to capture all the interactions ('touchpoints') with customers in a way that builds a healthy relationship with them, providing transparency and trust, and reassuring them that their vehicles are in safe hands. It should also ensure smooth communication and a connection between front office customer-facing staff and the back office.

The overall process also includes technical repair activities. What the manufacturer must provide to their dealer networks is the technical repair process, which includes but is not limited to workshop manuals, and documents and schematics that illustrate the repair process.

The next section presents the second sphere of categories, i.e., those related to the manufacturer support system.

4.5.2 Manufacturer Support System Decision Categories

The second sphere of decision areas is that relating to the manufacturer support system. This sphere has three decision categories: service offers and incentives, micro-vertical integration, and organizational structure. These are discussed in turn.

4.5.2.1 Service Offers and Incentives

Organizations are undergoing servitization shift the focus of customer interaction from providing a transactional service for product support to a relationship-based service for product support. Transactional services for product support include maintenance and repair, product upgrading/outfitting, repair and maintenance during the warranty period, and roadside assistance in emergency cases. All dealers offer these services as standard. The relationship-based services for product support include extended warranty contracts, maintenance service contracts, and so on.

A move from transactional services to relationship-based services also requires a change in pricing, from a price with mark-up for labour and parts every time a service or repair is provided to a fixed price paid in advance covering the service and repairs required at a specific time or mileage. Most relationship-based services offered are centred on service contracts and warranty offers. As it may seem narrow, it goes in conjunction with the factors mentioned under the service paradox, i.e., the fact that non-bankrupt firms are consistently characterised by greater diversification of production activities with a smaller number of service types (service breadth). The service offers (maintenance and warranty) and incentives are discussed in the following sections.

The traditional primary offer for most dealers is a fixed price for each service, which means that all parts, labour costs, and any additional miscellaneous consumables are offered in one bundle with a fixed price.

What the research found to be a necessity and is not offered by many manufacturers is offering **service contracts** that cover all the required services over a certain period for a fixed price. The usual practice is for service networks to create such offers independently and sell them to the customers, but an investigation of more than seven brands showed that there is a lack of transparency and that costs are excessively high.

What these service organizations try to offer is a service contract prepared by the aftersales department for the sales department to use when selling new vehicles. However, after analysing the contents of the several deals offered by various dealers, and discussing the contract details provided with the dealer sales personnel, it was apparent that the sales personnel were incapable of explaining exactly what is included in each contract.

This service offer is prepared by the dealer's aftersales department and is expected to cover service requirements for an extended period of up to three years. There is, therefore, a significant risk arising from any changes in the price of spare parts and labour during this period, both of which may result in higher costs, and further costs are added as sales consultants need to be incentivized to sell each contract. The aftersales department is, therefore, exposed to financial risk. Two specific cases will be discussed to illustrate how these issues can be dealt with.

- BMW is a pioneer in this field, as its service offer ultimately originates at the design stage of the vehicles. BMW has moved to what is called 'condition-based service' (CBS). This depends on an intelligent maintenance system that continually monitors oil levels and the degree of wear and tear on individual components. It also checks the time or mileage recommendations for fixed services. It analyses all this data and shows when a service is due. This feeds into a service contract that covers all requirements over an extended period at lower costs.

- Ford offers two levels of service coverage: an underlying contract that covers the necessary service requirements and a comprehensive contract that covers all aspects of all the services required during the contract period.

Offering service contracts provided by manufacturer's means that manufacturers assume the financial risk, and provide peace of mind to customers concerning future service requirements. Service contracts also reduce the variability and unpredictability of capacity utilization in the service network, as they work as a switching barrier for the customer, so the dealer network can anticipate the capacity required for servicing.

The marketing of comprehensive service contracts depends on clearly communicating the value proposition to the customer (Stremersch, Wuyts et al. 2001). This should include information that is relevant to the customer, such as the fact that the service will be carried out by certified technicians employed by an accredited dealer using original spare parts, and a clear description of what is covered with no surprises. A full-service contract will have a lower price than the sum of the costs of individual services. Additionally, it represents a commitment over a longer period, usually between three and five years.

The reputations of the manufacturer and the service organization play an important role, as the value perceived by the customer is based not only on the price but also on the quality of service performed. Customer retention figures for some dealers show that although some customers have free service contracts, they prefer to pay for the service to be carried out elsewhere because of the reputation of the service organization.

Comprehensive service contracts should be designed to cover all required services items according to the manufacturer's maintenance schedule, including all the parts and labor needed for the duration of the contract. Service contracts can be costed in many ways, but few studies have investigated this. In their work, Datta and Roy (2010) examined methods such as top-down costing,

bottom-up costing/activity-based costing, the mixed approach, target costing, analogy-based estimates, an extrapolation based on expert opinion. It is beyond the scope of this research to investigate the best pricing techniques.

What the research recommends is that manufacturers should have the service offers with more than one option, depending on customer requirements. For example, some customers may require a three-year service contract or one for five years with specific mileage coverage; for fleet owners, the period and mileage covered play an essential part in the purchasing decision.

Warranty offers are made by manufacturers on their products to reassure customers that the product will function as intended. A warranty for any manufacturer represents a financial risk. However, this risk is partially mitigated by having a warranty on the parts covered by their suppliers.

The attractiveness of warranty coverage to customers can be enhanced by extending it after the original factory warranty expires. Service organizations seek to offer this through a tie-up with third-party insurance companies; coverage is usually modest and does not extend beyond essential components. The research showed that Japanese manufacturers offer the lowest warranty coverage, while German manufacturers offer a full comprehensive bumper-to-bumper warranty.

Service contracts and extended warranty contracts supported by the manufacturer transform the value proposition for the end-user from the question of whether the product works to the efficiency and effectiveness of the product over its lifetime. Extending the service and warranty offers is a way in which manufacturing firms can leverage advantages when moving towards operations.

Manufacturers also offer **dealer incentives**. A structured set of performance-based incentives needs to be in place to ensure that the entire network is following the necessary procedures and achieving the expected results so that the customer is receiving the expected level

of service. Incentives could vary depending on the desired outcomes; for example, the achievement of a certain level of customer satisfaction or a specific penetration rate of service contracts, recall completions, or adherence to procedures.

4.5.2.2 Micro-Vertical Integration

Manufacturers tend to be focused on manufacturing the products, while service and maintenance are performed through the network, with spare parts being produced or sourced from suppliers alongside the normal channels required for production and then delivered to the dealer network.

The term ‘vertical integration refers to the extent to which a firm takes responsibility for its upstream suppliers and downstream customers; vertical integration can also be referred to as the span-of-process or supply chain position (Baines, Kay et al. 2005).

This section examines the micro-vertical integration required between the manufacturer and suppliers of parts. This is important because the manufacturer has to ensure the availability of parts for the network even for products that are no longer being produced. This requires the manufacturer to have contractual agreements with the supplier to ensure continuity of the parts supply.

The relationship with suppliers needs to be considered during the early stages of design, and the choice of a supplier should be based on their ability to provide parts over a period extending beyond the production lifecycle of a product to cover its service lifecycle. If a supplier stops the production of spare parts, the manufacturer will be forced to find another supplier. In some cases, this is not easy, in particular, because the original supplier may have ‘know-how which may not be available to other suppliers. This may require the manufacturer to redesign the part, which could result in delays and added costs.

Manufacturers also need to move towards a sophisticated logistics operation to meet the requirements of the dealer network. They need to maintain a buffer stock of parts to reduce the risk of shortages and to respond quickly to requests from the dealer network.

The relationship with the suppliers takes the form of a partnership rather than being purely transactional so that the supplier becomes part of the customer loop and focuses on providing and responding to customer requirements. Suppliers also try to reach economies of scale by supplying different manufacturers and expanding their business. An example of this is the low number of transmission producers globally: three main producers supply most of the manufacturers. Continuity of supply is crucial for the manufacturer. In 2009 the president of Ford Motor Company had to appear before the US Congress with the presidents of GM and Chrysler (who were asking for government aid) to support them in their request, and his argument was that if they went down many of the suppliers they shared would go down with them, which would affect Ford's production capacity.

4.5.2.3 Organizational Structure

The focus of the literature on servitization is on changing the internal organization structure to support business transformation and changing the business culture from product-centric to customer- or service-centric (Oliva and Kallenberg 2003; Fang, Palmatier et al. 2008; Vladimirova, Evans et al. 2011; Kowalkowski, Gebauer et al. 2017). Value is no longer delivered through the product alone but through the bundle of product and service, which requires that the language inside the organization should change (Baines, Lightfoot et al. 2009). A critical success factor for an organization intending to transition is to have a separate organisation which handles the service operations. This independent organization should assume an independent profit and loss responsibility and espouse a service culture (Oliva and Kallenberg 2003).

This requires the service organization to adopt a business model that is different from that of the manufacturer. The service business model should be based on the core business logic of how value is created, delivered, and the value is capturing mechanisms (Teece 2010). Value creation under servitization moves from being a unidirectional process as in production to the co-creation of value with the customer. The challenge is changing the mindset of employees in a production system to make them start thinking from a customer perspective (Brax 2005).

This relates not only to the service team within the manufacturer's headquarters but also to the teams in the regional offices handling the dealer network. Manufacturers need to have the proper team managing their dealer network, i.e., one which has the workforce to manage all business areas such as training, technical support, parts logistics, dealer operations, customer relations, and so on. The lacklustre performance of some manufacturers, which is a result of having a skeleton team in the region that works as a coordinator with the manufacturer's team, can be seen in their market share. Successful manufacturers in the Middle East region have invested in having the required team in place. High-performing manufacturers have established parts distribution centres in the region to support their dealers. The new initiative undertaken by successful manufacturers is to have an additional regional office in the biggest market in the Middle East, which is Saudi Arabia.

4.6 Step 5: Research Summary, Discussion and Contribution

4.6.1 Research Summary and Discussion

Servitization represents a shift for manufacturers from selling the product to selling integrated product-related services and providing customer support (Lightfoot, Baines et al. 2013). Manufacturers undergoing servitization must take into account the characteristics of the service

supplied to customers (Parasuraman, Zeithaml et al. 1985; Zeithaml 1988) and understand the differences between a service and a product. They must also have a deep understanding of their customers' requirements and expectations to create an appropriate service delivery system and a service offering, which will satisfy these requirements and expectations.

Many manufacturers depend on a dealer network for providing aftersales service to the customer. Networks are considered to be one of the most common factors which impinge on the success of the manufacturer (Chrisman, Bauerschmidt et al. 1998; Elfring and Hulsink 2003). However, a degree of control needs to be applied to the network to establish and maintain the quality provided to the customer (Goffin 1999). This requires an efficient service delivery strategy (Kumar and Kumar 2004).

The type of service provided in the automotive industry is what Saccani, Visintin et al. (2014) classify as 'product support (PS) services', which is aimed at ensuring that the product continues to work by providing product lifecycle services (PLS). To offer such a service, manufacturers should adopt the 'vertical after-sales service network' structure proposed by Gebauer, Paiola et al. (2013). In this structure, the manufacturer emerges as the focal point of the network, with actors covering the upstream and downstream activities of delivering aftersales services.

Despite the various reasons why companies pursue servitization, such as improving the sales of new products, improving their position in the market, and the substantial economic benefits which may accrue from service, there is an ongoing debate in the literature on the financial consequences of the decision to servitize. The literature suggests that many factors are at play, of which it is claimed that the lack of a proper service strategy is one that affects all aspects of servitization. The research shows that all successful companies have a clearly defined service strategy (Gebauer, Fleisch et al. 2005). A successful service strategy requires a comprehensive

understanding of the market and customer needs as a basis for offering the required service, and successful companies build a service delivery system to fit customer requirements.

When it comes to the service offering, most car makers offer transactional services for product support such as maintenance and repair, while advanced manufacturers offer relationship-based services for product support such as extended warranties, service contracts for repair, and long-term contracts for maintenance. To achieve differentiation, manufacturers need to focus on relationship-based services for customers such as payment by credit/debit card, financing schemes for product repair services, fleet management training and consultancy, support for maintenance activities and spare parts management (consultancy/training) for customers who own workshops, and web-based community services (apps, social networks, etc.).

The subject of this research is manufacturing and service operations, and this choice was based on the conclusion gained from a review of the literature that our current understanding of servitization is based on work from an operations perspective.

The research objective of this chapter derives from the central objective of the dissertation as a whole, which is to provide a basis on which automotive manufacturers can adopt a servitization strategy successfully. The specific objective of this chapter is, therefore, to develop a framework that captures the main operational decision categories involved when automotive manufacturers seek to configure their service aftersales operations within their dealer network in such a way that it results in effective and efficient customer-focused servitization. The paper has outlined some of the main strategic decision categories for manufacturers to consider for successful servitization. These strategic areas influence the performance of the service delivery system and the value presented to the customer.

This chapter, identifies two knowledge gaps:

Knowledge Gap 1: Available frameworks for the delivery of product-centric servitization are mainly manufacturing production-oriented frameworks, which lack the consideration of customer relationships that are present in other service operations frameworks.

Knowledge Gap 2: There is a lack of service classification schemes that can capture the nature of aftersales service in the automotive industry.

To fill the first gap, the identified service categories are then blended with the main categories in the Baines, Lightfoot et al. (2009) model. 13 principal categories were identified, which served as a basis for the empirical part of the research, and they were used to develop the guide questions and to assess the decision categories in the case study investigation.

To fill the second gap, a two-dimension classification scheme was proposed to capture the holistic nature of automotive aftersales service as an alternative to the traditional classification, which focuses on repairs. The scheme classifies automotive service based on the characteristics of the interface between service providers and consumers of the service operations process. This classification is used to propose the essential categories for an automotive aftersales operation.

Analysis of the data collected in a series of semi-structured interviews revealed two spheres of decision categories that are essential for successful servitization. The first sphere is ‘dealer network - service delivery system’, and includes decision categories which are directly related to the dealer network aftersales service system. These are considered essential to the success of the aftersales service operation within the dealer network. The second sphere is ‘manufacturer - service support system’, and includes decision categories which are directly related to the manufacturer. These relate to the support system provided by the manufacturer to the dealer network. See Figure 4.4 for research step schematic representation.

The left-hand part of the diagram shows how the proposed service classification scheme leads to the service-focused categories. These are then blended with the categories of the Baines,

Lightfoot et al. (2009) model, as shown in the middle to produce the proposed service-focused servitization framework on the right-hand side.

The framework thus achieves the first research objective of the paper by identifying the fundamental decision categories which will help automotive manufacturing firms configure their service operations within their dealer network as a basis for a successful service delivery system. The framework identifies not only the categories of a service delivery system but also what manufacturers need to provide to enable effective and efficient service delivery through the servitized process.

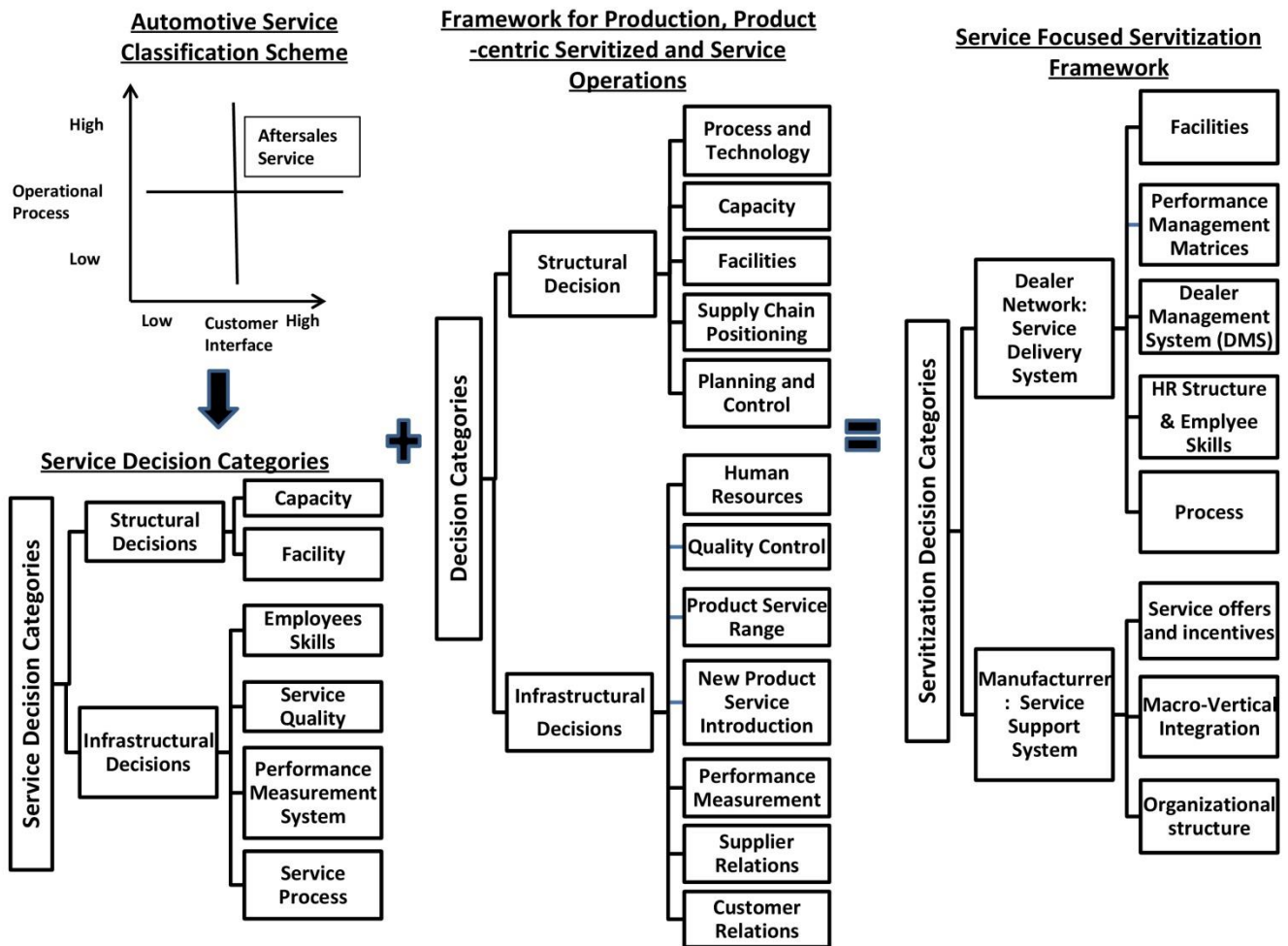


Figure 4.4 Research Steps Schematic Representation

4.6.2 Research Contribution

The following section will present the academic and practical contribution of the service focused servitization framework.

4.6.2.1 Academic Contribution of the Framework

1. the framework operationalize the framework for production, product-centric servitized and service operations' developed by Baines, Lightfoot et al. (2009)and extends the categories by integrating customer service categories, thus extending the literature on servitization by providing the “customer-centric servitized framework”;
2. the “customer-centric servitized framework” two levels of categories are considered a shift from the traditional manufacturing and service classification that classified decision categories structural and infrastructural. The framework integrated both under the “dealer network - service delivery system” level of decision categories and added the new level of “manufacturer - service support system” which is specific to service; thus adding another contribution to the servitization literature;
3. it provides an automotive-focused service classification scheme which will assist manufacturers in developing service systems that achieve strategic positioning based on the strategic priorities focusing on customer satisfaction and service quality;
4. the service classification scheme can be extended to other industries, and can serve as a platform for future academic studies;
5. it expands the knowledge base and academic literature related to service operation;
6. similar industries can use the service-focused servitization framework as a basis for designing their operations (see 4.6.2.3 below).

4.6.2.2 Practical Contribution of the Framework

1. the service-focused servitization framework presented will provide automotive manufacturers with a set of strategic categories they need to take into account for implementing servitization throughout their dealer network; it integrates elements from both manufacturing and service operations;
2. by categorising the level of customer interaction as ‘high’, the boundaries of customer interaction are expanded, and this becomes an essential element in the design of the service system;
3. the framework sets out the success factors for a successful servitization transition;
4. the research identifies some of the critical functions that should be available in an automotive dealer management system;
5. it also lists the cognitive awareness skills which the dealer staff need to build successful customer relationships.

4.6.2.3 Contribution of the Framework beyond the Automotive Industry to other Industries

The automotive industry structure is similar to many other industries. In the case of durable manufactured products such as capital equipment, durable consumer goods, trucks, machinery, light machinery, and so on, the customer purchases an asset that is put to use, and which requires aftersales servicing as it advances through its lifecycle. These products thus have costs of ownership beyond the purchase price (spare parts, maintenance, etc.). These industries have the same basic structure as the automotive industry as the manufacturers also depend on a dealer network to provide the required customer support.

It is therefore argued that the framework presented here can be extended to such industries by adapting it to take account of specific differences within each category in the type of product and the customer support required. The categories proposed in this framework form a foundation for implementing servitization successfully across these industries. It is acknowledged that some differences may be necessary for each category, but the category itself will still apply. The two spheres of categories in the framework, namely the service delivery and manufacturer support systems are essential. The following section presents a generalised version of the framework categories.

In the context of the service delivery system, it should be noted that for industries involved in the manufacture of durable products, the idea behind servitization is to deliver product-service support services to the customer. This support requires the same five service delivery system categories as those in the framework proposed here, i.e., the performance management system, facilities, the dealer management system, HR structure and employee skills, and process. These are discussed in turn.

Performance Management System

Performance management systems are essential for any organization to monitor and manage the performance of its business. The key performance indicators established within the system should account for differences in the type of product-service support provided. This research has identified two categories of performance measures, namely customer-facing and operations measures (workshop and parts). The level of customer interaction may vary from one industry to another.

For products that cannot be moved easily to the service location, the service support team may have to perform the required support onsite. In this case, customer-facing measures can

monitor response times, or how long it takes the support team to visit the customer and perform the required support, and it can monitor punctuality.

The workshop and parts operation may be different if the products and support required are known in advance, so it may be important to measure whether the service team has all the required parts and tools to complete the service from the start. Regardless of the type of service and support needed, a performance management system needs to be in place to capture the performance of the operation.

Facilities

If the service is performed on-site, the service van itself becomes the facility, and thus needs to have the external appearance and the tools required for the job. In other situations, however, the asset may need to be moved to the service facility, and customers may deliver some products such as small machinery to the service facility directly. This means that the facility should fulfil the same requirements as an automotive facility in terms of signage, layout, location, reception area, and customer parking area. The reception may vary in size depending on the requirements, as may the workshop and parts department. An automotive workshop will have a layout that is different from that of a bus or truck workshop simply because of the size of the asset. Similar considerations apply to parts - automotive parts are generally smaller than those of heavy equipment and machinery products. The difference is, therefore, not in the importance of the facility but rather in its general design.

Dealer Management System (DMS)

A dealer management system is nowadays mandatory - any organization requires an operating system that ensures that the critical requirements of each department are fulfilled. The DMS needs to streamline and connect all the dealer departments (after sales, marketing, sales, finance, IT, administration, and management).

Differences between industries will be reflected in terms of the modules and how they are customized. A manufacturer of heavy machinery may not have the same volume of customers as a small equipment business: heavy machinery firms have mainly B2B customers, while for small equipment, there is a mix of B2B and B2C. Examples of small equipment are the small power tools that many consumers have in their house to perform small jobs. These customers will interact directly with the service organization, which therefore requires the same structure as an automotive organization. In this case, the DMS will need a full customer relationship module, while in heavy machinery, each customer is traditionally allocated an individual account manager who handles all the requirements directly, and so the module customization would be different.

HR Structure and Employee Skills

Performing a service involves a human element, but the combination of skills required by employees may vary depending on the industry. For firms manufacturing heavy machinery, the primary focus will be on technical skills, even for front-facing employees, because many services are carried out on-site, which requires them to be technically qualified. In the automotive industry, however, front-facing staff needs sufficient knowledge to deal with the customer, even if that is not in-depth technical knowledge. It is the responsibility of HR to specify, select, and provide training for the skills required in each department. Manufacturers in any industry are responsible for providing the technical knowledge needed to repair or service their products, and a proper system needs to be in place to ensure that all employees are trained and qualified to perform the job.

Process

The process is the backbone of any organization; a full-service process needs to be designed and implemented to ensure the smooth operation of the organization. In the heavy machinery industry, there is a high dependency on technical repair processes, which should be

provided by the manufacturer. In the small equipment industry, technical repairs are more straightforward but are still essential. There is also more interaction with the customer in such industries, which requires that a process to deal with the customer should be in place. Generally, no matter what the industry is, a process needs to be in place to run the business.

In the context of the **manufacturer Support System**, the support provided by the manufacturer is essential to the success of the service support system within the dealer network this section covers three categories from the framework: service offers and incentives, micro-vertical integration, and organizational structure.

Service Offers and Incentives

As in the automotive industry, firms providing durable manufactured products depend on service offers. As these industries sell mainly to other businesses, they are similar to the fleet business in automotive manufacturing. Their customers are much focused on the operational efficiency of the products and demand even more complex service offers.

It is argued that the idea of service offers to cover the continuous use of a product originated in the durable manufacturing industry. These customers are compassionate towards breakdowns in their units, as anything which prevents them from using their asset costs them money, and they are committed to carrying out preventive maintenance on a timely basis and require a higher level of support if a breakdown happens. Similarly, fleet owners in transport companies also need a higher level of support.

The provision of service support by the manufacturer and designing the right service package is apparent and has become mandatory. In many situations, because of the investment value of the assets, the dealer works together with the manufacturer to design and to provide service offers. The manufacturer's support and warranty reinforced the offers. Manufacturers also incentivize their dealers to provide excellent service to their customers.

Micro-Vertical Integration

As they grow, manufacturing companies depend on many suppliers to provide them with the parts required to build their products. It is the responsibility of the manufacturer to supply dealers with the parts needed to service their customers. Regardless of the industry, if customers require a part for their asset, the manufacturer should be able to provide it.

In heavy machinery, manufacturing, or transportation industries, waiting for a part will cost money. The manufacturer works with the dealer network to make sure that they have the required part in stock to provide a first response to the customers, and supplies dealers with specific parts in response to orders they place.

Organizational Structure

Servitization requires manufacturers to adopt a business model that is different from that of traditional manufacturing; any manufacturer that decides to offer product-related services should have a separate service organization to provide the required support to the dealer network.

The business structure of the automotive industry in the Middle East is very similar to that of other industries, such as durable manufactured products. There is usually one dealer in each country that provides sales and service to the customers. Monopolies exist in various industries: even in food chains such as McDonald's and Pizza Hut, one company owns the franchise and then opens several branches, and this structure is unlike that in North America or Europe.

Many manufacturers have a representative office in the Middle East, following the same structure and support as the automotive industry. The structure and support can be simple, ranging from a skeleton office that works as a leasing office between the dealer network and head office to a fully-fledged office providing all the sales, marketing, and aftersales support required by the dealer network.

In view of these points, it is argued that the framework presented in this paper can be utilized in a variety of industries by accommodating the industry-specific factors and the differences in the product application. From an academic perspective, this framework can be seen as a starting point for further research on servitization.

4.7 Conclusion

Servitization is widely recognized as the way manufacturers adapt when they move from selling products to an integrated product-service approach. Such a move requires manufacturers to change their strategy and to abandon the traditional decoupling of products from service. Manufacturers often rely on networks for service operations, however, so they have to address the challenges of managing and orchestrating the network approach.

This paper presents the “Service-focused servitization framework,” which establishes the main strategic decision categories that automotive manufacturers need to configure their aftersales service operations within their dealer network, intending to deliver effective and efficient customer-focused servitization. The categories of the framework are based on an analysis and synthesis of the broader literature, supplemented with empirical data collected via an exploratory case study. It is also argued that this framework can be applied across different industries.

CHAPTER FIVE: BUSINESS PERFORMANCE MEASUREMENT SYSTEM FOR MANAGING THE AUTOMOTIVE AFTERSALES SERVICE DEALER NETWORK

5.1 Introduction

The objective of this chapter is to investigate how can automotive manufacturers measure the performance of the aftersales service operation within their dealer network.

- **The second research objective** is to develop an advantageous aftersales service performance management framework that can assist manufacturers in measuring the performance of key aspects of the aftersales service operation within their dealer network.
- **The second research question is:** what are the components of the a performance measurmnet managmnet system to meaasure the perfomance of the aftersales service operation within the OEM dealer network.

The chapter achieves the research objectives and answers the research question by starting first with a review on the aftersales framework proposed by (Gaiardelli, Saccani et al. 2006), and uses this as a theoretical platform to develop and expand incorporated findings from Chapter 4. This provided the theoretical foundation for the empirical study, and served as a basis for developing the interview guide questions used in the case study investigation and the fieldwork. This is followed by presenting the critical decisions and choices made regarding the research method, data collection, sampling, and analysis, then the framework is populated, drawing on existing literature and data from the case study data. The framework and its associated metrics are explained; the section also explains each KPI and how it is calculated. The final section presents a summary of the research and highlights the academic and practical contributions.

5.4 Aftersales Performance Measurement Systems

Literature Status

The literature on performance management systems is quite extensive. However, the frameworks suggested in the literature are in themselves insufficient to provide a complete and detailed assessment model of the integrated services delivery system in a product-centric servitization context, and of how a manufacturer can measure the performance of the service delivery system, either within their own service network or through their dealers. Little attention has been paid to their application to aftersales service (Gaiardelli, Saccani et al. 2006; Saccani, Songini et al. 2006; Cavalieri, Gaiardelli et al. 2007). The literature does assist in defining how to capture and measure the main performance dimensions relevant to aftersales services by specifying the levels which can be applied to evaluate them (Gaiardelli, Saccani et al. 2006). A knowledge gap therefore exists, namely:

Knowledge Gap: lack of a holistic aftersales service performance measurement frameworks, with those that are available being biased towards the supply chain and logistics.

To fill this gap, the current research attempts to develop a performance management system that offers such a holistic view of the aftersales area and is not biased towards any one aspect of the system.

5.4.1 A Framework for Aftersales Performance Measurement

The original framework that the research builds on is the “aftersales performance management framework” proposed by (Gaiardelli, Saccani et al. 2006), This framework is one of the few which focuses on aftersales, and was built on the basis of our case studies, two of which were conducted in multinational automotive manufacturers’ context.

In their work, Gaiardelli, Sacconi et al. (2006) propose an integrated reference framework for aftersales service, which integrates some features from other models in the literature (Lynch and Cross 1991; Kaplan and Norton 1992; Council 2003). The framework has four levels: (1) the business area, (2) the process level, (3) the activity and organizational unit level, and (4) the development and innovation level.

This multi-layered performance measurement framework aims to link the strategies of each different actor involved in after-sales service with performance attributes, levels, and indicators, both in the short-term and the long-term, as well as their effectiveness (in the performance areas on the left-hand side of the framework) or efficiency (on the right-hand side). The four levels are related, in that the performance of the lower level and areas influences the results of the upper levels:

Business Levels: these mainly comprise indicators of overall aftersales financial performance, such as operating profit, ROA, and ROI. Financial results are dependent on two factors, namely the market results which affect revenue (market share, market penetration, etc.), and the efficient use of resources (costs);

Process Level: this relates to the link between the business's strategic objectives and the specific activities carried out. It, therefore, focuses on measuring the process dimension. According to Lynch and Cross (); (Lynch and Cross 1991), process performance can be measured by customer satisfaction, flexibility, and productivity;

Activity Level: these are the measures that are focused on the short term, and concern the performance of the aftersales unit, distinguishing between front-office activities, that have a direct impact on customer satisfaction, and back-office ones, which are responsible for the efficiency and lead times. Five performance dimensions are considered at the activity level: reliability,

responsiveness, internal lead times (which are mainly measured by non-financial indicators), waste, costs, and asset utilization (which are mostly evaluated through financial indicators). Reliability and responsiveness are evaluated in the case of front-office activities, while internal lead times, waste, costs, and asset utilisation are seen as related to back-office activities. The dimensions are explained below:

- Reliability refers to performance in delivering the right product/service to the right place, at the right time, in the right condition and packaging, in the right quantity, with the right documentation, to the right customer;
- Responsiveness refers to providing products and services to the customer;
- Internal lead-times are the speed at which back-office activities are carried out;
- Waste and costs have to do with internal efficiency in the consumption of resources;
- Asset utilization refers to the effectiveness of AS in managing assets (fixed and working capital) to satisfy demand.

Development and Innovation Level: this involves a long-term perspective as it focuses on the development and innovation dimension, i.e., investment in new products and services, intangibles, and infrastructures that are the drivers of future competitive and financial results.

5.4.1.2 Evaluation of the Original Model:

This section presents a critical evaluation of the original Gaiardelli, Saccani et al. (2006) model.

Business Level: at the strategic business level, the framework proposes that financial results are generated both by market results (i.e., market share, market penetration, etc.) and by the efficient consumption of resources (costs). While it is generally true that an increase in market share may increase revenue, this does not necessarily entail higher profits. What is more, the

market share is a measure that relates to a specific service. If the organization is selling a specific brand and performing service only for this brand, market share would measure the overall service performed explicitly for this brand against all the competitors in the market. In the case of a monopoly, however, in which one firm is the exclusive seller/service provider for this brand, it already has the full market share, so in this case, what should be measured is service retention rather than market share.

Process and Activities levels: there is an overlap in the levels here and what is measured. It has been pointed out that the focus at the business and process level is on the activities of the firm, and so the measures relate to the overall performance of the organization, while the activity level in the model has to do with aftersales. An example of the overlap can be seen in the concept of an asset: this seems to stem from the logistics literature, and thus mainly refers to inventory. If the model considers inventory as an asset, then Return on Assets (ROA) at the business level is the return on inventory. However, the facility in which the service is performed is considered to be an asset, especially for services that require interaction with the customer within a facility. In such cases, organizations invest heavily in their facilities to present the brand and create a welcoming service environment for the customer. Furthermore, the cost area at the business level seems to focus specifically on the costs associated with aftersales and not with the firm overall.

The indicators at the activity level derive from the Supply Chain Operations Reference (SCOR) model and therefore relate to logistics operations. The activity level breaks down into aftersales planning, inventory distribution, procurement, customer care, service delivery warehousing, and reverse logistics. The problem with this is that the parts department is responsible for four of these six activities (inventory planning, procurement, warehousing, reverse logistics), while service delivery and aftersales planning are more part of the workshop operation, that is, KPIs related to the repair process and efficiency.

The framework focuses on the operation of the manufacturer and sees the dealers as the manufacturer's customers. However, the measures focus mainly on the internal operation of the manufacturer rather than on managing the dealer network.

Productivity is generally associated with the productivity of the workshop and Service Advisor (SA) productivity. Workshop productivity is one of the measures that are important for measuring operational performance, while SA productivity is mainly related to Repair Orders (RO) opened by SA.

We partially agree with model on the areas used to measure reliability and waste and cost but do not agree on KPIs used to measure responsiveness, internal lead-time, and asset utilisation; we see that the used KPIs are focused on the operation within the manufacturer and not for the dealers.

5.4.2 Decision Criteria for the Revised Framework

This research builds on the results of chapter four, which presents the critical strategic decision categories in a service delivery system. Chapter four found that to make a successful transition to servitization, automotive manufacturers need to focus on two spheres of decision categories as follows:

- **Dealer Network - Service Delivery System Decision Categories** (performance measurement metrics, facilities, DMS, HR structure and employee skills and process)
- **Manufacturer - Service Support System Decision Categories** (service offers and incentives, macro-vertical integration and organizational structure)

This section re-investigates the decision areas presented in Chapter 4 but from the perspective of the research objectives of Chapter 5 and the Gaiardelli, Saccani et al. (2006)

framework. Each decision area is examined to determine whether measurement metrics are essential for the manufacturer to measure the performance of the dealers.

The first set of decision categories to be examined relates to dealer network service delivery systems and includes performance measurement metrics, facilities, the Dealer Management System (DMS), HR structure and employee skills, and the process area.

The Performance Measurement System (PMS): the discussion of the PMS in Chapter 4 established that the dealer would have a management system to run its operation. The research recognizes that from the perspective of the manufacturer, not all measures in the metrics used at the dealer level can be used by the manufacturer. Furthermore, it can be seen that many of the measures proposed in the Gaiardelli, Saccani et al. (2006) are required in the dealer PMS, such as the customer-facing measures and the operations measures (workshop and parts) which are distributed across the four levels.

Facilities: the Gaiardelli, Saccani et al. (2006) model sees assets as comprising inventory, while from a holistic perspective on aftersales, the facility is also an asset and requires measurement. Both inventory and the facility need to be accounted for.

Dealer Management System (DMS): it is recognised that for a manufacturer, measuring the DMS is not an easy task, and the (Gaiardelli, Saccani et al. 2006) model does not mention the DMS. However, the requirement that the dealer must be able to present reports and show data entails that they should use a DMS. It is essential to consider the complicated nature of the measures and the accuracy required.

HR Structure and Employee Skills: there is an agreement between the findings of Chapter 4 and the Gaiardelli, Saccani et al. (2006) framework on the importance of employees, and this makes them an essential focus of the metrics. While Chapter 4 emphasized the importance of the skills required in each department and the need for training to be provided, the Gaiardelli et

al. framework focus on the importance of employees in the long-term success of the organization. The main point is that both frameworks agree on the importance of employees and training.

Process: both frameworks agree implicitly on the importance of process. The Chapter 4 framework emphasizes that having a process is essential for providing the customer with the required service. The Gaiardelli, Saccani et al. (2006) framework does not mention the process explicitly but recommends measuring the effectiveness and efficiency of the operation, which is measuring the effectiveness and efficiency of the process. A performance management system should thus include both effectiveness and efficiency.

The second sphere of decision categories relate to the **manufacturer - service support system**, and this is where the difference between the perspectives of the current study and the Gaiardelli, Saccani et al. (2006) framework becomes apparent. Nevertheless, it will be important to integrate elements of the two models to fulfil the research objectives of this paper.

Service Offers and Incentives: in the Gaiardelli, Saccani et al. (2006) framework, there is no mention of service offers or incentives provided by the manufacturer. However, the chapter 4 framework presented the importance of having service offers and incentives offered by the manufacturers. This makes it important that manufacturers must measure the effectiveness of the offers.

Most car makers offer transactional services for product support such as maintenance and repair, and advanced manufacturers offer relationship-based services for product support such as extended warranties and service contracts (repair and long-term maintenance contracts). The purpose of such offers is to improve manufacturers' competitive position and improve customer satisfaction, and the underlying assumption is that customers will continue to come to the dealer as these offers create a switching barrier to customers and thus provide income in both the short

and the long term for both the dealer and the manufacturer. Measuring performance in these areas is essential for the proposed framework.

Macro-Vertical Integration: from the perspective of a paper one, this type of integration is required between the manufacturer and parts suppliers, as manufacturers have to ensure the availability of parts for the network even for products that are no longer produced. This means that the manufacturer has to have a contractual arrangement with the supplier to ensure the continuity of the parts supply. However, as the manufacturer must have a level of control over the dealers, it is important to have measures in place which provide feedback on its operation. In the area of inventory and logistics, the Gaiardelli, Sacconi et al. (2006) framework is biased towards logistics, but from the perspective of the manufacturer's internal operations, so many of the measures in that model focus on the manufacturer internal performance concerning inventory and parts. To be more comprehensive, there is a need for a framework that captures different levels of the operation for the dealer aftersales operation.

Organizational Structure: although Chapter 4 discussed the importance of having an appropriate organizational structure within the manufacturer to provide support, this issue is not seen as applicable to this paper framework.

5.4.3 Criteria for an Aftersales Performance Management Framework

To build a well-functioning service organization and to develop the metrics needed to measure the performance of an aftersales service organization, various measures need to be captured, such as customer satisfaction, employee satisfaction, and business success (Oliva and Kallenberg 2003).

The literature review, together with the Gaiardelli, Sacconi et al. (2006) framework and the re-examination of the decision areas presented in Chapter 4 showed that there are various types of

performance measure which are needed in an aftersales performance management framework to control the performance of dealer network operations and deliver value to the customer. This study now presents a set of general criteria that such a framework should incorporate:

An aftersales performance management framework and its associated metrics should:

1. Capture four different levels of the operation (the business level, process level, activity level, and the development and innovation level);
2. Reflect the linkage between the business's strategic objectives and the specific activities carried out in each department;
3. Achieve a balance between capturing measurements which accurately reflect the performance of the organisation and presenting an over-detailed picture;
4. Capture different dimensions of performance, including financial and non-financial and short-term and long-term dimensions;
5. Quantify the efficiency and effectiveness in an aftersales measurement framework;
6. Account for the importance of employees, particularly in high customer-interaction industries.

5.5 Step 4: Research Methods and Techniques

This section presents the key decisions and choices made regarding the research design and the methods used for data collection and the analysis (chapter 3 detailed the main analytical research choices).

5.5.1 Research Method

The research method that best fits the purpose of this research is a case study. Using case studies allow the researcher to utilize multiple sources of data and the examination of the use of performance management systems in their natural setting.

5.5.2 Data Collection

The use of case studies allows the use of a variety of data sources. For this paper, the primary data source was semi-structured interviews, and a secondary data source was archival company reports, monthly customer viewpoint reports, training completion reports, monthly service excellence reports, yearly service excellence accreditation audit reports, and process audit reports. The secondary data was valuable for the study as it was necessary to research multiple sources to identify many of the proposed key performance indicators.

5.5.3 Sampling

Purposeful sampling was used to select the participants, and the sample included both a homogeneous and a heterogeneous group. 21 interviews were conducted with 15 managers, four of whom were interviewed more than once and provided valuable support throughout the research process. The homogeneous group was made up of 10 members of the aftersales management team working with the same manufacturer.

Members of the heterogeneous group were chosen to provide a different perspective. This group included six managers: a parts consultant who worked with parts consulting organizations on projects within both the Middle East region and North America, a service consultant who worked with different service organizations within both the Middle East region and Europe, and a parts manager and a service manager working with the dealer network. These two managers were interviewed to cross-check the information gathered from the manufacturer. The group also

included a quality manager working for another manufacturer who had regional responsibilities and previous experience of working with dealers and a business consultant with experience in setting a business performance measurement system. See Appendix E for a list of interviewees.

The use of different informants and data sources allowed for triangulation; to check the internal consistency of the data. The information provided from the interviews allowed the study to reach the level of data saturation required.

5.5.4 The Interview Guide

Interviews followed an interview guide consisting of a set of broad but clearly defined open-ended questions (see Appendix G). The development of the interview guide was an ongoing process of continuous refinement. The initial set of open-ended questions was designed to capture how the participants measured aftersales operations within the dealer network. These were intended to allow participants' scope to discuss what they saw as important areas and measures. Some participants gave full answers with a high level of in-depth information covering many areas and performance indicators. These answers were then linked to the levels of the theoretical model as a way of validating the dimensions, the areas proposed under each level, and the terminology used in the framework. Participants showed agreement about the links between the levels and the general codes. However, there was initial disagreement about the terminology used for the levels, and specifically about the names of the codes under the process and activity level.

A template was therefore created to use in the interviews and the coding, As a further aid for prompting and clarifying, a set of definitions for each level was also prepared, which was valuable as it helped to explain the aim of each level to participants and thus clear up such confusion (see Appendix H for definitions of the levels).

It was also found that some areas were not relevant to the aims of the research. For example, in the initial model, 'cost' was intended to relate to the efficient consumption of resources, but during the interviews, participants did not see how it was relevant from the perspective of the manufacturer. It was also found that some of the code names used in the original model had a different meaning in the automotive business, so it was important to find common meaning. It also emerged that some areas and the measures associated with them were interlinked, particularly under the quality dimensions.

The data from the pilot interviews were collated and presented to the participants to collect their feedback. The pilot interviews helped to refine the research questions and to provide a provisional structure for the framework, as well as highlighting the need to add some prompt questions. The pilot interviews suggested that the challenging issue for the participants would be the link between the measures related to the different areas.

The development of the interview guide did not end at the start of the first interview, and it continued to be modified through adding probes and whole topics, which had initially not been included but had emerged spontaneously in interviews and dropping or re-formulating questions, which were incomprehensible to participants or consistently failed to elicit responses that were in any way relevant to the research question(s).

5.5.5 Analysis Procedure

Various methods can be used for analyzing qualitative data. The method chosen for this study was a hybrid mix of qualitative methods of thematic analysis using the template analysis technique. The template used in the analysis represented the four levels as found in the literature and incorporated in the framework to maintain the level order. The levels of the framework and the areas under them were regarded as provisional themes and codes. The process began by

generating the codes that were arranged under themes, which in turn were placed under the template levels.

5.5.5.1 Phase 1: Familiarization with the Data

The first step after each interview was to transcribe the data from the audio recording to written text. This was followed by a validation process to find discrepancies, and then by editing the text.

5.5.5.2 Phase 2: Generating Initial Codes

In this initial coding phase, the transcripts of all the interviews were thoroughly examined to identify the main categories of information, using the template for reference. The entire data set for each interview was worked through, giving full and equal attention to each item to identify interesting aspects of the data that might form the basis of a cluster across the data set. Some of the codes that emerged related to a category, either falling under one of the provisional themes or creating a new theme. No attempt was made to force codes into any particular cluster or to match the provisional template; instead, codes that did not fit into the model or codes that emerged were used to modify the framework.

5.5.5.3 Phase 3: Searching for Themes

This phase involved the initial sorting and assembling of all the potentially relevant coded data into themes. The provisional themes were built on the original framework proposed by (Gaiardelli, Saccani et al. 2006), which was discussed earlier. Nine themes were classified under the four levels (financial results, market share, cost, customer satisfaction, flexibility, productivity, research and service portfolio, human resources, and IT and service capacity), and reliability and empathy were classified as subthemes under the central theme of front office, while the subthemes

internal lead-time, waste and cost, and assets utilization came under the central theme of back office.

The in-depth examination of each code and emerging codes showed that some of the initial codes could be merged, while some did not seem to belong anywhere. The four levels were retained for reference, but the central themes falling under each of these were further scrutinised. New themes started emerging from the data, with various codes. It was found that the composition of the themes under each of the levels had changed.

Four independent themes were identified (financial results, market share, customer satisfaction, training certification, and completion), as well as three themes that included two subthemes under each giving a total of six subthemes 1) front office, covering customer-facing staff and the customer service centre, 2) back-office covering the workshop and parts operations and 3) deliverables covering reliability and empathy. See Appendix F for a sample of the coding.

5.5.5.4 Phase 4: Reviewing the Themes - Research Triangulation

A review of the coded data extracted for each theme was undertaken to consider whether they appeared to form a coherent pattern and accurately reflected the meanings evident in the data set as a whole. , the review identified a need to establish sub-themes. Nevertheless, after breaking down themes into sub-themes and allocating initial codes to each sub-theme, a further review was conducted, which resulted in the composition of some sub-themes being changed and some codes being switched between sub-themes or reallocated to a different theme.

The codes representing the KPIs clustered under each theme played an instrumental role in clarifying the theme. In order to validate the findings, once the data had been collected and organised, it was shared with the key personnel who had participated in the pilot interviews to

collect feedback and if any modifications are required. During this phase, the secondary data was reviewed to check the application of the proposed KPIs and how each should be calculated.

5.5.5.5 Phase 5: Defining and Naming the Themes

In the previous phase, based on the feedback of the participants, the codes were modified; the names of the themes were then finalized, and the framework was sketched out along with the list of KPIs. A further validation exercise was then carried out with three other participants. The final validation was to present the framework to an independent business consultant with experience in business performance systems.

5.6 Step 5: The customer-focused aftersales performance measurement framework and metrics

The performance measurement framework and associated metrics proposed by this study incorporate the measures that are considered essential from the perspective of the manufacturer. The metrics constitute a set of operational performance measures representing the framework levels. The focus was on performance measures that can be used by the manufacturer, and this posed limits on the measures that could be considered in the metrics. One of the limitations highlighted in the interviews was difficulties in collecting reliable and timely data, as this is not always a simple task, especially for indicators that are provided by the dealers. From the perspective of the dealers, some measures could be used as a contractual weapon by the manufacturer, i.e., that it might count against the dealer when performance falls below an agreed level.

The performance measurement system must, therefore, strike a balance between capturing the measures required to provide an accurate reflection of the performance of the operation while

not presenting an over-complicated picture. The proposed framework is built on the basis of the literature, in particular taking as a reference point the work of Gaiardelli, Saccani et al. (2006). It links each particular feature of the aftersales operation with the relevant performance attribute, levels, and indicators and distinguishes between long-term and short-term perspectives, as well as performance areas related to efficiency and effectiveness.

The customer-focused aftersales performance measurement framework is articulated in four levels. Fig. 5.1 presents the customer-focused aftersales performance measurement framework.

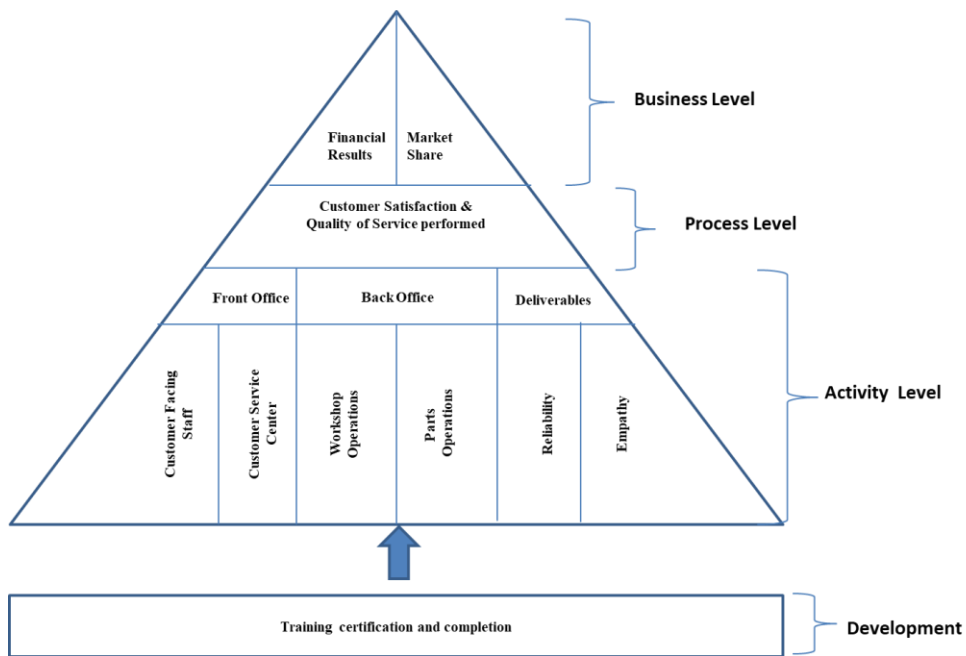


Figure 5.1. The Customer-Focused Aftersales Performance Measurement Framework

The metrics proposed in this framework capture different levels of the operation of automotive aftersales organizations. Table 5.1 presents the proposed measures for each area. The metrics do not involve an exhaustive list of indicators but include the main indicators suggested by the literature and the empirical research. See Appendix I for details of each measure and examples of the related calculations.

Table 5.1 The Customer-Focused Aftersales Performance Measurement Framework Metrics

No	Area	Metrics	Business Level	Calculation	Measurement Scale
1		Service Absorption		after-sales direct profit/total overheads (X 100) – Baseline: 100%	Percent
2		Service Contract Penetration Level		total number of contracts sold/number of vehicles sold (X 100) – Baseline: 100%	Percent
3		Extended Warranty Penetration Level		total number of contracts sold/number of vehicles sold (X 100) – Baseline: 100%	Percent
4		Stock Turnover		annualized parts purchases/stock value of parts – Baseline: 2-4 turns per year	Number of turns
5		Parts Sales per Vehicle Parc		annualized parts sales/vehicle parc – monetary value	Monetary value
		Financial results			
6		Parts Sales per Repair Order		total value of retail parts sold for the month/total number of retail repair orders opened for the month	Monetary value
7		Hours per Retail Repair-Order		total number of retail hours sold for the month/number of retail repair orders for the month - Baseline: 2 hours	Hours
8	Market Share	Service Retention		vehicle parc/number of vehicle visits per VIN – Baseline: 90% for the first year	Percent
			Process Level		
9	Customer	Customer satisfaction		how satisfied are you with the service performed by the dealer	5 point Likert scale
			Activity Level		
10.1				treating you with courtesy and respect	5 point Likert scale
10.2				understanding your service needs	5 point Likert scale
10.3		How do you rate your service advisor in terms of		explaining work and charges	5 point Likert scale
10.4	Front office			answering/resolving concerns in a timely manner	5 point Likert scale
11.1				treating you with courtesy and respect	5 point Likert scale
11.2				understanding your service needs	5 point Likert scale
11.3		How to you rate your parts Advisor in terms of		explaining work and charges	5 point Likert scale
11.4				answering/resolving concerns in a timely manner	5 point Likert scale
12	Customer Service	Percent of Resolved Concerns		number of concerns resolved/number of concerns received (X 100) - Baseline: 100%	Percent
13	Centre	Percent of Appointments		total number of appointments/total number of retail R.O. (X 100) - Baseline: 70 - 80%	Percent
14		Follow-Up Rate		number of follow-up calls/number of complete R.O.s (X 100) - Baseline: 100%	Percent

Table 5.1 The Customer-Focused Aftersales Performance Measurement Framework Metrics (Continued)

No	Area	Metrics	Activity Level	Calculation	Measurement Scale
15	Back office(Workshop Operations)	Productivity	hours sold/hours available (X 100) – Baseline: 80%		Percent
16		Utilization	hours worked/hours available (X 100) – Baseline: 80%		Percent
17		Efficiency	hours sold/hours worked (X 100) – Baseline: 100%		Percent
18	Back office (Parts Operations)	Parts First Fill Rate	number of parts delivered (off-the-shelf)/number of parts requested (X 100) – Baseline: 80%		Percent
19		Parts Second Fill Rate	number of parts delivered within 24 hours/number of parts requested and not available off-the-shelf (X 100) – Baseline: 90%		Percent
20		Parts Emergency Order (E.O) Percent	purchases of E.O(total purchases (X100) number of parts supplied by the manufacturer/ number of parts ordered by the dealer -1) (X100) - Baseline: 85%		Percent
21	Deliverables (reliability)	Backorder Percentage	number of customers confirming that the vehicle was fixed right the first time number of vehicles delivered back to customers (X 100) - Baseline: 100%		Percent
22		Fix it Right the First Time Percentage	number of customers confirming that the vehicle was ready when promised/number of vehicles delivered for service/repair (X 100) - Baseline: 100%		Percent
23		Vehicle Ready when Promised	number of customers confirming that they are satisfied with the convenience and time of their appointment/number of customers surveyed (X100) - Baseline: 80%		Percent
24	Deliverables (Empathy)	Convenience and Time of Appointments	number of customers confirming that they are satisfied with the time taken to complete the service/number of customers surveyed (X 100) – Baseline: 100%		Percent
25		Time Taken to Complete the Service	number of customers confirming that they are satisfied with the time taken to receive the required part/ number of customers surveyed (X 100) – Baseline: 90%		Percent
26		Time Taken to Deliver the Required Part (To Workshop)	number of customers confirming that they are satisfied with the time taken to receive the required parts/number of customers surveyed (X 100) – Baseline: 90%		Percent
27	Development and innovation	Time Taken to Deliver the Required Part (Through Parts Counter)	number of customers confirming that they are satisfied with the time taken to receive the required parts/number of customers surveyed (X 100) – Baseline: 90%		Percent
28		Technician Course Completion	total number of courses completed/total number of courses available (X 100) – Baseline: 100%		Percent
29		Service Advisor Course Completion	total number of courses completed/total number of courses available (X 100) – Baseline: 100%		Percent
30	Manager Course Completion	total number of courses completed/total number of courses available (X 100) – Baseline: 100%		Percent	

The following sections present the details of the framework and the measures utilized in the metrics under each level, with primary outcomes organised according to level.

5.6.1 Business Level

This represents the first and highest level of the framework and the KPIs that capture the long-term and short-term viability of the company. It views organizational performance through the lens of financial measures and market share.

5.6.1.1 Financial Measures

Aftersales service organizations face increasing pressure to improve financial performance. Aftersales is considered a separate profit centre within the dealer. Hence, its return on assets and inventory is vital for the performance of the entire organisation. The financial performance of service operations and service parts inventory management should be measured and adjusted to achieve the required profitability and performance levels.

The financial measures used by a manufacturer in this area are not the conventional cash flow, return on equity (ROE), return on sales (ROS), return on investment (ROI), return on assets (ROA) and so on measures that are typically used to measure the financial performance. The manufacturer cannot use such measures because at the dealer level, such financial information is considered confidential and is not shared. The important financial measures from the perspective of the manufacturer relating to the long-term and short-term viability of the company, which ensures the long-term continuity of the dealer business. The next section presents the measures proposed, which cover service absorption, the (monthly) service contract penetration level, the (monthly) extended warranty penetration level, stock turnover, parts sales per part unit, parts sales per repair order, and hours sold per retail repair order.

1 Service Absorption = aftersales direct profit/total overheads (X 100) – Baseline: 100%

Dealers can adopt different strategies to maximize their profit throughout the user lifecycle of the product. For example, some dealers may charge a high price for the purchase of the new vehicle and have lower profit margins on aftersales activities. Other dealers may choose to charge a low price for their new vehicles and higher prices for aftersales activities. This latter is common practice in the market due to increased competition, which means that the focus is on gaining higher profits by providing superior service during the ownership phase. 'Service absorption' is one measure that reflects the strength of the aftersales department; the absorption percentage figure is a measure of the risk to the business, i.e., how much of the company's overheads are covered by the profits generated by the aftersales department.

This allows the dealers to sell cars at a competitive rate and remain profitable. This is one of the tactics that would enable dealers in a competitive environment to capture greater market share by selling more cars than other brands.

2 Service Contract Penetration Level (per month) = total number of contracts sold/number of vehicles sold (X 100) – Baseline: 100%

3 Extended Warranty Penetration Level = total number of contracts sold/number of vehicles sold (X 100) – Baseline: 100%

Providing extended warranty contracts and service contracts is becoming an essential factor for future company revenue. Such products represent an additional source of revenue for manufacturers, and they, therefore, focus on measuring the number of extended warranty plans and the number of service contracts sold against the number of vehicles sold. It is important to mention that such products also affect product reputation and customer satisfaction.

4 Stock Turnover = annualized parts purchases/stock value of parts –Baseline:2 - 4 turns per year

The manufacturer also needs financial measures primarily related to the ability of the dealer to sell parts. The ‘Annual inventory turnover’ is one of the reliable indicators used by manufacturers to measure this in addition to the efficiency of the dealer inventory management. This measure represents the length of time parts stay in stock before being used. For example, an annual turnover of 2 indicates that the dealer sells the parts stock twice a year or in a different way; that, on average, a part stays in stock for half a year (six months). Calculating stock turnover requires knowing annual part purchases and the stock value of parts (at cost). The former can be obtained by the manufacturer, as they sell the parts to the dealers; the latter is where there may be some confusion.

Dealers can use different accounting procedures to value their inventory (such as LIFO, FIFO, weighted average costing or market price). Some dealers can even depreciate their inventories, whereas others do not. When using the stock turnover measure, it is important to distinguish between the gross value (based on purchase price) and the net (depreciated) value of the inventory investment. Many companies have data on inventory investment valued by more than one method, and these different values are used for different managerial purposes. To be consistent, the proposed model uses the gross value of inventory investment for comparison purposes. For a number to be meaningful, the method used in this measure needs to be the same for all dealers, so that cross-dealer comparisons can be used to rank the performance of the dealers.

5 Parts Sales per Vehicle Parc Unit = annualized parts sales/vehicle parc – monetary value

Measuring the value of the parts sold per vehicle in parc⁴ is another indicator for the manufacture; it is one of the measures that help to forecast the parts' sales target set for the dealers. If the average value of parts sold for every vehicle in the parc in the previous year is known, it is possible to forecast the next year's part sales by integrating the future year sales forecast in the dealer parc.

6 Parts Sales per Repair Order = total value of retail parts sold for the month/total number of retail repair orders opened for the month – monetary value

Similarly, the manufacturer turns to the service department for part sales per repair order. This is measured monthly basis and reflects the value of parts that a location sells for every repair order opened.

7 Hours per Retail Repair Order = total number of retail hours sold for the month/number of retail repair orders for the month - Baseline: 2 hours

Another critical measure is the 'hours sold per repair order'. This is a KPI measure of labour time sold against each repair order. It is essential for comparing the performance of dealers; each dealer will have a number of available hours to sell and different labour rates. Due to the difference in labour rates, monetary value cannot be utilized. Using hours sold as a measure allows accounting for all the differences and having a useful comparison.

This measure is influenced by the type of work done, so the figures for small satellite locations may be different from those for central locations, particularly because small locations focus on performing small to medium repairs which typically requires less number of hours while

⁴ Car parc is a European term from French parc that refers to the number of cars and other vehicles in a region or market. It is typically used to gauge the capacity within a market or region for aftersales.

the central location has the ability to perform major repairs that require more hours. When utilizing this measure to evaluate the performance of a location, the type of the facility needs to be considered to have a fair comparison.

Asset utilisation in the performance measurement system has a significant focus on inventory; this is logical, as many of the studies of aftersales performance measurement systems focused on supply and logistics. However, an 'asset' in the automotive aftersales world is part of a bigger picture of the facility and all its tools and equipment. Spare parts are considered as assets, but they are seen primarily as parts, and different measures are used for them.

Measuring asset utilisation for parts is not easy, as days of supply for the entire inventory cannot be captured in one single measure. The only accurate way is to measure the days of supply for each part in days based on the historical sales trend. This is a complicated process and requires a comprehensive analysis by inventory managers.

5.6.1.2 Market Share

The second business-level category is market share. Customers now have more bargaining power and are more informed than before. Since so much information is available online, it is straightforward for consumers to get all the details they want about prices and different offers. Despite being the official dealer representing a brand, dealers are losing customers to independent service providers regularly. This is mainly due to the costs of service and repairs charged by the dealers. As the vehicle gets older, its residual value decreases, and this makes customers reluctant to pay the prices charged by the dealers. Independent service facilities now offer service packages and attract many customers. Dealers need to measure the retention level of the customers to maintain their market share.

8 Service Retention = vehicle parc/number of vehicle visits per VIN – Baseline: 90% for the first year

As dealers in the Middle East enjoy a monopoly as the solely authorised representatives of a brand, their market share should be measured by how many vehicles are returned to them for servicing. The retention measure is based on the number of vehicles in the dealer car parc that keep coming back over a specific amount of time. Lost customers may be those who have started using independent service facilities.

5.6.2 Process Level

The second level in the framework is the process level, and the related KPIs measure how customers evaluate aftersales service operations, which means that it views organisational performance through the lens of customer satisfaction.

5.6.2.1 Customer Satisfaction

When interviewees were asked to describe the most important performance indicator of the success of an aftersales service operation in the eyes of the customer, they all responded that ‘level of customer satisfaction’ was the ultimate measure of service performance. The level of customer satisfaction provides the dealers with a view on the level of satisfaction of the customer on the service provided. Customer satisfaction is traditionally measured through a survey.

9 How Satisfied Are You With The Service Performed By The Dealer?

This question measures how satisfied the customer is with the service provided. Customer satisfaction is affected by a wide array of factors, which all need to be measured. The level of customer satisfaction is measured through a survey in which questions are answered by selecting a score on a Likert scale with a description for each score. The scale consists of five points where five is the highest score and one is the lowest. The five points have the following label: 5 =

Completely Satisfied; 4 = Very Satisfied; 3 = Neither satisfied nor dissatisfied; 2 = Somewhat Dissatisfied; 1 = Very Dissatisfied

5.6.3 Activity Level

The third level in the framework is the activity level or the level at which the aftersales operations happen. Measures at this level are classified as short-term. The KPIs here measure the performance of the aftersales service operation in dealing with its own specific activities and view performance through the lenses of the front office, back office, and of the deliverables from the aftersales service system.

5.6.3.1 Front Office

The main customer interfaces with the aftersales service organisation happen with the service advisor, the parts advisor, and the customer service centre. The performance measurement system should measure how customers are treated and how far their requirements are fulfilled.

Customer-facing staff includes the service advisor, who is responsible for taking care of customers' service needs, and parts advisors, who are responsible for taking care of customers' parts needs through the parts counter. The measures proposed focus on how they deal with the customers and satisfy their needs:

10 Service advisor measures: how do you rate your service advisor in terms of:

10.1 treating you with courtesy and respect

10.2 understanding your service needs

10.3 explaining work and charges

10.4 answering/resolving concerns promptly

11 Parts advisor measures: how do you rate your parts advisor in terms of:

11.1 treating you with courtesy and respect

11.2 understanding and identifying your parts needs

11.3 explaining prices

11.4 answering/resolving concerns promptly

It is proposed that a 5-point Likert scale should be used for all these questions. The measurement process is explained in detail in Appendix I

Customer Service Centre is responsible for responding to specific customer needs or concerns by phone, email, or any other electronic means. It contacts customers mainly to make appointments for service, log concerns, or conduct follow-up calls.

12 Percent of Resolved Concerns = number of concerns resolved/number of concerns received (X 100) - Baseline: 100%

The key factor is how proactive these staffs are in resolving complaints, and this can be measured by the number of concerns received against the number of concerns addressed.

13 Percent of Appointments = total number of appointments/total number of retail R.O. (X 100) - Baseline: 70 - 80%

Dealers should promote appointments, as this is one of the ways to smooth fluctuations in demand and ensure the best utilization of the service department's time. Spreading appointments ensures that customers will be allocated a dedicated time for their service advisors to handle their requirements.

14 Follow-Up Rate = number of follow-up calls/number of complete R.Os (X100) - Baseline: 100%

Customers should receive a follow-up call from the dealer two or three days after the service is completed. The call elicits customer feedback on the service performed, and the work is done on the vehicle.

5.6.3.2 Back Office

The back office carries out operations that happen away from the customer. It includes operations in the workshop to perform the required work on the vehicle, and the work done by the spare parts department to supply the required parts.

Workshop Operations: relate specifically to the performance of technicians, as they reflect on the customer and the overall workshop performance:

15 Productivity = hours sold/hours available (X 100) – Baseline: 80%

16 Utilization = hours worked/hours available (X 100) – Baseline: 80%

17 Efficiency = hours sold/hours worked (X 100) – Baseline: 100%

A typical workshop calculates the time in three ways:

Available Hours are the total number of hours that a technician is available to work: that is, the total number of hours that the technician is clocked in at the dealer. This number does not reflect the total number of hours that this technician works;

Worked Hours are the total number of hours which a technician spends working on a vehicle that is clocked on repair order;

Sold hours are the total number of hours that have been invoiced to the customer; these are traditionally based on a flat rate set by the manufacturer.

Parts Operations: from a customer satisfaction point of view, the time it takes to fulfil the request for a part is critical. The ‘parts fill rate’ is one of the most commonly used measures for parts availability. It is the percentage of part requests fulfilled immediately from inventory (off-the-shelf). The dealers that have a central parts department that feeds their network, a request may be filled from the dealer’s inventory or from the central warehouse.

18 Parts First Fill Rate = number of parts delivered (off-the-shelf)/number of parts requested (X 100) – Baseline: 80%

For the customer, the ‘first-fill rate’ is when the part is available off-the-shelf, and if it is not, how long it will take to get the part. The first fill rate is a good measure of how the location is stocked.

19 Parts Second Fill Rate = number of parts delivered within 24 hours/number of parts requested and not available off-the-shelf (X 100) – Baseline: 90%

Many dealers have a delivery process whereby parts are delivered the same day to remote locations, provided that they are ordered before a particular cut off time on the same day. Under some circumstances, the parts can arrive on the second day, so this measure captures orders filled by emergency shipments from central locations.

20 Parts Emergency Order (E.O) Percent = purchases of E.O/total purchases (X100)

EOs are the orders for parts that are not available in stock and are needed to complete a repair. They can be obtained through the workshop or the parts counter. If the part is not available and it is urgently required, the dealer places an emergency order for the part to be delivered in the fastest possible way. In most cases, ordering parts through E.O. will have financial implications; it is, therefore, in the interests of the dealer to maintain a healthy level of stock.

21 Backorder Percentage = Number of parts supplied by the manufacturer/ number of parts ordered by the dealer-1) (X100) - Baseline: 85%

The parts fill rate, and E.O percent measure the performance of the parts department. However, it is also vital to measure the ability of the manufacturer to provide the parts to the dealers. The dealer cannot be blamed for a low fill rate if the manufacturer is not providing them with the parts they need. The parts fill rate for the manufacturer measures the number of parts supplied to the dealers as a percentage of those ordered.

5.6.3.3 Deliverables

This has to do with the effectiveness of the front and back-office operations. A company must be both efficient and effective. Efficiency here means that the workshop and the parts department are doing the right things, while effectiveness means that they are performing or functioning in the best possible way, and relates to the operational effectiveness of the aftersales system.

Reliability is the ability of the aftersales system to deliver the correct service at the right time.

22 Fix it Right the First Time Percentage = number of customers confirming that the vehicle was fixed right the first time /number of vehicles delivered back to customers (X 100) - Baseline: 100%

This is a measure of the number of completed R.Os where the customer confirms that the vehicle was repaired right the first time against the number of vehicles delivered for repair. FIRTFT is a critical measure of customer satisfaction. It reflects different elements of the process,

starting with the S.A. capturing the correct information from the customer to the workshop performing the right work and the parts department supplying the correct parts.

**23 Vehicle Ready when Promised = number of customers confirming that the vehicle was ready when promised/number of vehicles delivered for service/repair (X 100)
- Baseline: 100%**

This measures customer feedback indicating that the vehicle was ready when the customer was promised.

Empathy has to do with the speed at which the aftersales system provides the service in terms of the appointment and the time taken to complete the service.

24 Convenience and Time of Appointments = number of customers confirming that they are satisfied with the convenience and time of their appointment/number of customers surveyed (X100) – Baseline: 80%

When customers call the customer assistance centre to book an appointment, they expect to be given a date shortly or at a time convenient to them. This measures the number of days customers have to wait for an appointment.

25 Time Taken to Complete the Service = number of customers confirming that they are satisfied with the time taken to complete the service/number of customers surveyed (X 100) – Baseline: 100%

This is the amount of time taken to complete the work required. Typically, small services should be completed while the customer is waiting if they have an appointment.

26 Time Taken to Deliver the Required Part (To Workshop) = number of customers confirming that they are satisfied with the time taken to receive the required part/number of customers surveyed (X 100) – Baseline: 90%

27 Time Taken to Deliver the Required Part (Through Parts Counter) = number of customers confirming that they are satisfied with the time taken to receive the required parts/number of customers surveyed (X 100) – Baseline: 90%

These are measures of the time taken by the parts department to deliver the required part. These could be parts requested by the workshop or requested by the customer over the counter.

5.6.4 Development

The fourth level in the framework is the development of KPIs, which capture the drivers of stable and satisfactory future competitive and financial results. At this level, organisational performance is viewed through the lens of employees.

5.6.4.1 Training and Development

‘Employees’ here refers to qualified management staff with the right management skills and capabilities, proper HR policies that focus on hiring and training employees. The only element related to this, which can be measured empirically, is training. This depends on the organization’s philosophy in relation to its employees and how they perceive their importance. Service organizations must understand that employees need to be adequately trained and to be proficient in dealing with customers. They are seen as an asset which the company can grow. This area can be measured through course completion rates for technicians, service advisors, and managers. Manufacturers can monitor these rates.

Training Certification and Completion Percentages

28 Technician Course Completion = total number of courses completed/total number of courses available (X 100) – Baseline: 100%

29 Service Advisor Course Completion = total number of courses completed/total number of courses available (X 100) – Baseline: 100%

30 Manager Course Completion = total number of courses completed/total number of courses available (X 100) – Baseline: 100%

A second level of measuring employees is performance achievement against objectives. Each employee, regardless of status, needs to be assessed against pre-set objective criteria; they need to be given a set of goals to be heading towards. However, this is an internal performance indicator for the dealers to monitor.

The areas “Research & Service Portfolio” and “IT & Service Capacity” proposed by Gaiardelli, Saccani et al. (2006) framework cannot be measured in a metric.

5.7 Step Six: Research Summary, Discussion and Contributions

5.7.1 Research Summary and Discussion

The literature on performance measurement systems offers various frameworks to be applied by organizations. Early frameworks focused on financial measures and then moved to combine financial and non-financial, long-term, and short-term measures. More advanced frameworks integrate new dimensions of performance, such as corporate social responsibility and sustainability, intangibles, and the supply chain. Despite this, however, there is very little which can be applied to aftersales service (Gaiardelli, Saccani et al. 2006; Saccani, Songini et al. 2006).

To fill this knowledge gap, the literature on business performance measurement systems was reviewed. The available frameworks in themselves are insufficient to provide a complete and detailed assessment model which can be applied to the integrated services delivery system in a customer-focused servitization context, nor can they indicate how manufacturers can measure the

performance of the service delivery system, either within their own service network or through their dealers. Nevertheless, the literature can assist in defining how to capture and measure the main performance dimensions which differentiate aftersales services by showing the relevant levels which can be applied to these services (Gaiardelli, Saccani et al. 2006).

This research is built on the aftersales performance measurement framework proposed by Gaiardelli, Saccani et al. (2006); and on the findings of chapter 4, which presents the critical strategic decision areas in a service delivery system. The research first critically reviewed the levels recommended in the Gaiardelli, Saccani et al. (2006) framework and examined the application of each level to the automotive business. This was followed by a reappraisal of the decision categories in the Chapter 4 framework and the metrics that are essential for a manufacturer to measure the performance of the dealer network.

The outcomes of these two steps were then combined to create a theoretical guide for the fieldwork. A series of semi-structured interviews were conducted, and documents were examined to analyse the systems currently used as part of the case study of an organisation. The research then presents a 'customer-focused performance measurement framework'. This framework incorporates the four levels suggested by the literature, but each level has a different composition.

The fundamental measure in this framework is at the process level, where measures of effectiveness are oriented towards the customer by focusing on the level of customer satisfaction on the service provided.

At the business level, financial measures reflect the strategic direction of the organisation and its attempts to maximize profits throughout the user lifecycle of the product. Measures of short-term performance such as penetration levels deal with factors which will ensure that customers will continue to come to the dealer, and thus secure future revenues; measures of long-

term performance such as the absorption level and stock turnover will help the dealer to minimize financial risks.

Factors which are measured at the business level are affected by factors at a variety of other levels: the activity level is where the operation happens, and the success of the delivery system with all its components such as the workshop, customer care, and the warehouse is what affects customer satisfaction and service quality at the process level, and ultimately has an impact on financial performance at the business level.

The link between strategic objectives and operational measures is essential in any aftersales performance management system. Additionally, the internal link between the levels at the business level and activity level is needed to achieve and maintain success in the long-term.

Manufacturers also need to promote alignment between the expected performance and the dealer network. Having such alignments aims to ensure high profitability levels and customer satisfaction. Manufacturers may set targets, provide incentives, and verify the dealers' performance for some of the measures at these levels. They thus exert control over their aftersales service network and its targets and actual performance results.

The performance measurement system will be successful if data is collected in a structured and timely way, and if the dealer network responds appropriately to challenges and takes corrective action.

Process in the strategic areas is a problematic measure, as each manufacturer has a particular process, and the measure cannot be generalized to other manufacturers. Adherence to the process set out is generally challenging to evaluate, as it requires a physical audit to capture any variance between the set process and the used process. Manufacturers, therefore, carry out such an audit only on a yearly basis. However, the effects of not following the stipulated process can be seen when performance in various other areas is not up to the required standards.

Costs and waste in the parts department are typically not high, as the dealer network mainly have a central parts distribution centre, locations tend to stock the main or fast-moving parts, and if they have parts which are not moving these are sent to the main parts distribution centre. Because the inventory is small and made up mainly of fast-moving parts, the number of damaged or lost items is low.

Effectiveness rather than efficiency should be an essential focus of performance measurement. For example, responding to all customer concerns results in a response rate of 100%; however, the critical issue is how effectively customers' concerns are resolved. In relation to measures of effectiveness, further analysis of the concerns, and how each concern was managed is essential to identify effectiveness.

The proposed framework by Gaiardelli, Saccani et al. (2006) differentiated between 'aftersales planning' and the 'service delivery system'. In the interviews, questions related to both areas, cause confusion as the participating managers see that the 'aftersales planning' was considered to be one component of the 'service delivery system' in a way that the proposed performance measures will fall under each other.

5.7.2 Research Contribution

The primary research objective was to provide automotive manufacturers operating in the Middle East with an aftersales performance management framework and its associated metrics to assist them in managing their dealer network. It is argued that this paper has achieved its objectives and answered the research question by presenting the 'customer-focused aftersales performance measurement framework'. Additionally, it can be claimed that the proposed research framework adds to the available literature, as it is an improvement on the frameworks currently available in

the literature in that it focuses on aftersales operations as a whole, and is not biased toward inventory and logistics operations. The contributions of this paper are summarised below:

5.7.2.1 Academic Contributions

The academic contributions of Chapter 5 are summarised as follows:

1. this paper contributes to the literature by extending the aftersales performance measurement framework proposed by Gaiardelli, Saccani et al. (2006) by adopting a holistic view on the aftersales operations that goes beyond the traditional focus on supply chain and logistics operations, thus extending the literature on performance measurement by providing the “customer-focused aftersales performance measurement framework metrics.”
2. it identifies the criteria which are needed in a performance management framework, and in an aftersales performance management framework thus adding to the performance management literature;
3. the research contribute to the literature on servitization by providing a framework that assists manufacture undergoing the servitization transition in managing the aftersales service dealer network within their dealer network;
4. the frameworks so far developed in the literature are targeted mainly at manufacturers or dealers as a basis for managing their operations internally. As now as can be ascertained, the framework developed in this study is the only one designed to assist a manufacturer in managing the performance of its dealer network;

5.7.2.2 Practical Contribution

1. it constitutes a holistic diagnostic instrument which is capable of providing the real status of operations and the level of detail required for a customer-centric servitized manufacturers' network;
2. the proposed "customer-focused aftersales performance measurement framework" addresses several performance areas at each level, focusing on both the efficiency and effectiveness of performance at the same time. It proposes customer-oriented measures using a balance of financial and non-financial indicators that relate drivers of the operation to financial results and customer satisfaction and is based on both long-term and short-term perspectives with an emphasis both on efficiency- and effectiveness-oriented measures.
3. the instrument helps manufacturers to identify the priorities for improvement in a strategic context for the delivery of a service-centric servitized offering rather than taking a series of ad hoc initiatives. This allows managers to intervene and make necessary changes or improvements to keep performance on the right track.

5.7.2.3 Contribution to Other Industries

The automotive industry has several similarities with other industries: durable manufactured products such as capital equipment, durable consumer goods, trucks, machinery, light machinery, and so on all face the same challenges as the automotive industry. The customer purchases an asset that is put to use for the duration of its useful life. Such products require service as they advance through their life, and therefore incur ownership costs beyond the purchase price (for spare parts, maintenance, etc.). These industries have the same basic structure as the automotive industry: manufacturers depend on a dealer network to provide the required customer support.

It is argued that this framework can be extended to such industries by accounting for the specific differences within each category concerning the type of product and the required customer support. The four levels of the framework apply equally to these other industries. In terms of specific details, the KPIs may need some adaptation.

The general application of the categories of the framework is presented below.

Business Level: the structure of the automotive industry is similar to the durable manufactured products industry when it comes to its dependence on the dealer network and service offers, so the manufacturer monitors the penetration level of the warranty and service contractors. Also, it is the manufacturer's responsibility to supply the parts to the dealer network and measures the ability of the dealer network in selling the parts through the stock turn and part sales measures.

Manufacturers of durable products focus on the long-term financial perspective. It is argued that heavy machinery manufacturers can make more complex and comprehensive offers to meet customer requirements. Due to the sensitivity of the customers to any breakdown, they guaranteed a certain level of operation. In such a setup, the financial terms can include any financial losses arising from breakdowns or delays in repair.

Process Level: in all these various industries, the service is provided to a customer, and it is, therefore, essential to measure the level of customer satisfaction. The process of measurement might vary, but the need for measuring customer satisfaction still exists.

Activity Level: measures relating to the front office and the back office may vary depending on the level of customer interaction. In industries with high customer interaction, front office measures can be expanded to cover more areas, and the same applies to industries where it is not easy to move the asset to the service location so that the service support team has to give the necessary support onsite. In this case, customer-facing measures can evaluate response time, i.e., how long it takes the support team to visit the customer and carry out the required support. The

workshop and the parts department operational measures may be different if they have advance information about the customer's product and the support required, i.e., performance metrics can measure whether or not the team had all the required parts and tools to complete the required service first time.

The "Deliverables" measures focus on the outcome of the aftersales operation by measuring how far the correct service is delivered at the right time to the customer. Reliability relates to whether the asset is fixed the right first time, and the service required is completed when promised. These are primary measures that apply to any industry. Similarly, empathy measures have to do with the speed at which the aftersales system provides excellent service in relation to appointments, the time needed to complete the service, and get parts to the customer. In some industries, the appointment concept may not be applicable. An example is breakdowns: these cost money, and the customer cannot wait for an appointment but requires immediate assistance, which means that the time taken to complete the service or provide the parts is even more important. Empathy is relevant beyond the automotive industry, and it must be measured.

Development Level: Training and development are critical, as the success of any service industry needs to have a well-trained team. Depending on the industry, there may be greater emphasis on the technical competency of the employees that requires a greater focus on technical training.

5.8 Conclusion

Servitization is widely recognized as the way manufacturers move from selling products to integrated products - service approach. Such a move requires manufacturers to change their strategy and break with the traditional decoupling products from service. Manufacturers often rely

on a dealer network to provide the required service support to the customers. However, they have to address the challenges of managing and orchestrating the network approach.

A performance management system is a tool that assists manufacturers to manage the performance of their network. This paper has explored the performance management system in automotive dealer networks with specific reference to aftersales service. The proposed framework and metrics are intended to be used by automotive manufacturers to manage the aftersales operation of their dealer network.

The proposed management system addresses several performance areas at each level, emphasising both the efficiency and effectiveness of performance, customer-oriented measures, the balance between financial indicators and those which are related to the drivers of the operation but have financial implications, and involves both long-term and short-term perspectives with the focus on both efficiency- and effectiveness-oriented measures.

CHAPTER SIX: MEASURING SERVICE QUALITY IN THE AUTOMOTIVE INDUSTRY USING THE SERVQUAL SCALE

6.1 Introduction

The objective of this chapter is to investigate the diagnostic abilities of the SERVQUAL scale and the applicability to the automotive aftersales.

- **The third research objective** is to evaluate the diagnostic abilities of the SERVQUAL scale in analyzing how the customer perceives the quality of the service performed and the applicability of the scale dimensions in automotive aftersales services settings.
- **The third research question** is: What are the diagnostic abilities of the SERVQUAL scale in capturing how the customer perceives the quality of the service performed, and the applicability of the scale dimensions to the automotive aftersales services setting?

The chapter achieves the research objectives and answers the research question by starting first with a review on the key literature related to the SERVQUAL scale and the theoretical and operational criticisms of the model. This followed by presenting the key decisions and choices made about the research method, data collection, sampling, and analysis followed by presenting the statistical test applied and the results of the data analysis. This statistical analysis includes a descriptive statistical analysis on demographics, i.e., age, gender, and education, which is followed by Factor analyses to reduce the number of variables, and finally, the new factors will be used for a multiple regression analysis between the reduced variables and service quality. The final section discusses the results of all the tests of demographic factors and concludes by outlining the academic and practical contributions of the research and its limitations.

6.2 The Measurement of Service Quality

6.2.1 Literature status

The conceptualisation and measurement of service quality perceptions have been a controversial and much-debated topic in the services marketing literature to date (Brady and Cronin Jr 2001). The primary debates have focused on (1) the nature of service quality, i.e., whether it is a perception of performance or disconfirmation, and (2) the make-up of service quality, or whether it is a single construct or an aggregation of several dimensions or components (Suuroja 2003).

Research in service quality has generally adopted one of two conceptualisations. The first is the perspective of the Nordic model proposed by Grönroos (1984), which identifies two dimensions of service quality: the functional and technical quality. The second was the SERVQUAL scale proposed by Parasuraman, Zeithaml et al. (1988), that proposed five dimensions, namely reliability, responsiveness, assurance, empathy, and tangibility, as characteristics of the service experience.

The Nordic model used the disconfirmation paradigm for the measurement of service quality. It divides the customer's perceptions of the service process into two dimensions, the technical quality that is the outcome dimension, or what the customer receives as a result of the interaction with the service firm, and the functional quality that represents the process or means by which the technical quality is transferred to the customer functionally; this is done through the process, i.e., the customer - employee interaction, or how the employees perform their task and how the service is done. The work done by Brady and Cronin Jr (2001) added a third component to the two proposed by Grönroos (1984), that is, the quality of the physical environment, which includes the ambient conditions, design, and social factors. The model recognises that the

company's image has an impact and functions as a filter in the customer's perception of quality (Caruana 2002).

The SERVQUAL scale introduced by Parasuraman, Zeithaml et al. (1985; 1988) is one of the best known and most commonly used measures of service quality (Buttle 1996; Ladhari 2009). The next section discusses this in some detail, as it is the scale used in this research.

6.2.2 The SERVQUAL Scale

The disconfirmation paradigm is also the basis of the SERVQUAL model. When the SERVQUAL scale was developed, it was presented as a generic instrument for measuring service quality across a broad range of service categories. According to Parasuraman, Zeithaml et al. (1985), the SERVQUAL model is based on gap analysis. The customer's perception of service quality is influenced by five 'gaps':

Gap 1 is the difference between customer expectations and management perceptions of customer expectations;

Gap 2 is the difference between management perceptions of consumer expectations and the translation of these perceptions into service-quality specifications;

Gap 3 is the difference between the service delivered by frontline service personnel on a day-to-day basis and the specifications set by management;

Gap 4 is the difference between service delivery and what is promised in external communications to consumers;

Gap 5 is the difference between customer expectations and perceptions (that is, perceived service quality as described above).

The last gap (5) is considered a consequence of Gaps 1-4, and the first four gaps are considered to be within the control of the organisation and need to be analysed to identify actions for closing them.

The SERVQUAL scale was introduced as an instrument for measuring customers' perceptions of service quality and is based on Gap 5. When it was introduced in the mid-80s it was based on information from 12 focus-group interviews with consumers, one finding of which reported by Parasuraman, Zeithaml et al. (1985) was that customers evaluate service quality by comparing expectations (of the service to be received) with perceptions (of the service actually received) on ten dimensions representing service quality: reliability, responsiveness, competence, access, courtesy, communication, credibility, security, understanding the customer and tangibles.

These ten dimensions were later refined into five dimensions: reliability, assurance, tangibles, empathy, and responsiveness. The new model is known as RATER.

- **Reliability** (measured by five items) is the ability of the organisation to perform the promised service dependably and accurately;
- **Assurance** (measured by four items) includes communication, competence, courtesy, credibility, and security, which are retained from the previous model, and the knowledge and courtesy of employees and their ability to inspire trust and confidence;
- **Tangibles** (measured by four items) are the physical facilities, equipment, and the appearance of personnel;
- **Empathy** (measured by five items) includes access, communication, understanding the customer (from the first version of the model), and the caring and individualised attention that the firm provides to its customers;

- **Responsiveness** (measured by four items) is the willingness to help customers and provide prompt service.

6.2.3 Criticisms of the SERVQUAL Scale

Despite its popularity, the SERVQUAL scale has been subjected to several criticisms on theoretical and operational grounds, and several authors have identified potential difficulties with the conceptual foundation and empirical operationalization of the scale. These relate to (1) the dimensionality of service quality (i.e., whether there are two, three, four, five or 10 distinct dimensions), (2) the appropriateness of operationalizing service quality as a difference in gap scores, and (3) the measurement of service quality across multiple service functions, problems with the measurement of customer expectations and dimensionality as a function of customer expectations. The main criticisms in the context of the present research are discussed below:

Theoretical Criticisms

- **Changes in Customer Expectations:** the SERVQUAL model assumes that customer expectations are stable and do not change, which means that it fails to capture the dynamics of changing expectations. Consumers learn from experience, and their expectations rise over time and may also fall over time. To account for this, service quality research needs to focus on the dynamics of changing expectations;
- **Number of Dimensions:** it is argued that the dimensionality of the model does not apply universally. The number of dimensions is also not constant. Research by different scholars indicates that the relevant dimensions do change depending on the industry; some have identified one factor, while others have proposed as many as ten factors. The number of factors can be one-dimensional in some industries and complex in others; this depends on the service being offered;

- **Item Loading:** the items do not always load on the factors suggested by the model; this reveals a high degree of correlation between the RATER dimensions;
- **Process Orientation:** SERVQUAL focuses on the process of service delivery, not the outcomes of the service encounter. This is defined as the difference between the functional and technical quality.

Operational Criticisms

- **Item Composition:** a criticism of the model from an operational perspective is that four to five items under each dimension cannot capture the variability of the dimension, and specific meaning to each dimension;
- **Variance Extracted:** the total amount of variance explained by the five RATER factors varied from research to another by industry. In general, the higher the variance it explains, the more valid the measure.

Critics have questioned the five generic dimensions of the scale and their applicability to all forms of service, as well as their stability from one context to another (Buttle 1996). As argued by Babakus and Boller (1992), the dimensionality of service quality may depend on the type of service under study. As a result, adaptations and/or replacements of SERVQUAL have been suggested for various industry-specific contexts(Ladhari 2009).

It has been argued that any straightforward adaptation of the SERVQUAL items will be insufficient to measure service quality across different industries. Carman (1990) explains that specific dimensions require expansion by the inclusion of more items to capture quality adequately across different services. Babakus and Boller (1992) argue that service quality can be a simple uni-dimensional construct in some contexts, but a complex multidimensional in other contexts.

6.3 Research based on SERVQUAL in the Automotive Aftersales Sector

There has been limited published research on aftersales service in the automotive industry using the SERVQUAL scale. This section reviews the studies that have used SERVQUAL in the context of aftersales across different non-western countries.

The empirical research conducted by Izogo (2015), investigate the diagnostic abilities and dimensional structure of the SERVQUAL scale within a non-western automotive repair service setting in the Nigerian market. The study indicated that the scale is a valid and reliable measure of service quality within the automotive repair services setting as it managed to replicate the five-dimensional SERVQUAL structure. However, the assignment of individual items to factors did not match the pattern reported in the SERVQUAL literature. The study also found that empathy emerged as the most significant dimension of service quality.

In their work Royne Stafford, Stafford et al. (1998) conducted an empirical study to identify the most critical determinants of perceived service quality and feelings of satisfaction in the automobile industry. The findings showed that the reliability component was the most critical determinant of both overall service quality and customer satisfaction, followed by assurance. Empathy was a key determinant of satisfaction.

Empirical research by Shuqin and Gang (2012) studied the relationship between different aftersales service qualities in the Chinese automobile sector and found that empathy, reliability, and convenience have a significant positive impact on customer satisfaction, while responsiveness does not have a significant effect.

The research conducted by Ambekar (2013) investigated the gap between expected and perceived quality as measured by SERVQUAL to know the current level of automobile service centre. This study showed the importance of reliability as one of the most important factors influencing service quality; the study also showed the applicability of the five dimensions.

In an empirical study, Jajae and Ahmad (2012) investigated the Australian car insurance industry to study the relationship between service quality and customer satisfaction. Their research showed the relationships that exist between five service quality dimensions (reliability, empathy, assurance, responsiveness, and tangibility) and customer satisfaction; they also found that there is a strong relationship between service quality and customer satisfaction.

Al-Shammari and Samer Kanina (2014), have researched the Saudi Arabian automotive market to examine service quality from the customer's point of view using the SERVQUAL model and utilising the five main dimensions. The study concludes that the most important quality dimensions from the customer's viewpoint are reliability and assurance, followed by tangibility and responsiveness, while the empathy dimension was the least important.

Several studies have taken a different approach to the five dimensions by grouping them into a smaller number and testing them. The research done by Saidin, Mokhtar et al. (2015), investigated Malaysian National Car Makers to study automotive aftersales service quality and relationship quality by grouping the dimensions.

Similarly Bouman and Van der Wiele (1992), conducted empirical research on Dutch garage firms, but regrouped and tested SERVQUAL, and found that the factors should be regrouped into two distinct dimensions with responsiveness, assurance, empathy, and reliability on one dimension termed 'customer kindness', and tangibility as a separate dimension. They found that only customer kindness contributed directly to measured service quality.

The research by Yieh, Chiao et al. (2007) studied automotive service and repair centres operated by Taiwan's three major car companies, regrouping the SERVQUAL dimensions and leaving tangibility as one separate dimension.

The available research on aftersales service reviewed here does indicate that the dimensions of the SERVQUAL model can predict service quality, although some studies conclude

that some dimensions are more important than others are which could be attributed to the customers in these markets. However, from the perspective of the current study, these findings are not seen as deficiencies but rather validate the essential usefulness of the scales. The SERVQUAL's dimensionality can provide a valuable diagnostic tool by indicating which of the five dimensions significantly influences overall quality perceptions (Parasuraman, Zeithaml et al. 1988). It can be argued that the differences between the results indicate that there is a need for some modification of the model. It is therefore recommended that industry-specific measures of service quality might be more appropriate than a single generic scale (Van Dyke, Kappelman et al. 1997).

6.3 Research Methodology

This section explains and justifies the methodological approach used to collect data in order to meet the objectives of the research. It also presents the research design, research variables, the population of the study, the sample and the sampling procedure, instrumentation, data collection procedure, scale validity, and reliability and the data analysis methods.

6.3.1 Data Collection - Sample and Data

The research data were collected from a customer satisfaction survey that was administered by the manufacturer to capture the level of customer satisfaction with the service performed at the dealer. The survey was designed to capture customer perceptions of all aspects and areas of the service performed. The areas measured were based on a set of identified customer expectations. These customer expectations were collected through field research conducted by the manufacturer to determine what a customer would expect from an automotive service experience (see appendix J: Customer Expectations). During our investigation, we found that the attributes

for measuring SERVQUAL were embedded in the survey questionnaire. The survey includes a direct question measuring the customer's perception of the overall quality of the service performed and additional questions covering all five dimensions of the model.

The data base had a total of 1420 completed customer survey during the period from June to December. Each survey was screened and examined by reviewing the answers for each question in the survey. Any survey that had any uncomplete answer to any question was removed. The total number of completed survey was then reduced to 1210 customer survey which formed the bases of the statistical analysis. Table 6.1 represents the number of chosen surveys by month.

Table 6.1 Survey Monthly Breakdown

		Month			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	JUN	163	13.5	13.5	13.5
	JUL	177	14.6	14.6	28.1
	AUG	161	13.3	13.3	41.4
	SEP	152	12.6	12.6	54.0
	OCT	197	16.3	16.3	70.2
	NOV	183	15.1	15.1	85.4
	DEC	177	14.6	14.6	100.0
	Total	1210	100.0	100.0	

The customer survey reseponce was collected by an independent global research company appointed by the manufacturrer. The response was collected by a combination of web-based surveys and phone surveys. Table 6.2 shows the retun break down.

Table 6.2 Returned Surveys Breakdown

		Return Method			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Phone	745	61.6	61.6	61.6
	Web	465	38.4	38.4	100.0
	Total	1210	100.0	100.0	

In the web-based surveys, customers received an email with a link to the survey which they were invited to complete, and once they had completed the survey, the responses were stored in the database. In the phone surveys customers received a phone call in which they responded to the same questions in the same sequence as in the online survey while the surveyer recorded their responses.

As the data is considered secondary data, the three characteristics reliability, suitability, and adequacy were investigated and data used in this research meets all three requirements. It was collected by a third-party research company that is specialized in conducting marketing research. Using a third party reassures interview respondents that they can be open and share their honest opinions. The research company has the infrastructure and technology required to capture the data correctly and appropriately. Additionally, all the telephone interviews were recorded for auditing purpose, all the interviewers were adequately trained, and a random audit that was conducted on four telephone interviews found a perfect match between the responses provided over the phone and the survey report. The data is also suitable for this study as the customer survey used was built on the dimensions of service quality proposed by Parasuraman, Zeithaml et al. (1988), and it, therefore, contained many of the elements which are incorporated in the SERVQUAL dimensions. The data, thus, fulfilled the research requirements.

6.3.3 Population Sample

The data collected through the customer survey is based on a probability sampling design. All the respondents had to meet the following criteria to be interviewed: they had to be first owner customers who had a paid warranty claim within 30 days of the repair visit and must not have completed a service survey within the previous 365 days

6.3.4 Research Sample Number

A total of 1,210 survey responses were analysed to identify the relationship between the quality dimensions proposed and the actual quality perceived by the customer. The survey data was collected for seven consecutive months for the same dealer.

This number of surveys was sufficient both in terms of the overall total and in terms of the monthly breakdown for a statistically valid analysis. The figures given here are for the total number of responses overall.

6.3.5 Measures

The survey includes a direct question that asks the customer to rate the quality of the service performed by the dealer, which is the research dependent variable. Additional questions covering the five SERVQUAL dimensions of reliability, responsiveness, assurance, empathy, and intangibles proposed by Parasuraman, Zeithaml et al. (1988) were adopted using the same operational definitions as proposed in the original model. These questions are independent research variables.

Independent Variables

Eighteen questions from the customer satisfaction survey were identified, which matched each of the five dimensions of the SERVQUAL instrument. Table 6.3 shows the questions that were used in the analysis with their corresponding dimensions.

Table 6.3 Independent Research Variables and their Corresponding Dimensions

Tangibles	The appearance of the service department
Reliability	Fix it right the first time Vehicle ready when promised Length of time to complete the service
Responsiveness	Answer/resolve concern in a timely manner Advising of future maintenance needs Cleanliness of vehicle Explanation of work and charges The overall vehicle pick-up process
Assurance	Treated with courtesy and respect Service Advisor Overall Keeping informed of vehicle status Time to retrieve the vehicle Understanding your service needs
Empathy	Convenient day/time for vehicle service Easy to schedule appointment Overall getting the vehicle in for service The efficiency of the check-in process

Dependent Variable

The dependent variable is the quality of the service performed. 1,210 surveys were completed. Service quality is focused on a direct question in the survey, which used a 5-point Likert scale. Table 6.4 presents the verbal description of the scales and the breakdown of responses.

Table 6.4 Breakdown of Responses for the Dependent Variable

	Frequency	Percent	Valid Percent	Cumulative Percent
Excellent	376	31.1	31.1	31.1
Very Good	427	35.3	35.3	66.4
Valid Good	274	22.6	22.6	89
Fair	78	6.4	6.4	95.5
Poor	55	4.5	4.5	100
Total	1210	100	100	

6.3.4 Response Scale Used- Survey Administration

The scale for all the 18 items, including the question measuring the customer's perception of the overall quality of the service performed, used a five-point Likert scale, fully anchored with a verbal description for all the points. For an explanation of scoring, see appendix I- Metrics KPI's Sample Calculation–Likert scale questions for the scoring methodology. The scale was labelled as follows:

- 5 = Completely Satisfied
- 4 = Very Satisfied
- 3 = Neither Satisfied nor Dissatisfied
- 2 = Somewhat Dissatisfied
- 1 = Very Dissatisfied

6.4 Data Analysis

Many statistical procedures have been used by different researchers to measure customer satisfaction; bivariate correlation and multiple regression analysis are often used to measure the

relationship between overall satisfaction and judgments about a service. Factor analysis is also applied to reveal the inter-correlation among the variables or for reducing the number of variables.

This analysis will start by testing the independent and dependent variables for normality. This will be followed by a descriptive statistical analysis of demographics, i.e., age, gender, and education. Factor analyses will be used to reduce the number of variables, and finally, the new factors will be used for a multiple regression analysis between the reduced variables and service quality.

6.4.1 Testing for Normality

The independent and dependent variables were all tested for normality using the Kolmogorov-Smirnov test for normality. With Sig. less than 0.05 indicating deviation from normality, all the data shows deviation from normality. However, the sample size is large enough (≥ 30), so the central limit theorem meant that the standard t-test could be used to test the difference between demographic factors. No assumptions were made about any particular differences. 2-tailed tests were used, which suggested caution about using the usual 5% significance threshold since a set of 18 tests was to be conducted. The test was adjusted for this to give a family-wise error rate of 5%, meaning that the individual p-value should be $< .0028$ to be considered robust (Field 2009). See Appendix K- Testing For Normality

6.4.2 Analysing Demographics

The data was analysed by investigating potential differences according to the major demographic segmentation (gender, age, level of education, nationality). Data were examined for all demographic segments against the independent and dependent variables.

6.4.2.1 Gender

Examining the difference between the mean values of the dependent variable based on gender shows that the mean value of males is higher than the female. Additionally, when examining the difference between the means of all independent variables and gender, the box plot shows that males have a higher mean than female in all 18 questions. This was investigated further by carrying out a robust statistical test. The t-test on gender shows that the significant results are for 'Length of time to complete the service' (4b), where $p = .00168$, and 'Quality of service performed' (4a), where $p = .00143$. Table 6.5 represents the breakdown of responses by gender (male/female)

Table 6.5 Breakdown of Responses by Gender

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Male	1070	88.4	88.4	88.4
Female	140	11.6	11.6	100
Total	1210	100	100	

6.4.2.2 Nationality

The survey was administrated on a pool of customers with a wide and diverse range of nationalities. The survey classifies customers as (1) national (originally from the country in which the research was done), (2) Middle East expatriate (Arab expatriates), (3) Asian expatriate, (4) African expatriate, or (5) western expatriate. An examination of the difference between the means of all the independent variables and nationality shows that overall western expatriate customers rated the service performed less than other nationalities. Table 6.6 represents the breakdown of responses based on the nationality of the driver.

Table 6.6 Breakdown of Responses Based on Nationality of the Driver

	Frequency	Percent	Valid Percent	Cumulative Percent
A National	55	4.5	4.5	4.5
Middle East Expatriate	280	23.1	23.1	27.7
Asian Expatriate	637	52.6	52.6	80.3
Valid African Expatriate	39	3.2	3.2	83.6
Western Expatriate	185	15.3	15.3	98.8
Other	14	1.2	1.2	100
Total	1210	100	100	

The outcome of the Kruskal-Wallis Test confirmed that differences between nationalities also exist in responses to the following questions, Table 6.7 presents the Kruskal-Wallis test results:

- Quality of service performed
- Easy to schedule appointment
- Appearance of service department
- Efficiency of check-in process
- Treated with courtesy and respect
- Understanding your service needs
- Cleanliness of vehicle

Explanation of work and charges

Table 6.7: Kruskal-Wallis test results

	Chi-Square	df	Asymp. Sig.	Monte Carlo Sig.		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Overall getting vehicle in for service	14.18	4	0.007	.006c	0.004	0.008
Service Advisor Overall	8.336	4	0.08	.082c	0.074	0.089
Quality of service performed	21.28	4	0.000	.000c	0.000	0.000
Fixed it right the first time	3.279	4	0.512	.506c	0.493	0.518
Overall vehicle pick-up process	12.088	4	0.017	.015c	0.012	0.018
Easy to schedule appointment	17.779	4	0.001	.002c	0.001	0.003
Convenient day/time for vehicle service	11.82	4	0.019	.020c	0.017	0.024
Appearance of service department	34.831	4	0.000	.000c	0.000	0.000
Efficiency of check-in process	18.685	4	0.001	.001c	0.000	0.001
Treated with courtesy and respect	23.188	4	0.000	.000c	0.000	0.000
Understanding your service needs	20.425	4	0.000	.000c	0.000	0.001
Answer/resolve concern in timely manner	10.233	4	0.037	.038c	0.033	0.043
Keeping informed of vehicle status	3.595	4	0.464	.469c	0.456	0.482
Length of time to complete the service	13.3	4	0.01	.009c	0.007	0.012
Cleanliness of vehicle	54	4	0.000	.000c	0.000	0.000
Vehicle ready when promised	10.729	4	0.03	.029c	0.024	0.033
Time to retrieve vehicle	15.052	4	0.005	.005c	0.003	0.007
Explanation of work and charges	23.076	4	0.000	.000c	0.000	0.000
Advising of future maintenance needs	13.677	4	0.008	.011c	0.008	0.013

What can be concluded from these results is that certain nationalities have different perceptions of the quality of service provided, and in particular, that Europeans seem to have higher expectations. This finding demonstrates the ability of the SERVQUAL scale to show differences and provide useful guidance for management

6.4.2.3 Education

The survey classifies customers according to the educational background as follows: (1) high school graduate or less, (2) technical/trade school graduate or Some College/Un, (3) college/university graduate, or (4) post-university graduate. Table 6.8 represents the breakdown of the responses based on the educational level of the driver. The analysis found that the first two classifications made up less than 8% of the sample, and because of these low numbers, the ‘high school graduate’ and ‘technical/trade school graduate or Some College/Uni’ were removed.

Table 6.8 Breakdown of Responses Based on Education of the Driver

	Frequency	Percent	Valid Percent	Cumulative Percent
High school graduate or less	34	2.8	2.8	2.8
Technical/trade school graduate or Some College/Un	60	5	5	7.8
College/University graduate	668	55.2	55.2	63
Post University graduate	448	37	37	100
Total	1210	100	100	

Education does not seem to have any effect on the responses or how customers perceive the factors. The Kruskal-Wallis Test also confirms the outcome, see table 6.9 for Kruskal-Wallis Test results:

Table 6.9 for Kruskal-Wallis Test results:

	Chi-Square	df	Asymp. Sig.	Monte Carlo Sig.		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Overall getting vehicle in for service	1.541	3	0.673	.671 ^c	0.659	0.683
Service Advisor Overall	6.735	3	0.081	.081 ^c	0.074	0.088
Quality of service performed	7.981	3	0.046	.046 ^c	0.041	0.052
Fixed it right the first time	1.264	3	0.738	.735 ^c	0.724	0.746
Overall vehicle pick-up process	4.078	3	0.253	.256 ^c	0.244	0.267
Easy to schedule appointment	3.208	3	0.361	.368 ^c	0.355	0.38
Convenient day/time for vehicle service	3.245	3	0.355	.350 ^c	0.338	0.362
Appearance of service department	5.944	3	0.114	.117 ^c	0.109	0.125
Efficiency of check-in process	2.495	3	0.476	.470 ^c	0.457	0.483
Treated with courtesy and respect	1.941	3	0.585	.591 ^c	0.578	0.604
Understanding your service needs	7.321	3	0.062	.064 ^c	0.058	0.071
Answer/resolve concern in timely manner	4.39	3	0.222	.222 ^c	0.211	0.233
Keeping informed of vehicle status	3.241	3	0.356	.357 ^c	0.345	0.369
Length of time to complete the service	5.316	3	0.15	.151 ^c	0.141	0.16
Cleanliness of vehicle	9.649	3	0.022	.020 ^c	0.017	0.024
Vehicle ready when promised	3.814	3	0.282	.282 ^c	0.271	0.294
Time to retrieve vehicle	7.182	3	0.066	.065 ^c	0.059	0.071
Explanation of work and charges	7.598	3	0.055	.052 ^c	0.046	0.058
Advising of future maintenance needs	5.284	3	0.152	.154 ^c	0.144	0.163

6.4.2.4 Age

The survey classifies age groups as (1) under 25, (2) 25 – 34,(3) 35-44, (4) 45 – 54, (5) 55 – 64 and (6) 65-74. Table 6.10 represents the breakdown of the responses based on the age of the driver. An examination of the numbers shows that the under 25s, 55 – 64, and 65-74 categories can be eliminated, which leaves 1,000 respondents to focus on. The reason for such low numbers in these age groups is that the majority of the residents of the country are expatriates, as can be seen from the nationality breakdown.

Table 6.10 Breakdown of Responses Based on Age of the Driver

	Frequency	Percent	Valid Percent	Cumulative Percent
Under 25	29	2.4	2.4	2.4
25-34	444	36.7	36.7	39.1
35-44	479	39.6	39.6	78.7
45-54	204	16.9	16.9	95.5
55-64	49	4	4	99.6
65-74	5	0.4	0.4	100
Total	1210	100	100	

Analysis of the remaining age groups also shows that age does not seem to have any effect on the responses. The Kruskal-Wallis Test again confirms the analysis. See table 6.11 for Kruskal-Wallis Test results.

Table 6.11: Kruskal-Wallis Test results

	Chi-Square	df	Asymp. Sig.	Monte Carlo Sig.		
				Sig.	99% Confidence Interval	
					Lower Bound	Upper Bound
Overall getting vehicle in for service	3.962	2	0.138	.141 ^c	0.132	0.15
Service Advisor Overall	4.388	2	0.111	.111 ^c	0.103	0.119
Quality of service performed	0.45	2	0.799	.804 ^c	0.793	0.814
Fixed it right the first time	3.63	2	0.163	.168 ^c	0.158	0.177
Overall vehicle pick-up process	4.42	2	0.11	.109 ^c	0.101	0.117
Easy to schedule appointment	1.155	2	0.561	.559 ^c	0.546	0.572
Convenient day/time for vehicle service	4.088	2	0.13	.127 ^c	0.118	0.135
Appearance of service department	0.913	2	0.633	.634 ^c	0.621	0.646
Efficiency of check-in process	1.974	2	0.373	.376 ^c	0.363	0.388
Treated with courtesy and respect	3.399	2	0.183	.183 ^c	0.173	0.193
Understanding your service needs	4.928	2	0.085	.089 ^c	0.081	0.096
Answer/resolve concern in timely manner	4.888	2	0.087	.087 ^c	0.08	0.094
Keeping informed of vehicle status	2.797	2	0.247	.249 ^c	0.237	0.26
Length of time to complete the service	1.662	2	0.436	.440 ^c	0.427	0.453
Cleanliness of vehicle	1.591	2	0.451	.447 ^c	0.435	0.46
Vehicle ready when promised	0.108	2	0.947	.950 ^c	0.944	0.955
Time to retrieve vehicle	3.058	2	0.217	.213 ^c	0.202	0.223
Explanation of work and charges	1.248	2	0.536	.533 ^c	0.52	0.546
Advising of future maintenance needs	2.77	2	0.25	.252 ^c	0.241	0.263

6.4.3 PCA/FA Analysis

The data were subjected to an exploratory factor analysis using principal component analysis (PCA) on the 18 independent variables, with the varimax rotation for scale reduction and factor extraction and identification of smaller sets of factors with eigenvalues greater than or equal to 0.7. Factor analysis attempts to identify the underlying factors or dimensions that have been used and to describe what the factors represent conceptually (Garson, 2005). Before the PCA analysis, various suitability tests were conducted.

The sampling adequacy for factor analysis was verified using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's (1954) test of sphericity. Table 6.12 shows the KMO and Bartlett's Test. High values (between 0.5 and 1.0) indicate that factor analysis is appropriate, while values below

0.5 imply that factor analysis may not be appropriate (Tabachnick and Fidell 2007). Also, all the KMO values for the individual variables (the diagonal elements of the anti-image correlation matrix) are greater than the threshold of .5 (Field, 2009, p. 659). For these data, all values are over 0.9, which is superb. See Appendix L for the PCA/F.A analysis.

Table 6.12: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.962
	Approx. Chi-Square	15752.966
Bartlett's Test of Sphericity	df	153
	Sig.	0

The correlation matrix was also inspected for factorability, as suggested by Tabachnick and Fidell (2007). A factorability of 0.3 indicates that the factors account for approximately 30 percent of the relationship within the data and therefore validates the use of factor analysis (Williams, Onsman et al. 2010).

Four factors were obtained and subjected to the oblique rotation to allow correlation between categories. Initially, the number of factors was set to five to resample the same number of dimensions as in the SERVQUAL model; the loading table showed that all the factors in factor 5 had a (-ve) loading. The scree plot showed that only one factor had an eigenvalue of more than 1, meaning that only one factor could be retained. To confirm this, a parallel analysis was conducted, which also suggested that one factor should be retained. At this point, Kaiser's Criterion seemed too strict, so following Jolliffe (1972) suggestion of reducing Kaiser's threshold from 1 to around 0.7, four factors were retained, representing all four dimensions of customers' perceptions of the service.

- The Kaiser-Meyer-Olkin measure verified the sampling adequacy for the analysis. KMO = .962, which is considered 'great' according to Field (2009).
- all the KMO values for individual values were >.944, which is well above the acceptable limit of .5; Bartlett's test of sphericity $\chi^2 (155) = 15752$, $p < .0005$, which indicated that the correlations between items were sufficiently large for PCA;
- four components had eigenvalues of over 0.7. The item clustering in the factor loading table differed from the previous clustering and varied across all the dimensions;
- the factor loading showed a shift in the loading of the variables under the dimensions of the SERVQUAL model; it not only showed a reduction of one dimension, but a mix of the factors loading together, and new dimensions were formed. The dimensions are interrelated.

The cluster of factors on the same component suggests that Component 1 ('Assurance') represents the factors that front-facing service personnel can control through direct communication with the customer. Component 2 ('Reliability') represents the outcomes of the service visit and whether the vehicle was fixed right the first time or not. Component 3 ('Empathy') represents factors related to there is a process in place. Component 4 ('Responsiveness') represents the delivery process of the vehicle. The four components explained 71.3 % of the variance in the factors. Table 6.13 presents the factor loadings after rotation and table 6.14 for pattern matrix. The table is color-coded to show the dimensions of the colors that previously loaded to.

Table 6.13 Factor Loadings

Pattern Matrix^a

	Component			
	1	2	3	4
3c Understanding your service needs	.883			
3b Treated with courtesy and respect	.865			
3d Answer/resolve concern in timely manner	.847			
3a Service Advisor Overall	.818			
3e Keeping informed of vehicle status	.704			
4d Fixed right first time		.902		
2d Easy to schedule appointment			.775	
2e Convenient day/time for vehicle service			.738	
4b Length of time to complete the service			.593	
2c Overall getting vehicle in for service			.572	
2f Appearance of service department			.545	
4c Vehicle ready when promised			.525	
5b Time to retrieve vehicle			.431	
2g Efficiency of check-in process			.417	
5c Cleanliness of vehicle				.821
5d Explanation of work and charges	.473			.550
5e Advising of future maintenance needs	.464			.507
5a Overall vehicle pick-up process				.447

Extraction Method: Principal Component Analysis.
 Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 11 iterations.

Table 6.14 Pattern Matrix

Assurance	Reliability	Empathy	Responsiveness
Service Advisor Overall	Fixe it right the first time(FIRTF)	Overall getting vehicle in for service	Cleanliness of vehicle
Treated with courtesy and respect		Easy to schedule appointment	Explanation of work and charges
Keeping informed of vehicle status		Convenient day/time for vehicle service	Overall vehicle pick-up process
Understanding your service needs		Efficiency of check-in process	Advising of future maintenance needs
Answer/resolve concern in a timely manner		Appearance of service department	
		Time to retrieve vehicle	
		Length of time to complete the service	
		Vehicle ready when promised	

6.4.4 MLR Analysis

During the factor analysis, factor scores were extracted using the Anderson-Rubin method and saved for the MLR analysis. The MLR was done using “Forced Entry” for testing; it was then repeated using the Stepwise method. The results confirm that Communication is the main factor explaining the maximum variance in the model, followed by Process, FIRFT, and Delivery. See fig 6.15 for the MLR coefficient analysis and Appendix M for the MLR full analysis.

The analysis shows that the four factors that were constructed from the 18 questions measuring customer perceptions can predict 61% of the result for the perception of service quality overall:

$$\text{Overall customer perception of the quality of the service performed} = 2.181 + .325 \text{ Assurance} + .269 \text{ reliability} + .294 \text{ Empathy} + .234 \text{ Responsiveness}$$

Table 6.15 MLR Coefficients Analysis

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.181	.023		95.171	.000	2.136	2.226					
	Communication	.733	.023	.677	31.976	.000	.688	.778	.677	.677	.677	1.000	1.000
2	(Constant)	2.181	.022		101.227	.000	2.139	2.223					
	Communication	.638	.023	.589	27.917	.000	.593	.682	.677	.626	.556	.891	1.123
	FIRFT	.289	.023	.267	12.634	.000	.244	.333	.461	.342	.252	.891	1.123
3	(Constant)	2.181	.020		107.999	.000	2.141	2.221					
	Communication	.419	.027	.387	15.380	.000	.366	.473	.677	.405	.287	.550	1.820
	FIRFT	.270	.021	.250	12.596	.000	.228	.312	.461	.341	.235	.887	1.128
	Process	.345	.027	.319	12.958	.000	.293	.398	.636	.350	.242	.575	1.740
4	(Constant)	2.181	.019		112.210	.000	2.143	2.219					
	Communication	.325	.028	.300	11.634	.000	.270	.380	.677	.318	.209	.485	2.062
	FIRFT	.269	.021	.248	13.025	.000	.228	.309	.461	.351	.234	.887	1.128
	Process	.294	.026	.271	11.211	.000	.242	.345	.636	.307	.201	.551	1.813
	Delivery	.234	.024	.216	9.843	.000	.187	.280	.561	.273	.177	.670	1.492

a. Dependent Variable: 4a Quality of service performed

6.5 Step 4: Discussion

The purpose of this paper is to investigate the diagnostic abilities and dimensional structure of the SERVQUAL scale in an aftersales services setting. It is claimed that the research has helped to answer the research question.

More important, and perhaps the major contribution of this study, is what has been found about the strength of the assurance dimension in affecting how customers perceive the quality of the service performed. The combination of the significant relationship between assurance and service quality, the strength of the parameter estimates, and the lack of any other significant variables suggest that the assurance dimension is a critical factor in achieving service quality.

The tangible dimension did not show importance, which could be explained as our construct did not contain expect one component for tangibility representing the appearance of the service facility. Tangibles such as offices may not be particularly relevant to customers, which could be a reflection of the fact that most contact between the dealer and the customer takes place in the reception area and away from employee offices, and so customers have minimal experience of the office surroundings. Furthermore, the dealer that was investigated in this research is well known for having state-of-the-art facilities that stand out among those of all other dealers in the region and even those of dealers selling other brands.

The importance of assurance and the items loaded to it shows the importance of human interaction between service employees and customers: it is the employees' knowledge, courtesy, and understanding, which represent quality in the eyes of the customers.

6.5.1 Research Analysis

This type of analysis can help identify those demographic segments that have the highest potential for defection, and thus the customers who should be given priority if marketing resources are limited.

6.5.1.1 Demographics Analysis

This section presents key findings arising from the analysis of demographic factors.

- **Gender:** analysis based on gender reveals that females perceive rate quality and the time taken to carry out their service lower than males, which could be attributed to their level of understanding of the service process and complexity of the process;
- **Nationality:** analysis based on nationalities shows that western customers rate all aspects of the service performed lower than other nationalities, which could be attributed to the fact that experiences shape their expectations in their home countries: western markets are more mature, and the level of service is generally higher than in the Middle East;
- **Age and education:** analysis based on age and education shows that these have only a minor effect on the responses.

6.5.1.2 PCA/FA Analysis

The factor analysis confirms some of the criticisms that have been directed at the SERVQUAL scale; this preliminary analysis suggests that the dimensionality of the model for the automotive customer in the Middle East is different, as there are only four dimensions rather than five. The loading of the items is different from what is proposed by the model.

6.5.1.3 MLR Analysis

The regression between the four factors and the overall service quality question indicates that the new dimensions of the SERVQUAL scale can account for only 61% of customers' perceptions of the quality of the service performed, which means that 39% must be attributable to a latent variable which cannot be explained.

This could mean that this particular manufacturer does not collect data covering the entire breadth of each dimension, which would suggest modifications should be made to the survey being used. Alternatively, it might mean that the dimensions in the assessment model are not sufficient

to capture how customers perceive quality and that further research needs to be done to identify and focus on measures of how customers perceive quality. It may also be possible to try to develop a more comprehensive model that can capture a more detailed picture of the quality dimensions.

6.5.2 Research Contributions

The contributions of this research are both academic and practical.

6.5.2.1 Academic Contribution

1. The research supports criticisms of the SERVQUAL scale regarding the number of dimensions, the items loading and composition, and variance extracted. While the constructs in this study do not fully explain the attributes of customer perceptions, the model remains important.
2. The research confirms the importance and applicability of the SERVQUAL scale to aftersales service in general. It is argued that the fact that the items loading differs from one component to another could be attributed to changes in customer expectations, which implies that customers may place a higher value on some attributes than on others. It is suggested that the model should be revised on an ongoing basis to match the change in customer expectations.
3. The results of the multiple regression models show that the four factors which were constructed from the 18 questions measuring customer perceptions can predict only 61% of the overall service quality level, suggesting that more items could be integrated into the model to enable it to capture more of the SERVQUAL factors.

6.5.2.2 Practical Contribution

Improving service quality is key for automotive aftersales services, as it leads to a competitive advantage in the market. By understanding the effects of different aspects of service quality on

customer satisfaction, managers can implement changes more effectively the findings of the current study suggest the following:

- 1- The research reveals the importance of the assurance dimension towered improving the automotive aftersales perceived service quality. If automotive aftersales personnel can provide dependable and appropriate service, demonstrate understanding and build a relationship with customers, then overall levels of perceived service quality and feelings of satisfaction are likely to be improved;
- 2- The results of the research suggest that if managers want to improve customers' perceptions of quality, focusing on assurance dimension would have the most significant impact while changing the responsiveness dimension would have the least impact;
- 3- The demographic analyses assist in revealing segments which have the highest potential for defection, and thus the customers who should be given priority to improve their perception of service quality;
- 4- The strategic implications are therefore straightforward: maximization of customer satisfaction can be achieved not by maximization but rather by optimisation of service quality.

6.6 Conclusion

This chapter presents an empirical investigation of the use of the SERVQUAL instrument as a measurement tool for perceptions of the quality of service performed in the automotive industry. While the outcomes of the research support a number of the criticisms which have been made of this model, it suggests that the measurement scale is still a valuable instrument, but that it needs to be adapted for each industry to which it is applied. While the constructs used by the

manufacturer investigated in this study did not explain customers' perceptions of service quality fully, they did explain significant aspects of it. This leaves questions to be answered by future research.

CHAPTER SEVEN: CONCLUSION

7.1 Introduction

The central research objective of this dissertation is to assist automotive manufacturers operating in the Middle East to make a successful servitization transition by developing a successful aftersales operation within their dealer network. Servitization aims to achieve high levels of customer satisfaction by delivering service quality. The research triangulates the servitization phenomenon from three angles, the manufacturer, dealer network, and the customer.

This central research objective has been broken down and is covered in three chapters as follows:

- **Chapter four research objective:** to develop a framework of the fundamental decision categories, which confront automotive manufacturers in configuring aftersales service operations within their dealer network.
- **Chapter five research objective:** to develop an aftersales service performance management framework with its associated metrics, to assist manufacturers in measuring the performance of key aspects of the aftersales service operation within their dealer network.
- **Chapter six research objective:** to evaluate the diagnostic abilities of the SERVQUAL scale in capturing how the customer perceives the quality of the service performed, and the applicability of the scale dimensions to the automotive aftersales services setting.

7.2 The Contributions of this Research

This dissertation contributes to the body of literature on servitization and provides an integrated industry-level analysis of the automotive sector in the Middle East. It expands the traditional notion of servitization by integrating the role service network as a necessity and one of the contributing factors in the success of the servitization transition for manufacturers. In chapter 4, it highlights the role of manufacturer in configuring the service network by presenting the “Service-focused servitization framework,” which identifies the fundamental decision categories that helps automotive manufacturing firms configure their service operations within their dealer network for a successful servitization transition. In chapter 5, the research highlights the role of manufacturer in managing the performance of the network to assure a successful servitization transition and provides the “customer-focused aftersales performance measurement framework” and metrics that assists automotive manufacturers, in managing their dealer network. Finally in chapter 6, the research provides conformity on the applicability of the SERVQUAL scale dimensions to the automotive aftersales services setting and improvement recommendations to the scale. The practical contribution of the research is believed to enhance managerial practices in various operational areas.

This following section outlines the contribution of the research in line with the overall dissertation objective as represented by the theoretical and empirical findings:

- Through operationalizing the ‘framework for production, product-centric servitized and service operations’ developed by Baines, Lightfoot et al. (2009) and extending the categories by integrating customer service categories. The proposed research framework contributes to filling the first knowledge gap identified in the literature and in itself extends the literature on servitization.

- The framework considered two levels of categories; a shift from the traditional manufacturing and service classification that classified decision categories structural and infrastructural. The framework integrated both under the “dealer network - service delivery system” level of decision categories and added the new level of “manufacturer - service support system” that is specific to service, thus adding another contribution to the servitization literature.
- The presented automotive-focused service classification scheme contributes to the literature by filling the second knowledge gap in the literature and expands the knowledge base and academic research related to service operation. The proposed classification scheme provides practical contribution as it can assist manufacturers in developing service systems that achieve strategic positioning based on the strategic priorities of customer satisfaction and service quality and can be extended to other industries, and serve as a platform for future academic studies.
- The service-focused servitization framework presented will provide automotive manufacturers with a set of strategic categories they need to take into account implementing servitization throughout their dealer network; it integrates elements from both manufacturing and service operations;
- By categorizing the level of customer interaction as ‘high’, the boundaries of customer interaction are expanded, and this becomes an essential element in the design of the service system;
- The research identifies some of the critical functions that should be available in an automotive dealer management system; it also lists the main staff cognitive awareness skills required to build a successful customer relationship.

- The aftersales performance management frameworks developed in the literature until now, are targeted mainly at manufacturers or dealers as a basis for managing their operations internally. The “customer-focused aftersales performance measurement framework” developed in this study is the only one that is designed to assist a manufacturer in managing the performance of its dealer network, thus help in filling the third literature gap and also adds to the servitization literature.
- The “customer-focused aftersales performance measurement framework” contributes to the literature by extending the aftersales performance measurement framework proposed by Gaiardelli, Sacconi et al. (2006) with specific reference to the automotive industry, and also presents a set of general criteria needed in an aftersales performance management framework, thus extending the knowledge on aftersales performance management. It contribute to the literature on servitization by providing a framework that assists manufacturers undergoing the servitization transition successfully by managing the aftersales service dealer network within their dealer network.
- The “customer-focused aftersales performance measurement framework” addresses several performance areas at each level, emphasizing both efficiency and effectiveness. At the same time, it addresses customer-oriented measures, the balance between financial and non-financial indicators, which relate the operative drivers with the financial results, and presents both long-term and short-term perspectives with the focus on efficiency- and effectiveness-oriented measures. It can be adopted by aftersales managers to measure the overall performance of the aftersales operations within the dealer network as it constitutes a holistic diagnostic instrument which is capable of providing the real status of operations and the level of detail required for a customer-centric servitized manufacturers’ network.

This will allow them to intervene and make any changes or improvements required to keep performance on the track.

- The research on the applicability of the SERVQUAL scale supports the importance of the scale and its applicability to aftersales service in general. The fact that the constructs in this study do not fully explain the attributes of quality as perceived by the customer, the importance of the model cannot be dismissed. Also, the difference in the items loading could be attributed to changes in customer expectations, i.e., the fact that customers may set higher importance to some attributes. It is suggested that the application of the model should be revised on an ongoing basis to account for the change in customer expectations.
- The statistical analysis done on the SERVQUAL scale revealed the strength of the “Assurance” dimension in affecting how customers perceive the quality of the service performed in the automotive industry. The combination of the significant relationship between Assurance and service quality, the strength of the parameter estimates, and the lack of any other considerable variables suggest that the Assurance dimension is a critical factor in achieving service quality. The research suggests that service organizations should concentrate on providing superior levels of Assurance. In short, if automotive aftersales personnel can offer reliable and appropriate service, demonstrate understanding, and build a relationship with customers, then overall levels of perceived service quality and feelings of satisfaction are likely to be reliable. The strategic implications are therefore straightforward: maximization of customer satisfaction can be achieved not by maximization but rather by optimization of service quality.
- The changes in the Assurance dimension have the most significant impact, while changes in Reliability have less. On the other hand, based on the results of the multiple regression

model, it is recommended that more items could be integrated into the model to enable it to capture more factors that contribute toward measuring the service quality.

7.2.4 Contributions beyond the Automotive Industry

The automotive industry has various similarities with other industries. In the case of durable manufactured products such as capital equipment, durable consumer goods, trucks, light machinery, and so on, the customer purchases an asset that is put to use for its useful life. Such products require servicing as they advance through their life, and therefore have costs of ownership beyond the purchase price (for spare parts and maintenance, etc.). These industries have the same structure as the automotive sector: manufacturers depend on a dealer network to provide the required customer support.

This dissertation has developed the ‘service-focused servitization framework,’ which presents the fundamental categories of decisions facing product-centric servitized manufacturers to enable their automotive service network to implement a successful service system.

It has also put forward the “customer-focused aftersales performance measurement framework” with its associated metrics, to serve as a diagnostic instrument which is capable of evaluating the performance of the operation in a realistic and detailed way, as well as the important dimension incorporated in the SERVQUAL scale. All of these can be extended to similar industries with minor modifications to account for the specific differences within each category concerning the type of product and the customer support required. It is acknowledged that there will be differences in each category in the framework and the composition of the quality dimensions, but the main categories will still apply. The two spheres of categories for the service delivery system and the OEM support systems in the basic framework are essential.

7.3 The Future of Automotive Servitization

This section presents a vision of the future, i.e., the changes which will take place in the servitization landscape and some thoughts on how dealers will need to respond.

7.3.1 The Servitization of Mobility

Global awareness of environmental issues and efforts to reduce CO₂ pollution resulted in pressure on auto manufacturers to produce cleaner engines. While many are still seeking to improve the internal combustion engine, the eco-system is changing, and the introduction of new technologies along with other factors will fundamentally change the automotive industry over the next 20-30 years and move it towards the servitization of mobility.

Four developments will shape the industry: (1) the electric car, (2) on-demand mobility services, (3) autonomous (self-driving) technology, and (4) car management software, which will move away from proprietary systems developed by car manufacturers to standard systems developed by software companies. The effects of such developments will be to move demand towards electric vehicles and away from customer-owned vehicles to mobility services.

Electric cars depend on electric motors rather than the internal combustion engines used in traditional vehicles, and there are fewer parts and components in electric vehicles than in traditional cars, resulting in reduced maintenance requirements. There is no need for oil changes or the long list of traditional forms of preventive maintenance, changing the setup of the supply chain and reducing the capital intensity and capital structure. The current breakdown of work in a dealer shows that nearly 50% of customer visits are related to preventive scheduled maintenance, and minor repairs, another 25%-35% for medium repairs, and the rest are major repairs. This means that the main source of income for a dealer comes from service. With the shift to electric cars, dealers will face a challenge to recover this income: with the electric car, most of the work will

relate to electrical concerns such as batteries, especially in the Middle East, with its high temperatures during the summer that affects the battery lifetime.

On-demand mobility services are increasing significantly, both in the form of convenient short-term rental services such as those provided by Zipcar or Car2Go (Mercedes-Benz) and Autolibin in many major cities and Uber-type services, reflecting the fact that technological developments are changing the ownership of vehicles from private individuals to major corporate owners. Although Uber traditionally relies on privately owned vehicles, in the Middle East, it is a major fleet owner as it owns all the vehicles. With the increase of such services, dealers will need to change their business model as the share of retail or privately owned vehicles will decrease, and the share of fleet owners will increase. Fleet owners require different levels of product support services from retail customers, which has an impact on dealers in terms of a city layout, the service process, and parts and logistics requirements.

Autonomous (self-driving) vehicles, once considered science fiction, are now becoming a reality, and the introduction of electric vehicles is one reason for this. However, autonomous vehicles bring another set of challenges. What will a vehicle do once it has dropped a passenger off - will it have to look for somewhere to park as it waits for a new customer, or will it continue to circle in a fixed route to find another customer, as taxis do? What will happen in the case of a breakdown? Most importantly, how will dealers service vehicles that cannot be dropped off by a customer? What is traditionally seen as 'customer service' that involves human interaction will become devoid of human interaction.

Autonomous vehicles eliminate the costs of a driver, and as there will be fewer accidents, both maintenance costs and insurance rates will fall, resulting in increased demand. The balance between demand for mobility services and the demand for owned cars will change the way service

will have to be provided, and this is something that all dealers and manufacturers will have to take into account.

The trend has been moving towards fully autonomous vehicles for some years. Currently available systems such as crash-warning systems, adaptive cruise control, lane-keeping systems, and self-parking technologies are just some examples of the factors driving this development.

The number of electric cars on the roads around the world is increasing. Car manufacturers are estimating that 20 million electric cars could be deployed by 2020, and between 40 and 70 million by 2025.

Such shifts in consumer and product demand will shift the structure of the automotive industry from the current form of servitization to the servitization of mobility. Many manufacturers need to start laying the groundwork for this shift by preparing for a dealer network that can provide the required support. The next section presents some of the ideas that the dealer network may consider.

7.3.2 Dealers' Reactions

Current practices for aftersales product-service support in dealers will need a major reorientation. What is currently offered, such as long-term, fixed-price maintenance, service bundles, service contracts and warranty extension contracts that are used to control the cost of ownership and ensure customer loyalty may not be sufficient in the future.

The dominant generation now is 'generation Y,' characterized as 'tech-savvy' and sophisticated, and they may no longer respond to traditional marketing and sales pitches. It is therefore likely that manufacturers and dealers will need to invest in hi-tech customer support infrastructure such as individualized service offerings via internet, self-service kiosks with speech recognition and direct on-line communication with the service centre so that customers can discuss the full range of service matters and prepare the repair order remotely. The vehicle can then be

taken to the dealer by a recovery truck or dropped off at the customer's convenience. Video conferencing can be used for communication with the customer, and faults in the vehicle can be demonstrated by the customer eliminating the need for the customer's physical presence at the dealer. On-line information systems will enable each customer to track the progress of the service and see vehicle service status.

Some manufacturers have developed advanced features in their vehicles that will allow them to communicate and send the details of the service required to the dealer so that the dealer can then contact the customer to schedule a service appointment. As communication technologies are becoming more sophisticated, forms of contact with customers that rely on *his physical presence* need to be updated to include his *virtual* presence as well (Zeithaml et al. 2002; Froehle and Roth 2004; Parasuraman et al. 2005).

The use of the internet of things (IoT) will allow the generation of value through more efficient resource allocation, higher productivity, and better utilization of resources and reduction of waste. Dealers may start considering the concept of Total Profit of Ownership rather than the traditional Total Cost of Ownership. Gathering data about drivers' behaviour and the use of a strong IT system can eliminate problems at an early stage: warnings and error codes can be monitored on a 'live' basis to enable major problems to be dealt with before they happen.

The transformation that the automotive industry is undergoing makes it more important than ever for automotive manufacturers to be sure that the dealer network is operating up to speed. If dealers cannot get it right by having a proper and efficient service delivery system, they will not be able to evolve and be ready for the future. The importance of this research is that it provides manufacturers with a foundation for developing an efficient aftersales service network, which is the first step in moving on and being ready for the challenges the future will bring.

This research should not be seen as limited to the Middle East as such. Its application can be extended across different regions in Asia and Africa, as manufacturers have the same structure in different parts of the world, with regional offices overseeing the operation. Some regional offices located in the Middle East are responsible for operations in Africa and parts of Asia. Manufacturers can, therefore, extend the application of the research to cover wider geographical areas to enhance the service operation of their dealers and improve the quality of the service delivered to their customers.

7.4 Limitations and future research opportunities

As with the majority of studies, the design of the current study is subject to limitations. There are three major limitations in this study that could be addressed in future research.

The primary limitation is related to the generalization of the research results. While the “service focused servitization framework” and the “The customer-focused aftersales performance measurement framework” are intended to be generalized across different automotive manufacturers; the empirical application was limited to a single case study for one automotive manufacture. This limits the investigation to the relationship between this particular manufacturer and its dealer network. Further evaluation of the frameworks is thus needed, involving more manufacturers. Future studies may operationalize the two frameworks and examine their applicability by covering more automotive manufacturers operating within and outside of the Middle East and upgrading the frameworks.

The second limitation is related to KPI’s proposed in the “The customer-focused aftersales performance measurement framework”. The list of performance indicators proposed in this paper are not meant to be exhaustive, but instead should be viewed as a preliminary set that could be

expanded according to the required application. Future research can adapt a downward approach and collect quantitative data to conduct comparative performance analysis between different service networks and identifying variant in performance and success factors. Quantitative studies could provide new complimenting views on this topic.

The third limitation is related to the quantitative analysis conducted to test the applicability of the SERVQUAL scale. The data utilized for the analysis was for a single dealers covering one country only. While the reliance on a single database gives the advantage of focusing on a homogenous group of customers, it limits the results as findings are based on one particular set of customers only. Future research can integrate data from different dealers in different countries to measure the applicability of the scale and the relationship between other dimensions and service quality. This would provide deeper insight on the customer evaluation to service quality in different markets. The use of a more heterogeneous sample from other countries might lead to a different result.

7.5 Conclusion

Firstly, it can be claimed that this research project has presented a credible triangulation of the servitization phenomenon. Secondly, the frameworks presented in Chapters 4 and 5, along with the study of the SERVQUAL scale in Chapter 6, provide automotive manufacturers with the tools they require to improve the aftersales operation in their dealer network and measure the performance of the operation within the network. Finally, it allows manufacturers to measure how customers perceive the level of service quality provided by the network. Furthermore, the results of the research can be extended to a variety of other industries.

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APPENDIX

Appendix A - Chapter 4: Interview Guide and Questions

The research guide below was designed to provide definitions and question for all the 13 principal categories that emerged from complaining the service categories and the Baines, Lightfoot et al. (2009) model.

Preliminary categorisation and propositions of	Research proposed definitions	Interview questions
<i>Characteristics of operations: structural</i>		
Process and technology	Represents the service technologies to achieve efficiency in service delivery	What technologies are required for a service organization to achieve efficiency?
Capacity	Capacity represents the availability of time in the workshop to meet customer demand	What is the capacity required? How to deal with fluctuation in customer demand?
Facilities	Represents the location of where the service is performed, it combines various elements such as equipment and tools required, location, looks	What are the requirements in a service facility to deliver high level of service quality? What are the elements that need to be in a facility?
Vertical integration	Represents the supply relationship between the manufacturer and part suppliers	What extent of vertical integration is required between the manufacturer and part suppliers?
Planning and control	Represents the availability of planning process inside the workshop	What techniques are used in workshop planning
<i>Characteristics of operations: infrastructural</i>		
Human resources	Represents HR practices utilized and the level of service personnel	What are the attributes and skill required in the service organization personnel? What HR practices should be utilized?
Quality control	Represents the quality of service performed as seen by the customer	What is service quality? How can dealers achieve a high level of service quality?
Product/Service Range	Represents the Product/Service support offers	What Product/Service support offers do customers require?
New product/service introduction	Represents how are new service offers formulated and deployed to the customers	How service offers are formulated? What are the drivers? How are they deployed?
Performance measurement metrics	How to measure the performance of a service delivery system	What are the measures required?
Supplier relations	Represents the relationship between manufacturer and dealers	What type of relation is required between manufacturer and dealers?
Customer relations	Represents the relationship between the manufacturer and dealer as their customers and the relation between dealer and customer	What type of relation is required between the manufacturer/dealer/customer?
Service process	Represents the process required to provide service to customers and the link between the front and back office	What process is needed to in a service delivery system ?

Appendix B - Chapter 4: List of Interviewees

A total of 19 interviews were conducted with 15 managers, the table below represents the details of the interviews: organization, identification (position), number of times interviewed purpose of the interview and the contribution of their answers.

Participant code	Organization	Identification	No. of times interviewed	Questions interview guide	Answers
1	OEM	Regional Aftersales Manager	3	Testing and formulation of the interview guide	Overview of research setting, questions, and outcome validation
2	OEM	Regional Aftersales Manager	3	Testing and formulation of the interview guide	Overview of research setting, questions, and outcome validation
3	OEM	Regional Aftersales Director	1	Framework operational decision categories	Components of framework
4	OEM	Regional Aftersales Manager	1	Framework operational decision categories	Components of framework
5	OEM	Regional Aftersales Manager	1	Framework operational decision categories	Components of framework
6	OEM	Regional Aftersales Manager	1	Framework operational decision categories	Components of framework
7	OEM	Customer Satisfaction Manager	1	Framework operational decision categories	Components of framework
8	OEM	Aftersales Zone Manager	1	Framework operational decision categories	Components of framework
9	OEM	Aftersales Zone Manager	1	Framework operational decision categories	Components of framework
10	OEM	Aftersales Zone Manager	1	Framework operational decision categories	Components of framework
11	Consultancy firm	Service consultant	1	Framework operational decision categories	Components of framework
12	Consultancy firm	Service consultant	1	Framework operational decision categories	Components of framework
13	Dealer	Service Manager	1	Framework operational decision categories	Components of framework
14	Dealer	Location manager	1	Framework operational decision categories	Components of framework
15	OEM (Different Brand)	Customer Quality Manager	1	Framework operational decision categories	Components of framework

Appendix C - Chapter 4: List of Codes Generated from the First Round and Second Round of Coding

The list below represents the initial 26 code generated from the first round of coding, this list was then reduced reduced to 14 codes in the second round of coding. The third round of coding reduced the number to 8, which are presented in the final model.

Codes generated from the first round of coding.

1. Compliance with corporate identity
2. Service Capacity
3. Tools
4. Equipment
5. Customer satisfaction
6. Service process
7. Facility
8. Employees
9. People
10. Empowerment of employees
11. Recourses – physical such as tools and operational cash flow
12. Performance measurement systems
13. Managerial capabilities
14. Attitude of employees
15. Meeting customer expectation
16. Service quality

17. first line managers
18. Organizational structure
19. Incentive system
20. Back office
21. Size of the facility
22. Location of the facility
23. Service offers
24. Supply chain & logistics
25. Training and support
26. Dealer management system (DMS)

Codes generated from the second round of coding

- 1- Customer satisfaction & Meeting customer expectation
- 2- Service quality
- 3- Facility:
 - Physical facility
 - Size of the facility:
 - Compliance with corporate identity (CI):
 - Facility Location
 - Service “Capacity
 - Tools & Equipment
- 4- Service Process
 - The connection from and back office
 - Workshop operation

5- Employees/ Dealer Personal Skills

- People
- Training
- Empowerment
- Rewording system
- Payment and wages

6- Organizational structure

7- Personal skills

8- Performance measures

9- Dealer management system (DMS)

10- Service offers

11- Warrant offers

12- Service contracts

13- Dealer Incentives

14- Micro-vertical integration

Appendix D - Chapter 4: Coding Sample

The table below represents the participant responses to the fine facility code and its sub codes flowed by a coding sample done on the questions related to facility and the emerged sup codes

Participant code	Question area	Respondent answer	Code
3	Facility	The right facility is not a palace, but rather one that fits the purpose of what the enterprise is trying to do. The facility enables to deliver the target. Our vision is to provide retail service excellence best in class within the volume automotive class; our facilities should include customer handling aspects, nice reception area, easy access, comfortable and convenient service area	Facility - Layout - External and internal appearance - Reception
8	Facility	a big aftermarket or after sales organization for a franchise dealer where you could have 20, 30, 40, 50 technicians, and the more and the bigger it is, the more links there are in the chain of that service organization which unfortunately means the more things you have to get right if you're going to deliver quality service, something that's competitive in the marketplace, because any time any small part of that falls over, the whole lot falls over as far as the customer is concerned	Facility - Capacity - Process
7	Facility	it is both your base of operations, it is the driver of your efficiencies depending on how it is structured, the layout, it is the façade, sounds terrible but it is the way you present your organization to the customer	Facility - Layout - External and internal appearance
11	Facility	The facility is the combination of the elements required, customer touch points and back office, so in our sense, it's the reception area, it's the workshop area, it's	Facility - Layout - Capacity - Reception area - Washing area

		the customer waiting area, it's the washing area, it's the parts facility, it's car parking....you can have the best workshop in the world and the capacity of 140 cars a day, if you can only park 20, you've got a problem	<ul style="list-style-type: none"> - Workshop - Parking area
12	Facility	things that you can identify visually are the aesthetics... the two main things that you need to control are people flow, whether they are external people or internal people and vehicle flow because that is where time is made and lost	Facility <ul style="list-style-type: none"> - Layout - External and internal appearance -
10	Facility	Facility and which includes location and design... reception, workshop, tools and equipment...	Facility <ul style="list-style-type: none"> -layout - Tools and Equipment - Reception - Workshop
13	Facility	What do I think I want the capacity to be? Does it include, you know, the ability to cope with 10 years' growth or whatever the period is, that gives us a baseline, then how do I fit it out, how do I lay this facility out on the piece of land that I have in terms of easy access, the best exposure	Facility <ul style="list-style-type: none"> - Capacity - Layout
14	Facility	Capacity represents having enough service hours to perform the required service and repairs to customers.	Capacity
15	Facility	The facility needs to comply with corporate identity, this represents how the dealer service department looks on the outside, inside, branding, and employees uniform	Facility <ul style="list-style-type: none"> - External and internal appearance -
5	Facility	Facility: represents the location that customers come to perform the service	Facility
2	Facility	availability of proper outside signage, parking for customer and visitors, clean reception area, enough space to accommodate customers, inside signage, S.A easy to be identified through desk, tag	Facility <ul style="list-style-type: none"> - External and internal appearance - Reception - Signage - Parking

4	Facility	the facility and the facility presumably includes all the things we discussed and that includes layout, parking, traffic flow, vehicle flow, people flow, then all of that needs to be wrapped up	Facility - Layout - Parking
2	Process	the more links there are, the more important that the process remains strong	Process
9	Process	some sort of quality process and the bigger it gets the more complex it gets	Process
1	Process	The bigger it gets, the more complex it gets, the more things around it go wrong, so the better the process needs to be	Process
11	Process	a service organization and I've seen plenty, needs to be process dependent, not person dependent	Process
12	Process	Process is an agreed method of operating, and it could be, I say agreed, it could be mandated, it could be developed over a period and then formalized as we've tried this, we've tried that, we've tried the other, if we do it this way, it works, let's formalize that and call it the process, so this is how I deal with a telephone	Process
3	Process	In organizations where things go wrong, it is because they are not linked, or there's no process to cater for a circumstance which might be unlikely but is going to happen	Process
5	Process	Represents the availability of proper structured process in place to run the business effectively, proper training and empowerment to the employees to be flexible in the process and also know their limits in authority	Process

Coding Sample:

The transcripts of all the interviews were examined, below is a sample of the coding done on the questions related to facility. These were initially considered as separate code then through the review process we classified as sub codes of a facility.

Participant 3: The right facility is not a palace (*code: facility*), but rather one that fits the purpose of what the enterprise is trying to do (*sub code: layout, internal and external appearance*). The facility enables to deliver the target. Our vision is to provide retail service excellence best in class within the volume automotive class (*sub code: external and internal appearance*); our facilities should include customer handling aspects, nice reception area (*reception area & internal appearance*), easy access (*sub code: layout*), comfortable and convenient service area (*sub code: layout*).

Participant 7: it's both your base of operations, it's the driver of your efficiencies depending on how it's structured, the layout (*sub code: layout*) it's the façade, sounds terrible but it's the way you present your organization to the customer (*sub code: external and internal appearance*).

Participant 11: The facility (*code: facility*) is the combination of the elements required, customer touch points and back office, so in our sense, it's the reception area (*sub code: reception*), it's the workshop area, it's the customer waiting area, it's the washing area, it's the parts facility, it's car parking (*sub code: layout*)...you can have the best workshop in the world and the capacity of 140 cars a day (*sub code: capacity*), if you can only park 20, you've got a problem (*parking area*).

Participant 12 : things that you can identify visually are the aesthetics (*sub code: external and internal appearance*)....the two main things that you need to control are people flow, whether they are external people or internal people and vehicle flow because that's where time is made and lost (*sub code: layout*)

Participant 5: Capacity represents having enough service hours to perform the required service and repairs to customers (*sub code: capacity*).

Appendix E– Chapter 5: Interview Participant List

A total of 21 interviews were conducted with 15 managers, the table below represents the details of the interviews: organization, identification (position), number of times interviewed purpose of the interview and contribution of their answers:

Participant code	Organization	Identification	No. of times interviewed	Questions interview guide	Answers
1	OEM	Regional Aftersales Manager	3	Testing and formulation of the interview guide	Overview of research setting, questions, and outcome validation
2	OEM	Regional Aftersales Manager	3	Testing and formulation of the interview guide	Overview of research setting, questions, and outcome validation
3	OEM	Regional Aftersales Director	1	Framework structure and metrics	Components of framework
4	OEM	Regional Aftersales Manager	2	Framework structure and metrics	Components of framework
5	OEM	Regional Aftersales Manager	2	Framework structure and metrics	Components of framework
6	OEM	Customer Satisfaction Manager	1	Framework structure and metrics	Components of framework
7	OEM	Aftersales Zone Manager	1	Framework structure and metrics	Components of framework
8	OEM	Aftersales Zone Manager	1	Framework structure and metrics	Components of framework
9	OEM	Aftersales Zone Manager	1	Framework structure and metrics	Components of framework

10	Consultancy firm (parts)	Consultant	1	Framework structure and metrics	Components of framework
11	Consultancy firm (service)	Service consultant	1	Framework structure and metrics	Components of framework
12	Dealership	Parts Manager	1	Framework structure and metrics	Components of framework
13	Dealership	Service Manager	1	Framework structure and metrics	Components of framework
14	OEM (Different Brand)	Customer Quality Manager	1	Framework structure and metrics	Components of framework
15	Business consultancy firm	Business Consultant	1	Final framework structure and metrics	Framework and metrics validation

Appendix F-Chapter 5: Coding Sample

The table below represents the participant responses and the related codes.

Participant code	Question area	Respondent answer	Code	KPI
1	Business Level	Dealers overlook the importance of the aftersales department in carrying the weight of other departments, Measuring the “Service Absorption” is one measure that reflects the strength of the aftersales department in mitigating the risk when sales decline	Financial results	- Service Absorption
2	Business Level	If you cannot guarantee the future flow of customers to the dealer you risk losing them to your competitors and will have a dent in your bottom line	Financial results	- Service contract penetration level - Extended warranty penetration level
5	Business Level	Customers now are more focused on the cost of ownership, the term “gas and go” should be the mojo to achieve that	Financial results	- Service contract penetration level
3	Business Level	Dealers are in the business of selling parts, if they do not turn their inventory frequently then their either have an unsalable part or something is going wrong in their sales channels. No matter what the reason is if they do not sell parts we do not sell parts	Financial results	- Stock Turn Over
7	Process level	A customer is an opportunity to make money for a service organization...you can survey, you can call, you can email, you can SMS, you know	Customer Satisfaction	- How Satisfied Are You With The Service Performed By The Dealer
4	Process level	to a large degree, the customer is the reason for existence... you can ask them “were you completely satisfied?”	Customer Satisfaction	- How Satisfied Are You With The Service Performed By The Dealer
9	Process level	A customer is a crucial element for a service organization. If there is no need there is no demand; then there is no need to supply a service.	Customer Satisfaction	- How Satisfied Are You With The Service Performed By The Dealer

6	Process level	The customer is our reason for existence, the best way to find out about customer satisfaction is to ask them.	Customer Satisfaction	- How Satisfied Are You With The Service Performed By The Dealer
11	Activity Level- Back Office	the customer touch points are the person they speak to on the phone, the person that they speak to when they are delivering the vehicle... They speak hopefully to a service advisor	Customer Facing Staff	Service advisor measures- how do you rate your service advisor in terms of: <ul style="list-style-type: none"> - Treat you with courtesy and respect - Understand your service needs - Explanation of work and charges - Answer/resolve concerns in a timely manner
14	Activity Level- Back Office	The back office is the most integrating in terms of its importance because without any one element of that the customer is not going to be happy. ..workshop and parts department needs to be perform as intended or you risk breaking the chain	Workshop operation Parts operations	- Productivity - Efficiency - Utilization Parts fill rate

Coding Sample:

The transcripts of all the interviews were examined, below is a sample of the coding done on the questions related to business level. The verbatim indicated several KPIs related to the business level.

Participant 1: Dealers overlook the importance of the aftersales department in carrying the weight of other departments, Measuring the “Service Absorption” is one measure that reflects the

strength of the aftersales department in mitigating the risk when sales decline (*KPI : service absorption*)

Participant 2: If you cannot guarantee the future flow of customers to the dealer you risk losing them to your competitors and will have a dent in your bottom line (*KPI: Service contract penetration level and extended warranty penetration level as they both guarantee future flow of customers to the dealership*)

Participant 5: Customers now are more focused on the cost of ownership, the term “gas and go” should be the mojo to achieve that (*KPI: Service contract penetration level, the term “gas and go” refers to the customer not spending money on servicing the vehicle but only pay for the gas*)

Participant 3: Dealers are in the business of selling parts, if they do not turn their inventory frequently then their either have an unsalable part or something is going wrong in their sales channels. No matter what the reason is if they do not sell parts we do not sell parts (*KPI: Stock Turn, this refers to the number of times dealer can sell a part*)

Appendix G- Chapter 5: Interview Guide

Interviews followed an interview guide consisting of a set of broad but clearly defined open-ended, below are the list of interview questions:

1-General opening questions:

- 1.1-How to measure the overall performance of A.S organizations
- 1.2-What areas should be in a performance measurement system, to have a holistic view of the operations.

These opening questions were intended to provide participants with space to provide a general structure for what they see as important areas and measures. Some participants provided intensive answers with a high level of in-depth information covering many areas and providing many performance indicators. Below are the questions for each level in the framework.

2- Business level

2.1- How to measure the financial performance for an after-sales department?

- 2.1.1- What affects the financial performance of an aftersales department?
- 2.1.2- What are the assets of an after sales organizations?
- 2.1.3- How do you measure the asset utilization?

2.2- What is the market share for A.S?

- 2.2.1- How to measure the market share?

2.3- What are the long-term and short-term financial measures?

3-Process Level

How to measure the customer satisfaction and perception of the service performed?

4-Activity Level

4.1- What are the departments within the aftersalesorganization that affect the customer satisfaction?

4.2- How do you distinguish between front office activities and back office activities?

- 4.2.1- How do you see the role of each in customer satisfaction?

4.3- How would you define the efficiency and effectiveness of an aftersales system?

- 4.3.1- How would you measure the efficiency and effectiveness of an aftersales system?

4.4- How would you measure the quality of the service performed

4.4.1- How would you measure that an aftersales system can deliver what it promises?

4.4.2- How you measure the responsiveness of a service system?

4.4.3- What would you consider as an internal lead time, and how would you measure it?

4.5- What do you consider as a waste in operation?

5- Development and innovation

5.1- What are the drivers for stable and adequate future competitive and financial results?

5.1.1- How would you measure these areas.

6- Concluding questions

6.1- How do you collect the data for the provided indicators?

6.2- How frequent should you collect the data?

Appendix H- Chapter 5: Framework Level Definitions and Theme Template

The table below represents the framework level definitions and the theme template created to use in the interviews and the coding:

A prior level	level Description and associated themes
Business Level	KPI's the capture the long-term and short-term viability of the company, it views organizational performance through the lenses financial performance, market share and waste and cost
Process Level	KPI'S that measures the success of the Aftersales operations with the customers, it views organizational performance through the lenses customer satisfaction, productivity, and flexibility
Activity level	KPI's the measure the performance of the AS operations in dealing with its specific activities, It views performance through the lenses of the front office and back office efficacy and effectiveness
Development and innovation level	KPI'S that capturing the drivers of stable and adequate future competitive and financial results. it views organizational performance through the lenses of human capital, infrastructure, technology

Appendix I- Chapter 5: Metrics KPI's Sample Calculation

The list below presents the suggested KPIs for each area in the “Customer-Focused Aftersales Performance Measurement Framework” and a sample calculation for each KPI.

- **Financial results- Service Absorption**

1. Aftersales direct profit / total overheads(x100) – baseline: 100%

- A- Direct Profit from aftersales = \$100,000
- B- Total Company overheads = \$110,000
- C- Overhead service absorption = $100,000/110,000= 90.9\%$
- D- Value of under absorption = \$100,000 (B-A)

- **Financial results- Service Contract Penetration Level (per month)**

2. Total number of service contracts sold/number of vehicles sold (x100) – baseline: 100%

- A- Total number of contract sold in the month = 90
- B- Total number of new vehicles sold in the month = 100
- C- Service Contract Penetration Level for the month = $90\% (A/B)$

- **Financial results - Extended Warranty Penetration Level (per month)**

3. Total number of Extended Warranty contracts sold/number of vehicles sold (x100) – baseline: 100%

- A- Total number of contract sold in the month =90
- B- Total number of new vehicles sold in the month = 100
- C- Extended Warranty Penetration Level for the month = $90\% (A/B)$

- **Financial results- Stock Turn Over**

4. Annualized parts purchases/parts stock value

- A- Annualised parts purchase= \$1,000,000
- B- Parts stock value(at cost price)=\$500,000
- C- Total parts stock turn (per year)= 2 turns (A/B)

- **Financial results - Parts sales per parc unit**

5. Annualized Part Sales/ vehicle parc

- A- Annualised parts sales = \$4,000,000
- B- Number of vehicles in parc = 13,000
- C- Parts sold per parc unit = \$307.7 (A/B)

- **Financial results - Parts Sales per Repair Order**

6. The total value of retail parts sold for the month/ total number of retail repair orders opened for the month

- A- The total value of retail parts sold for the month = \$250,000
- B- Total number of retail repair orders opened for the month = 700
- C- Parts Sales per Repair Order = \$357 (A/B)

- **Financial results - Hours sold per retail repair order**

7. Total number of Retail hours sold for the month/number of retail repair orders for the month

- A- Total value of retail hours sold for the month = 1,500
- B- Total number of retail repair orders opened for the month = 700
- C- Hours sold per retail repair order = 2.14 hrs (A/B)

- **Market Share - Service Retention**

8. Vehicle parc/number vehicle visits per VIN

- A- Vehicle Parc for the last 7 years

Year	2016	2015	2014	2013	2012	2011	2010
A-New Vehicle sales	13000	15000	16000	15000	14000	12000	10000
B-Visits per VIN for each year	12500	13000	12000	10000	8000	6000	4000
Retention (A/B)	96%	87%	75%	67%	57%	50%	40%

- Likert Scale Questions:

Various KPI's are collected through customer satisfaction survey that adopt a 5 point Likert scale scoring scale, fully anchored with a verbal description for all the points, the scale is labelled as following: 5 = Completely Satisfied, 4 = Very Satisfied, 3 = neither satisfied nor dissatisfied , 2 = Somewhat Dissatisfied, 1 = Very Dissatisfied.

Every answer on the scale has a corresponding score as shown below:

Scale	5	4	3	2	1
Label	Completely Satisfied	Very Satisfied	Neither satisfied nor dissatisfied	Somewhat Dissatisfied	Very Dissatisfied
Points	1	0.5	0	-1	-1

Below is an example of the final score for any of these questions. Assuming 10 customers responded to any of this question with the below distribution:

Scale	5	4	3	2	1
Label	Completely Satisfied	Very Satisfied	Neither satisfied nor dissatisfied	Somewhat Dissatisfied	Very Dissatisfied
Points	1	0.5	0	-1	-1
No of responses	5	2	1	1	1
Final score	5	1	0	-1	-1

5 completely satisfied + 2 very satisfied+ 1 neither satisfied nor dissatisfied + 1 Somewhat Dissatisfied + 1 Very Dissatisfied

$$A- \text{ Points Score } 5(1)+2(0.5)+1(0)+1(-1)+1(-1)=5+1+0-1-1= 4$$

$$B- \text{ Total number of responses } = 10$$

The score of this question = $4/10$ (100%) $A/B = 40\%$

This scoring methodology applies to all of the below questions:

- **Customer satisfaction**

9. How satisfied are you with the service performed by the dealer

- **Front Office**

10. How do you rate your Service Advisor in terms of

10.1 Treat you with courtesy and respect

10.2 Understand your service needs

10.3 Explanation of work and charges

10.4 Answer/resolve concerns in a timely manner

11. How do you rate your parts Advisor in terms of

11.1 Treat you with courtesy and respect

11.2 Understand your service needs

11.3 Explanation of work and charges

11.4 Answer/resolve concerns in a timely manner

Yes/No questions:

Various questions within the customer satisfaction survey are Yes/No questions, 1 point is scored for customer responding with “Yes,” and zero for customers responding with “No”, below is an example of the scoring:

A- Total number of customer surveyed = 10

B- Total number of yes responses = 7

C- Question score: 70% (A/B)

This scoring methodology applies to all of the below questions:

- **Deliverables (reliability) - Fix it right the first time (FIRTFT)**
 - 22. Number of customers that confirmed that the vehicle was fixed right/number of customers surveyed (x100)**
- **Deliverables (reliability) - Vehicle ready when promised**
 - 23. Number of customers that confirmed that the vehicle was ready when promised/number of delivered vehicles back to customers(x100)**
- **Deliverables (Empathy) - Convenience and Time of Appointments**
 - 24. Numbers of customers confirming that they are satisfied with the time taken to takean appointment/ number of customers surveyed (x100)**
- **Deliverables (Empathy) - Time taken to complete the service**
 - 25. Numbers of customers confirming that they are satisfied with the time taken to complete the service/ number of customers surveyed (x100)**
- **Deliverables (Empathy) - Time taken to take to deliver the required part – workshop**

- 26. Numbers of customers confirming that they are satisfied with the time taken to receive the required parts/ number of customers surveyed (x100)**
- **Deliverables (Empathy)/Time Taken to Deliver the Required Part (Through Parts Counter)**

- 27. Numbers of customers confirming that they are satisfied with the time taken to receive the required parts/ number of customers surveyed (x100)**
- **Customer Service Centre - Percent of Resolved Concerns**

12. Number of concerns resolved/number of concerns received (x100)

- A- Number of concerns resolved = 20
- B- Number of concerns received = 25
- C- Resolved concerns rate= 80% (A/B X100)

- **Customer Service Centre - Percent of Appointments**

13. Total Number appointments/ total number of retail R.O (x100)

- A- Total Number appointments = 500
- B- Total number of retail R.O = 700
- C- Appointments rate= 71% (A/B X100)

- **Customer Service Centre - Follow-up rate**

14. Number of follow-up calls/Number of complete retail R.O (x100)

- A- Number of follow-up calls = 650
- B- Total number of retail R.O = 700
- C- Follow-up rate = 93% (A/B X100)

Back office (Workshop Operations)

15. Productivity	Hour's sold/available hours (x100)
16. Utilization	Hours worked/available hours (x100)
17. Efficiency	Hours sold/ worked (x100)

A- Hours sold = 1000

B- Hours worked= 700

C- Available Hours = 800

Productivity = 125 % (A/C)

Efficiency = 142 % (A/B)

Utilization= 87.5 % (A/C)

Back office (Parts)

- **Back office(Parts Operations) - Parts first fill rate:**

18. Number of parts delivered (off-the-shelf) /number of parts requested (x100)

A- Number of parts delivered (off-the-shelf) = 1200 pcs

B- Number of parts requested = 1500

C- Fill rate = 80% (A/B)

- **Back office(Parts Operations) - Parts second fill rate:**

19. Number of parts delivered within 24hrs/ number of parts requested and was not available off the shelf (x100)

A- Number of parts delivered after 24 hrs=250

B- Number of parts requested and was not available off-the-shelf = 300

C- Parts Second fill rate = 80% (A/B)

- **Back office(Parts Operations)Parts emergency order**

20. Purchases of E.O / Total purchases (x100)

A- Purchases in E.O. = \$20,000

B- Total Part Purchases = \$1,000,000

C- E.O% = 2% (A/B x100)

- **Training certification and completion percent**

Total number of courses completed/total number of courses available(x100)

A- Total number of courses completed = 30

B- Total number of courses available= 33

C- Training completion rate = 91% (A/B x100)

The same calculation applies to the following:

28. Technician course completion

29. Service Advisor course completion

30. Manager course completion

Appendix J: Customer Expectations

The list below represents the customer expectations that were collected through field research conducted by the manufacturer to determine what a customer would expect from an automotive service experience:

Service Expectations #1

Make it convenient to have my vehicle serviced at your dealer

- Make it easy to schedule my service appointment
- Allow me to get an appointment on a day and time that is convenient for me
- Assist me with my alternative transportation needs (shuttle, rental car, loaner, etc.), if required

Service Expectation #2

Demonstrate a genuine concern for my service needs

- Promptly acknowledge me when I arrive at the dealer and begin my service write-up within a reasonable amount of time
- Demonstrate that you understand my service needs
- Provide me with an accurate estimate of when service will be completed
- Be honest and sincere with me

Service Expectation #3

Fix it right the first time

- Fix my vehicle right the first time I bring it in

Service Expectation #4

Complete servicing my vehicle in a timely and professional manner

- Service my vehicle in a reasonable amount of time
- Notify me of any changes in service needs or additional service requirements
- Notify me of any changes in when my vehicle will be ready
- Have my vehicle ready when promised
- Allow me to pick up my vehicle at a time that is convenient for me
- Return my vehicle as clean as or, ideally, cleaner than when I took it in

Service Expectation #5

Provide me with a clear and thorough explanation of the service performed

- Provide me with an explanation of all service performed and any charges
- Advise me of future service or maintenance needs my vehicle may require

Service Expectation #6

Call me within a reasonable amount of time after the service visit to ensure that I am completely satisfied

- Call me in a reasonable amount of time
- Be helpful to me

Service Expectation #7

Be responsive to questions or concerns I bring to your attention

- Answer my questions or resolve my concerns the first time I contact you about them
- Provide me with clear and helpful advice
- Follow through on any promises you make to help me

Appendix K: Testing for Normality

The independent and dependent variables were all tested for normality using the Kolmogorov-Smirnov test for normality.

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Recommend Dealer	0.332	1210	0	0.71	1210	0
Quality of service performed	0.23	1210	0	0.856	1210	0
Overall getting vehicle in for service	0.212	1210	0	0.844	1210	0
Service Advisor Overall	0.223	1210	0	0.857	1210	0
Fixed right first time	0.5	1210	0	0.467	1210	0
Overall vehicle pick-up process	0.223	1210	0	0.862	1210	0
Easy to schedule appointment	0.234	1210	0	0.831	1210	0
Convenient day/time for vehicle service	0.214	1210	0	0.837	1210	0
Appearance of service department	0.236	1210	0	0.828	1210	0
Efficiency of check-in process	0.221	1210	0	0.861	1210	0
Treated with courtesy and respect	0.271	1210	0	0.794	1210	0
Understanding your service needs	0.214	1210	0	0.84	1210	0
Answer/resolve concern in timely	0.215	1210	0	0.856	1210	0
Keeping informed of vehicle status	0.211	1210	0	0.862	1210	0
Length of time to complete the service	0.208	1210	0	0.87	1210	0
Cleanliness of vehicle	0.213	1210	0	0.857	1210	0
Vehicle ready when promised	0.241	1210	0	0.816	1210	0
Time to retrieve vehicle	0.205	1210	0	0.878	1210	0
Explanation of work and charges	0.199	1210	0	0.881	1210	0
Advising of future maintenance needs	0.202	1210	0	0.885	1210	0

Appendix L: PCA/F.A Analysis

The KMO values for the individual variables (the diagonal elements of the anti-image correlation matrix) are greater than the threshold of .5 (Field, 2009, p. 659). For these data, all values are over 0.9, which is superb.

		2c Overall getting vehicle in for service	3a Service Advisor Overall	4d Fixed right first time	5a Overall vehicle pick-up process	2d Easy to schedule appointment	2e Convenient daytime for vehicle service	2f Appearance of service department	2g Efficiency of check-in process	3b Treated with courtesy and respect	3c Understanding your service needs	3d Answer/resolve concern in timely manner	3e Keeping informed of vehicle status	4b Length of time to complete the service	5c Cleanliness of vehicle	4c Vehicle ready when promised	5b Time to retrieve vehicle	5d Explanation of work and charges	5e Advising of future maintenance needs
Anti-image Covariance	2c Overall getting vehicle in for service	.406	-.007	-.011	-.043	-.091	-.073	-.052	-.073	-.017	-.022	-.026	-.001	-.015	-.005	.017	.001	-.001	-.002
	3a Service Advisor Overall	-.007	.305	-.023	-.021	.027	-.025	-.008	-.042	-.064	-.037	-.072	-.039	.013	.014	.003	-.018	-.020	-.004
	4d Fixed right first time	-.011	-.023	.781	-.036	.025	-.036	.065	-.034	.101	-.020	-.025	-.010	-.020	-.021	-.053	.024	-.002	-.037
	5a Overall vehicle pick-up process	-.043	-.021	-.036	.311	-.002	.007	-.028	-.045	-.006	-.009	.025	-.006	.000	-.034	-.022	-.156	-.013	-.024
	2d Easy to schedule appointment	-.091	.027	.025	-.002	.625	-.070	-.048	-.020	-.016	-.009	-.010	-.016	-.014	-.027	.010	-.029	-.007	-.005
	2e Convenient daytime for vehicle service	-.073	-.025	-.036	.007	-.070	.420	-.037	-.016	.015	-.011	.003	.002	-.081	-.001	-.082	.005	.018	-.013
	2f Appearance of service department	-.052	-.008	.065	-.028	-.048	-.037	.559	-.078	-.041	.017	.002	.005	-.015	-.070	-.003	-.001	-.030	-.004
	2g Efficiency of check-in process	-.073	-.042	-.034	-.045	-.020	-.016	-.078	.421	.031	-.049	-.009	-.006	-.019	-.020	.010	-.013	-.003	.004
	3b Treated with courtesy and respect	-.017	-.064	.101	-.006	-.016	.015	-.041	.031	.378	-.109	-.002	-.032	-.009	-.017	-.019	-.004	-.022	-.010
	3c Understanding your service needs	-.022	-.037	-.020	-.009	-.009	-.011	.017	-.049	-.109	.266	-.090	.002	.007	-.001	.012	.005	-.021	-.008
	3d Answer/resolve concern in timely manner	-.026	-.072	-.025	.025	-.010	.003	.002	-.009	-.002	-.090	.247	-.076	-.014	.013	-.027	-.008	-.014	-.016
	3e Keeping informed of vehicle status	-.001	-.039	-.010	-.006	-.016	.002	.005	-.006	-.032	.002	-.076	.371	-.031	.009	-.043	-.001	-.015	-.050
	4b Length of time to complete the service	-.015	.013	-.020	.000	-.014	-.081	-.015	-.019	-.009	.007	-.014	-.031	.320	-.004	-.128	-.043	-.008	-.011
	5c Cleanliness of vehicle	-.005	.014	-.021	-.034	-.027	-.001	-.070	-.020	-.017	-.001	.013	.009	-.004	.563	-.012	-.033	-.104	-.032
	4c Vehicle ready when promised	.017	.003	-.053	-.022	.010	-.082	-.003	.010	-.019	.012	-.027	-.043	-.128	-.012	.330	-.033	-.013	.019
	5b Time to retrieve vehicle	.001	-.018	.024	-.156	-.029	.005	-.001	-.013	-.004	.005	-.008	-.001	-.043	-.033	-.033	.325	-.002	-.015
5d Explanation of work and charges	-.001	-.020	-.002	-.013	-.007	.018	-.030	-.003	-.022	-.021	-.014	-.015	-.008	-.104	-.013	-.002	.341	-.150	
5e Advising of future maintenance needs	-.002	-.004	-.037	-.024	-.005	-.013	-.004	.004	-.010	-.008	-.016	-.050	-.011	-.032	.019	-.015	-.150	.392	
Anti-image Correlation	2c Overall getting vehicle in for service	.974*	-.019	-.019	-.120	-.181	-.176	-.110	-.177	-.043	-.066	-.082	-.003	-.042	-.011	.048	.004	-.003	-.006
	3a Service Advisor Overall	-.019	.972*	-.048	-.067	.061	-.071	-.020	-.117	-.188	-.129	-.262	-.117	.042	.033	.009	-.057	-.063	-.012
	4d Fixed right first time	-.019	-.048	.944*	-.073	.036	-.062	.098	-.059	.186	-.044	-.057	-.018	-.040	-.031	-.104	.047	-.004	-.067
	5a Overall vehicle pick-up process	-.120	-.067	-.073	.947*	-.005	.019	-.067	-.125	-.017	-.030	.092	-.017	.001	-.081	-.070	-.491	-.039	-.070
	2d Easy to schedule appointment	-.181	.061	.036	-.005	.977*	-.137	-.081	-.038	-.034	-.023	-.026	-.034	-.030	-.046	.023	-.065	-.015	-.010
	2e Convenient daytime for vehicle service	-.176	-.071	-.062	.019	-.137	.966*	-.077	-.037	.038	-.034	.008	.005	-.220	-.003	-.221	.012	.048	-.032
	2f Appearance of service department	-.110	-.020	.098	-.067	-.081	-.077	.976*	-.161	-.090	.045	.004	.011	-.035	-.124	-.006	-.003	-.068	-.009
	2g Efficiency of check-in process	-.177	-.117	-.059	-.125	-.038	-.037	-.161	.976*	.078	-.148	-.027	-.014	-.053	-.042	.027	-.036	-.008	.011
	3b Treated with courtesy and respect	-.043	-.188	.186	-.017	-.034	.038	-.090	.078	.957*	-.344	-.006	-.086	-.025	-.037	-.055	-.012	-.062	-.025
	3c Understanding your service needs	-.066	-.129	-.044	-.030	-.023	-.034	.045	-.148	-.344	.953*	-.351	.005	.024	-.002	.041	.016	-.070	-.024
	3d Answer/resolve concern in timely manner	-.082	-.262	-.057	.092	-.026	.008	.004	-.027	-.006	-.351	.956*	-.250	-.049	.035	-.094	-.029	-.049	-.051
	3e Keeping informed of vehicle status	-.003	-.117	-.018	-.017	-.034	.005	.011	-.014	-.086	.005	-.250	.977*	-.090	.019	-.123	-.004	-.041	-.130
	4b Length of time to complete the service	-.042	.042	-.040	.001	-.030	-.220	-.035	-.053	-.025	.024	-.049	-.090	.958*	-.008	-.394	-.133	-.023	-.031
	5c Cleanliness of vehicle	-.011	.033	-.031	-.081	-.046	-.003	-.124	-.042	-.037	-.002	.035	.019	-.008	.974*	-.028	-.078	-.237	-.068
	4c Vehicle ready when promised	.048	.009	-.104	-.070	.023	-.221	-.006	.027	-.055	.041	-.094	-.123	-.394	-.028	.953*	-.102	-.039	.052
	5b Time to retrieve vehicle	.004	-.057	.047	-.491	-.065	.012	-.003	-.036	-.012	.016	-.029	-.004	-.133	-.078	-.102	.950*	-.006	-.042
5d Explanation of work and charges	-.003	-.063	-.004	-.039	-.015	.048	-.068	-.008	-.062	-.070	-.049	-.041	-.023	-.237	-.039	-.006	.956*	-.411	
5e Advising of future maintenance needs	-.006	-.012	-.067	-.070	-.010	-.032	-.009	.011	-.025	-.024	-.051	-.130	-.031	-.068	.052	-.042	-.411	.960*	

a. Measures of Sampling Adequacy(MSA)

Communalities

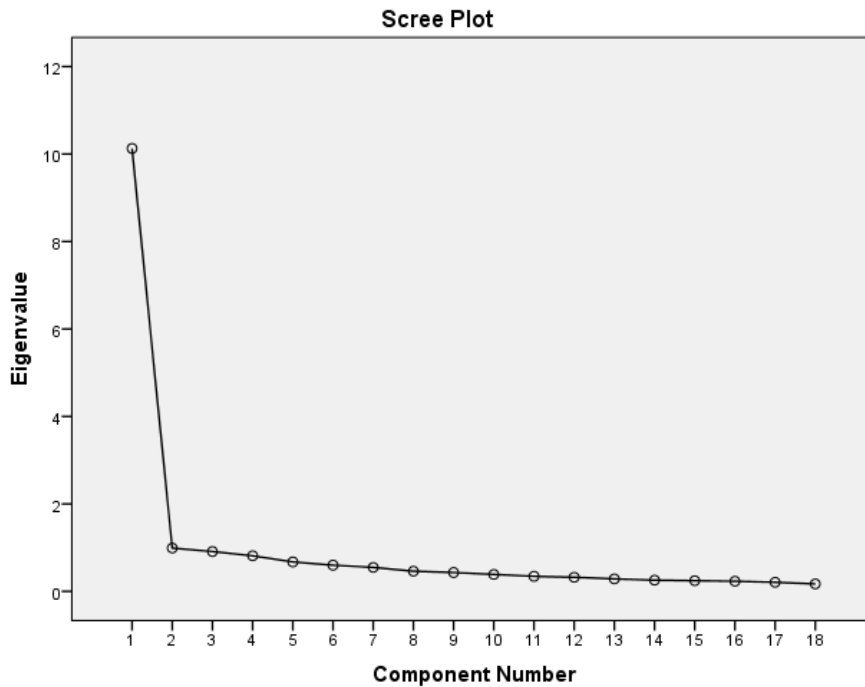
	Initial	Extraction
Overall getting vehicle in for service	1	0.659
Service Advisor Overall	1	0.771
Fixed it right the first time	1	0.822
Overall vehicle pick-up process	1	0.703
Easy to schedule appointment	1	0.583
Convenient day/time for vehicle service	1	0.718
Appearance of service department	1	0.606
Efficiency of check-in process	1	0.602
Treated with courtesy and respect	1	0.743
Understanding your service needs	1	0.804
Answer/resolve concern in a timely manner	1	0.822
Keeping informed of vehicle status	1	0.697
Length of time to complete the service	1	0.724
Cleanliness of vehicle	1	0.735
Vehicle ready when promised	1	0.705
Time to retrieve vehicle	1	0.676
Explanation of work and charges	1	0.764
Advising of future maintenance needs	1	0.706

Extraction Method: Principal Component Analysis.

Average communality	0.713
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Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	10.127	56.263	56.263	10.127	56.263	56.263	4.493	24.96	24.96
2	0.989	5.497	61.76	0.989	5.497	61.76	3.974	22.078	47.038
3	0.911	5.061	66.821	0.911	5.061	66.821	2.875	15.973	63.011
4	0.813	4.516	71.337	0.813	4.516	71.337	1.499	8.325	71.337
5	0.672	3.736	75.073						
6	0.599	3.329	78.402						
7	0.548	3.047	81.449						
8	0.461	2.561	84.01						
9	0.43	2.39	86.401						
10	0.387	2.147	88.548						
11	0.344	1.911	90.459						
12	0.322	1.791	92.25						
13	0.285	1.584	93.834						
14	0.256	1.423	95.257						
15	0.244	1.356	96.614						
16	0.231	1.283	97.897						
17	0.208	1.156	99.053						
18	0.17	0.947	100						



Sample size (Field, 2009, p.647)

- $N = 1210$, which is excellent for an FA
- 67 response per variable
- The determinant of the R-matrix = 0.00000204 which is greater than 0.000001, which implies not multicollinearity
- Average communality = .713
- Balance of sample size, commonalities, no. of factors and number of variables contributing to each factor seems sufficient

We conclude that this is an adequate sample for FA

Appendix M: MLR Modelling

Testing the four variables and Service Quality variable

Model Summary^a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.677 ^a	.458	.458	.797	.458	1022.462	1	1208	.000	
2	.782 ^b	.611	.610	.676	.153	158.098	3	1205	.000	1.989

a. Predictors: (Constant), A-R factor score 1 for analysis 21

b. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 2 for analysis 21, A-R factor score 3 for analysis 21, A-R factor score 4 for analysis 21

c. Dependent Variable: 4a Quality of service performed

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	649.731	1	649.731	1022.462	.000 ^b
	Residual	767.632	1208	.635		
	Total	1417.363	1209			
2	Regression	866.538	4	216.634	473.916	.000 ^c
	Residual	550.825	1205	.457		
	Total	1417.363	1209			

a. Dependent Variable: 4a Quality of service performed

b. Predictors: (Constant), A-R factor score 1 for analysis 21

c. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 2 for analysis 21, A-R factor score 3 for analysis 21, A-R factor score 4 for analysis 21

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	
1	(Constant)	2.181	.023		95.171	.000	2.136	2.226						
	A-R factor score 1 for analysis 21	.733	.023	.677	31.976	.000	.688	.778	.677	.677	.677	1.000	1.000	
2	(Constant)	2.181	.019		112.210	.000	2.143	2.219						
	A-R factor score 1 for analysis 21	.325	.028	.300	11.634	.000	.270	.380	.677	.318	.209	.485	2.062	
	A-R factor score 2 for analysis 21	.269	.021	.248	13.025	.000	.228	.309	.461	.351	.234	.887	1.128	
	A-R factor score 3 for analysis 21	.294	.026	.271	11.211	.000	.242	.345	.636	.307	.201	.551	1.813	
	A-R factor score 4 for analysis 21	.234	.024	.216	9.843	.000	.187	.280	.561	.273	.177	.670	1.492	

a. Dependent Variable: 4a Quality of service performed

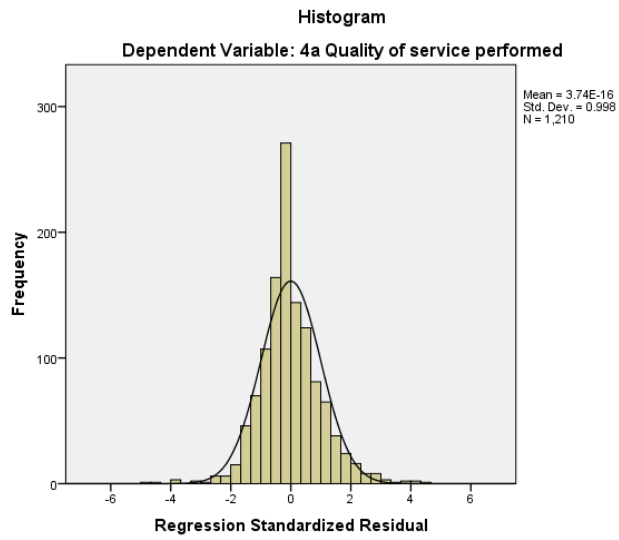
Collinearity Diagnostics^a

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	A-R factor score 1 for analysis 21	A-R factor score 2 for analysis 21	A-R factor score 3 for analysis 21	A-R factor score 4 for analysis 21
1	1	1.000	1.000	1.00	.00			
	2	1.000	1.000	.00	1.00			
2	1	2.290	1.000	.00	.07	.04	.07	.07
	2	1.000	1.513	1.00	.00	.00	.00	.00
	3	.849	1.642	.00	.00	.89	.02	.08
	4	.525	2.089	.00	.05	.04	.34	.77
	5	.336	2.610	.00	.88	.03	.57	.07

a. Dependent Variable: 4a Quality of service performed

- The difference between r2 and final r = .611- .610= .001. Which indicated that is the model was derived from the population rather than a sample it would account for approximately .1% less variance in the outcome
- All VIF values are well below 10 and the tolerance statistics are all well above .2.
- We can conclude that there is no collinearity within the data.

- The average VIF = 1.62 which is close to one, this confirms that collinearity is not a problem for the model.



Repeated the test using Stepwise methods

Model Summary ^a										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.677 ^a	.458	.458	.797	.458	1022.462	1	1208	.000	
2	.724 ^b	.525	.524	.747	.066	168.886	1	1207	.000	
3	.762 ^c	.580	.579	.702	.055	158.656	1	1206	.000	
4	.782 ^d	.611	.610	.676	.031	96.893	1	1205	.000	1.989

- a. Predictors: (Constant), A-R factor score 1 for analysis 21
- b. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 3 for analysis 21
- c. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 3 for analysis 21, A-R factor score 2 for analysis 21
- d. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 3 for analysis 21, A-R factor score 2 for analysis 21, A-R factor score 4 for analysis 21
- e. Dependent Variable: 4a Quality of service performed

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	649.731	1	649.731	1022.462	.000 ^b
	Residual	757.632	1208	.635		
	Total	1417.363	1209			
2	Regression	743.955	2	371.978	666.724	.000 ^c
	Residual	673.407	1207	.558		
	Total	1417.363	1209			
3	Regression	822.246	3	274.082	555.426	.000 ^d
	Residual	595.117	1206	.493		
	Total	1417.363	1209			
4	Regression	856.538	4	216.634	473.916	.000 ^e
	Residual	560.825	1205	.467		
	Total	1417.363	1209			

- a. Dependent Variable: 4a Quality of service performed
- b. Predictors: (Constant), A-R factor score 1 for analysis 21
- c. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 3 for analysis 21
- d. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 3 for analysis 21, A-R factor score 2 for analysis 21
- e. Predictors: (Constant), A-R factor score 1 for analysis 21, A-R factor score 3 for analysis 21, A-R factor score 2 for analysis 21, A-R factor score 4 for analysis 21

Coefficients ^a														
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF	
1	(Constant)	2.181	.023		95.171	.000	2.136	2.226						
	A-R factor score 1 for analysis 21	.733	.023	.677	31.976	.000	.688	.778	.677	.677	.677	1.000	1.000	
2	(Constant)	2.181	.021		101.569	.000	2.139	2.223						
	A-R factor score 1 for analysis 21	.494	.028	.456	17.474	.000	.439	.550	.677	.449	.347	.577	1.733	
	A-R factor score 3 for analysis 21	.367	.028	.339	12.996	.000	.312	.423	.636	.350	.258	.577	1.733	
3	(Constant)	2.181	.020		107.999	.000	2.141	2.221						
	A-R factor score 1 for analysis 21	.419	.027	.387	15.380	.000	.366	.473	.677	.405	.287	.550	1.820	
	A-R factor score 3 for analysis 21	.345	.027	.319	12.958	.000	.293	.398	.636	.350	.242	.575	1.740	
	A-R factor score 2 for analysis 21	.270	.021	.260	12.596	.000	.228	.312	.461	.341	.235	.887	1.128	
4	(Constant)	2.181	.019		112.210	.000	2.143	2.219						
	A-R factor score 1 for analysis 21	.325	.028	.300	11.634	.000	.270	.380	.677	.318	.209	.485	2.062	
	A-R factor score 3 for analysis 21	.294	.026	.271	11.211	.000	.242	.345	.636	.307	.201	.551	1.813	
	A-R factor score 2 for analysis 21	.269	.021	.248	13.025	.000	.228	.309	.461	.351	.234	.887	1.128	
	A-R factor score 4 for analysis 21	.234	.024	.216	9.843	.000	.187	.280	.561	.273	.177	.670	1.492	

- a. Dependent Variable: 4a Quality of service performed

Collinearity Diagnostics ^a								
Model	Dimension	Eigenvalue	Condition Index	Variance Proportions				
				(Constant)	A-R factor score 1 for analysis 21	A-R factor score 3 for analysis 21	A-R factor score 2 for analysis 21	A-R factor score 4 for analysis 21
1	1	1.000	1.000	1.000	.00	.00	.00	.00
	2	1.000	1.000	.00	1.00	.00	.00	.00
2	1	1.650	1.000	.00	.17	.17	.00	.00
	2	1.000	1.295	1.00	.00	.00	.00	.00
	3	.350	2.172	.00	.83	.83	.00	.00
3	1	1.856	1.000	.00	.12	.12	.09	.00
	2	1.000	1.362	1.00	.00	.00	.00	.00
	3	.799	1.524	.00	.04	.10	.89	.00
	4	.345	2.319	.00	.84	.78	.02	.00
4	1	2.290	1.000	.00	.07	.07	.04	.07
	2	1.000	1.513	1.00	.00	.00	.00	.00
	3	.849	1.642	.00	.00	.02	.89	.08
	4	.525	2.089	.00	.05	.34	.04	.77
	5	.336	2.610	.00	.88	.57	.03	.07

- a. Dependent Variable: 4a Quality of service performed

