FACTORS AFFECTING CUSTOMER RETENTION AT AUTHORISED COMMERCIAL VEHICLE WORKSHOPS IN INDIA

by

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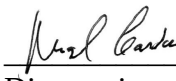

Dissertation chair - Dr. Gualdino Cardoso

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Dedication

I wish to dedicate this work of mine to my parents who wanted to see me with the title Dr. for a long time. With a lot of sacrifices, love and care they made me an engineer. I also wish to dedicate this to my daughter Jenisha and wife Anjali who were always there by my side and supported me to complete this research. Thanks to all my colleagues who motivated me to complete this research on time.

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ABSTRACT

FACTORS AFFECTING CUSTOMER RETENTION AT AUTHORISED COMMERCIAL VEHICLE WORKSHOPS IN INDIA

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2022 to 2025

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Retaining customers is vital for any business. Acquiring a new customer is very expensive while retaining customers help in growing the business further. Lot of research have been already carried out in the domain of customer retention across industries. Commercial Vehicle Business in India is one of the critical components in the economic activity of the country. It is cyclical in nature. The life of these vehicles is more than 15 years. To make such long durable products perform efficiently, a strong after-sales service is required. The number of registered commercial vehicles on the roads of the country are increasing every year, which is in turn attracting many new workshops to come up. The Commercial Vehicle (CV) manufacturers are investing heavily in the expansion of their sales and service network to cater to this growing population. Very little research has been carried out in the past with respect to customer retention at authorised workshops. Retaining customer is essential for a CV manufacturer to get vehicle performance feedback as well as to ensure

that their channel partners' business is viable. It is observed that the customers move away from authorised workshops as the vehicles get older. This research has been able to shortlist the factors which affects customers' visit to a workshop for availing its services. The list of 38 factors which affect customer retention based on extensive literature review was obtained. Through experts' scoring and evaluation, a list of 20 factors was shortlisted. These 20 factors were subjected to pairwise comparison by industry experts using Analytic Hierarchy Process (AHP) as well as Decision Making Trial & Evaluation Laboratory (DEMATEL) method. The AHP study was used to obtain the relative weights of these factors and DEMATEL method was used to obtain the relationship between these factors. The insights from the combined study helped in identifying 9 factors which are relatively important. Strategies as well as practically implementable ideas have been suggested based on these 9 factors for the CV manufacturers, which could probably help them retain the customers at their authorised workshops.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I:

INTRODUCTION

1.1 Introduction

1.1.1. Indian Automobile industry Landscape

Indian Automobile Industry holds substantial importance on the global platform and that is why many global players are here since the liberalization of government policies on foreign investments. Road transport controls 90% of passenger traffic and 67% of freight in the country. As of 2017, Indian Automobile industry is the 4th largest in the world; and in 2018 it was the 7th largest manufacturer of commercial vehicles (Muthuseshan, 2021). As of 2022, India overtook Japan in terms of Auto sales climbing to 3rd spot (CNBC, 2023). The government factors also had some weightage in the development of this sector through formulation of various schemes and policies. One which can be of great significance will be the Automotive Mission Plan 2006-16. This plan has achieved the target of additional employment of twenty-five million, attracted investment from global players exceeding the target of 157500 crores. On similar lines the vision statement of Automotive Mission Plan 2026 is Vision 3/12/65, which means by 2026 Indian Automobile Industry will be amongst the top 3 in the world with respect to engineering, manufacturing and export of vehicles and auto components, with 12% contribution to the GDP generating additional 65 million jobs. This clearly indicates that the Automobile sector will continue to be the backbone of the Indian Economy.

1.1.2. Automobile Segment Mix

The domestic share of automotive industry last 5 years, as per the statistics provided by Society of Indian Automobile Manufacturers (SIAM) is given in the table below, which indicates that the commercial vehicles' contribution is about 4%. The Commercial Vehicle

(CV) segment had been growing despite having various challenges and comparatively long replacement cycle which is typically of 5 to 7 years. This clearly indicates that CV Industry has a strong correlation with the growth of Indian economy.

Category	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
Passenger Vehicles	33,77,389	27,73,519	27,11,457	30,69,523	38,90,114	42 18,746
Commercial Vehicles	10,07,311	7,17,593	5,68,559	7,16,566	9,62,468	9,67,878
Three Wheelers	7,01,005	6,37,065	2,19,446	2,61,385	4,88,768	6,91,749
Two Wheelers	2,11,79,847	1,74,16,432	1,51,20,783	1,35,70,008	1,58,62,087	1,79,74,365
Quadricycles	627	942	-12	124	725	725
Grand Total	**2,62,66,179**	**2,15,45,551**	**1,86,20,233**	**1,76,17,606**	**2,12,04,162**	**2,38,53,463**
% Commercial Vehicles	4%	3%	3%	4%	5%	4%

Table 1.1 Automobile Vehicle Sales. Source: (SIAM, 2024)

1.1.3. Cyclicity of Auto Business and After Sales Service

Commercial Vehicles sales is cyclical in nature (Muthuseshan, 2021). The figure 1.1 clearly depicts the same. Cyclicity is a cause of concern for the CV manufacturers as well as for the thousands of dealers who support these CV manufacturers. They try to offset the effect of cyclicity by focusing on international market as well as after sales service. A commercial vehicle dealer typically earns about 5% to 7% margin for every vehicle sold (AutocarProfessional, 2020). However, it will earn multi-fold of the same amount by servicing the same vehicle throughout the life cycle of the product at its authorised workshops. According to Johnson and Mccullough (1997) after sales service are "those activities in which a firm engages after the purchase of its product that minimise potential problems related to the product use and maximise the value of the consumption experience". This experience will decide customer retention. Hence, CV manufacturers & Dealers have been focusing over the years on both Sales and Service. With rising competition and more technology, Commercial Vehicle (CV) manufacturers have kept to themselves only the key aggregates, rest all are bought-out. The vendors of these

aggregates are common for most of the big players. This phenomenon is reducing the gap in product differentiation amongst the various CV manufacturers. This means it is more crucial to focus on after sales service and use it as a differentiator. SAR – Service Absorption Ratio is one of the common terms used as a part of the dealer profitability or viability program. SAR indicates the extent to which the After Sales Service (i.e., the workshops) contributes to covering the total expenses of the dealership including both sales and service. The service centre is looked upon as a support mechanism not only to the vehicle users but also to the dealer owners, especially during the sales downturn. This was clearly visible during the pandemic years of 2019 & 2020.

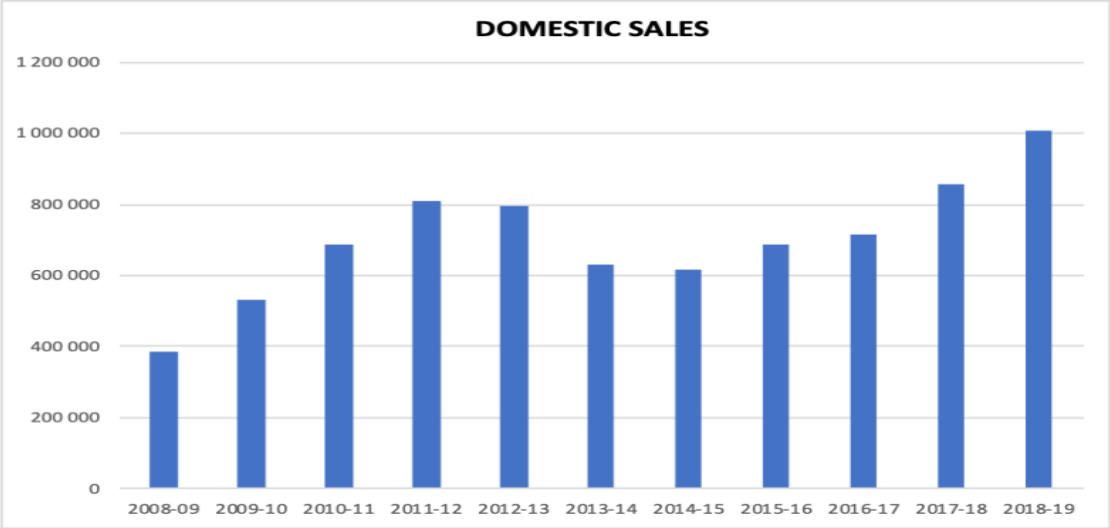

Figure 1.1 Automobile Vehicle Sales. Source: (Muthuseshan, 2021).

Every commercial vehicle requires well prescribed scheduled maintenance for its optimal performance. It means, the vehicle needs to visit workshop or get attended by a technician once every few months for periodic preventive maintenance service (PMS) which includes lube change, general check, brake setting etc. (Bouguerra et al., 2012). All CV manufacturers wish that their customers visit their authorised service network for availing

these services. It helps them to capture vital health data like performance, wear etc, which act as input for their engineering team to design future products. They also get to know more about the customer expectations (Chiu et al., 2016).

Whether it is a physical product or service, the complete set of transactions revolve around customers. Business exists because of customers. Hence it is essential for organisations to check if their customers are satisfied with their products and services. Retaining a customer is equally important for a dealership as well as the CV manufacturer. Customer retention is a subject of discussion in every industry or business centred around a customer and not only specific to the automobile sector. Literature is filled with various works on Customer Retention and allied topics. This research is an effort to understand the concept of customer retention with respect to Commercial Vehicles After Sales Service in Indian scenario in a better way and help companies develop strategies.

1.2 Research Problem

A growing market attracts a lot of players who wants a share of the pie. Commercial Vehicle Business is growing, and it is a vital element for the economy. CV manufacturers are facing tough competition to maintain their market share. CV manufacturers are expanding their geographical presence to increase their sales. After Sales Service support is very important for a product which has life of more than 15 years. It also acts as a deciding factor while purchasing a truck. As per the annual report FY24 of Tata Motors, the biggest CV manufacturer in the country has appointed 160 workshops in FY24 taking its cumulative touch points to 1876. Similar expansion has been done by other players as well. These workshops help in adding confidence in the customers to choose a specific brand. Every workshop inaugurated means a few crores of investment. With few hundreds of authorised workshops getting added each year means an investment of few hundred

crores by the CV manufacturers and its Dealers put together. Once an authorised workshop is established in an area, the sales volume in the area usually improves. This attracts other local workshops and allied businesses to pop-up in that area, which in turn attract the customers to their fold. The overhead cost in an authorised workshop is higher and they in no means match the price of service offered by the local workshops. Customers moving away from the authorised workshops will jeopardise their viability. CV manufacturers have got the moral responsibility to ensure the viability of its dealers. They are also aware that if the dealer is not viable, it may close down its operations which will impact its vehicle sales.

The CV manufacturer continues to invest further to makes its customers satisfied. Customer Satisfaction is a pre-condition for Customer loyalty, but it does not guarantee the repeat purchase by itself; an unhappy customer is more tempted to evaluate alternatives (Vinita Kaura, Ch. S. Durga Prasad, 2015) and this may act as a hinderance for the re-purchase behaviour. How to satisfy a commercial vehicle customer? Customer behaviour is a complex subject. There could be several hundred reasons which could make a customer satisfied or dissatisfied. Some of the major challenges for the CV manufacturer is to maintain and sustain its standards across the fast-expanding service network. It is really a challenge to maintain service quality, have skilled trained technicians, maintain repair consistency, mange technology upgradation, control costs across its vast expanding workshop network. After Sales Service is more human centric though a lot of automation has happened. We still require quality technicians and managers to run the workshops. With renumeration not so attractive and jobs so taxing, retaining skilled technicians and supervisors in a workshop is also big challenge.

CV manufacturers adopt different strategies to retain customers based on their experience and market intelligence. But despite their best efforts, the customers continue to move away from the authorised workshops. According to A. Kumar et al (2017) in the 2-wheeler company which was undertaken for research, 84% customers were retained during the first year, which dropped to 29% in the second year, and reached 5% by the 5th year. The scenario is quite similar in commercial vehicle after sales service as well. According to the company experts of one of the leading CV manufacturers in the country, only 35% of the vehicles come forward to avail their 3rd Free Service.

Every Commercial Vehicle requires maintenance services for a trouble-free performance. The schedules are provided in the user's manual given along with the vehicle. Adhering to these maintenance schedules help in preventing break downs and support enhanced performance of the vehicle. The CV manufacturers insist on their customers to avail all these scheduled services at their authorised workshops to get the benefit of warranty which is offered to take care of any manufacturing defect in the vehicle. Now a days commercial vehicles come with warranty as high as 6 years / 6 lakhs km and with increased number of free services, aimed at retaining the customers within the authorised service network. Whatever best ways the CV manufacturers try to retain the customers, the latter for whatsoever reasons, feel reluctant to patronise authorised workshops as the vehicles turn older. The retention decreases with the age of the vehicle. This is what brings in the motivation for this research. A good customer retention percentage will ideally be win-win for both customers as well as the CV manufacturers; for the customers, the vehicles will be serviced by skilled & trained hands which means better performance & durability of the product; for the CV manufacturers, it is a non-cyclical source of revenue and opportunity to enhance brand loyalty, advocacy through word of mouth (Haverila, 2011) thereby

increasing repeat visits & purchase of new vehicles. So, what are the factors that affects the customer's behaviour to not patronise authorised workshops as the vehicle becomes older is the problem statement.

1.3 Purpose of Research

In India, the CV manufacturers majorly sell their vehicles through their dealers, except for certain strategic locations and customers. The dealers not only sell the vehicles but also service the vehicles sold by them or by their co-dealers. To cater to all the geographies, CV manufacturers also do appoint authorised service centres, which can service the vehicles but not sell new vehicles. The after-sales service's effectiveness plays a critical role in deciding on the next vehicle purchase. According to Government of India (2020), there were about 295.8 million registered vehicles in India in 2019. Out of these commercial vehicles accounts for 25.89 million vehicles, which is really a substantial number, and it is increasing every year. So, the after sales market is noticeably big and this has attracted the entry of various players small and big setting up their service centres /repair shops across the length and breadth of the country

Figure 1.2 Total Number of Registered Vehicles. Source: (Government of India, 2020)

After sales service plays a crucial role and has substantial impact on new vehicle sales. The CV manufacturers currently have after sales capacity just to cater to a fraction of the entire vehicle population. Though the CV manufacturers are continuously expanding its after sales network by investing a huge amount, it would not be viable as well as not economical to setup capacity for the entire vehicle population. If the CV manufacturers do not have the necessary capacity to cater to the entire vehicle population, then why are they apprehensive about customers patronising local workshops? What benefits do they get by retaining their customers within the fold of authorised workshops? Customer retention helps dealers and authorised workshops to grow and be profitable. It means the CV manufacturer can sell more vehicles and spare parts through them and increase the revenues. Once the aspiring entrepreneurs finds in its environment the commercial vehicle dealers and authorised workshops are running their businesses profitably, they may also be attracted to obtain a dealership / authorised workshop license from the CV manufacturers, which will augment the network expansion plans and help them spread geographically into new markets. There are other benefits too by retaining customers. It would have an easy access to the product performance data which is required to improve the future products. Its customer acquiring cost will decrease. Its logistics lead time for new vehicles and spares parts may decrease. But the biggest challenge is, what will make the customer retained. It is essential to keep customers happy and satisfied with the products & services for repeat sales. There could be several factors which make a customer choose a workshop to carry out the maintenance services and other repairs for his/her vehicle. The overall purpose of this research was to find out these factors and understand them better.

1.4 Significance of the Study

Literature review indicates that truly little research has been done around customer retention with respect to Indian Truck After Sales Service. Customer retention is an important topic for every industry. A firm which knows its customers well and retains them will be able to be successful. Commercial vehicles industry is greatly linked to the growth of the Indian economy. Commercial vehicle sales is cyclical. However, the after sales service of commercial vehicles is non-cyclical and it is extremely critical and important in providing financial stability to the CV dealers. Also, we learnt that margins in After Sales Service is much higher than in vehicle sales.

The commercial vehicles industry is witnessing many changes in the recent years. These are caused by the influence of government factors or schemes, economic development, entry of foreign players, sophistication in technology etc. The net commercial vehicles on the road are increasing and opportunities to service/ repair these vehicles are also increasing. Electric vehicles and other alternate fuel technologies are waiting around the corner to disrupt this industry. All these have created a lot of curiosity and have attracted many to become stake holders of this industry. One of the critical stake holders of this industry is the dealer who sells and services the vehicles manufactured by the CV manufacturers. CV manufacturers are striving hard to have healthy and profitable dealer network. This is possible by retaining the customers in their after-sales service category as this is non-cyclical and has better margins. Also, understanding the performance of the vehicles is very crucial for the CV manufacturer as these vital data will be used to refine existing products as well as launch new products. This knowledge of vehicles' performance is possible only if the vehicles continue to visit authorised workshops. Thus, the viability

of the dealerships and collection of vehicle performance data are some of the motivation elements to work on the area of customer retention in after sales service.

This research will not only help in understanding the customer retention factors in commercial vehicles after sales service but also persuade other researchers to do further research in this area, thereby reduce the research gaps, which will help the CV Industry to flourish further. It can even lead to co-creation of products in the future. The requirements of various stakeholders in the value chain can be understood better, thereby uplift the lesser privileged group like technicians and truck drivers and make their lives even better.

1.5 Research Purpose and Questions

The purpose of the research is to find the factors influencing the customers decision to avail the services of a commercial vehicle workshop and to facilitate the CV manufactures with insights to develop strategies to improve customer retention. The following are the questions for which we will attempt to find answers through this research.

a. What are the factors that influence availing of services offered by a commercial vehicle workshop and what is its relative importance?
b. How are these factors related to each other and how does it impact retention of the customer to the commercial vehicle workshop?
c. What should the CV manufacturers do, to motivate the customers to avail the services of their authorised workshops repeatedly and keep them retained?
d. What will be the better way to describe customer retention & vehicle retention in a commercial vehicle industry?
e. Is it practically possible to cater to all the customers? What is the optimum customer retention level to be targeted?

CHAPTER II:

REVIEW OF LITERATURE

2.1 Theoretical Framework of customer retention and measurement

In simple language we can say that retaining a customer as Customer Retention. But when do you say a customer is retained? If the customer repeatedly purchases the same product or same services, is it? If a company produces A & B, if the customer stops buying product A and switches to product B of the same company will the customer be tagged as retained? As we are interested in the well-being of the organisations, retention should be continuation of transactions of any product or services of a firm, by the customer (Ascarza et al., 2017). Customer retention can either be behavioural or attitudinal. Behavioural retention may look comparatively simple and relevant but sometime may mislead the marketers (Aspinall et al., 2001). This can be explained in this way. Assume a customer exhibits behavioural retention by repeated purchase of product/service from firm XYZ, if the marketer does not pay attention to the attitude of the customer whether he is cost sensitive or not, it is possible that when another firm comes up with similar product/ service at better perceived cost, the customer may switch to the competitor. Measuring retention in the behavioural terms is relatively simple. We can use the following a. number of active customers b. frequency of buying c. recency of buying d. share of wallet (Aspinall et al., 2001). Similarly in terms of attitude, we need to measure psychological commitment, trust, empathy, cost sensitivity, advocacy, etc. These variables cannot be quantified and can be measured qualitatively only.

Customer retention is a behaviour exhibited by a customer coming back to same service provider / seller for availing the services or purchase of products. Retaining existing customers requires less efforts than acquiring new ones. The perception of the customer of the value offered by the service provider leads to sustained customer retention. Raising

customer retention rate will have multi-fold effect on the lifetime profits (Weinstein, 2002). Also, it has positive consequence on the economic and financial development of an organisation (Sliz and Delińska, 2021). Emphasis on segmentation of customers and develop customized strategies for each of the segment along with recency, frequency, and monetary value (RFM) analysis will be helpful in evaluating customer usage and loyalty patterns (Weinstein, 2002).

2.2 Customer Satisfaction (CS), Customer Loyalty (CL), Customer Retention (CR)

There is abundant literature available which speak about CS, CL & CR. Many authors say that they are positively corelated leading to profitability (Murali et al., 2016) though there are difference in viewpoints how they are related. Oliver (2014) in his book defines satisfaction in this way – "Satisfaction is the consumer's fulfilment response. It is a judgement that a product/service feature, or the product or service itself, provided (or is providing) a pleasurable level of consumption – related fulfilment, including levels of under or over fulfilment." According to Posselt and Gerstner (2005), higher customer satisfaction will lead to enhanced customer loyalty which in the long run help in improving profits; they evaluated the impact of satisfaction before and after the actual sale on the intent to make a repeat purchase; The effect of post sales customer satisfaction was 10 times stronger. Customer satisfaction may not significantly improve customer retention, but it is necessary for retaining the customer (V. Kumar et al., 2013). Customer Satisfaction plays a vital role in increasing Customer Retention and in creating Customer Loyalty (Murali et al., 2016). Customer Satisfaction in Automobiles is nonlinearly related to repurchase intent (Jones and Sasser, 1998). Customer Loyalty is a complex subject. According to Mahadavina Seyed Hessamaldin (2008) loyalty is difficult to define; it can be measured through behaviour, attitude or both (John T. Bowen and Shiang-Lih Chen,

2001); behaviour loyalty is the act of the customer of consistently and repeatedly exhibiting the same purchase behaviour, however attitudinal loyalty exhibits the emotional and psychological bond; loyal customers provide repeat business and there is definite connection between loyal customers and profitability. Based on the literature review, we can for sure say that CS, CL & CR are interrelated, which means factors affecting one, will also influence the remaining two.

2.3 Service Quality

There are lot of data in literature available which says that service quality influences Customer Satisfaction and Customer Loyalty (SR, 2021). 90% of the customers consider the quality of after sales service as the main reason to make their purchases (Srivastava and Tyagi, 2016). Service Quality positively impacts the behaviour intentions of the customer (Bei and Chiao, 2006). Though literature speaks about several ways to measure Service Quality, the one which is predominately visible and used across industries is SERVQUAL. This metric was developed over a period of 5 years. This was developed by A. Parasuraman, Valarie A. Zeithaml (1985); initially it had had 10 dimensions, later with a lot of deliberation and research, it was re-grouped into five. They are Tangibility, Reliability, Responsiveness, Assurance and Empathy. This model is built on the expectancy-confirmation paradigm, where the quality perceived by the customers is nothing but how well the service delivery meets their expectations. SERVQUAL is used across various industries with certain tweaking to the model. A variant for Auto Sector is also available and it is termed as AutoSERVQUAL (Gencer and Akkucuk, 2017), which is also based on the 5 dimensions with 6 more additional variables i.e. 28 instead of 22 in the original SERVQUAL. The literature does not have much information on application of SERVQUAL to Indian Truck market. One of critical elements to deliver service quality is

the people, the human touch is one of the intangible elements which need to be upskilled and enhanced by organisation for better customer satisfaction (Ojha et al., 2021). Modern day firms, to be successful, should go beyond customer satisfaction and create value as just satisfied customers are not always loyal. Customers are becoming increasingly demanding in their requirements, and they look for firms who are continuously improving the quality of product or services (Yang and Yang, 2011).

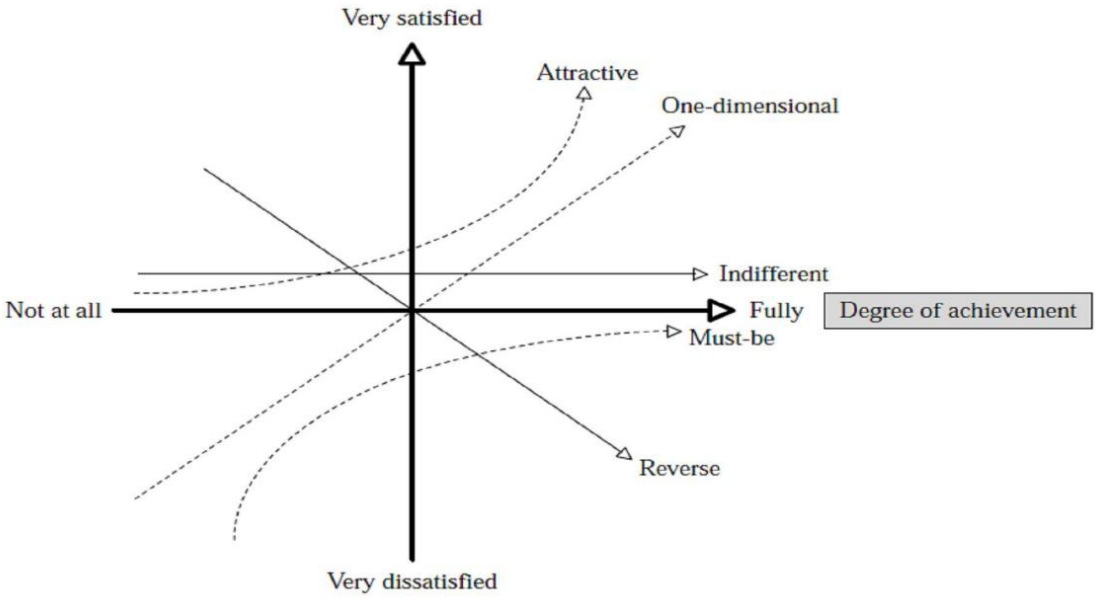

Figure 2.1 Kano Model. Source: (Harrington, 2020)

The famous Kano model which is depicted in the figure 2.1 speaks about 5 distinct types of attributes namely must be quality, one-dimensional quality, attractive quality, indifferent quality, reverse quality. Also, it is worthy to note that the attributes of product / service which currently delights the customer may turn into a basic need tomorrow. The Kano model itself got refined over a period. The refined Kano model speaks about 8 quality attributes, which emphasises on the degree of importance to certain aspects by the customers (Harrington, 2020). The refined Kano model also lead to the importance of

satisfaction model; based on the importance and satisfaction levels, the quality attributes can be fit into any of these 4 sections namely excellent, to be improved, surplus and carefree as depicted in figure 2.2 (Yang, 2005)

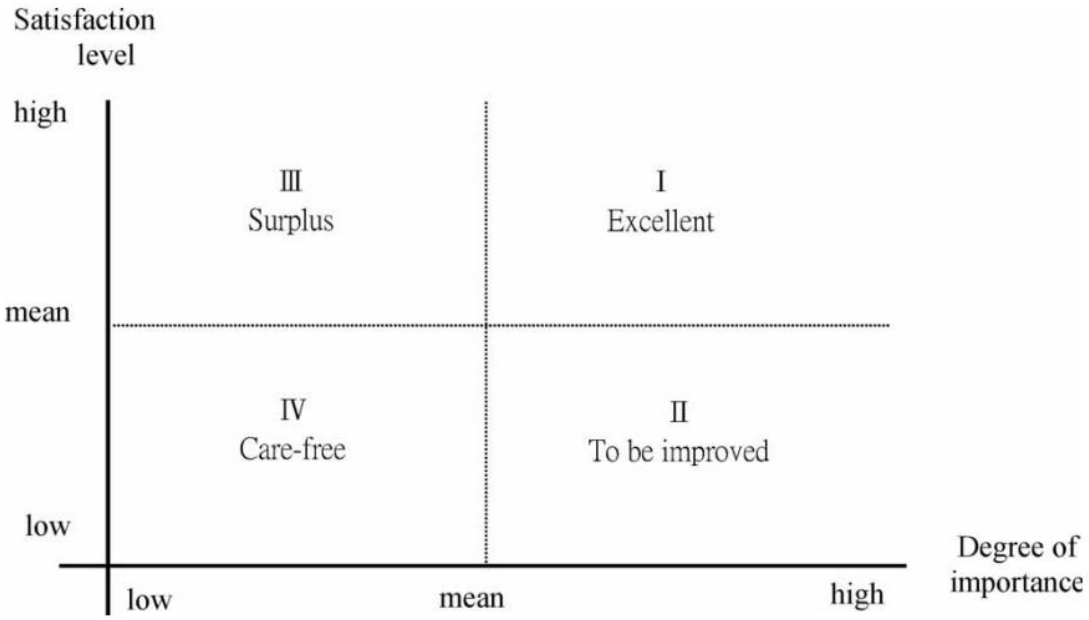

Figure 2.2 Importance satisfaction Model. Source: (Harrington, 2020)

The customer brings his/ her vehicle to the service centre either for periodic maintenance services or get some issue in the vehicle fixed. It is essential to understand the complaints in the vehicle from the customer clearly, diagnose the complaint and resolve the same. Care should be taken that the customer is not made to visit the service centre again for the same complaint at least for a reasonable period of time. This is also treated as one of the ten commandments of customer service (Sewel and brown, 2002).

2.4 Product Quality

Literature clearly says the product quality has a high implication for Customer Satisfaction and Customer Loyalty. However, it may not be a significant area of study as we are

interested in studying attractiveness of customers towards authorised workshops or the local workshops of the same product (James et al., 2020). The area where the quantum of intangibles is higher, focus should be on Service Quality than on product quality (Bei and Chiao, 2006)

2.5 Service Capability

Literature groups time taken to deliver the service, parts availability, information to customers under the header service capability (SR, 2021). In addition to the actual repair time, authorised workshops consume substantial amount of time in documentation and adhering to the policies and procedures given by the CV manufacturer. Non-availability of the required parts also adds to the idle time of the vehicle in the workshop. Customers want their vehicles to spend less time in the workshops and more time running on the roads and generating revenue, hence they expect a quick turnaround time i.e., shorter repair time. The importance on repair time varies with different customer segments and vehicle applications. The repair time is a summation of time taken to interact with the customer to understand the problem on the vehicle, time of diagnosis and then the actual repair time (Jain and Subhedar, 2016). The workshop layout also can affect the time of repair (Bhat et al., 2016).

2.6 Cost of Service

According to Bei and Chiao (2006), price is also one of the determinants in customer retention. The price can be defined as something that is given up or sacrificed to get a product (Zeithaml, 1988); most of the research leads to the fact that price and perceived quality are related in a positive manner. Also there does exist a non-linear relationship, customers who have high overall satisfaction may be willing to pay a premium for the services received (Homburg et al., 2005). The infrastructure, availability of tools &

equipment, availability of a trained workforce, access to the latest service guideline and information from CV manufacturers etc. are usually better in authorised workshops. Hence the cost of service in authorised workshops is higher as compared to the local workshops. In that case the perceived quality by the customers should be high, and they should have patronised these authorised workshops repeatedly. However, this does not happen. Is it that they are not having overall satisfaction? May be this can be explained by different concepts of price namely objective price, perceived price (which may not be quantified in terms of money) and sacrifice (Bei and Chiao, 2006). According to Bei and Chiao (2006) in automobile after sales service, perceived price fairness directly affects customer satisfaction and indirectly affects customer loyalty. Customers may prefer local workshops due to cost benefits; they feel that local workshops are more affordable, responsive and closer to their locations (SR, 2021). Customer sometimes fail to appreciate the technical aspects and capability of the authorised workshops like the technician skill, their knowledge level, diagnostic capability etc. (Amin and Nasharuddin, 2013) and do not wish to pay more for the same. All the above necessitates a pricing strategy based on customer satisfaction.

2.7 Service Convenience

Service convenience is the time and effort which need to be put in by a customer to avail the service (Berry et al., 2002); the 5 dimensions of service convenience are Decision, Access, Transaction, Benefit and Post benefit. Organisations should focus on time and effort customers spend in addition to the service quality, lesser time and effort would mean higher perceived value (Thuy, 2011). The closeness of the service availability to the customer, operating hours, transaction easiness, the facilities available in the workshop will affect the attractiveness to the workshops (SR, 2021). The driver rest area / overnight sleep

area has now become hygiene at many authorised truck workshops citing this reason. According to A. Kumar et al. (2017), customers expect doorstep services; local workshops are present closer to customers' place which provides extra convenience; also, these local technicians are mostly the ones who were earlier working in authorised workshops which further adds to the trust factor of the customers.

2.8 Cost of Switching

The cost of switching will decide the repurchase or the revisit behaviour (Haverila, 2011). It is possible that customers can be held hostile and be attached to one service provider due to non-availability of substitutes or the effort involved in switching is huge. In such scenario though a dissatisfied customer, he / she may continue to be retained to the service provider (Nasrin Danesh et al., 2012). When the switching barrier is minimal, the customer will no longer be retained. Companies need to devise strategies which will get the customers hooked to their services and also keep them satisfied. Literature speaks about 3 categories of switching costs namely customer related, organisation or the seller related, and industry related which includes the competition (El-Manstrly, 2016). There are various other categorisations of switching cost too in the literature. Switching cost is important factor with respect to customer retention and it can explain to a substantial percentage, the cause of a customer intention to stick to a service provider (Burnham et al., 2003)

2.9 Handling of Warranty

According to Shafiee and Chukova, (2013), "A product warranty is a contract between the buyer and the product manufacturer. It requires manufacturers/dealers to repair, replace or provide compensation to the buyers in the case of product failure for a pre-specified period, referred to as the warranty period". CV manufacturers use higher warranty, as a tool to attract customers. Currently CV manufacturers are offering warranty as high as 6 years.

This aspect of warranty is applicable only to authorised workshops and not to the local workshops. Incorrect awareness of warranty terms and improper administration of warranty policies sometimes result in disputes between the customer and the service centre; this may even affect the long-term relationship and future purchase / service behaviour. Higher warranty may mean reduced risk in the minds of the customer (Albaum and Wiley, 2010). There is substantial literature available on this topic, as this can be a crucial factor to losing a customer forever, but not much information is available on how warranty handling will affect CS, CL & CR.

2.10 Brand image & its attractiveness

Brand Image and its attractiveness are crucial for customer loyalty; CS accounts less than 25% of the variance in repurchase behaviour; trust is positively related to behavioural intentions of a customer (Nyadzayo and Khajehzadeh, 2016). Brand awareness is consumer's capability to recall a brand; we can measure it through variables like word of mouth (WOM), brand experience and brand image (SR, 2021). Customer retention to a very great extent depends on the perception about the quality of the brand; quality comparison plays a critical factor in service recommendation to others (A. Kumar et al., 2017)

According to A. Kumar et al., (2017), a vehicle may face problems if repaired by unskilled staff, non-genuine parts, non-specialized tools at local workshops. Authorised workshops are better equipped with tools and technicians to handle sophisticated vehicles as compared to local workshops (James et al., 2020). If the above argument is true, why do customers get attracted to local workshops? Some customers, due to lack of awareness are indifferent to the services offered by authorised workshops and local workshops. Customers are not bothered about the documentation procedures and environmental concerns on which

authorised workshops spend more attention upon (James et al., 2020). All the above indicates that there exists relative attractiveness between authorised workshops and local workshops.

2.11 PESTEL – Political Factors

Introduction of GST from 1st Jul'17 has impacted all businesses in India. Removal of border check posts reduced the truck traveling time there by covering more distance (Muthuseshan, 2021). This improved the auto parts availability across service centres. The Kmpl of vehicles improved and maintenance costs reduced (Baggonkar, 2017). Fleet owners or corporate logistics firm recognised the importance of collecting proper GST invoices from the service centres, so that they can claim the input credit. This functioned as a disadvantage for many of the local workshops which were not registered under GST. There was also a shift towards the purchase of heavy tractor trailers modifying the landscape of vehicles getting serviced in the service centres (Muthuseshan, 2021). GST also helped in the growth of e-commerce (e-com) logistics firms. The e-com players were having stringent timelines with logistics partners. This forced many logistics partners to keep their vehicles in good condition always by regular maintenance preferably at authorised workshops.

2.12 PESTEL – Economical Factors

The disposable income available to truck owners has an influence on the share of the wallet spent on vehicle maintenance. When the economic outlook is good and operation of the truck are optimal, then truck owners will be motivated to spend on vehicle maintenance and keep their vehicles in good shape (Rykała and Rykała, 2021).

2.13 PESTEL – Social Factors

The Truck driver and Technicians working at the service centre are both important stake holders in the After Sales Service. Who is the customer? Though there will be a legal owner of a truck, the truck is driven by a driver who may not own the truck, and its maintenance schedule is taken care of by a Fleet Manager in case of customers with a fleet. According to SaveLIFE Foundation (2020), 93% of the drivers surveyed, work just as employees. It means a smaller percentage of the trucks are driven to the service centre by the owners of the trucks. The Fleet Manager and the driver of the truck influence the decision to decide where the truck gets serviced. The decisions of the drivers in turn depend on a range of factors. For this we need to understand the life of a truck driver better. Literature does not have much information on the influence of truck drivers in bringing the vehicle to a particular service centre though industrial experts recognize their influence and are already creating strategies to make them a valuable member of the automobile eco system. In India, truck drivers were respected in the periods immediately after independence for their discipline (Mittal et al., 2018), but subsequently the profession lost its value, and it is at the lower end of the socio-economic status. There is also a huge shortage of drivers in the country as people dislike taking up this as a profession. In 2020, save life foundation along with M/s Mahindra did country wide research in understanding the plight of the drivers in the country. Truck drivers are a critical stake holder in the transportation of goods, but they are fragmented and unorganized. 84% of the respondents said they will not recommend trucking to their family members or relative (SaveLIFE Foundation, 2020). The various other findings are as follows 1) 9 out of 10 have not undergone any formal training before getting the driving license. 2) They drive 12 hours a day, 50% of the people surveyed said they drive vehicles even if they are fatigued. 3) 70% of the respondents have qualifications less than 10th standard 4) They do not have social security or health security 5) They face

the hardships of the RTO / GST officials 6) They do not get much respect in society and 53% claimed that the quality of life has deteriorated in the last 10 years. 7) They also undergo a lot of health issues. 8) 92% of the drivers drive non-ac vehicles. 9) 47.6% of the respondents have said that the toilets and washrooms are bad on the highways. With all these issues troubling the drivers, they also face the issue of vehicle break downs and they find it difficult to get assistance on time especially when they get stuck at remote locations. Many drivers also must foot the expense to make the truck on-road.

There is plenty of literature available which speaks about the working conditions of the truck drivers in the country. When the truck is due for preventive maintenance or repairs, the truck driver in many places has a say in choosing the service centre. Little research has been done on the drivers' behaviour which affects the retention of a vehicle to an authorised workshop. The same applies to the influence of fleet managers. CV manufacturers try to attract truck drivers by providing facilities like driver lounge, driver sleeping area / night stay, canteen facility, washing and bathing facility at many of its authorised service centres. CV manufacturers also invest a lot in driver training covering technical, driving related and health related topics. This way, they put efforts into uplifting the driver's socio-economic status.

We discussed the situation of truck drivers in the country, and we understood how vulnerable and severely affected they are. Similar is the plight of the technicians in the service centres. Philip et al., (2014) studied the situation of automobile repair workers in the country which were pointing out the fact that they are stressed physically and mentally and exposed to various health issues; many were not even aware of the health hazards they were facing. Technicians play a crucial role in the service delivery in the after sales function. Their effectiveness will decide the quality of service offered to the customers.

2.14 PESTEL – Technological Factors

Commercial Vehicles unlike cars were far behind passenger car segment with respect to technology onboard the vehicle, though some catching up has taken place due to government regulations and influence of foreign players. You can still find trucks with wooden cabin body, uncomfortable seats, etc. The stricter implementation of emission norms has brought in a lot of electronics onto commercial vehicles which are creating a lot of trouble for the drivers to understand and cope with it. The latest BS6 truck typically contains 20 plus sensors, multiple micro controllers to manage engine, exhaust aftertreatment system etc. These vehicles also consume Adblue – which is nothing but aqueous urea solution in addition to the fuel. The typical Adblue consumption is in the range of 3% to 5 % of the fuel consumed. These sophisticated vehicles need well trained technicians to oversee them in case of any issues. The roadside garages, if they try to repair these vehicles without proper knowledge and skill, can cause more damage to the vehicles. This fear persists in customers' minds and sometimes persuades them to take their vehicles to authorised workshops in case of any electrical/sensor related problems.

2.15 PESTEL – Environmental Factors

Trucks are one of the sources of air and noise pollution. Similarly, service centres also generate waste if not disposed in the correct way, may create harm to the environment. Government is active to introduce and upgrade emission norms (Mirgal, 2017). Currently all trucks in India need to comply to Bharat Stage VI norms. Similarly, there are norms laid down by the pollution control board on the workshops. The used oil, filters, battery electrolytes, wastewater after washing the trucks need to be processed and disposed of as per the guidelines and norms. The stringent emission norms forces CV Manufactures to bring in more technology into the truck which has an impact on the maintenance practices

which were explained under the technological factors section. And complying with the environment/pollution control norms requires investment by the workshops, which in turn reflects in the cost of service. Usually, local workshops do not pay much attention to compliance with pollution control norms. But in the days to come with better enforcement of the laws, the local workshops may start facing the heat and may be forced to comply or exit in case of non-compliance.

2.16 PESTEL – Legal Factors

The health safety laws which govern the technician's working conditions in a service centre also have an influence on the operation of the service centre. The employment laws, labour laws and other laws are strictly adhered to by the authorised workshops whereas these may not be given importance by the local workshops (Muthuseshan, 2021)

2.17 Complaints Management

When the services offered to a customer are not in commensurate with the customer expectations, then the latter may express his / her dissatisfaction through complaint/ feedback. Only 5 to 10% of dissatisfied customers actually register a complaint, rest of them silently walk out or switch to another service provider (Bendall-Lyon and Powers, 2001). Customer complaints need to be used as input to conduct the service recovery, and this will in turn help in improving customer retention. The figure 2.3 indicates the framework of complaint management system as indicated by Bendall-Lyon and Powers (2001) for a health care system.

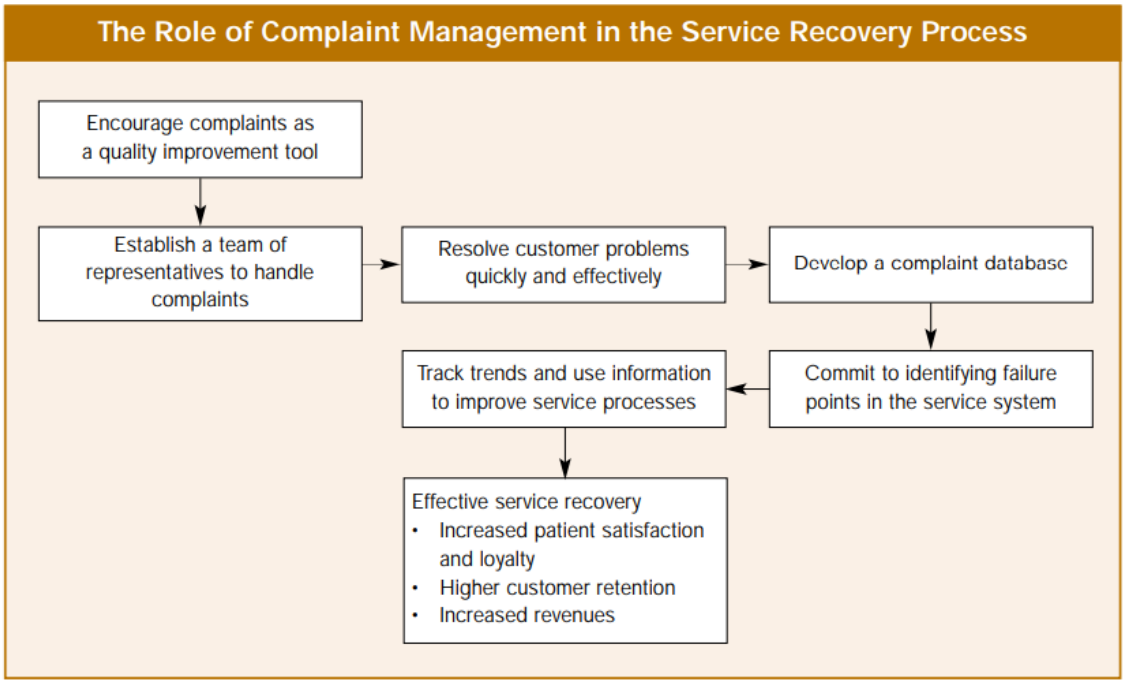

Figure 2.3 Complaint Management process Source: (Bendall-Lyon and Powers, 2001)

Customer complaints and the steps taken to resolve it, need to be captured in a knowledge bank and this will prove useful for the organisation for further improvements in the products as well as the process (Szocs, 2023). Satisfaction level of the customer post service recovery can be termed as secondary satisfaction and this has got the capability of making the bond with the customer even stronger than the primary satisfaction (Santos and Fernandes, 2008).

2.18 Summary

The topic of customer retention has been researched for decades, and huge volumes of literature are available. A portion of the literature was reviewed and presented here. We can confidently say that there is no classical research gap. A. Kumar (2021) in his research on factors affecting Customer happiness thereby the customer retention in 2-wheeler after sales has reviewed the existing literature and carved out 46 factors which he then grouped

under 5 headers namely Technological, Social, Environmental, Economic & organisation governance. Many of these factors have already been reviewed in the earlier sections. We do not know whether all these factors are relevant to the Truck After Sales Service, as little information is available in the literature. This is a contextual research gap as it does not cover the Truck After Sales population. A similar attempt needs to be made in making a consolidated list of factors affecting the customer retention in Commercial Vehicles (Trucks & Buses) segment. A. Kumar et al., (2017) in their research mentioned that no prior work has been done around measuring customer retention at authorised automobile workshops. The same is true at this point of time for CV workshops. With product differentiation becoming thinner, people excellence along with robust systems and application of technology will create positive impact on the entire after sales service value chain thereby helping in customer acquisition and retention (Ojha et al., 2021)

With respect to After Sales Service of a CV manufacturer, there exists 2 main verticals, one which is focused on the network of authorised workshops and another which focuses on just selling spare parts through their authorised distributors and retailers. Customers move away from authorised workshops for several reasons and that is what we are interested in this research. Sometimes as per the company's experts the following scenarios occur – the customer may have a fleet of vehicles; a part of the fleet is serviced at authorised workshops and the remaining at local or captive workshops. Can this customer be termed as retained? In another instance, a customer may avail the service of authorised workshops only for critical issues and for the rest of the jobs he may prefer the local workshops. Can this customer be tagged as retained? The literature does not have answer to these questions, as little research has been conducted with respect to Indian Truck After Sales Service.

The limitations created by the covid environment has forced many Automobile manufacturers to expand their digital horizon, to connect with customers. The recent internal survey indicates that 80% of the truck drivers do have smart phones; typical usage is for WhatsApp and watching videos. Will digital interference have an impact on customers patronising authorised workshops? There is not much literature available on this as well. CV manufacturers are already working on creating digital truck driver communities; even local workshops are posting a lot of content on YouTube channels. We should spend time understanding the effect of digitisation on customer retention.

Though literature speaks about the importance of employees on the impact on customer satisfaction and customer retention. There is truly little literature available on the influence of technicians and truck drivers on customer retention; how uplifting their lives and knowledge level will improve the perceived value of the service as well as the brand and thereby impacting the retention.

Literature indicates that the customer requirements continuously evolve, and their requirements are becoming more demanding. The customers perceive things as per the zone of tolerance they operate. With digitisation, information is now available to customers and various stakeholders very quickly. The information availability changes the perceived value of the customers. Do the customers value the same set of factors over a time horizon? What is the validity period of the factors affecting customer retention? Literature suggests that organisation should have Customer Relationship Management (CRM) activities in place to understand and support customers. We also need to segment the customer group and develop strategies accordingly.

Let us take an exaggerated scenario and assume that customer retention at authorised workshops goes to 100%. Do the CV Manufacturers have the bandwidth to serve 100% of their customers? Then to what extent should they retain the customers? Should CV manufacturers look for venues to collaborate with local workshops and work out a win-win strategy? The literature speaks about relative attractiveness. Should we evaluate the factors affecting retention at authorised workshops and local workshops separately, arrive the relative attractiveness weightage and then formulate collaborative strategies? The literature review has indicated that there are vast unexplored areas in the context of Truck After Sales Service. An attempt will be made to the research to add value to certain areas of customer retention.

CHAPTER III:

METHODOLOGY

3.1 Overview of the Research Problem

Automobile Sales business is a cyclical one and the Automobile After Sales Service is non-cyclical one. Like all other industries, retaining a customer is critical for Automobile Business as well. Commercial Vehicles account for about 4% of the total automobile population. They are one of the lifelines of the economy as road transport contributes more than 60% of the freight movement. Post liberalisation many foreign players have entered the Indian CV space. The competition between the CV manufacturers together with the tightening of the emission and other norms by the government have brought in substantial product improvements and innovations. Commercial vehicles are long-life span products with the life span of more than 15 years though the trucks changes hands multiple times during this period. Commercial vehicles require periodic maintenance and repairs so that the vehicles perform well. It means that After Sales Service has a key role to play in order to support the customers in maintaining their vehicles. The Aftermarket sales for FY21 were INR 64509 Cr, out of which 35% i.e. INR 22710 Cr was from commercial vehicles (Vairavanathan Shanmugavelu, 2022). Focus on After Sales Service is very much required to balance cyclicity, to support customers in maintaining the vehicles, to know the performance of the vehicles better and thereby make necessary improvements in the future products and to improve the margins. With all the CV manufacturers focusing on expansion of their sales and service network, it is essential to take care that the existing customers are retained along with acquiring new customers. Customer retention is very much required to ensure viability and survival of the expanding service network. Commercial vehicle parc is expected to grow from the current 13 million to 19 million in 2028 (ACMA, 2024). This has attracted unauthorised or local garages across the country alongside the authorised

workshops of the CV manufacturers, causing threat to the authorised workshops which are bound by huge overheads and compliance to many statutory norms and standards. It is observed that, as the vehicles get older, the commercial vehicle customers prefer to get the vehicles serviced or repaired at local workshops. Though the CV manufacturers offer a few free services to attract customers, the takers are not many. The decline in patronisation of authorised workshops affects customer retention. To improve customer retention at authorised workshops, we need to understand the range of factors affecting it and an effort towards the same has been undertaken in this research.

3.2 Operationalization of Theoretical Constructs

Review of literature has helped to know the several factors which directly or indirectly have an impact on customer retention across various industries and customer groups. We have further tried to explore how these factors are relevant to Indian CV space. We sought the views of the CV experts to understand the relevance of these factors and to gain insights into any other significant factors which were not captured during the literature review. These factors were then evaluated through Multi Criteria decision making methods (MCDM). A. Kumar et al. (2017) in their research have summarised the various research on customer retention which made use of MCDM. This is represented in Table 3.1. It indicates MCDM is an apt methodology for evaluating the factors. But which one of these to be used – VIKOR, TOPSIS, DEMATEL, ANP, SEM, AHP, Fuzzy AHP, Fuzzy Logic, Hybrid, etc. Each method has got their unique characteristics.

Authors	Application Area	Used Methods
Park et al. (2006)	Airline service quality and passengers' future behaviour retention	Hybrid MCDM
Wang and Tzeng (2012)	Brand marketing for creating brand value	DEMATEL, ANP, VIKOR
Havertila (2011)	To select the feature of mobile and repurchase retention	Hybrid
Nilashi and Ibrahim (2014)	Purchasing intentions business to consumer	Hybrid
Liu et al. (2013)	How improving services in metro-airports can help tourism development	Hybrid
Chiu et al. (2013)	Prediction of consumers' repurchase intention for improving e-store business	DEMATEL, ANP, VIKOR
de Dienes Alicia et al. (2011)	Functional food products and consumer repurchase retention	AHP and Choice Based Conjoint
Huang et al. (2012)	Identifying influencing factors for smartphone operation systems	DEMATEL and SEM
Hu et al. (2014)	Exploring smartphone improvements and customers' repurchase retention	Hybrid
Khatwani et al. (2014)	Evaluating internet information search channels	Hybrid
Anand and Srivastava (2015)	Comparative analysis about internet among gender	Hybrid
Khatwani and Das (2016)	Understanding information given by internet channels	Hybrid
Maymand et al. (2017)	Factors affecting shopping behaviour of foreign tourists	Hybrid
Lin et al. (2016)	E-service quality performance and e-store	VIKOR
Chiang (2016)	Fair trade products purchase	AHP
Yogi (2015)	Measuring the customers' intention about quality	Fuzzy Logic
Rekik et al. (2016)	Assessing e-commerce website ranking	Fuzzy ANP
Kumar and Dash (2017a)	Measuring and evaluating emails on their technical and web dimensions	Fuzzy Delphi, Fuzzy TOPSIS
Kumar et al. (2017)	Comprehensive evaluation of internet shopping malls	AHP, TOPSIS
Kumar and Dash (2017b)	Measuring repurchase intention of online consumers	Hybrid
Kumar and Dash (2017e)	Consumer decision-making in e-marketplace	DEMATEL
Tajdolat et al. (2016)	Maintenance strategy selection and retention	Hybrid
Bouguerra et al. (2012)	How customers accept different maintenance policies	Hybrid
Cui et al. (2017)	Selecting a remanufacturing quality strategy based on consumer preferences	Hybrid
Kassim et al. (2016)	Consumer behaviour towards safer car purchasing decisions	Hybrid
Padilla et al. (2017)	Service value on repurchase intentions in business-to-business	Hybrid
Chiu et al. (2016)	Tourists' expectations on purchase	Hybrid
Li et al. (2017)	Evaluation of in-flight service quality	Fuzzy AHP

Table 3.1 MCDM tools used for various research on Customer retention.

VIKOR is used when there are conflicting criteria and objectives. Since our objective is clear, VIKOR is not preferred. TOPSIS is an MCDM method where the alternatives are based on various criteria; it is relatively simple but it works on predefined criteria weights. DEMATEL is used when the factors or criteria are interrelated, and judgement is done by group decision making. In AHP, criteria weights are obtained which in turn could be used to evaluate the alternatives, it has an element of consistency check which helps in improving the reliability of the judgements by the experts. ANP – Analytic Network Process is an advance form of AHP involving complex inter relationship between factors. Fuzzy Logic has got the capability to handle uncertain criteria or data. Hybrid is nothing but using a combination of 2 or more MCDM methods. As this research is first of its kind with respect to Indian commercial vehicles after sales service, and since we wanted to obtain the criteria weights and relationship between criteria through group or experts decision making, simple AHP and DEMATEL were used. A. Kumar et al. (2017) in their research also followed similar methodology. Based on the results of this research, we can explore usage of other tools like ANP, Fuzzy AHP, Fuzzy Logic, Hybrid for future research. Further details of the methodology are available in the subsequent sections.

3.3 Research Purpose and Questions

As outlined in the introduction section, the research purpose is to arrive the list of factors which influences the decision of the customer to patronise a commercial vehicle workshop and develop key insights to the CV manufacturers which would help them to improve customer retention with respect to after sales service. The primary objectives are to seek answers to the following.

- What are the factors that influence availing of services offered by a commercial vehicle workshop and what is its relative importance?

- How are these factors related to each other and how does it impact retention of the customer to the commercial vehicle workshop?
- What should the CV manufacturers do, to motivate the customers to avail the services of their authorised workshops repeatedly and keep them retained?

While exploring the answers to the above questions, we simultaneously tried to derive /suggest some metrics or KPIs for the CV manufacturer with respect to customer retention which can be used in the future to measure whether the strategies devised as part of this research are really helping in improving customer retention. Also, check if it is practically possible to cater to all the customers? What is the optimum customer retention level to be targeted?

3.4 Research Design

3.4.1 Factors finalisation

The list of factors which affect customer retention based on the extensive literature review is provided in Table 3.1. Though these factors may be relevant to Commercial Vehicles After Sales, there is no literature available to establish the connection. Hence feedback was collected from 34 industry experts on the significance of these factors on a scale of 1 to 5, where 1 being the least significant and 5 being most significant. Also, the experts were given the option to add any other factor which was missed but has relevance to customer retention. The questionnaire was administered through Google Forms provided by the institution. The responses from the experts were collated and the final list of factors were tabulated. Certain factors which were allotted lower significance by many of the experts were dropped (Mangla et al., 2016). Also, some of the factors which had similar significance level and behaviour were combined into a single factor. The original list had 38 factors. Post the evaluation of feedback from experts, 20 factors were shortlisted.

Factors - Evaluated by the Industry Experts
1. Availability of required infrastructure & facilities for undertaking repairs
2. Neatly Dressed Staff
3. Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility
4. Trustworthiness & Behaviour of the staff
5.Knowledge level, understanding, diagnosis skill, communication of the staff
6. Price Reasonableness of the services
7.Resolution of complaints in first instance.
8.Providing correct Time estimate & Cost estimate for Repair
9. Quick Turn Around Time
10.Staff speed to respond to queries
11.Transparency in the transaction, correct billing with explanation
12.Repairs as per the SOPs
13.Usage of genuine or original parts
14. Personalised attention
15.Easiness of payment transactions
16.Freebies and promotional/ seasonal campaigns
17.Presentation of vehicle after service (Washing, Cleaning)
18.Availability of required parts at the workshop
19.Awareness by the customer on sophistication of the product, technical expertise required to handle the product and benefits of proper vehicle maintenance
20.Operating hours of the workshop
21.Location of the workshop
22.Doorstep Service by the workshop
23.Cost of switching for the customer to another workshop
24.Information on Warranty
25.Warranty Acceptance Rejection Handling
26.Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)
27. GST, Input Tax credit and compliance makes the Transporter prefer certain workshops / authorised workshops
28.Solution for category specific customers - At Site, Ecom, Passenger
29.Disposable income with the transporter (will he prefer quality service if the disposable income increases)
30.Influence of Technicians
31.Influence of Truck Drivers
32.Influence of Fleet Managers
33.Health & Safety Regulations compliance by workshops
34.Technology sophistication in the trucks
35.Customer Attitude towards maintenance. Indifference to quality services by customer
36.Availability of Customer Complaint Redressal system

37. Customer relationship Building Marketing Activities
38. Availability of facility for proper / complete maintenance records of the vehicles
39. Any other significant factors which will affect customer retention

Table 3.2 Questionnaire on Significance of Factors

3.4.2 Analytic Hierarchy Process (AHP)

The 20 factors were subjected to the Analytic Hierarchy Process (AHP) to arrive at the weights for each of the factors. AHP is one of the Multi Criteria Decision Making (MCDM) methods and it is widely used to predict customer retention. **Thomas L Saaty** developed the AHP tool between 1971 to 1975 (R. W. Saaty, 1987). This tool uses the concept of pairwise comparison (Yoon and Kim, 2000). The model consists of 3 levels as depicted in Figure 3.1.

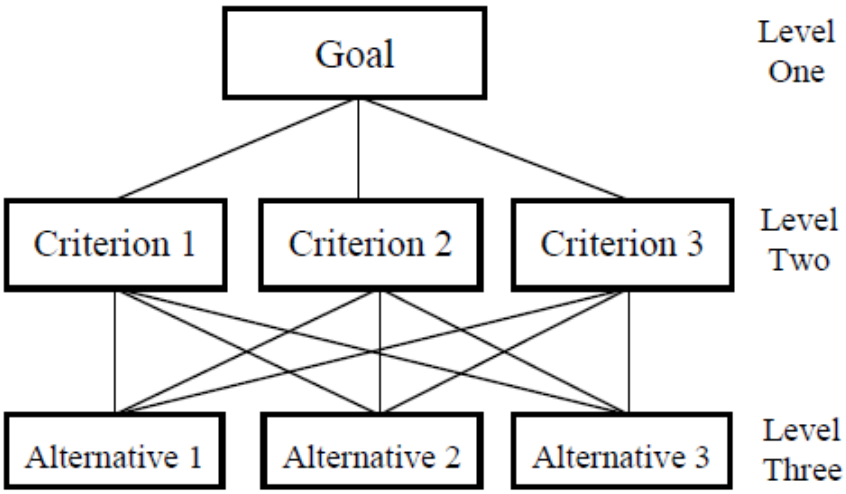

Figure 3.1 AHP Framework. Source: (R. W. Saaty, 1987)

The level 1is the Goal which in our case is *Customer Retention*. Level 2 are the *several factors which affect customer retention* i.e. the 20 factors which we finalised. Level 3 was

not used as we did not evaluate any alternatives. In level 2 each factor was compared with all other factors on a 9-point scale as illustrated in Table 3.3 (T. L. Saaty, 2002).

Importance Scale	Definition of Importance Scale
1	Equally Important Preferred
2	Equally to Moderately Important Preferred
3	Moderately Important Preferred
4	Moderately to Strongly Important Preferred
5	Strongly Important Preferred
6	Strongly to Very Strongly Important Preferred
7	Very Strongly Important Preferred
8	Very Strongly to Extremely Important Preferred
9	Extremely Important Preferred

Table 3.3 Scale for the AHP Questionnaire

This pair wise comparison was made by each of the 15 experts. Each of the experts mentioned the relative importance of one factor to another. The questionnaire was initially administered through Google forms for a pilot study. The questionnaire was lengthy as we had to compare 20 factors pairwise. The responses were evaluated for the consistency ratio which is an important attribute to be considered for making effective inference out of the AHP study. If there are n criteria then there will be n x (n-1)/ 2 pairwise wise comparisons. In our case the number of factors is 20, so there were 20*(19)/2 pairwise comparisons which are 190 nos. We had to review the responses multiple times to achieve the desired consistency ratio. For ease of collection of responses and minimise the number of iterations to review and correct the responses for the required consistency ratio, it was decided to

administer the survey through google sheets/excel template. Formula was embedded in the sheet which would indicate the real time consistency ratio as the experts fill in their responses. By using this methodology, the responses from 15 experts were collected in the shortest time with lesser number of iterations. The responses from each of the respondents were converted into a judgment matrix. These matrices were worked upon in an excel file. The geometric-mean of each of the individual respondents' values were used for further calculations instead of arithmetic mean (T. L. Saaty, 2002). The combined matrix with the geometric-mean of all experts' responses was then normalised. For obtaining the normalised matrix, first the sum of each column was obtained. Then each element of the matrix was divided by the column sum. Thus, a normalised matrix was obtained. The sum of elements in each column of a normalised matrix is 1. The criteria weights (A) of each of the factors were calculated by taking the average of each row of the matrix. Also, the consistency ratio was calculated (CR). To calculate the consistency ratio, we need to first obtain consistency index (CI). The equation for CI is.

$$\text{Consistency Index}(CI) = \frac{\lambda_{max} - n}{n - 1}$$

Where n is the number of factors (which is 20 in our case). To obtain lambda (λ)max or the principal eigen value, each of the elements of a column of the matrix before normalisation need to be multiplied by the criteria weight of that criterion/factor; then the sum of all rows needs to be obtained. This will be the weighted sum of criteria (B). Now we need to divide weighted sum of criteria by criteria weights i.e. B/A for each criterion or row. The average of all B/A will provide the lambda (λ)max. Since now lambda (λ)max and n are known, the CI can be calculated.

The formula for CR is

$$\text{Consistency Ratio}(CR) = \frac{CI}{RI}$$

where CI is the consistency index and RI is the random index. Random index is the consistency index of a random matrix. For 20X20 matrix the RI value of **1.6341** can be used (Alonso and Lamata, 2006). If the consistency ratio is <=0.1 then the responses given by the experts are consistent and acceptable, else we need to go back to the experts and request them to review their ratings (A. Kumar et al., 2017). The factors were then ranked based on their relative weights.

3.4.3 DEMATEL Method

The next step was to arrive at the causal relationship between the factors using the DEMATEL method. The usage of DEMATEL tool in Customer retention research in the past is already portrayed in Table 3.2. Figure 3.2 indicates the steps to be followed in DEMATEL (A. Kumar and Dash, 2016). The direct-relation matrix was obtained by asking the experts about the influence of one factor on another. The survey was conducted using Google forms provided by the institution. 23 experts participated in the survey. A pair wise comparison on the influence was obtained on a 4-point scale 0 – no influence, 1- low influence, 2 – medium influence 3 – high influence 4 – very high influence. The simple average of the responses of experts were calculated to obtain the average direct relation matrix (Shieh et al., 2010). The obtained matrix was then normalised. Then the Total Relation Matix (T) using the formula $T = X (I– X)^{-1}$ was computed, where I is the identity matrix and X is the normalised direct relation matrix. We can use MATLAB, excel or any other relevant tools to obtain this total relation matrix. Here we used Microsoft Excel. Next step was to calculate the sum of all rows (R) and columns (C) of the matrix. R-C values are used to find out the variables/factors which are “cause” variables and “effect” variables. The factors with negative R-C values are effect factors, the factors with positive R-C values are cause factors. The R+C values were used to find out the variable or factor which has

the maximum relationship with other variables/factors. R+C and R-C values were then plotted on a scatter plot which provided the causal diagram (A. Kumar et al., 2017). A threshold value was calculated using the average value of T matrix. The items less than the threshold value were considered to have negligible effect. We then sorted the factors as per the degree of influence and the other factors which they influence upon.

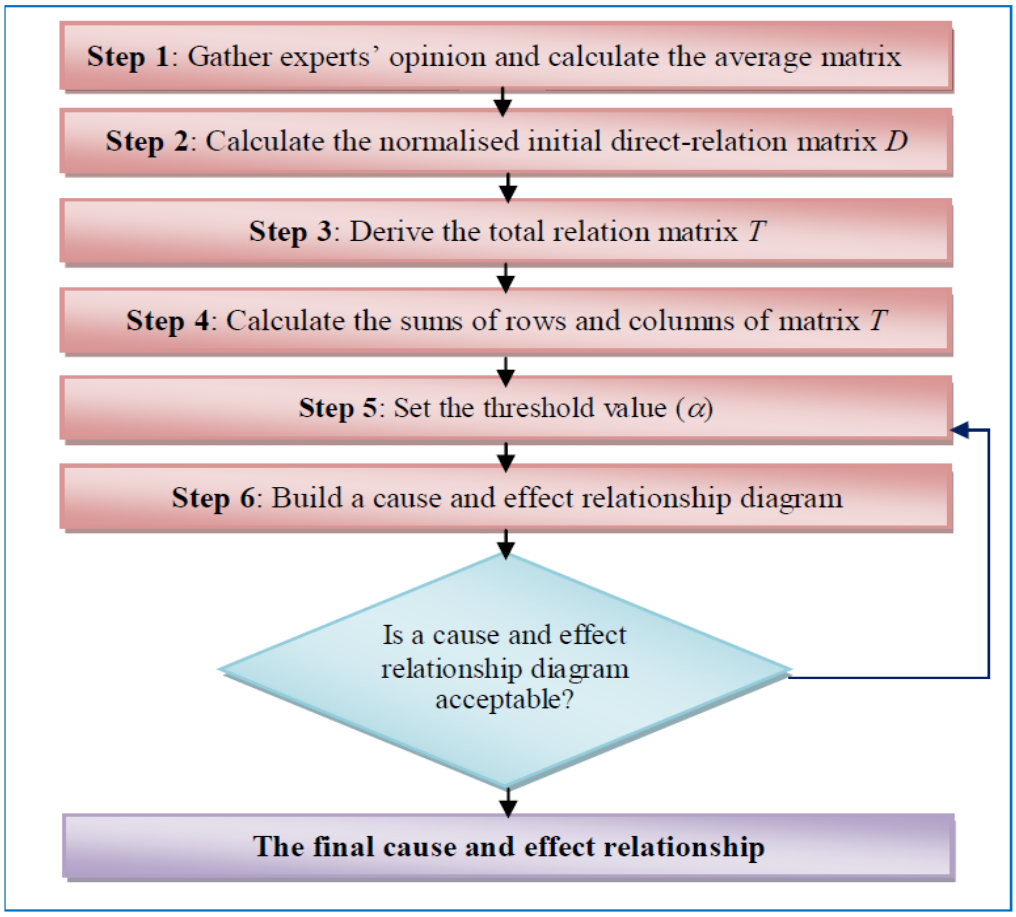

Figure 3.2 DEMATEL Framework Source (A. Kumar and Dash, 2016)

3.5 Population and Sample

The research was carried out into After Sales Service in the Medium and Heavy Commercial Vehicles (MHCV) Industry. Though the research was aimed at being brand

agnostic with respect to understanding the factors which affect customer retention, some areas will be more applicable to the 2nd largest commercial vehicle manufacturer in the country. The population for this research was the MHCV customers in India. Customer retention was evaluated by collecting information from the industry experts who were / are in the field of After Sales Service and who have 360 degrees view of the customers, authorised workshops, local workshops, and other aspects of customer service.

3.6 Participant Selection

The literature review suggests the number of experts who will participate in decision making should not be too less or too high; It is preferred to be in the range of 5 to 50 respondents (Gumus, 2009). A. Kumar et al. (2017) used only 10 experts from industry and 25 customers for their research on factors affecting customer retention in 2-wheeler industry. In this research, the responses were collected from 34 experts in the CV industry for factors analysis, from 10 experts for the AHP study and then from 22 experts for DEMATEL study. The variation in the number of experts across the 3 surveys is because of the availability of the experts for collection of data within the time frame stipulated for the research. All the experts who participated in this research by providing their inputs are from the Top 2 Commercial Vehicles manufacturers in the country and are having a professional working experience of more than 10 years in the field of After Sales Service. The selection of experts was based on convenience sampling. Experts who were known to the researcher, easily accessible, and available during the required time slots based on their schedules participated in this research. They are located in different cities of the country namely Chennai, Mumbai, Raipur, Bangalore, Delhi, Hyderabad, Cochin, Salem, Jaipur etc.

3.7 Instrumentation

The factors which influence customer retention were identified through the literature review. The data collection / evaluation for the validating of the factors, for AHP and DEMATEL analysis were collected from the industry experts through surveys and excel templates. General discussion with the experts also helped in suggesting some strategies based on the final shortlisted factors.

3.8 Data Collection Procedures

The surveys were administered through Google forms and Google sheets. The links of the forms and sheets were shared through WhatsApp and email. The survey methodology was explained to the experts over phone/ WhatsApp / face to face discussion depending on the location of the experts. The data collection involved only collecting experts' opinion in rating the importance of one factor over another and its influence on customer retention. No confidential data or any data pertaining to the experts' or the organisations they work for have been obtained during the survey. The data collected through surveys were used for further computations as part of this research and in developing strategies which will help the CV Manufacturers perform better in the customer retention area.

3.9 Data Analysis

The data collected in this research were analysed using Microsoft Excel. The matrices were created in the excel itself. All the computations were done using the inbuilt formula available in excel. For the purpose of experimentation and to check the correctness of the analysis, the trial version of the AHP software from spicelogic.com was also used. Also, the auto generated graphs / pie charts by Google Forms have also been used to generate insights.

3.10 Research Design Limitations

Based on the literature review, this research would be first of the kind in the area of Customer retention with respect to Indian Truck After Sales Service, specifically in the Medium and Heavy Commercial vehicle segment, in the range of 16 tons Gross Vehicle weight (GVW) to 55 tons GVW. In this research, as the subject being complex and first of its kind, the surveys have been limited to subject experts. However, interviewing actual customers and taking their answers for the AHP and DEMATEL analysis would have added more value. AHP & DEMATEL are some MCDM tools. There are many more complex and advanced tools available. The usage of those tools will further refine our research. In this research the entire customers have been considered as one single group, however in reality it is not so. Truck customers can be classified into Fleet operators, Single Owner, First time user etc., based on ownership; they can be grouped based on segments like haulage, passenger, tippers etc.; they can be grouped based on application e-com, market load, white goods etc. The requirements of each group of customers are different, their behaviour patterns are different. We cannot fit one solution for all. The factors which affect the retention may be different for different groups. Considering the limitations of time and expertise currently available, the points mentioned above have been kept for future research in this area.

3.11 Conclusion

The 38 factors which were carved out from the literature were evaluated by experts and trimmed down to 20 factors, which were then subjected to AHP and DEMATEL studies. The weight of the factors and their inter relationship were obtained. The results from AHP and DEMATEL were combined and looked together for generating insights. Based on the ranks, weights, relative weights, cause effect nature, factors influenced etc, 9 factors were finalised. Strategies were formulated using these 9 factors as a base. Also, some metrics which can be used to monitor the effectiveness of the strategies were reviewed.

CHAPTER IV:

RESULTS

4.1 Research Question One—Weights of factors affecting customer retention.

4.1.1 Factors Evaluation

As mentioned earlier, the list of 38 factors obtained through literature review were submitted to 34 Industry experts for their reviews. The graphical representation of the scores of each of 38 factors are given below.

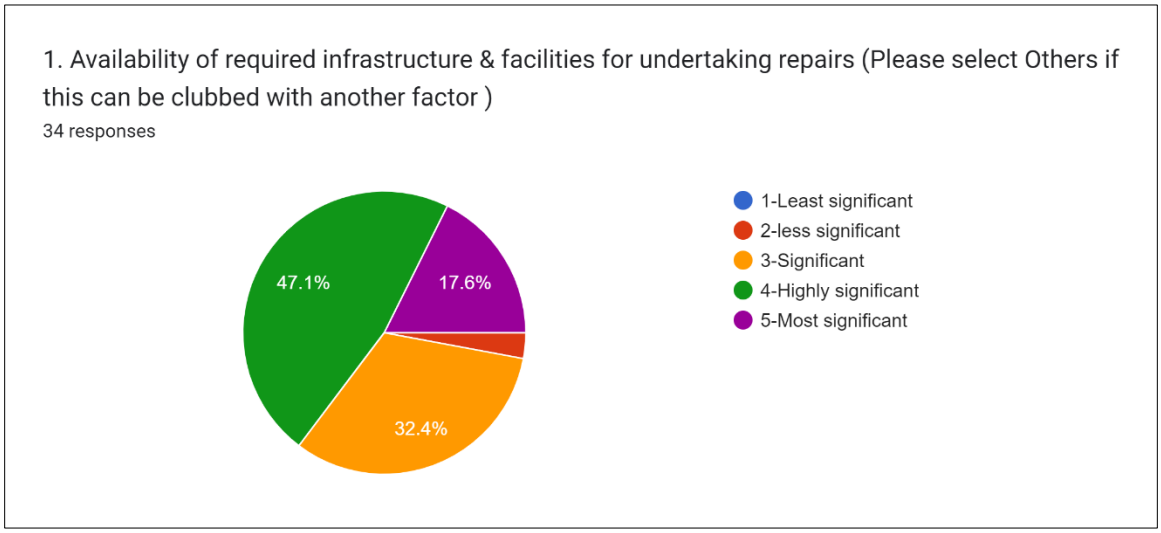

Figure 4.1 Factor 1 score

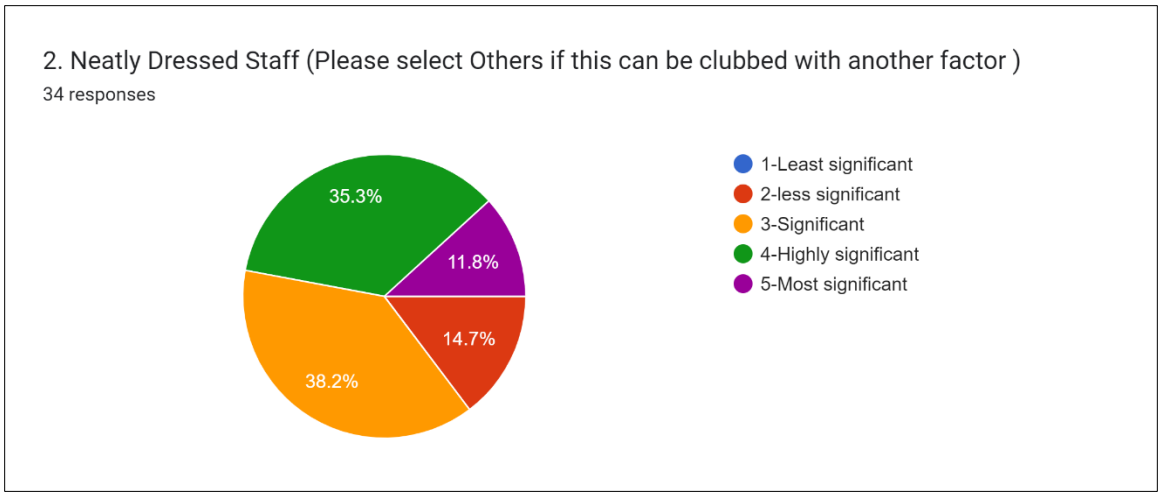

Figure 4.2 Factor 2 score

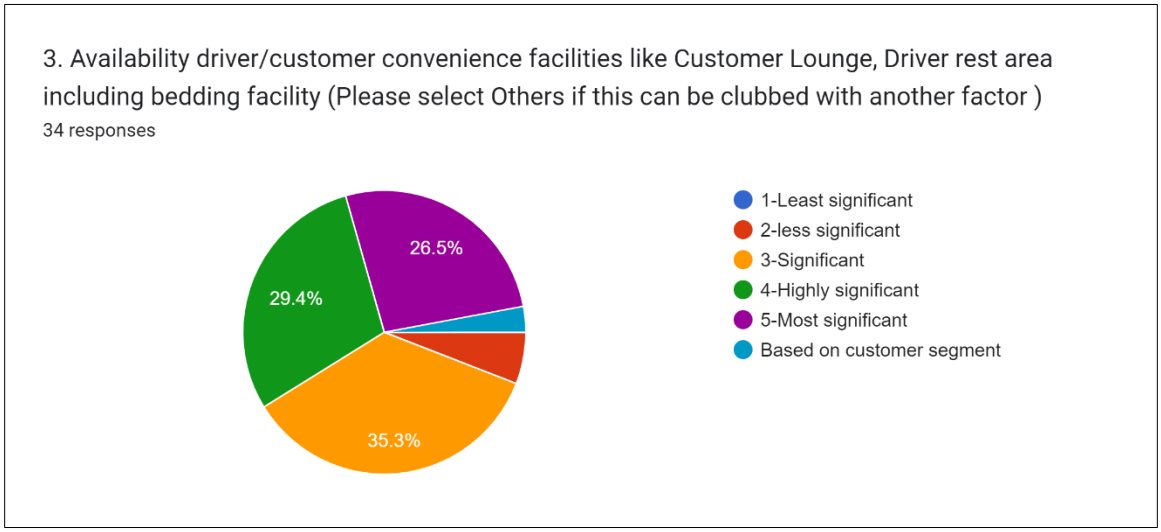

Figure 4.3 Factor 3 score

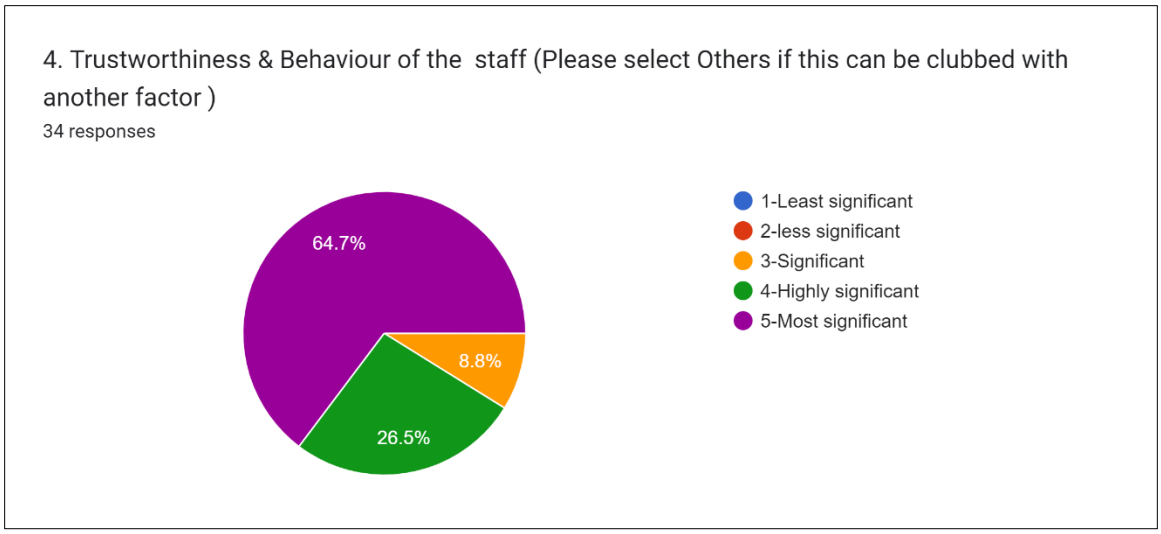

Figure 4.4 Factor 4 score

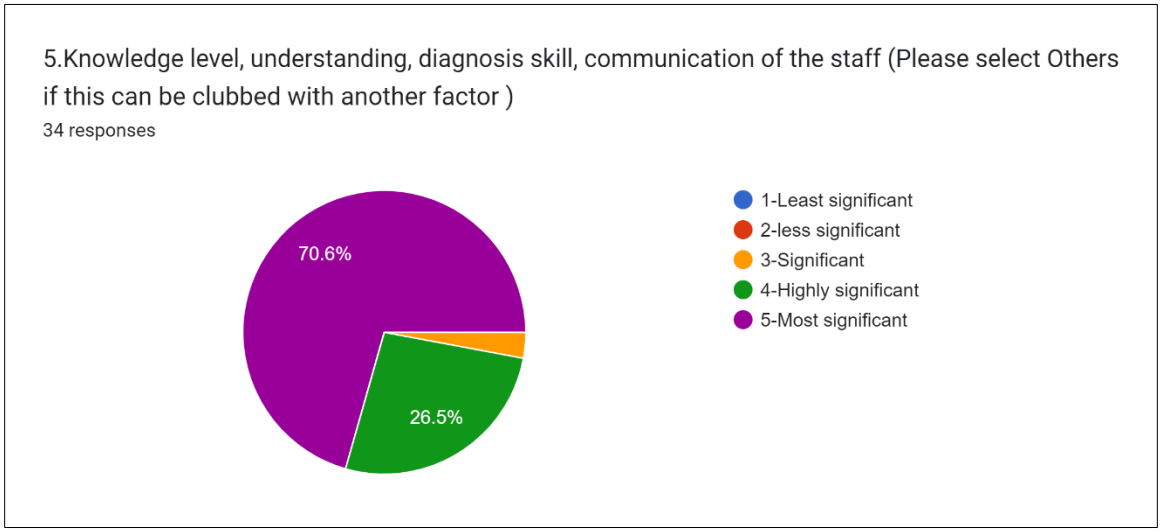

Figure 4.5 Factor 5 score

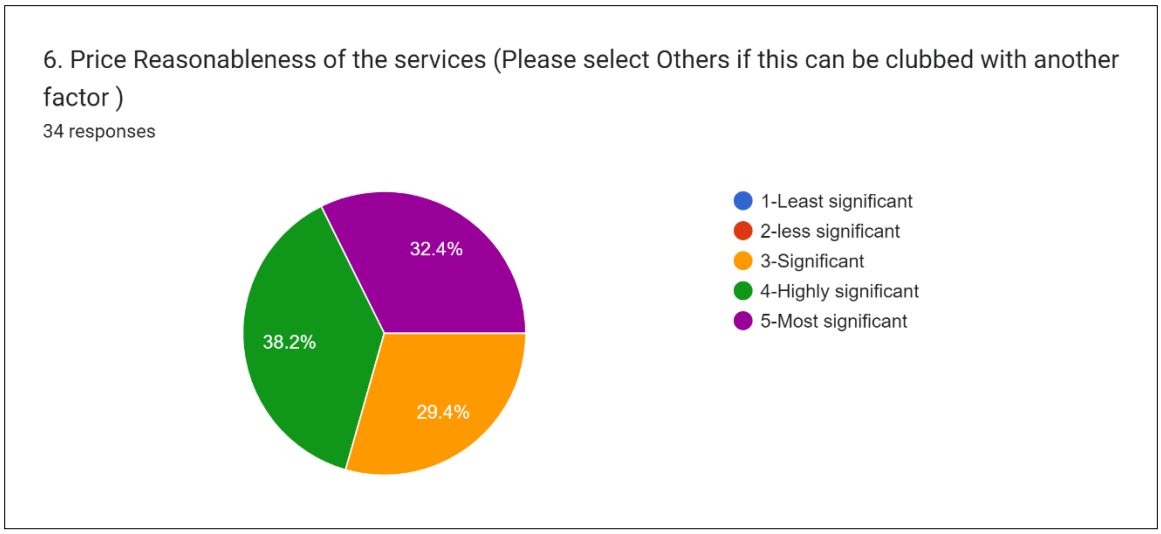

Figure 4.6 Factor 6 score

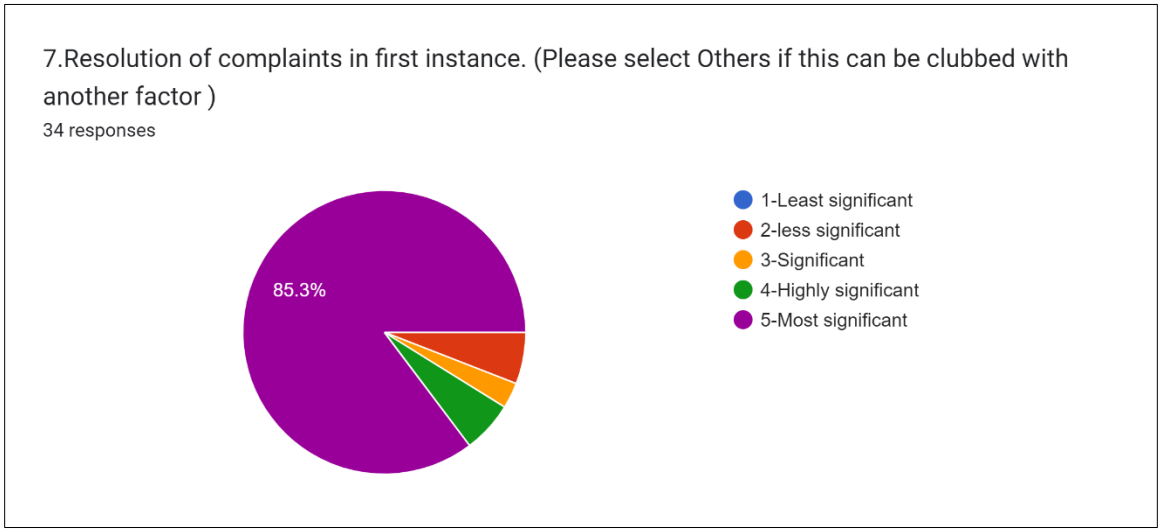

Figure 4.7 Factor 7 score

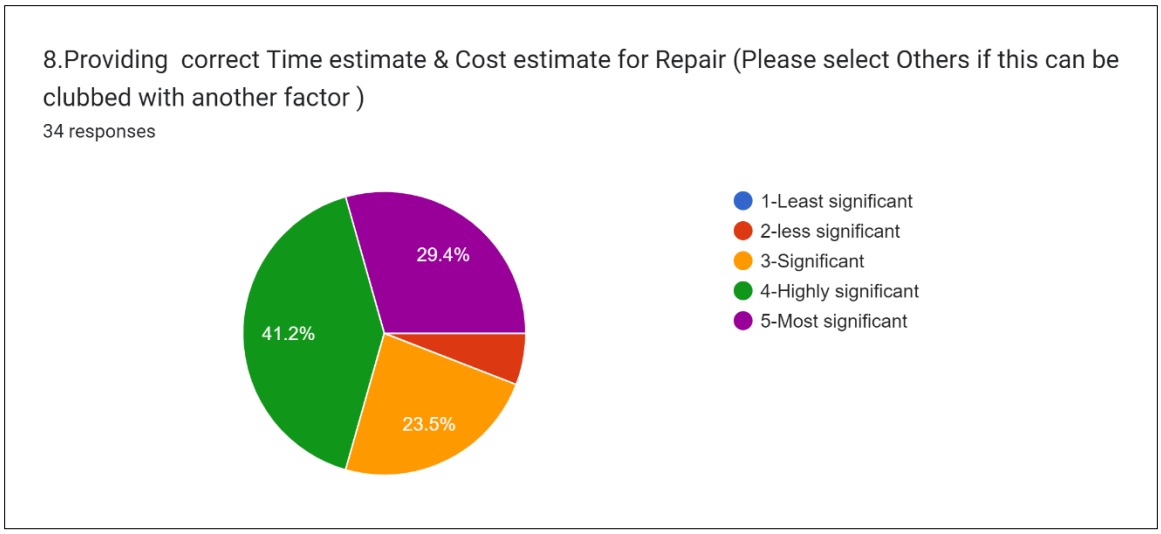

Figure 4.8 Factor 8 score

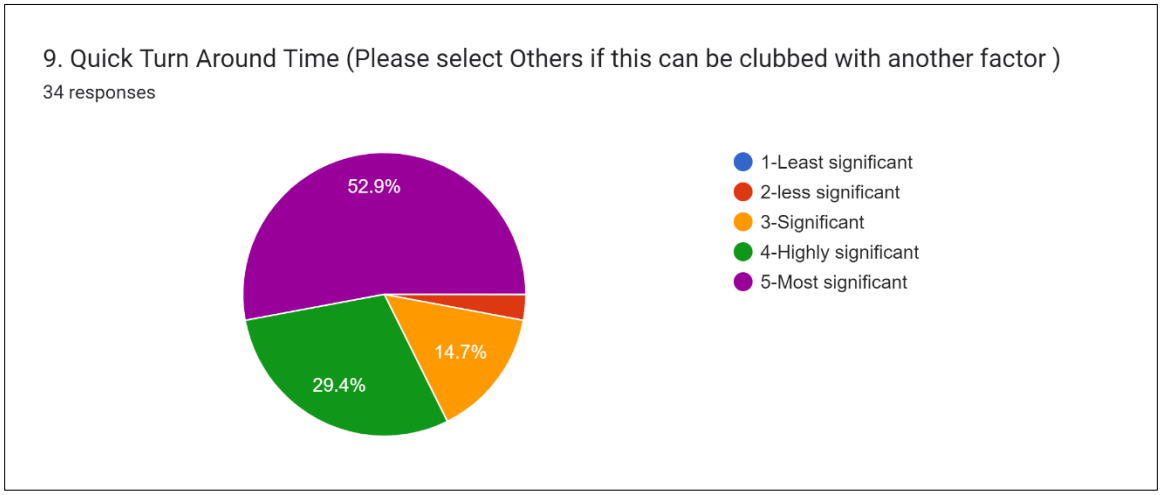

Figure 4.9 Factor 9 score

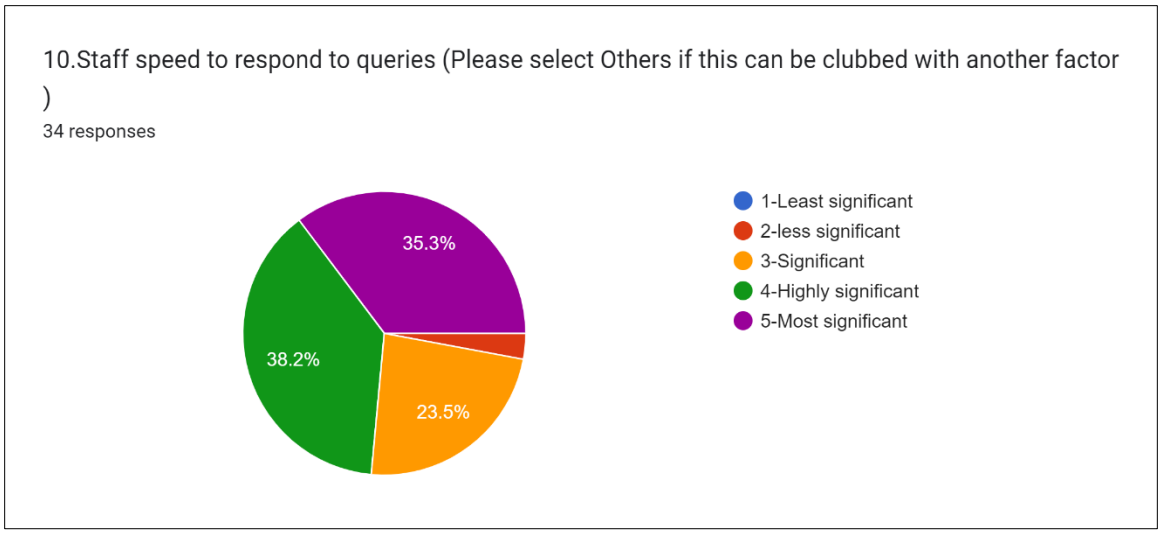

Figure 4.10 Factor 10 score

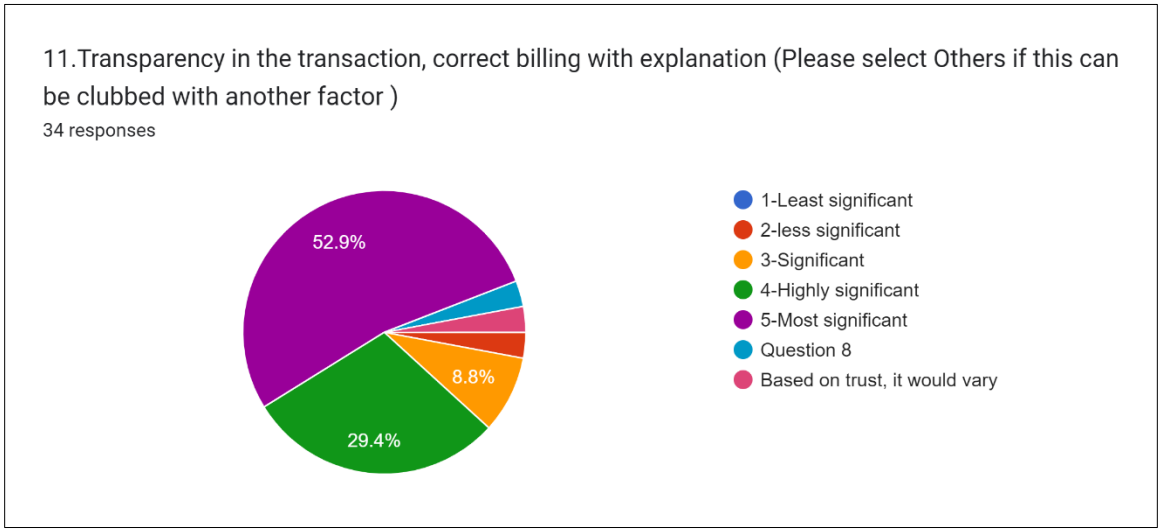

Figure 4.11 Factor 11 score

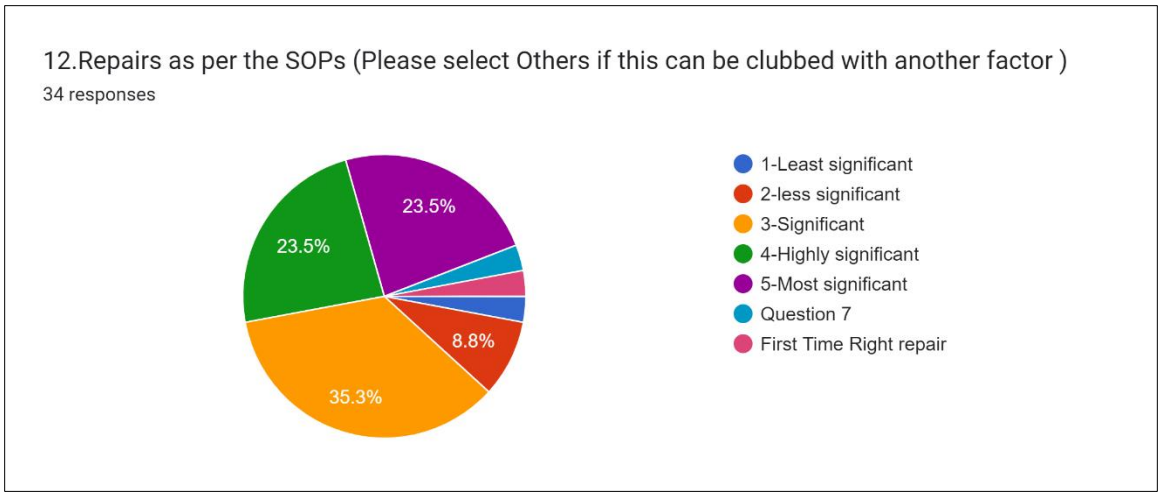

Figure 4.12 Factor 12 score

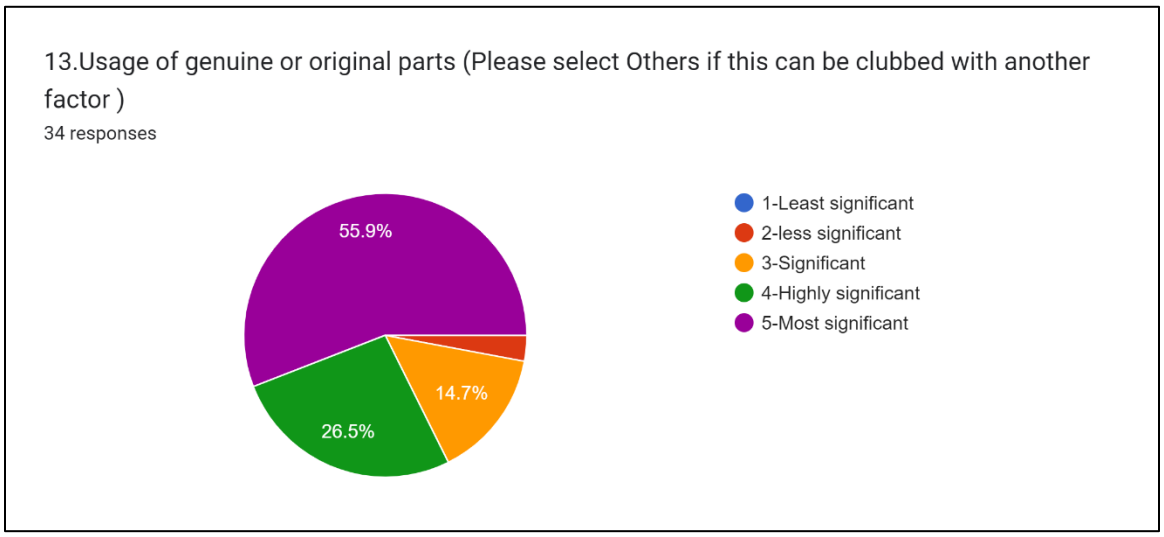

Figure 4.13 Factor 13 score

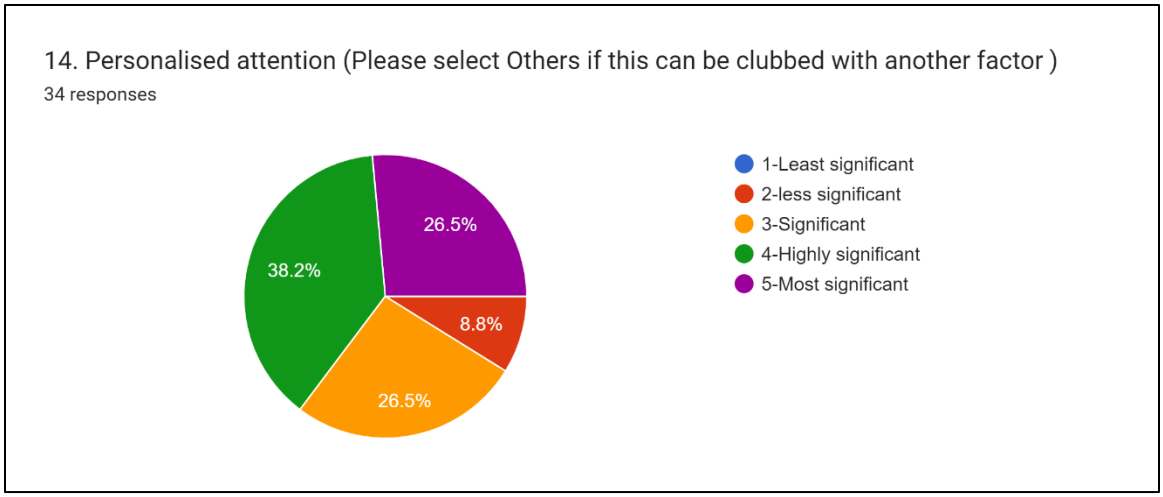

Figure 4.14 Factor 14 score

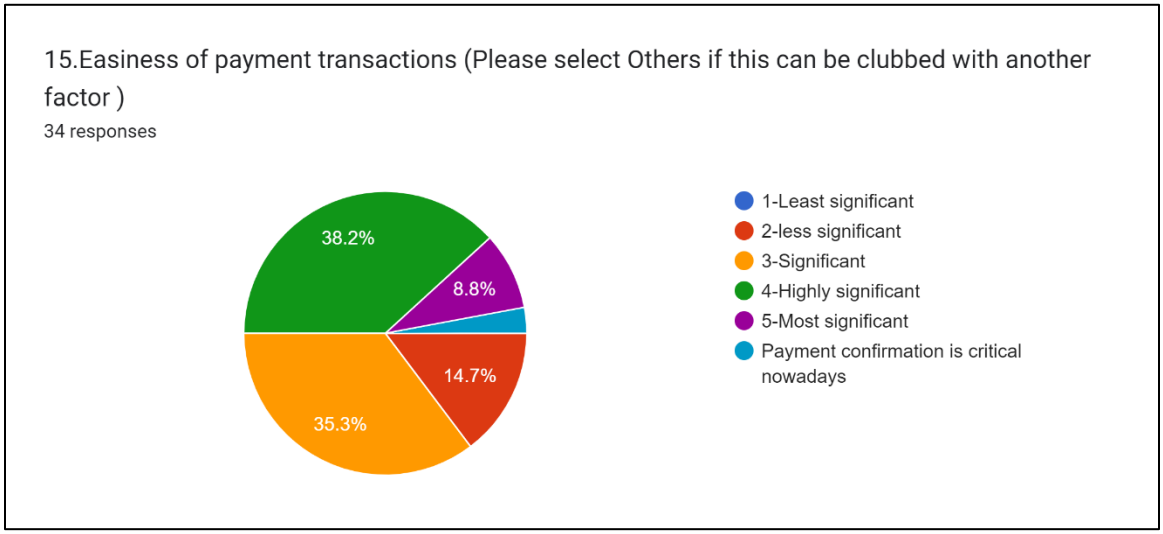

Figure 4.15 Factor 15 score

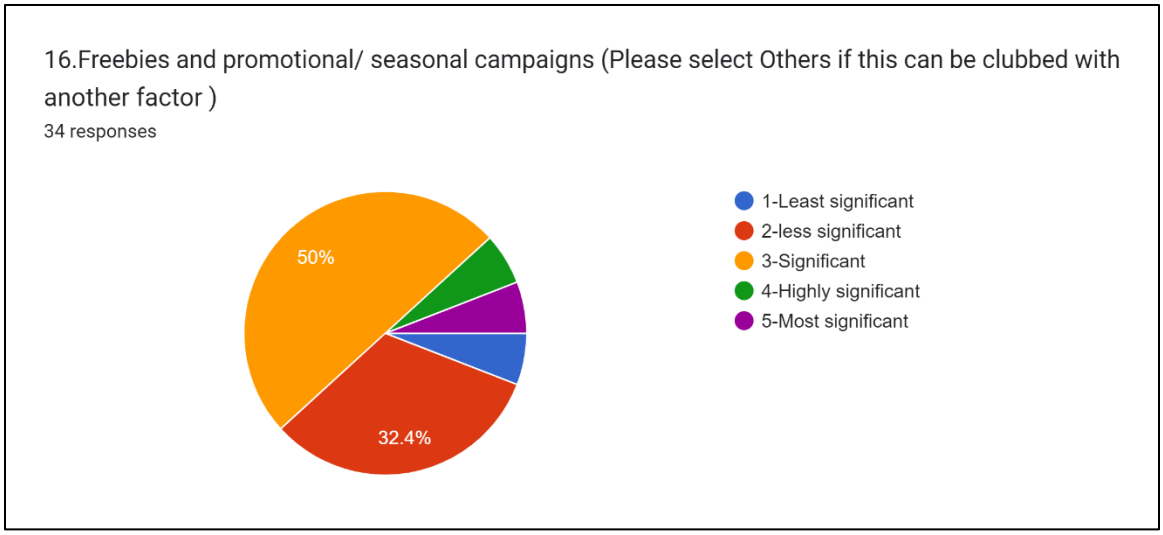

Figure 4.16 Factor 16 score

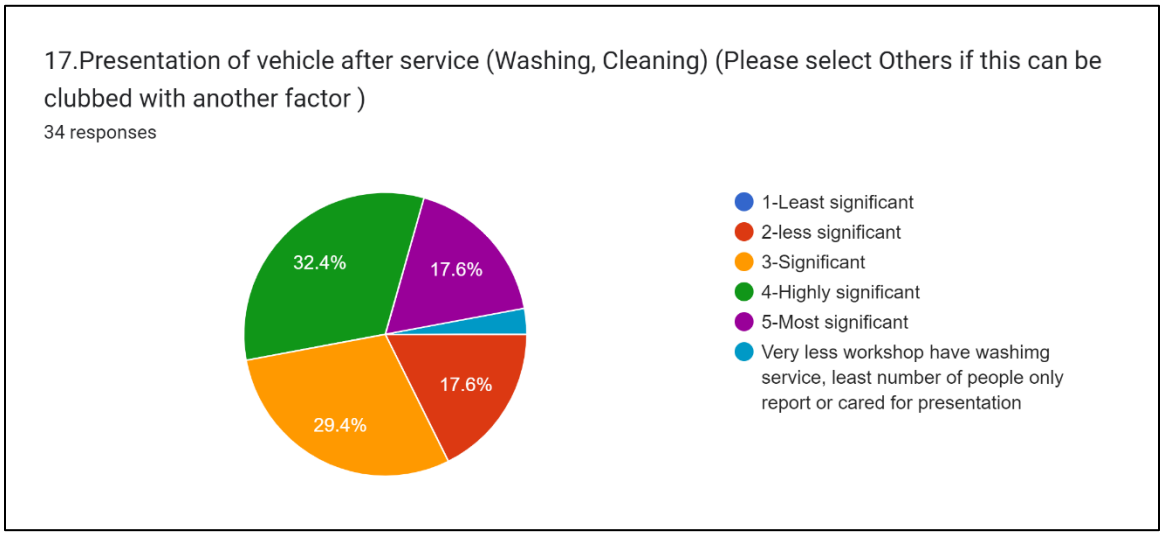

Figure 4.17 Factor 17 score

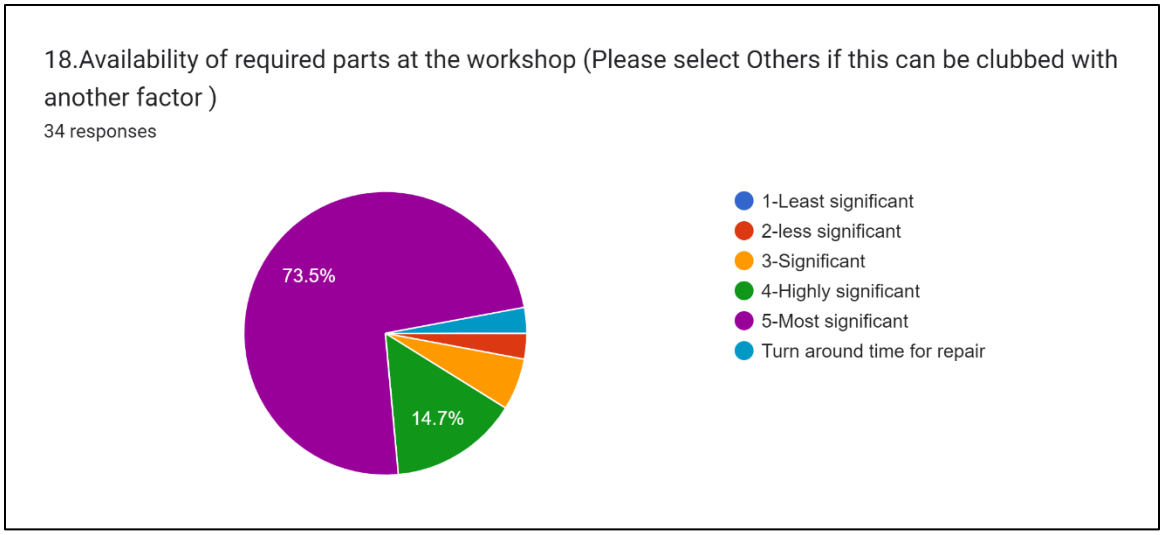

Figure 4.18 Factor 18 score

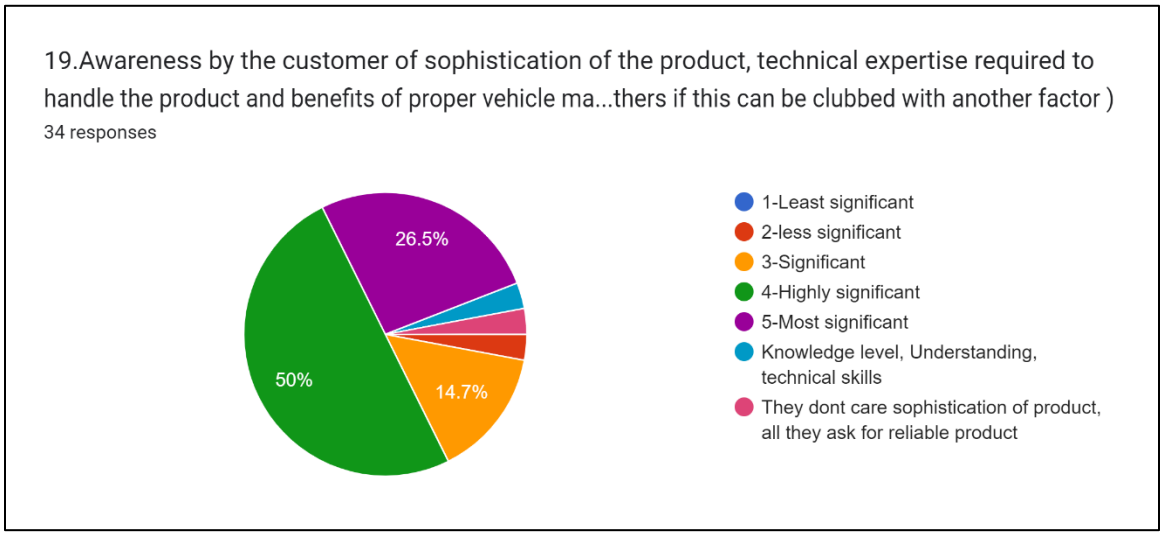

Figure 4.19 Factor 19 score

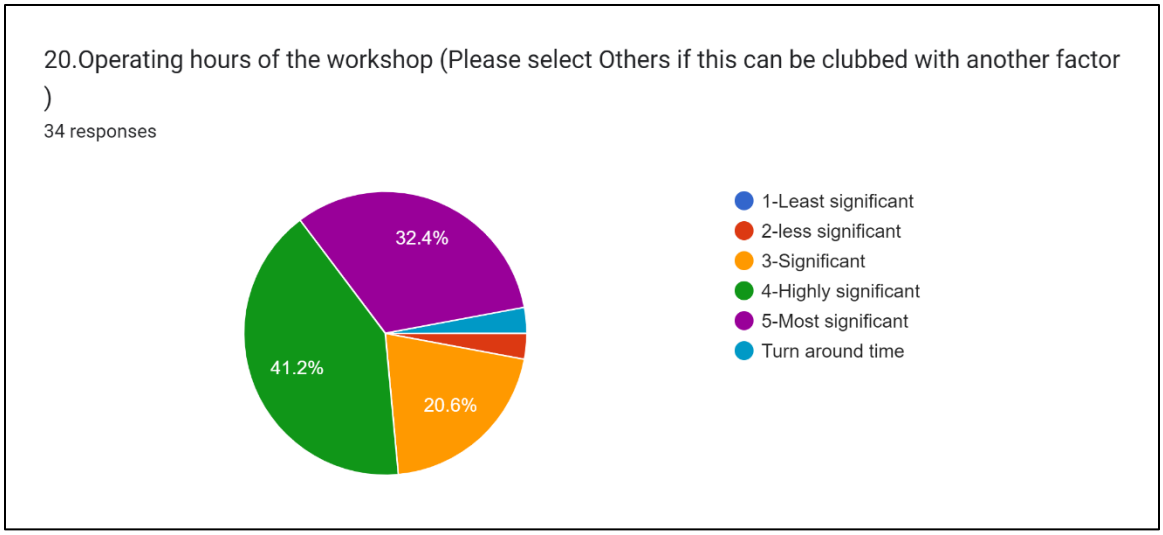

Figure 4.20 Factor 20 score

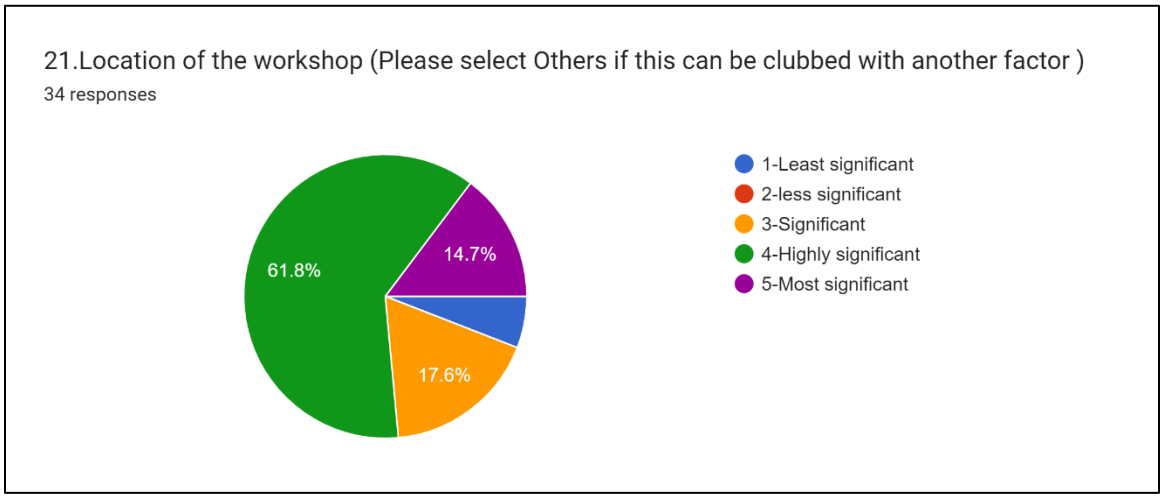

Figure 4.21 Factor 21 score

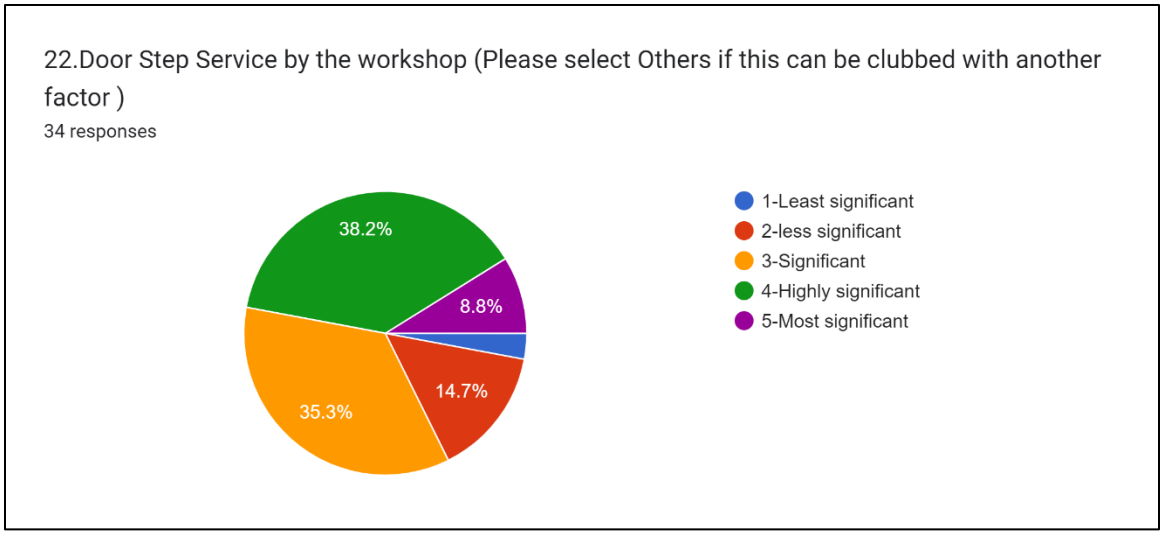

Figure 4.22 Factor 22 score

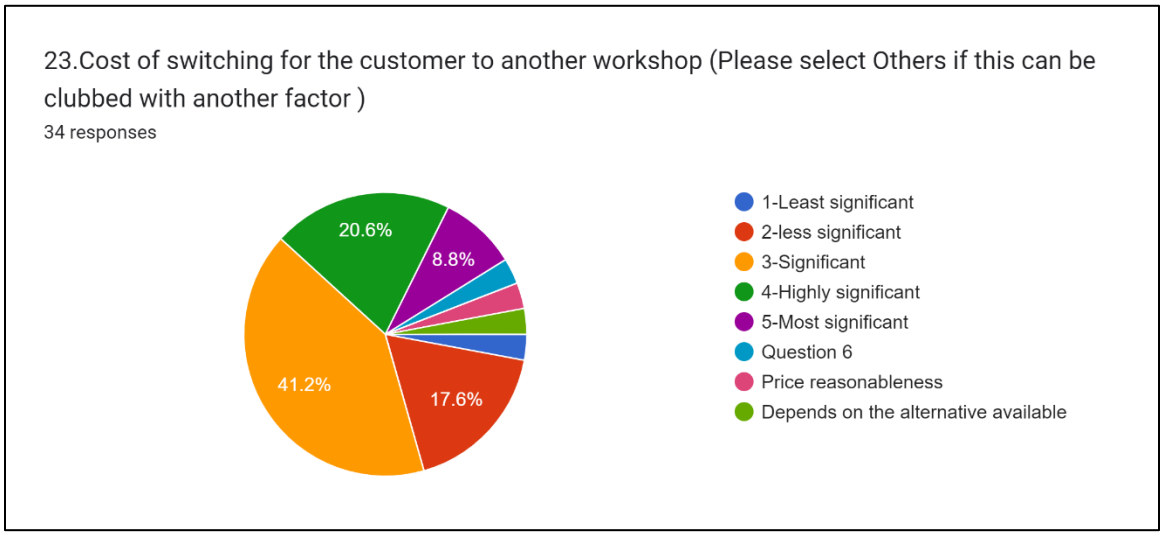

Figure 4.23 Factor 23 score

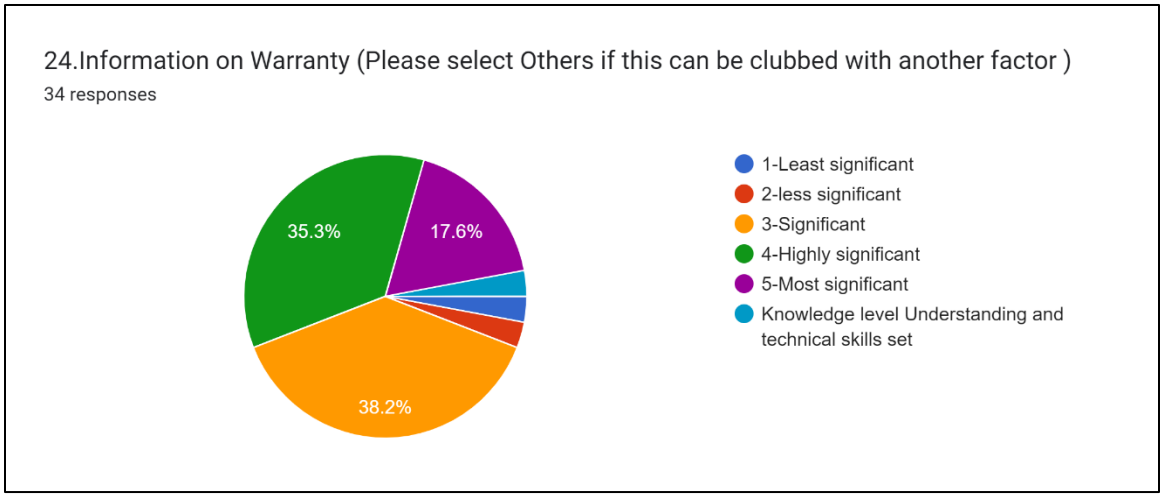

Figure 4.24 Factor 24 score

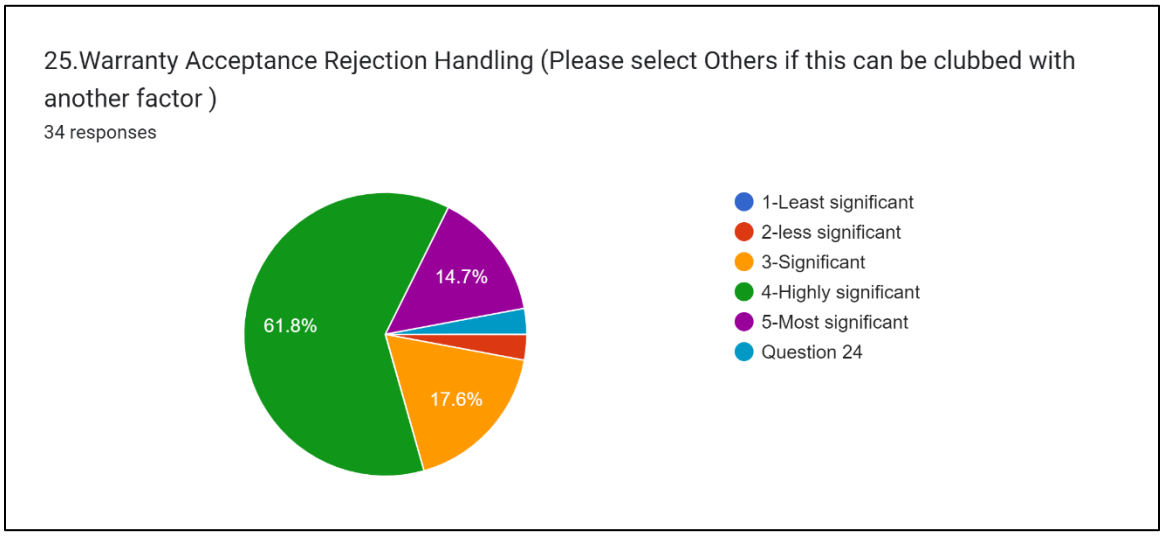

Figure 4.25 Factor 25 score

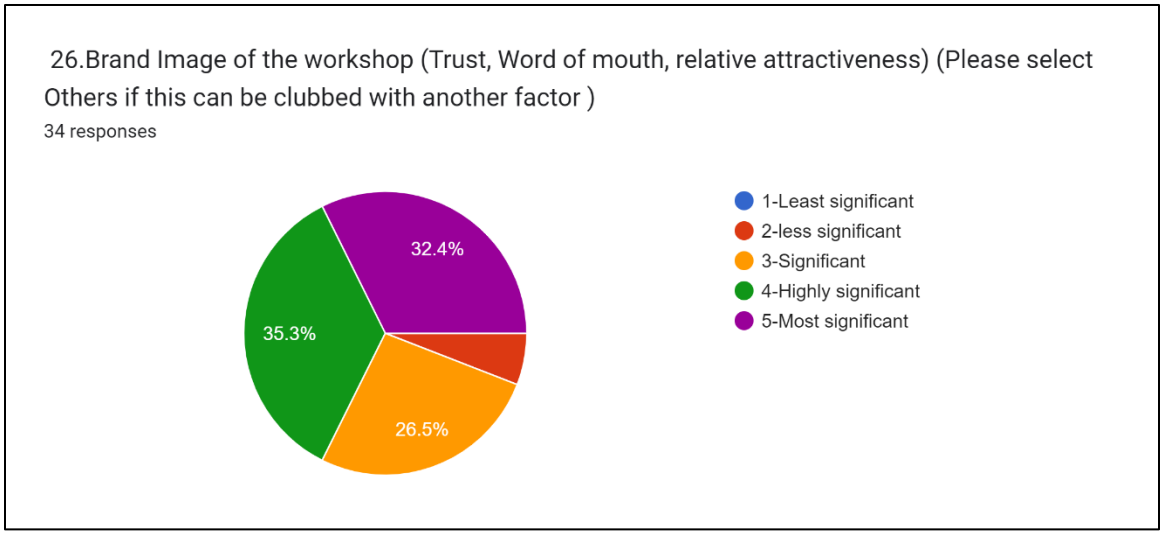

Figure 4.26 Factor 26 score

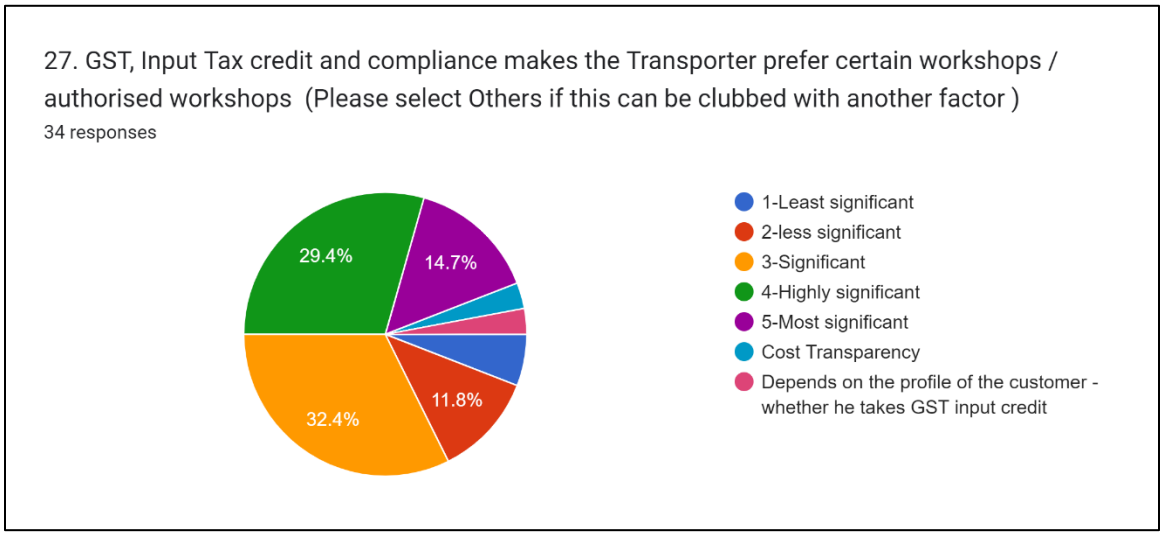

Figure 4.27 Factor 27 score

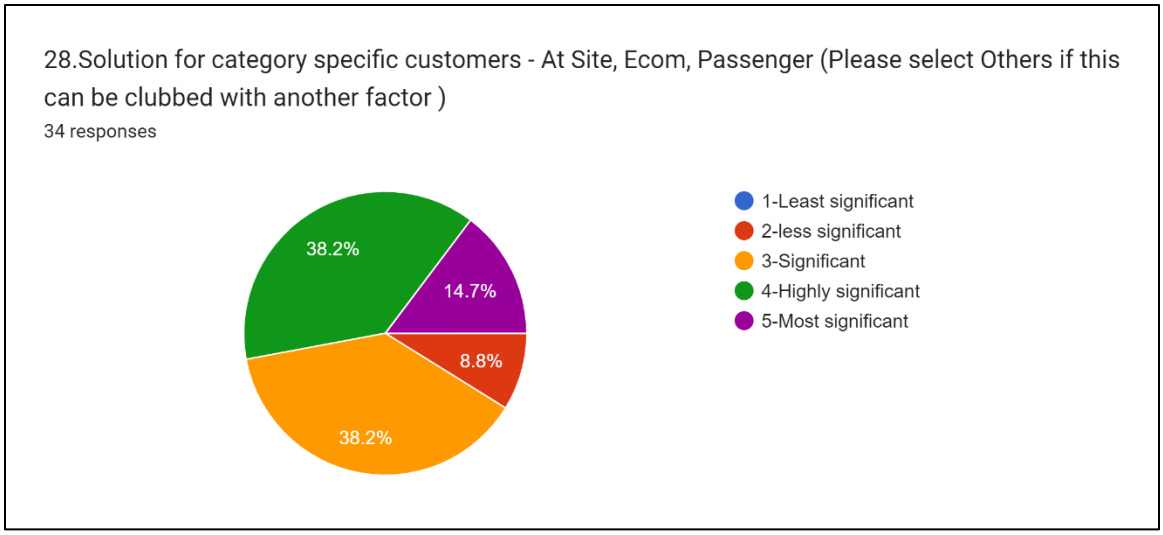

Figure 4.28 Factor 28 score

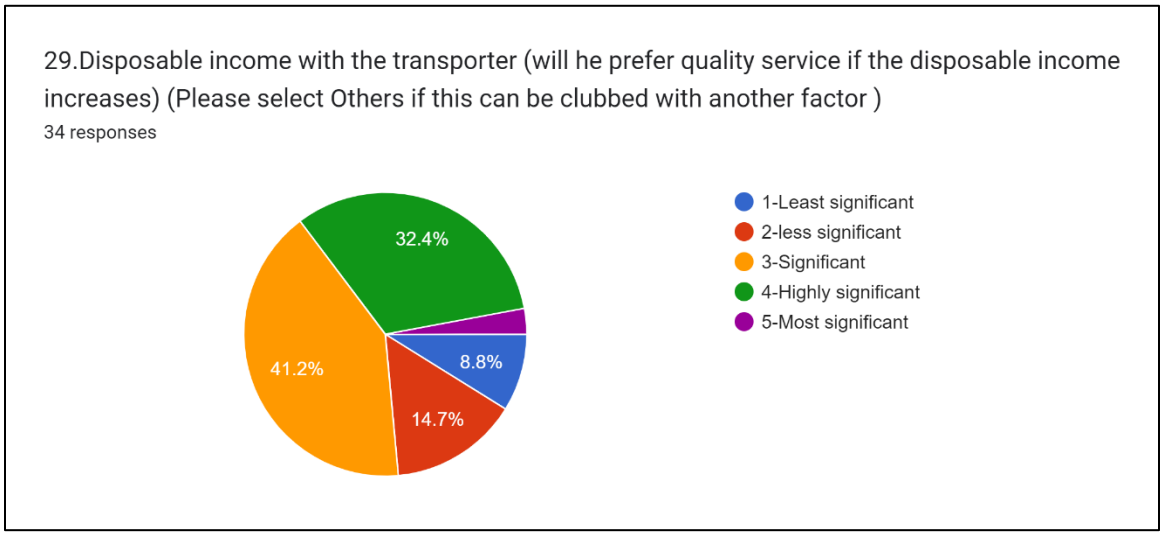

Figure 4.29 Factor 29 score

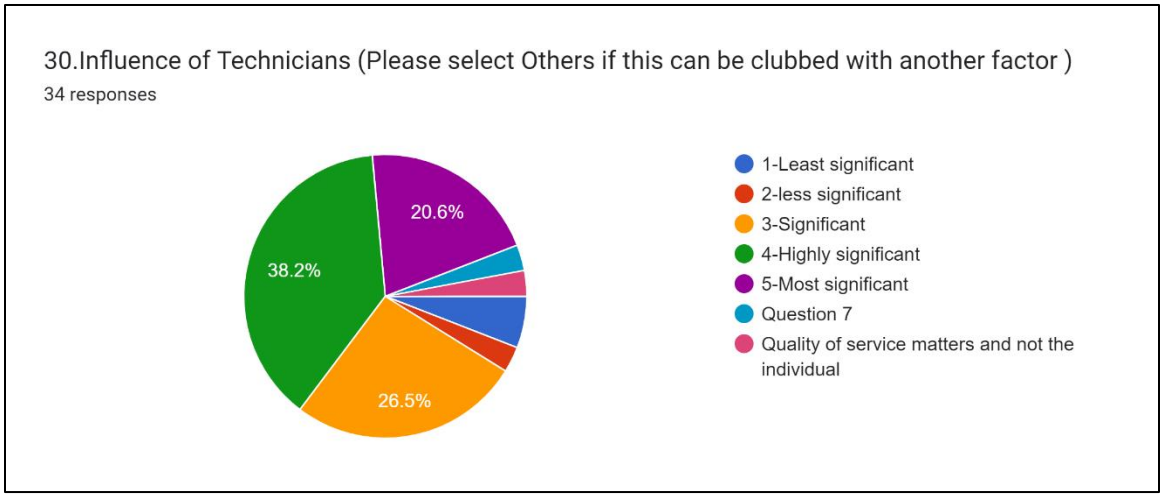

Figure 4.30 Factor 30 score

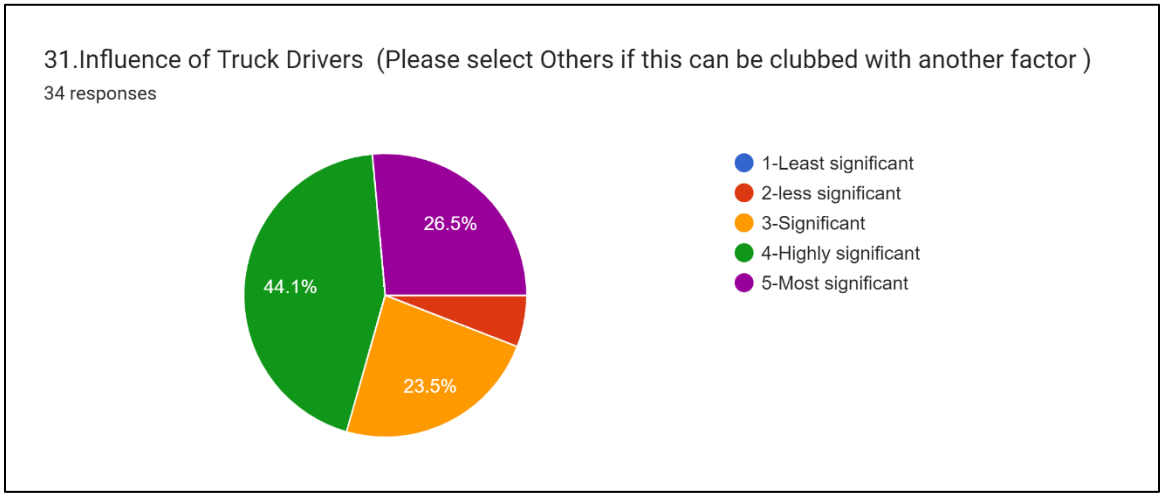

Figure 4.31 Factor 31 score

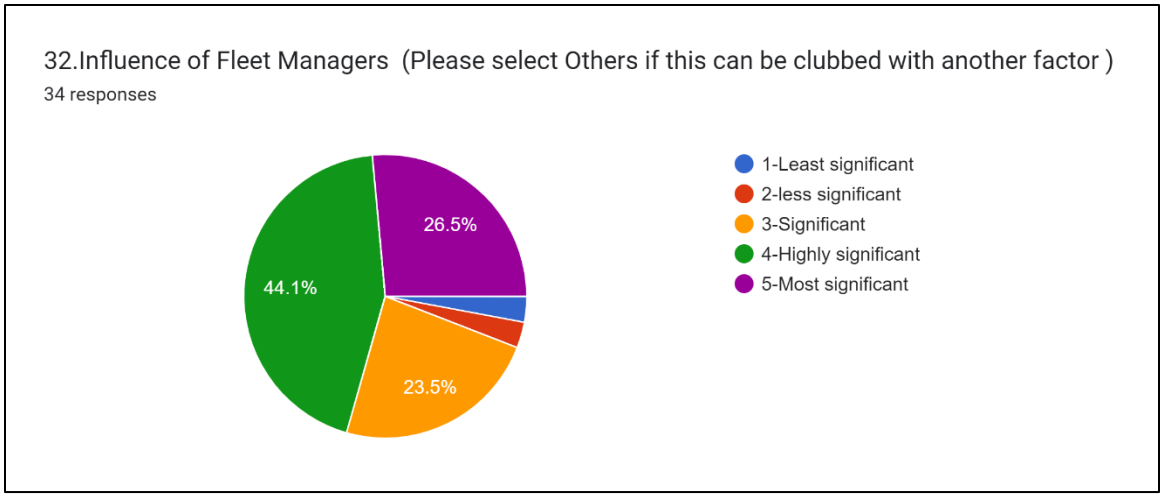

Figure 4.32 Factor 32 score

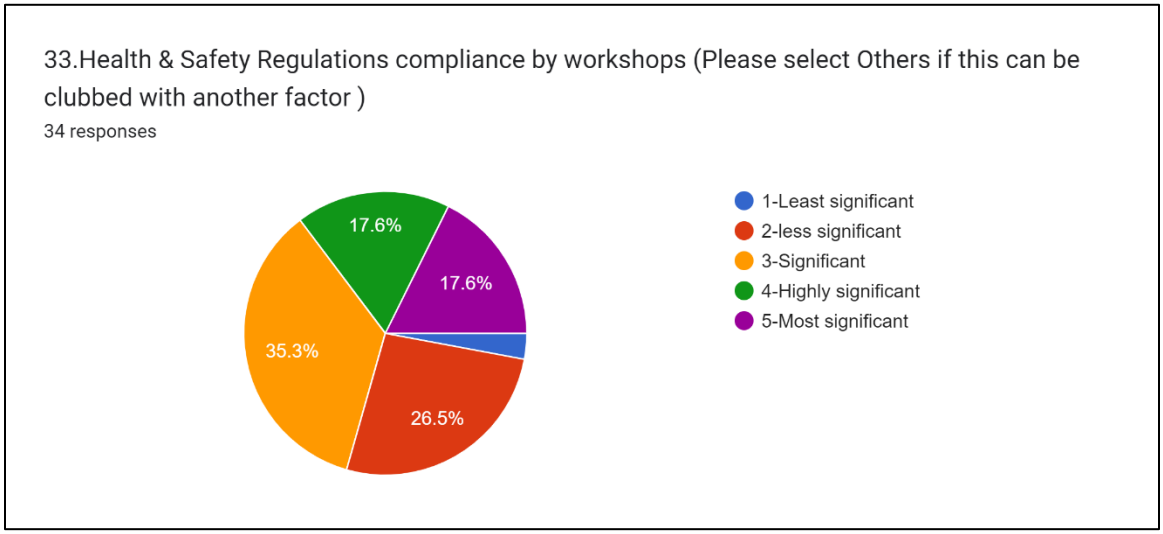

Figure 4.33 Factor 33 score

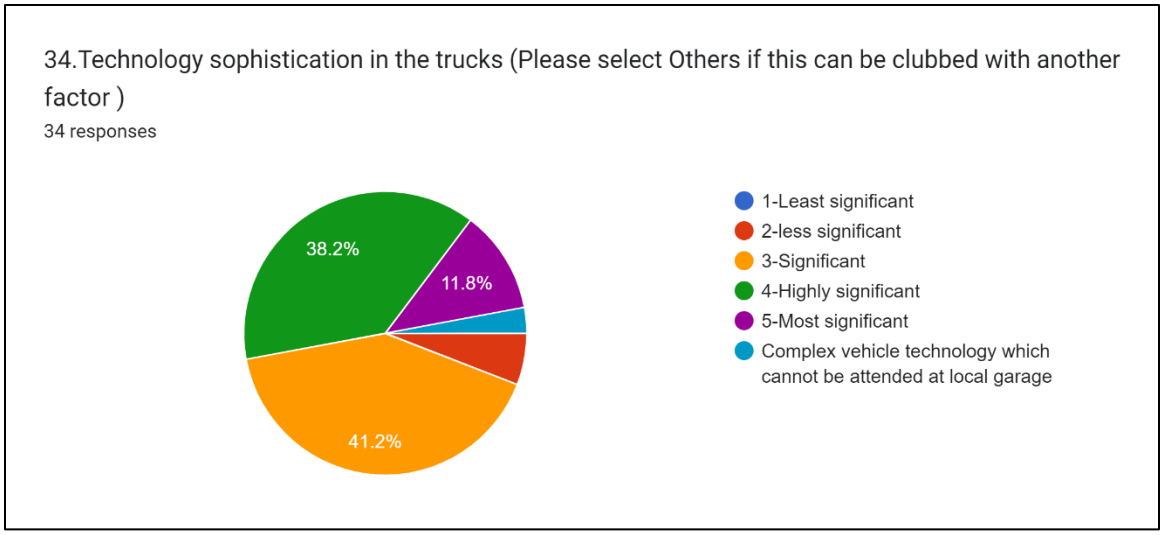

Figure 4.34 Factor 34 score

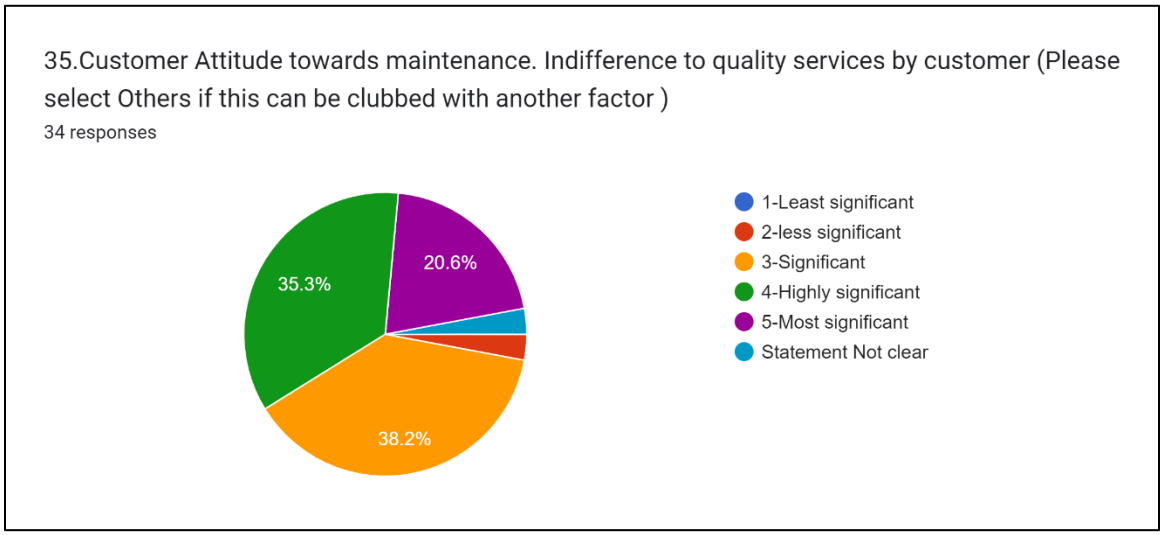

Figure 4.35 Factor 35 score

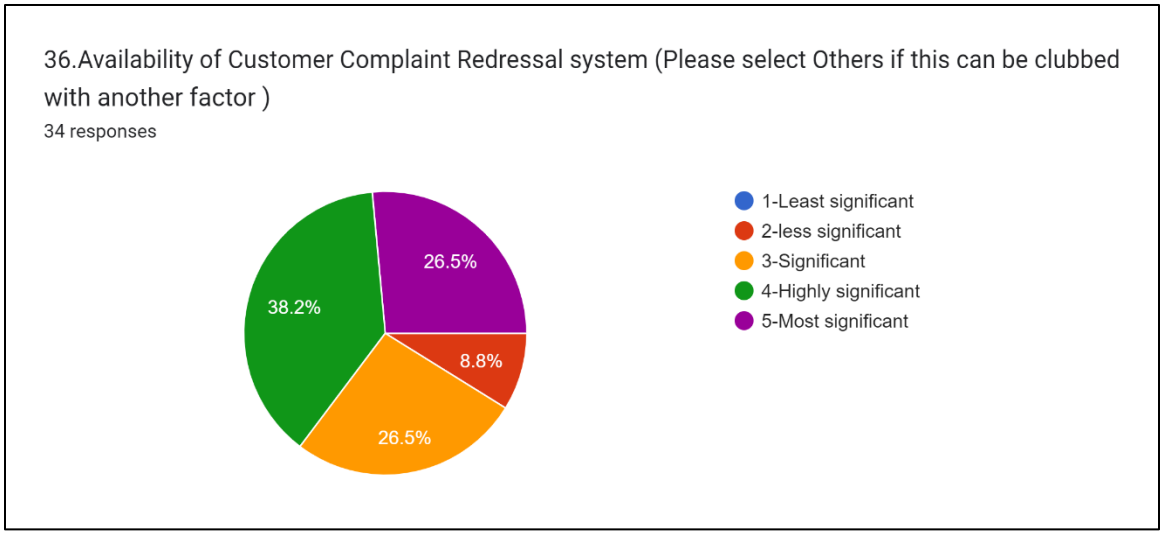

Figure 4.36 Factor 36 score

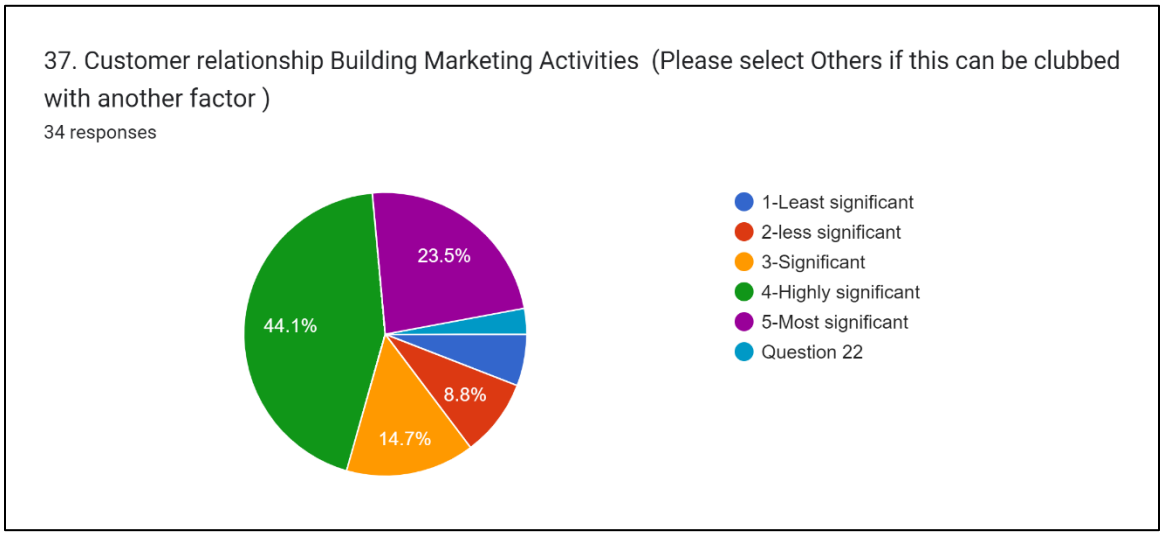

Figure 4.37 Factor 37 score

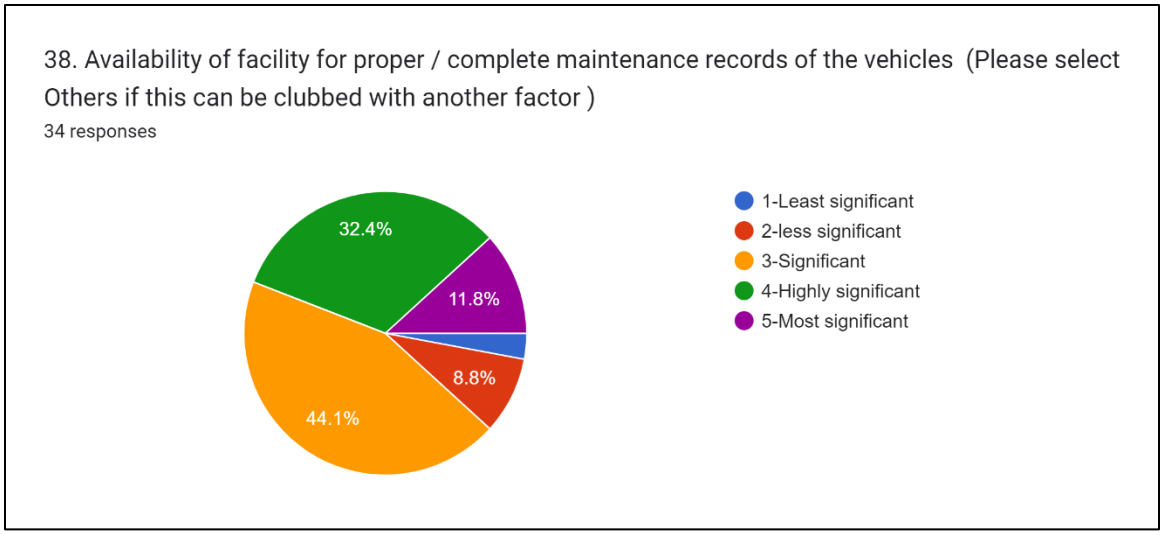

Figure 4.38 Factor 38 score

4.1.2 Factors grouping

The factors arranged in the descending order of the average score is provided in the Table 4.1. The factors which were similar in nature were grouped. Also, the factors with scores less than equal to 3.5 were dropped.

Factors	Sum of Scores	Average	Remarks
7.Resolution of complaints in first instance.	160	4.7	
5.Knowledge level, understanding, diagnosis skill, communication of the staff	159	4.7	Group
4. Trustworthiness & Behaviour of the staff	155	4.6	Group
18.Availability of required parts at the workshop	153	4.5	Group
13.Usage of genuine or original parts	148	4.4	Group
9. Quick Turn Around Time	147	4.3	
11.Transparency in the transaction, correct billing with explanation	141	4.1	
10.Staff speed to respond to queries	138	4.1	Group
6. Price Reasonableness of the services	137	4.0	
8.Providing correct Time estimate & Cost estimate for Repair	134	3.9	
20.Operating hours of the workshop	134	3.9	
26.Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	134	3.9	
31.Influence of Truck Drivers	133	3.9	Group
32.Influence of Fleet Managers	132	3.9	Group

14. Personalised attention	130	3.8	
19.Awareness by the customer of sophistication of the product, technical expertise required to handle the product and benefits of proper vehicle maintenance	130	3.8	
36.Availability of Customer Complaint Redressal system	130	3.8	
1. Availability of required infrastructure & facilities for undertaking repairs	129	3.8	
21.Location of the workshop	129	3.8	
25.Warranty Acceptance Rejection Handling	129	3.8	
3. Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	125	3.7	
35.Customer Attitude towards maintenance. Indifference to quality services by customer	124	3.6	
37. Customer relationship Building Marketing Activities	123	3.6	
28.Solution for category specific customers - At Site, Ecom, Passenger	122	3.6	
24.Information on Warranty	120	3.5	Group
30.Influence of Technicians	118	3.5	Group
34.Technology sophistication in the trucks	118	3.5	
2. Neatly Dressed Staff	117	3.4	Group
17.Presentation of vehicle after service (Washing, Cleaning)	116	3.4	Drop
38. Availability of facility for proper / complete maintenance records of the vehicles	116	3.4	Drop
12.Repairs as per the SOPs	115	3.4	Drop
22.Doorstep Service by the workshop	114	3.4	Drop
15.Easiness of payment transactions	113	3.3	Drop
33.Health & Safety Regulations compliance by workshops	109	3.2	Drop
27. GST, Input Tax credit and compliance makes the Transporter prefer certain workshops / authorised workshops	108	3.2	Drop
29.Disposable income with the transporter (will he prefer quality service if the disposable income increases)	104	3.1	Drop
23.Cost of switching for the customer to another workshop	98	2.9	Drop
16.Freebies and promotional/ seasonal campaigns	93	2.7	Drop

Table 4.1 Factors Finalisation

4.1.3 Other Factors Evaluation

The other factors recommended by the experts are given in Table 4.2. These factors were reviewed and checked for similarity with any of the existing factors.

Other Factors	Similarity Factor
Proper explanation of Job done, parts replaced, and activities involved before billing	5
Define customer Segment in your poll. customer behaviour differs with Segment	Out of Scope
Post Service Feedback and complaint resolution if any with good follow ups	36
Honesty in transactions and Proficiency in handling the complaints are the key points for customer retention.	36
Price gap between OE and Vendor Parts and Lube.	6
Labour price gap between authorized and non-authorized service canters.	6
Human touch required (3 C concept Connect, Convey and Convince) instead of transaction-based approach with the customer	4
Further detailed on Proximity or network reach	21 & 22
Regular meeting with customer as he feels approachable.	37
Quick action / update on his query.	10
Availability of service touch points enroute (network strength),	21 & 22
Service products offerings such as EWP AMC, Customer loyalty programs	37
All the facility at one place, example: Washing, Wheel alignment, tyre replacement, Battery replacement, Insurance renewals etc...	1
Location of workshop - loading / unloading points	21
Availability of Credit facility	15
Retention schemes offered by the workshop for drivers, fleet managers and owners.	31 & 32
Customer meets and engagement activities	37
High TAT, Higher breakdowns and off roads	9
Non availability of parts	18
Poor handling of customer, driver by dealer.	4
Job done explained to customer, technically not explaining to customer etc.	11
Customers require Credit facility	15
High Cost and High TAT	6 & 9
Strong relationship building	37
High billing time.	15

Table 4.2 Other Factors by experts

The factor number which was similar to the suggested additional factors by the experts, is also mentioned in Table 4.2. The list of shortlisted 20 factors after evaluation of the responses by all 34 experts is given in Table 4.3

New Factor Number	Factors	Factors Grouped
F1	Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries	4,5,10
F2	Resolution of complaints in first instance.	
F3	Usage of genuine or original parts and availability of required parts at the workshop	13 & 18
F4	Quick Turn Around Time	
F5	Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	
F6	Price Reasonableness of the services	
F7	Transparency in the transaction, correct billing with explanation	
F8	Providing correct Time estimate & Cost estimate for Repair	
F9	Availability of Customer Complaint Redressal system.	
F10	Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	
F11	Operating hours of the workshop	
F12	Influence of Truck Drivers, Fleet Managers, Workshop Technicians	30,31,32
F13	Personalised attention of customers	
F14	Warranty Acceptance & Rejection Handling	24 &25
F15	Customer Attitude towards maintenance. Indifference to quality services by customer	
F16	Availability of required infrastructure (tools, equipment) & facilities for undertaking repairs	
F17	Location of the workshop or doorstep service support	21 & 22
F18	Awareness by the customer on sophistication of the product, technical expertise required to handle the product, maintenance schedules, benefits of its adherence, warranty terms etc	
F19	Customer relationship Building Marketing Activities	
F20	Customised Solution for category specific customers - At Site, Ecom, Passenger	

Table 4.3 Finalised 20 Factors

4.1.4 Analytic Hierarchy Process (AHP) Study

The list of shortlisted 20 factors were subjected to AHP study by 14 experts where 190 pair wise comparisons were carried out by each of the expert. The responses on a 9-point scale by every expert were converted into 20X20 matrix as given in the tables below.

0.089	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	1.0	1.0	3	3	1.0	1.0	1.0	3	3	3	3	1.0	0.3	1.0	3	1.0	3	3
F2	1.0	1.0	1.0	1.0	3	3	1.0	2	2	3	3	3	3	3	1.0	1.0	2	1.0	2	2
F3	1.0	1.0	1.0	1.0	1.0	1.0	0.3	1.0	2	2	2	1.0	2	1.0	3	0.5	3	1.0	2	1.0
F4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	2	1.0
F5	0.3	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	3	1.0	2	0.5	1.0	1.0
F6	0.3	0.3	1.0	1.0	1.0	1.0	1.0	1.0	0.5	3	1.0	1.0	1.0	3	3	1.0	3	0.5	2	1.0
F7	1.0	1.0	3.0	1.0	1.0	1.0	1.0	1.0	3	2	1.0	2	1.0	3	3	1.0	2	2	3	2
F8	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	2	2	2	2	2	1.0	0.5	1.0	0.5	1.0	0.5	2
F9	1.0	0.5	0.5	1.0	1.0	2.0	0.3	0.5	1.0	2	2	3	1.0	0.3	2	0.5	0.5	1.0	2	0.5
F10	0.3	0.3	0.5	0.5	1.0	0.3	0.5	0.5	0.5	1.0	1.0	3	1.0	0.5	0.5	1.0	1.0	0.3	0.5	0.5
F11	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	0.3	0.3	0.3	1.0	0.3	0.3	1.0
F12	0.3	0.3	1.0	1.0	1.0	1.0	0.5	0.5	0.3	0.3	1.0	1.0	1.0	1.0	3	0.3	1.0	3	1.0	1.0
F13	0.3	0.3	0.5	0.3	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	1.0	3	3	1.0
F14	1.0	0.3	1.0	1.0	1.0	0.3	0.3	1.0	3.0	2.0	3.0	1.0	1.0	1.0	1.0	1.0	3	1.0	3	3
F15	3.0	1.0	0.3	1.0	0.3	0.3	0.3	2.0	0.5	2.0	3.0	0.3	1.0	1.0	1.0	1.0	3	1.0	3	1.0
F16	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	3.0	3.0	3.0	1.0	1.0	1.0	1.0	1.0	2	3
F17	0.3	0.5	0.3	1.0	0.5	0.3	0.5	2.0	2.0	1.0	1.0	1.0	1.0	0.3	0.3	1.0	1.0	0.3	3	0.3
F18	1.0	1.0	1.0	1.0	2.0	2.0	0.5	1.0	1.0	3.0	3.0	0.3	0.3	1.0	1.0	1.0	3.0	1.0	2	2
F19	0.3	0.5	0.5	0.5	1.0	0.5	0.3	2.0	0.5	2.0	3.0	1.0	0.3	0.3	0.3	0.5	0.3	0.5	1.0	1.0
F20	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	2.0	2.0	1.0	1.0	1.0	0.3	1.0	0.3	3.0	0.5	1.0	1.0

Table 4.4 Pairwise Comparison Matrix – Expert 1

The cells in black were filled with the reciprocals of the equivalent cells on the other side of the diagonal of the matrix, as per the AHP process. The consistency ratio of the experts' responses is given in the first cell of the matrix. For example, the consistency ratio of expert-1 is 0.089. The format of the excel template which was used to collect the responses is given in Appendix.

0.0218	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	2	2	1.0	3	8	2	2	2	2	2	2	2	2	0.5	1.0	2	1.0	2	2
F2	0.5	1.0	1.0	1.0	2	2	1.0	2	1.0	2	2	2	2	2	1.0	1.0	3	1.0	2	2
F3	0.5	1.0	1.0	1.0	2	2	1.0	1.0	1.0	2	2	2	2	1.0	1.0	1.0	1.0	1.0	2	1.0
F4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	2	2	1.0	1.0	1.0	1.0	1.0	2	2
F5	0.3	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F6	0.1	0.5	0.5	1.0	1.0	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	2	1.0
F7	0.5	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2	1.0	2	2	1.0	1.0	1.0	1.0	1.0	2	2
F8	0.5	0.5	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2	1.0	2	2	1.0	1.0	1.0	1.0	1.0	2	2
F9	0.5	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	0.5	1.0	2	2
F10	0.5	0.5	0.5	0.5	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0
F11	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0
F12	0.5	0.5	0.5	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	1.0	1.0
F13	0.5	0.5	0.5	0.5	1.0	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0
F14	0.5	0.5	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F15	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F16	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F17	0.5	0.3	1.0	1.0	1.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2	2
F18	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2	2
F19	0.5	0.5	0.5	0.5	1.0	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	1.0	1.0
F20	0.5	0.5	1.0	0.5	1.0	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0

Table 4.5 Pairwise Comparison Matrix – Expert 2

0.0865	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	1.0	1.0	2	0.5	1.0	1.0	3	1.0	2	1.0	1.0	1.0	0.2	1.0	2	2	2	3
F2	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	2	1.0	2	3	1.0	2	3	1.0	2	4	4	4
F3	1.0	1.0	1.0	0.2	3	4	0.3	0.3	3	0.3	1.0	1.0	0.3	0.5	0.3	1.0	0.3	0.3	0.5	0.5
F4	1.0	1.0	5.0	1.0	3	2	1.0	1.0	3	2	3	4	2	3	3	1.0	2	2	2	3
F5	0.5	1.0	0.3	0.3	1.0	1.0	1.0	0.2	1.0	0.5	1.0	0.5	1.0	0.5	2	2	1.0	1.0	1.0	1.0
F6	2.0	0.5	0.3	0.5	1.0	1.0	0.5	0.3	1.0	0.3	1.0	2	1.0	0.5	0.5	0.3	1.0	0.5	2	2
F7	1.0	1.0	3.0	1.0	1.0	2.0	1.0	1.0	1.0	0.5	2	2	1.0	1.0	2	1.0	2	3	3	3
F8	1.0	1.0	4.0	1.0	5.0	4.0	1.0	1.0	2	1.0	2	2	2	2	2	1.0	2	2	3	3
F9	0.3	0.5	0.3	0.3	1.0	1.0	1.0	0.5	1.0	0.5	1.0	1.0	0.5	0.5	1.0	0.3	0.5	1.0	1.0	1.0
F10	1.0	1.0	4.0	0.5	2.0	3.0	2.0	1.0	2.0	1.0	2	2	2	2	4	1.0	3	3	4	4
F11	0.5	0.5	1.0	0.3	1.0	1.0	0.5	0.5	1.0	0.5	1.0	1.0	1.0	0.3	1.0	0.3	1.0	1.0	1.0	1.0
F12	1.0	0.3	1.0	0.3	2.0	0.5	0.5	0.5	1.0	0.5	1.0	1.0	1.0	1.0	0.5	4	1.0	1.0	1.0	1.0
F13	1.0	1.0	3.0	0.5	1.0	1.0	1.0	0.5	2.0	0.5	1.0	1.0	1.0	1.0	1.0	0.3	1.0	2	3	2
F14	1.0	0.5	2.0	0.3	2.0	2.0	1.0	0.5	2.0	0.5	3.0	1.0	1.0	1.0	2	0.3	2	3	3	4
F15	5.0	0.3	4.0	0.3	0.5	2.0	0.5	0.5	1.0	0.3	1.0	2.0	1.0	0.5	1.0	0.3	0.5	1.0	1.0	1.0
F16	1.0	1.0	1.0	1.0	0.5	3.0	1.0	1.0	3.0	1.0	4.0	0.3	3.0	4.0	4.0	1.0	3	4	4	4
F17	0.5	0.5	3.0	0.5	1.0	1.0	0.5	0.5	2.0	0.3	1.0	1.0	1.0	0.5	2.0	0.3	1.0	2	3	3
F18	0.5	0.3	3.0	0.5	1.0	2.0	0.3	0.5	1.0	0.3	1.0	1.0	0.5	0.3	1.0	0.3	0.5	1.0	1.0	1.0
F19	0.5	0.3	2.0	0.5	1.0	0.5	0.3	0.3	1.0	0.3	1.0	1.0	0.3	0.3	1.0	0.3	0.3	1.0	1.0	1.0
F20	0.3	0.3	2.0	0.3	1.0	0.5	0.3	0.3	1.0	0.3	1.0	1.0	0.5	0.3	1.0	0.3	0.3	1.0	1.0	1.0

Table 4.6 Pairwise Comparison Matrix – Expert 3

0.0992	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	9	1.0	9	1.0	1.0	1.0	7	9	9	4	9	7	0.1	1.0	6	1.0	5	4
F2	1.0	1.0	1.0	1.0	9	9	1.0	9	1.0	3	3	3	7	9	1.0	1.0	2	1.0	9	9
F3	0.1	1.0	1.0	1.0	6	3	1.0	1.0	1.0	2	2	4	4	1.0	1.0	1.0	1.0	1.0	2	1.0
F4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	2	2	1.0	1.0	1.0	1.0	1.0	2	2
F5	0.1	0.1	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F6	1.0	0.1	0.3	1.0	1.0	1.0	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	2	1.0
F7	1.0	1.0	1.0	1.0	1.0	3.0	1.0	1.0	1.0	2	1.0	2	3	1.0	1.0	1.0	1.0	1.0	3	2
F8	1.0	0.1	1.0	1.0	1.0	3.0	1.0	1.0	1.0	2	1.0	2	3	1.0	1.0	1.0	1.0	1.0	3	2
F9	0.1	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	0.5	1.0	2	2
F10	0.1	0.3	0.5	0.5	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.1	1.0	1.0
F11	0.1	0.3	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0
F12	0.3	0.3	0.3	0.5	0.5	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.3	0.5	1.0	1.0
F13	0.1	0.1	0.3	0.5	1.0	1.0	0.3	0.3	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.3	0.5	0.5	1.0	1.0
F14	0.1	0.1	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F15	9.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F16	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	4.0	3.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F17	0.2	0.5	1.0	1.0	1.0	2.0	1.0	1.0	2.0	2.0	2.0	3.0	2.0	1.0	1.0	1.0	1.0	1.0	4	2
F18	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	7.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	4	2
F19	0.2	0.1	0.5	0.5	1.0	0.5	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.3	0.3	1.0	1.0
F20	0.3	0.1	1.0	0.5	1.0	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0

Table 4.7 Pairwise Comparison Matrix – Expert 4

0.0873	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	2	1.0	0.5	0.5	1.0	1.0	2	1.0	1.0	1.0	1.0	0.5	0.1	1.0	0.3	1.0	0.3	0.2
F2	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	0.5	1.0	0.5	0.3	0.5	0.5
F3	0.5	1.0	1.0	1.0	0.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	2	0.5	1.0	0.5	0.5	0.5	0.5
F4	1.0	1.0	1.0	1.0	0.5	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5
F5	2.0	1.0	2.0	2.0	1.0	0.5	1.0	2	2	2	2	2	2	0.5	0.5	0.5	0.5	0.5	2	0.5
F6	2.0	0.5	1.0	1.0	2.0	1.0	0.5	0.5	0.5	2	2	2	2	0.5	1.0	0.5	0.3	0.5	2	2
F7	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2	2	2	4	1.0	2	1.0	0.5	2	3	2
F8	1.0	1.0	2.0	2.0	0.5	2.0	1.0	1.0	2	2	2	2	3	2	2	0.5	2	2	3	2
F9	0.5	2.0	2.0	2.0	0.5	2.0	1.0	0.5	1.0	2	0.5	2	2	2	0.5	0.5	0.5	0.5	2	0.5
F10	1.0	1.0	2.0	2.0	0.5	0.5	0.5	0.5	0.5	1.0	2	0.5	0.5	0.5	0.5	1.0	0.5	0.3	0.5	0.5
F11	1.0	2.0	2.0	2.0	0.5	0.5	0.5	0.5	2.0	0.5	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5
F12	1.0	2.0	2.0	2.0	0.5	0.5	0.5	0.5	0.5	2.0	1.0	1.0	2	0.5	0.5	0.3	0.5	0.5	0.5	0.5
F13	1.0	1.0	2.0	2.0	0.5	0.5	0.3	0.3	0.5	2.0	1.0	0.5	1.0	0.5	0.5	0.3	0.5	0.5	1.0	1.0
F14	2.0	1.0	0.5	2.0	2.0	2.0	1.0	0.5	0.5	2.0	2.0	2.0	2.0	1.0	2	0.5	0.5	2	2	2
F15	9.0	2.0	2.0	2.0	2.0	1.0	0.5	0.5	2.0	2.0	2.0	2.0	2.0	0.5	1.0	0.5	0.5	0.5	2	2
F16	1.0	1.0	1.0	0.5	2.0	2.0	1.0	2.0	2.0	1.0	2.0	4.0	3.0	2.0	2.0	1.0	2	2	2	2
F17	4.0	2.0	2.0	2.0	2.0	4.0	2.0	0.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	0.5	1.0	1.0	4	2
F18	1.0	3.0	2.0	2.0	2.0	2.0	0.5	0.5	2.0	3.0	2.0	2.0	2.0	0.5	2.0	0.5	1.0	1.0	4	2
F19	4.0	2.0	2.0	2.0	0.5	0.5	0.3	0.3	0.5	2.0	2.0	2.0	1.0	0.5	0.5	0.5	0.3	0.3	1.0	1.0
F20	5.0	2.0	2.0	2.0	2.0	0.5	0.5	0.5	2.0	2.0	2.0	2.0	1.0	0.5	0.5	0.5	0.5	0.5	1.0	1.0

Table 4.8 Pairwise Comparison Matrix – Expert 5

0.0991	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	9	1.0	9	1.0	1.0	1.0	6	1.0	9	2	1.0	2	2	1.0	3	1.0	2	1.0
F2	1.0	1.0	1.0	1.0	5	2	1.0	9	1.0	1.0	3	3	6	5	1.0	1.0	2	1.0	5	8
F3	0.1	1.0	1.0	1.0	9	6	1.0	1.0	1.0	1.0	2	5	6	1.0	1.0	1.0	1.0	1.0	6	1.0
F4	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	2	1.0	3	5	1.0	1.0	1.0	1.0	1.0	5	2
F5	0.1	0.2	0.1	1.0	1.0	1.0	1.0	0.2	0.5	0.3	1.0	2	1.0	1.0	1.0	1.0	0.2	0.1	1.0	0.5
F6	1.0	0.5	0.2	1.0	1.0	1.0	0.5	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.3	0.5	2	1.0
F7	1.0	1.0	1.0	0.5	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	1.0	1.0	3	2
F8	1.0	0.1	1.0	1.0	5.0	3.0	1.0	1.0	1.0	2	1.0	2	2	1.0	1.0	1.0	1.0	1.0	2	2
F9	0.2	1.0	1.0	1.0	2.0	2.0	1.0	1.0	1.0	0.1	0.5	0.5	2	0.5	1.0	1.0	0.5	1.0	2	1.0
F10	1.0	1.0	1.0	0.5	4.0	1.0	1.0	0.5	8.0	1.0	2	1.0	1.0	1.0	2	2	0.5	0.5	1.0	1.0
F11	0.1	0.3	0.5	1.0	1.0	1.0	1.0	1.0	2.0	0.5	1.0	1.0	1.0	0.5	1.0	1.0	0.5	1.0	1.0	0.5
F12	0.5	0.3	0.2	0.3	0.5	1.0	1.0	0.5	2.0	1.0	1.0	1.0	3	1.0	1.0	0.3	0.5	0.5	1.0	1.0
F13	1.0	0.2	0.2	0.2	1.0	1.0	0.5	0.5	0.5	1.0	1.0	0.3	1.0	1.0	0.5	0.5	0.5	0.5	1.0	1.0
F14	0.5	0.2	1.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F15	0.5	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	0.5	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F16	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	0.5	1.0	3.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F17	0.3	0.5	1.0	1.0	6.0	4.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2	2
F18	1.0	1.0	1.0	1.0	8.0	2.0	1.0	1.0	1.0	2.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	2	0.5
F19	0.5	0.2	0.2	0.2	1.0	0.5	0.3	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5	0.5	1.0	0.3
F20	1.0	0.1	1.0	0.5	2.0	1.0	0.5	0.5	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	0.5	2.0	3.0	1.0

Table 4.9 Pairwise Comparison Matrix – Expert 6

0.0928	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	2	0.2	1.0	8	4	5	2	7	5	3	2	6	4	8	2	2	2	8	8
F2	0.5	1.0	6	1.0	2	2	8	9	1.0	2	1.0	5	4	4	1.0	4	1.0	2	8	8
F3	6.0	0.2	1.0	3	2	2	1.0	1.0	2	3	2	1.0	4	1.0	1.0	1.0	1.0	2	4	2
F4	1.0	1.0	0.3	1.0	1.0	1.0	1.0	1.0	2	1.0	3	2	4	4	2	2	1.0	2	4	4
F5	0.1	0.5	0.5	1.0	1.0	2	2	2	3	4	3	2	7	4	1.0	2	1.0	6	6	6
F6	0.3	0.5	0.5	1.0	0.5	1.0	2	3	3	2	2	2	2	1.0	1.0	1.0	1.0	2	2	2
F7	0.2	0.1	1.0	1.0	0.5	0.5	1.0	1.0	1.0	2	1.0	3	3	1.0	1.0	1.0	1.0	1.0	3	2
F8	0.5	0.1	1.0	1.0	0.5	0.3	1.0	1.0	1.0	2	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	3	3
F9	0.1	1.0	0.5	0.5	0.3	0.3	1.0	1.0	1.0	2	1.0	1.0	4	1.0	1.0	1.0	0.5	2	2	2
F10	0.2	0.5	0.3	1.0	0.3	0.5	0.5	0.5	0.5	1.0	1.0	1.0	2	1.0	1.0	0.5	0.5	0.3	1.0	1.0
F11	0.3	1.0	0.5	0.3	0.3	0.5	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	0.5	0.5	0.5	3	3
F12	0.5	0.2	1.0	0.5	0.5	0.5	0.3	1.0	1.0	1.0	1.0	1.0	7	7	1.0	1.0	1.0	1.0	2	2
F13	0.2	0.3	0.3	0.3	0.1	0.5	0.3	0.3	0.3	0.5	0.5	0.1	1.0	0.5	1.0	0.3	0.5	0.5	2	2
F14	0.3	0.3	1.0	0.3	0.3	1.0	1.0	1.0	1.0	1.0	1.0	0.1	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F15	0.1	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F16	0.5	0.3	1.0	0.5	0.5	1.0	1.0	1.0	1.0	2.0	2.0	1.0	3.0	1.0	1.0	1.0	1.0	2	5	2
F17	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	6	6
F18	0.5	0.5	0.5	0.5	0.2	0.5	1.0	1.0	0.5	3.0	2.0	1.0	2.0	1.0	1.0	0.5	1.0	1.0	4	2
F19	0.1	0.1	0.3	0.3	0.2	0.5	0.3	0.3	0.5	1.0	0.3	0.5	0.5	0.5	0.5	0.2	0.2	0.3	1.0	1.0
F20	0.1	0.1	0.5	0.3	0.2	0.5	0.5	0.3	0.5	1.0	0.3	0.5	0.5	1.0	1.0	0.5	0.2	0.5	1.0	1.0

Table 4.10 Pairwise Comparison Matrix – Expert 7

0.0799	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	0.5	0.3	0.5	1.0	0.3	0.2	1.0	3	2	4	3	4	1.0	3	2	0.5	2	2	2
F2	2.0	1.0	2	2	2	1.0	0.3	1.0	2	2	5	2	5	2	3	4	2	2	3	3
F3	3.0	0.5	1.0	0.3	0.3	0.5	1.0	1.0	2	2	2	2	2	1.0	3	1.0	3	2	2	2
F4	2.0	0.5	4.0	1.0	0.5	0.5	2	2	2	3	1.0	2	3	3	3	1.0	4	3	2	2
F5	1.0	0.5	4.0	2.0	1.0	2	1.0	1.0	3	2	3	2	3	1.0	3	1.0	3	2	2	2
F6	3.0	1.0	2.0	2.0	0.5	1.0	1.0	1.0	2	2	3	3	3	0.5	2	0.3	3	3	3	2
F7	5.0	3.0	1.0	0.5	1.0	1.0	1.0	1.0	2	3	2	3	2	1.0	3	0.5	3	3	3	2
F8	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	2	2	1.0	2	3	1.0	3	0.5	3	3	3	2
F9	0.3	0.5	0.5	0.5	0.3	0.5	0.5	0.5	1.0	0.5	0.3	1.0	0.3	0.3	2	0.3	0.3	0.3	0.5	0.5
F10	0.5	0.5	0.5	0.3	0.5	0.5	0.3	0.5	2.0	1.0	1.0	1.0	0.5	0.5	3	0.3	1.0	2	0.5	0.5
F11	0.3	0.2	0.5	1.0	0.3	0.3	0.5	1.0	3.0	1.0	1.0	2	2	0.3	2	0.3	1.0	2	0.3	0.5
F12	0.3	0.5	0.5	0.5	0.5	0.3	0.3	0.5	1.0	1.0	0.5	1.0	0.5	0.5	2	0.3	0.5	2	0.3	0.3
F13	0.3	0.2	0.5	0.3	0.3	0.3	0.5	0.3	3.0	2.0	0.5	2.0	1.0	0.5	2	0.5	0.3	3	1.0	1.0
F14	1.0	0.5	1.0	0.3	1.0	2.0	1.0	1.0	3.0	2.0	3.0	2.0	2.0	1.0	2	0.3	2	2	2	2
F15	0.3	0.3	0.3	0.3	0.3	0.5	0.3	0.3	0.5	0.3	0.5	0.5	0.5	0.5	1.0	0.5	0.3	0.5	0.3	0.3
F16	0.5	0.3	1.0	1.0	1.0	3.0	2.0	2.0	3.0	3.0	3.0	3.0	2.0	3.0	2.0	1.0	4	9	4	5
F17	2.0	0.5	0.3	0.3	0.3	0.3	0.3	0.3	3.0	1.0	1.0	2.0	3.0	0.5	3.0	0.3	1.0	5	1.0	1.0
F18	0.5	0.5	0.5	0.3	0.5	0.3	0.3	0.3	3.0	0.5	0.5	0.5	0.3	0.5	2.0	0.1	0.2	1.0	0.5	0.3
F19	0.5	0.3	0.5	0.5	0.5	0.3	0.3	0.3	2.0	2.0	3.0	3.0	1.0	0.5	3.0	0.3	1.0	2.0	1.0	1.0
F20	0.5	0.3	0.5	0.5	0.5	0.5	0.5	0.5	2.0	2.0	2.0	3.0	1.0	0.5	3.0	0.2	1.0	3.0	1.0	1.0

Table 4.11 Pairwise Comparison Matrix – Expert 8

0.0864	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	2	2	3	3	1.0	1.0	1.0	3	3	3	3	1.0	0.3	1.0	3	1.0	3	3
F2	1.0	1.0	2	2	3	3	1.0	2	2	3	3	3	3	1.0	1.0	1.0	2	1.0	2	2
F3	0.5	0.5	1.0	2	1.0	1.0	0.3	1.0	2	2	2	1.0	2	1.0	3	0.5	3	1.0	2	1.0
F4	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	2	1.0
F5	0.3	0.3	1.0	1.0	1.0	1.0	1.0	3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	0.5	1.0	1.0
F6	0.3	0.3	1.0	1.0	1.0	1.0	1.0	1.0	0.5	3	1.0	1.0	1.0	3	3	1.0	3	0.5	2	1.0
F7	1.0	1.0	3.0	1.0	1.0	1.0	1.0	1.0	3	2	1.0	2	1.0	3	3	1.0	2	2	3	2
F8	1.0	0.5	1.0	1.0	0.3	1.0	1.0	1.0	2	2	2	2	2	1.0	0.5	1.0	0.5	1.0	0.5	2
F9	1.0	0.5	0.5	1.0	1.0	2.0	0.3	0.5	1.0	2	2	3	1.0	0.3	2	0.5	0.5	1.0	2	0.5
F10	0.3	0.3	0.5	0.5	1.0	0.3	0.5	0.5	0.5	1.0	1.0	1.0	0.3	0.3	0.3	1.0	0.3	0.3	1.0	0.5
F11	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	3	0.3	1.0	3	1.0	1.0	1.0
F12	0.3	0.3	1.0	1.0	1.0	1.0	0.5	0.5	0.3	1.0	1.0	1.0	1.0	1.0	3	0.3	1.0	3	1.0	1.0
F13	0.3	0.3	0.5	0.3	1.0	1.0	1.0	0.5	1.0	3.0	1.0	1.0	1.0	1.0	1.0	0.3	1.0	3	3	1.0
F14	1.0	1.0	1.0	1.0	1.0	0.3	0.3	1.0	3.0	3.0	0.3	1.0	1.0	1.0	1.0	1.0	3	1.0	3	1.0
F15	3.0	1.0	0.3	1.0	1.0	0.3	0.3	2.0	0.5	3.0	3.0	0.3	1.0	1.0	1.0	1.0	3	1.0	3	1.0
F16	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	3.0	3.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F17	0.3	0.5	0.3	1.0	0.5	0.3	0.5	2.0	2.0	3.0	0.3	1.0	1.0	0.3	0.3	1.0	1.0	0.3	3	1.0
F18	1.0	1.0	1.0	1.0	2.0	2.0	0.5	1.0	1.0	3.0	1.0	0.3	0.3	1.0	1.0	1.0	3.0	1.0	1.0	1.0
F19	0.3	0.5	0.5	0.5	1.0	0.5	0.3	2.0	0.5	1.0	1.0	1.0	0.3	0.3	0.3	0.5	0.3	1.0	1.0	1.0
F20	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 4.12 Pairwise Comparison Matrix – Expert 9

0.0515	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	2	1.0	1.0	2	1.0	3	4	5	2	6	2	1.0	5	1.0	1.0	6	4	1.0
F2	1.0	1.0	2	1.0	5	2	1.0	4	5	6	2	5	2	1.0	5	1.0	1.0	6	3	1.0
F3	0.5	0.5	1.0	1.0	3	2	1.0	3	3	4	2	5	2	1.0	4	1.0	1.0	4	3	1.0
F4	1.0	1.0	1.0	1.0	4	2	1.0	2	3	4	2	5	2	1.0	4	1.0	1.0	5	3	1.0
F5	1.0	0.2	0.3	0.3	1.0	0.5	0.5	0.5	1.0	0.5	0.5	2	0.3	1.0	1.0	4	0.3	5	0.3	0.2
F6	0.5	0.5	0.5	0.5	2.0	1.0	2	2	3	3	2	4	2	1.0	5	1.0	1.0	4	2	1.0
F7	1.0	1.0	1.0	1.0	2.0	0.5	1.0	2	2	2	1.0	4	1.0	1.0	4	1.0	1.0	3	2	1.0
F8	0.3	0.3	0.3	0.5	2.0	0.5	0.5	1.0	1.0	2	1.0	3	2	1.0	3	1.0	1.0	3	1.0	1.0
F9	0.3	0.2	0.3	0.3	1.0	0.3	0.5	1.0	1.0	2	1.0	3	1.0	0.5	2	1.0	1.0	3	2	0.5
F10	0.2	0.2	0.3	0.3	2.0	0.3	0.5	0.5	0.5	1.0	0.5	3	0.5	0.3	2	0.3	0.3	4	2	0.3
F11	0.5	0.5	0.5	0.5	2.0	0.5	1.0	1.0	1.0	2.0	1.0	3	1.0	1.0	4	1.0	1.0	4	2	1.0
F12	0.2	0.2	0.2	0.2	0.5	0.3	0.3	0.3	0.3	0.3	0.3	1.0	0.3	0.3	1.0	0.3	0.3	2	0.3	0.3
F13	0.5	0.5	0.5	0.5	3.0	0.5	1.0	0.5	1.0	2.0	1.0	3.0	1.0	1.0	4	1.0	1.0	4	1.0	1.0
F14	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	3.0	1.0	4.0	1.0	1.0	4	2	1.0	2	2	1.0
F15	0.2	0.2	0.3	0.3	1.0	0.2	0.3	0.3	0.5	0.5	0.3	1.0	0.3	0.3	1.0	0.2	0.3	0.5	0.3	0.2
F16	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	1.0	3.0	1.0	4.0	1.0	0.5	5.0	1.0	1.0	5	2	1.0
F17	1.0	1.0	1.0	1.0	4.0	1.0	1.0	1.0	1.0	3.0	1.0	4.0	1.0	1.0	3.0	1.0	1.0	4	1.0	1.0
F18	0.2	0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.5	0.3	0.5	2.0	0.2	0.3	1.0	0.3	0.3
F19	0.3	0.3	0.3	0.3	3.0	0.5	0.5	1.0	0.5	0.5	0.5	4.0	1.0	0.5	4.0	0.5	1.0	4.0	1.0	0.5
F20	1.0	1.0	1.0	1.0	5.0	1.0	1.0	1.0	2.0	3.0	1.0	4.0	1.0	1.0	5.0	1.0	1.0	4.0	2.0	1.0

Table 4.13 Pairwise Comparison Matrix – Expert 10

0.0958	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	9	1.0	1.0	7	1.0	7	6	7	9	4	9	5	6	1.0	0.1	1.0	4	4
F2	1.0	1.0	1.0	8	7	2	1.0	9	1.0	3	3	3	5	9	1.0	1.0	2	1.0	9	9
F3	0.1	1.0	1.0	1.0	3	3	1.0	1.0	1.0	4	2	4	5	1.0	1.0	1.0	1.0	1.0	4	1.0
F4	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	3	4	1.0	1.0	1.0	1.0	1.0	2	2
F5	1.0	0.1	0.3	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	2	3	1.0	1.0	1.0	3	1.0	3	1.0
F6	0.1	0.5	0.3	1.0	1.0	1.0	0.3	0.3	0.5	3	1.0	1.0	1.0	0.3	0.5	0.5	0.3	0.5	2	1.0
F7	1.0	1.0	1.0	1.0	1.0	3.0	1.0	1.0	1.0	2	1.0	2	6	1.0	1.0	1.0	1.0	1.0	3	2
F8	0.1	0.1	1.0	1.0	1.0	3.0	1.0	1.0	1.0	2	1.0	2	3	1.0	1.0	1.0	1.0	1.0	3	2
F9	0.2	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	0.5	1.0	2	2
F10	0.1	0.3	0.3	0.5	0.5	0.3	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.1	1.0	1.0
F11	0.1	0.3	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0
F12	0.3	0.3	0.3	0.3	0.5	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.3	0.5	1.0	1.0
F13	0.1	0.2	0.2	0.3	0.3	1.0	0.2	0.3	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.3	0.2	0.5	1.0	1.0
F14	0.2	0.1	1.0	1.0	1.0	4.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	7
F15	0.2	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F16	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	4.0	3.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F17	7.0	0.5	1.0	1.0	0.3	4.0	1.0	1.0	2.0	2.0	2.0	3.0	6.0	1.0	1.0	1.0	1.0	1.0	6	4
F18	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	7.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	6	4
F19	0.3	0.1	0.3	0.5	0.3	0.5	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.2	0.2	1.0	1.0
F20	0.3	0.1	1.0	0.5	1.0	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	0.1	1.0	1.0	0.3	0.3	1.0	1.0

Table 4.14 Pairwise Comparison Matrix – Expert 11

0.0985	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	9	1.0	9	1.0	1.0	1.0	6	9	9	4	9	2	0.1	1.0	9	1.0	4	4
F2	1.0	1.0	1.0	1.0	9	2	1.0	9	1.0	3	3	3	6	9	1.0	1.0	2	1.0	9	9
F3	0.1	1.0	1.0	1.0	3	3	1.0	1.0	1.0	4	2	4	5	1.0	1.0	1.0	1.0	1.0	4	1.0
F4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	3	4	1.0	1.0	1.0	1.0	1.0	2	2
F5	0.1	0.1	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F6	1.0	0.5	0.3	1.0	1.0	1.0	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.3	0.5	2	1.0
F7	1.0	1.0	1.0	1.0	1.0	3.0	1.0	1.0	1.0	2	1.0	2	4	1.0	1.0	1.0	1.0	1.0	3	2
F8	1.0	0.1	1.0	1.0	1.0	3.0	1.0	1.0	1.0	2	1.0	2	3	1.0	1.0	1.0	1.0	1.0	3	2
F9	0.2	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0	1.0	1.0	0.5	1.0	2	2
F10	0.1	0.3	0.3	0.5	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.1	1.0	1.0
F11	0.1	0.3	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.5	0.5	1.0	1.0	1.0
F12	0.3	0.3	0.3	0.3	0.5	1.0	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.3	0.5	1.0	1.0
F13	0.1	0.2	0.2	0.3	1.0	1.0	0.3	0.3	0.5	1.0	1.0	1.0	1.0	1.0	0.5	0.3	0.5	0.5	1.0	1.0
F14	0.5	0.1	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F15	9.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F16	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	2.0	2.0	4.0	3.0	1.0	1.0	1.0	1.0	1.0	2	1.0
F17	0.1	0.5	1.0	1.0	1.0	4.0	1.0	1.0	2.0	2.0	2.0	3.0	2.0	1.0	1.0	1.0	1.0	1.0	4	2
F18	1.0	1.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	7.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	4	2
F19	0.3	0.1	0.3	0.5	1.0	0.5	0.3	0.3	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.3	0.3	1.0	1.0
F20	0.3	0.1	1.0	0.5	1.0	1.0	0.5	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0

Table 4.15 Pairwise Comparison Matrix – Expert 12

0.0935	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	0.5	2	0.5	2	0.5	0.5	0.5	4	3	4	4	4	0.5	0.5	0.3	3	2	3	2
F2	2.0	1.0	4	2	3	2	3	2	4	4	4	3	3	2	3	3	2	3	3	3
F3	0.5	0.3	1.0	2	3	3	2	2	3	4	2	4	3	2	2	2	3	3	3	3
F4	2.0	0.5	0.5	1.0	3	0.5	0.5	0.5	3	2	3	3	4	0.3	3	2	3	2	3	3
F5	0.5	0.3	0.3	0.3	1.0	0.3	0.5	0.3	3	2	2	2	0.5	0.5	2	3	3	3	2	2
F6	2.0	0.5	0.3	2.0	3.0	1.0	2	0.3	0.3	3	3	2	2	3	0.5	0.5	4	0.5	2	3
F7	2.0	0.3	0.5	2.0	2.0	0.5	1.0	2	2	2	3	3	3	2	3	4	2	3	3	3
F8	2.0	0.5	0.5	2.0	3.0	3.0	0.5	1.0	3	3	3	3	3	0.5	2	2	3	3	3	3
F9	0.3	0.3	0.3	0.3	0.3	3.0	0.5	0.3	1.0	2	3	3	2	0.5	2	0.5	2	2	2	2
F10	0.3	0.3	0.3	0.5	0.5	0.3	0.5	0.3	0.5	1.0	2	2	0.5	0.5	2	0.3	0.5	2	2	2
F11	0.3	0.3	0.5	0.3	0.5	0.3	0.3	0.3	0.3	0.5	1.0	0.5	0.5	0.5	2	0.5	0.5	2	0.5	2
F12	0.3	0.3	0.3	0.3	0.5	0.5	0.3	0.3	0.3	0.5	2.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2
F13	0.3	0.3	0.3	0.3	2.0	0.5	0.3	0.3	0.5	2.0	2.0	2.0	1.0	0.5	0.5	0.5	0.5	0.5	0.5	2
F14	2.0	0.5	0.5	3.0	2.0	0.3	0.5	2.0	2.0	2.0	2.0	2.0	2.0	1.0	2	2	3	2	2	2
F15	2.0	0.3	0.5	0.3	0.5	2.0	0.3	0.5	0.5	0.5	0.5	2.0	2.0	0.5	1.0	0.5	2	1.0	0.5	2
F16	3.0	0.3	0.5	0.5	0.3	2.0	0.3	0.5	2.0	3.0	2.0	2.0	2.0	0.5	2.0	1.0	2	2	2	2
F17	0.3	0.5	0.3	0.3	0.3	0.3	0.5	0.3	0.5	2.0	2.0	2.0	2.0	0.3	0.5	0.5	1.0	0.5	0.5	2
F18	0.5	0.3	0.3	0.5	0.3	2.0	0.3	0.3	0.5	0.5	0.5	2.0	2.0	0.5	1.0	0.5	2.0	1.0	2	2
F19	0.3	0.3	0.3	0.3	0.5	0.5	0.3	0.3	0.5	0.5	2.0	2.0	2.0	0.5	2.0	0.5	2.0	0.5	1.0	2
F20	0.5	0.3	0.3	0.3	0.5	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1.0

Table 4.16 Pairwise Comparison Matrix – Expert 13

0.0333	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F4	1.0	1.0	1.0	1.0	8	1.0	1.0	2	2	2	1.0	8	9	9	9	9	8	8	8	8
F5	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F8	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F9	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F10	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F11	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F12	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F13	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F14	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F15	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F16	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F17	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F18	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F19	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F20	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Table 4.17 Pairwise Comparison Matrix – Expert 14

0.0795	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	1.0	1.0	5	1.0	1.0	1.0	7	5	7	7	6	5	7	1.0	5	5	6	9
F2	1.0	1.0	1.0	1.0	7	2	5	5	5	3	3	3	6	4	7	1.0	8	1.0	9	9
F3	1.0	1.0	1.0	1.0	6	1.0	1.0	1.0	5	4	2	4	5	1.0	3	1.0	4	3	4	7
F4	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	8	2	1.0	7	5	1.0	4	1.0	5	4	5	5
F5	0.2	0.1	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
F6	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	5	5	4	4	4	1.0	2	1.0	1.0	2	3	3
F7	1.0	0.2	1.0	1.0	1.0	1.0	1.0	1.0	4	2	4	5	4	1.0	5	4	5	1.0	5	2
F8	1.0	0.2	1.0	1.0	1.0	1.0	1.0	1.0	5	5	1.0	5	6	1.0	4	1.0	4	6	3	2
F9	0.1	0.2	0.2	0.1	1.0	0.2	0.3	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.5	1.0	1.0	1.0
F10	0.2	0.3	0.3	0.5	1.0	0.2	0.5	0.2	1.0	1.0	1.0	1.0	1.0	0.3	1.0	0.5	1.0	0.1	1.0	0.3
F11	0.1	0.3	0.5	1.0	1.0	0.3	0.3	1.0	1.0	1.0	1.0	2	1.0	0.5	1.0	0.5	1.0	2	1.0	1.0
F12	0.1	0.3	0.3	0.1	1.0	0.3	0.2	0.2	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.3	0.3	1.0	1.0	1.0
F13	0.2	0.2	0.2	0.2	1.0	0.3	0.3	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.5	1.0	1.0	1.0
F14	0.2	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	4.0	2.0	1.0	1.0	1.0	1.0	1.0	4	1.0	1.0	1.0
F15	0.1	0.1	0.3	0.3	1.0	0.5	0.2	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.5	1.0	1.0	1.0
F16	1.0	1.0	1.0	1.0	1.0	1.0	0.3	1.0	5.0	2.0	2.0	3.0	3.0	1.0	4.0	1.0	2	4	2	5
F17	0.2	0.1	0.3	0.2	1.0	1.0	0.2	0.3	2.0	1.0	1.0	3.0	2.0	0.3	2.0	0.5	1.0	0.3	4	1.0
F18	0.2	1.0	0.3	0.3	1.0	0.5	1.0	0.2	1.0	7.0	0.5	1.0	1.0	1.0	1.0	0.3	4.0	1.0	1.0	1.0
F19	0.2	0.1	0.3	0.2	1.0	0.3	0.2	0.3	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.3	1.0	1.0	1.0
F20	0.1	0.1	0.1	0.2	1.0	0.3	0.5	0.5	1.0	3.0	1.0	1.0	1.0	1.0	1.0	0.2	1.0	1.0	1.0	1.0

Table 4.18 Pairwise Comparison Matrix – Expert 15

The summary of consistency ratio of individual responses of the experts is given in the table 4.19. As required by the AHP process, all were within the required limit of 0.01. The geometric mean (T. L. Saaty, 2002) of the each of the individual experts' values was then calculated in Microsoft excel using the GEOMEAN formula and it represented in table

4.20. The GEOMEAN formula was used only for the cells on the top half of the diagonal. The values in the cells which are in black and derived as the reciprocals of the equivalent cells on the other side of the diagonal.

Expert Number	Consistency Ratio (CR)
Expert 1	0.089
Expert 2	0.022
Expert 3	0.087
Expert 4	0.099
Expert 5	0.087
Expert 6	0.099
Expert 7	0.093
Expert 8	0.080
Expert 9	0.086
Expert 10	0.052
Expert 11	0.096
Expert 12	0.099
Expert 13	0.094
Expert 14	0.033
Expert 15	0.080

Table 4.19 Consistency Ratio of the responses of all experts

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.0	1.0	1.9	1.0	2.6	1.4	1.0	1.3	3.2	2.9	3.5	2.7	3.0	1.6	0.8	1.0	1.7	1.5	2.6	2.3
F2	1.0	1.0	1.4	1.3	3.1	2.1	1.3	3.1	1.6	2.2	2.2	2.5	3.0	2.7	1.5	1.3	1.8	1.4	3.4	3.3
F3	0.5	0.7	1.0	1.0	2.0	1.8	0.8	1.0	1.6	1.9	1.7	2.1	2.3	1.0	1.3	1.0	1.3	1.2	2.2	1.2
F4	1.0	0.8	1.0	1.0	1.3	1.0	1.0	1.0	1.6	1.9	1.2	2.5	3.0	1.3	1.7	1.3	1.5	1.7	2.5	2.0
F5	0.4	0.3	0.5	0.8	1.0	0.9	1.0	0.8	1.2	1.1	1.2	1.5	1.2	1.0	1.2	1.2	1.1	1.1	1.3	1.0
F6	0.7	0.5	0.6	1.0	1.1	1.0	0.8	0.6	0.9	1.7	1.5	1.6	1.4	0.8	1.0	0.6	0.9	0.8	2.0	1.4
F7	1.0	0.8	1.2	1.0	1.0	1.3	1.0	1.1	1.5	1.7	1.4	2.2	2.1	1.2	1.8	1.1	1.4	1.5	2.7	1.9
F8	0.8	0.3	1.0	1.0	1.2	1.5	0.9	1.0	1.5	2.0	1.3	2.0	2.5	1.0	1.3	1.0	1.3	1.5	1.9	2.0
F9	0.3	0.6	0.6	0.6	0.8	1.2	0.7	0.7	1.0	1.0	1.0	1.3	1.3	0.7	1.2	0.6	0.6	1.0	1.6	1.0
F10	0.3	0.5	0.5	0.5	0.9	0.6	0.6	0.5	1.0	1.0	1.1	1.2	0.8	0.7	1.0	0.6	0.6	0.5	1.0	0.8
F11	0.3	0.4	0.6	0.8	0.8	0.7	0.7	0.8	1.0	0.9	1.0	1.1	1.0	0.6	1.0	0.5	0.7	1.1	0.9	1.0
F12	0.4	0.4	0.5	0.4	0.7	0.6	0.5	0.5	0.7	0.8	0.9	1.0	1.1	0.9	1.1	0.4	0.5	0.9	0.8	0.9
F13	0.3	0.3	0.4	0.3	0.8	0.7	0.5	0.4	0.7	1.2	1.0	0.9	1.0	0.8	0.8	0.4	0.6	1.0	1.2	1.1
F14	0.6	0.4	1.0	0.8	1.0	1.2	0.8	1.0	1.4	1.5	1.7	1.1	1.2	1.0	1.3	0.9	1.4	1.3	2.0	1.5
F15	1.2	0.7	0.7	0.6	0.8	1.0	0.6	0.8	0.8	1.0	1.0	0.9	1.2	0.8	1.0	0.7	0.9	0.9	1.3	0.9
F16	1.0	0.8	1.0	0.8	0.8	1.6	0.9	1.0	1.6	1.6	1.8	2.3	2.3	1.1	1.5	1.0	1.4	1.8	2.2	1.7
F17	0.6	0.6	0.8	0.7	0.9	1.2	0.7	0.8	1.7	1.6	1.3	1.9	1.8	0.7	1.1	0.7	1.0	1.0	2.4	1.6
F18	0.7	0.7	0.8	0.6	0.9	1.2	0.6	0.6	1.0	1.9	0.9	1.1	1.0	0.8	1.1	0.6	1.0	1.0	1.7	1.2
F19	0.4	0.3	0.5	0.4	0.8	0.5	0.4	0.5	0.6	1.0	1.1	1.2	0.8	0.5	0.8	0.4	0.4	0.6	1.0	0.9
F20	0.4	0.3	0.8	0.5	1.0	0.7	0.5	0.5	1.0	1.2	1.0	1.1	0.9	0.6	1.1	0.6	0.6	0.8	1.1	1.0

Table 4.20 Geometric mean values of the responses of all experts

The obtained Geometric mean matrix was then normalised as per the AHP process to arrive at the criteria weights. The normalised matrix is given in the table 4.21.

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	0.08	0.09	0.11	0.06	0.11	0.06	0.07	0.07	0.13	0.10	0.13	0.08	0.09	0.08	0.04	0.06	0.08	0.07	0.07	0.08
F2	0.08	0.09	0.08	0.09	0.13	0.10	0.08	0.17	0.06	0.07	0.08	0.08	0.09	0.14	0.06	0.08	0.09	0.06	0.10	0.11
F3	0.04	0.06	0.06	0.06	0.09	0.08	0.06	0.05	0.06	0.06	0.06	0.06	0.07	0.05	0.06	0.06	0.06	0.05	0.06	0.04
F4	0.08	0.07	0.06	0.07	0.06	0.04	0.07	0.06	0.06	0.06	0.04	0.08	0.09	0.07	0.07	0.08	0.07	0.07	0.07	0.07
F5	0.03	0.03	0.03	0.05	0.04	0.04	0.06	0.05	0.05	0.04	0.04	0.05	0.04	0.05	0.05	0.08	0.05	0.05	0.04	0.03
F6	0.05	0.04	0.03	0.07	0.05	0.04	0.05	0.04	0.03	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.06	0.05
F7	0.08	0.07	0.07	0.06	0.04	0.06	0.07	0.06	0.06	0.06	0.05	0.07	0.06	0.06	0.08	0.07	0.07	0.07	0.08	0.07
F8	0.06	0.03	0.06	0.06	0.05	0.07	0.06	0.06	0.06	0.07	0.05	0.06	0.08	0.05	0.06	0.06	0.06	0.07	0.05	0.07
F9	0.02	0.06	0.04	0.04	0.03	0.05	0.04	0.04	0.04	0.03	0.04	0.04	0.04	0.04	0.05	0.04	0.03	0.05	0.04	0.04
F10	0.03	0.04	0.03	0.04	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.03	0.02	0.03	0.03
F11	0.02	0.04	0.04	0.05	0.03	0.03	0.05	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.04	0.03	0.04	0.05	0.02	0.03
F12	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.04	0.03	0.03	0.04	0.02	0.03
F13	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.02	0.03	0.04	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.03	0.04
F14	0.05	0.03	0.06	0.05	0.04	0.05	0.05	0.05	0.06	0.05	0.06	0.03	0.04	0.05	0.06	0.05	0.07	0.06	0.06	0.05
F15	0.09	0.06	0.04	0.04	0.03	0.04	0.04	0.04	0.03	0.03	0.04	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03
F16	0.08	0.07	0.06	0.05	0.03	0.07	0.06	0.06	0.06	0.05	0.07	0.07	0.07	0.06	0.06	0.06	0.07	0.08	0.06	0.06
F17	0.05	0.05	0.05	0.04	0.04	0.05	0.05	0.04	0.07	0.05	0.05	0.06	0.05	0.04	0.05	0.05	0.05	0.04	0.07	0.06
F18	0.05	0.07	0.05	0.04	0.04	0.06	0.04	0.04	0.04	0.06	0.03	0.03	0.03	0.04	0.05	0.03	0.05	0.04	0.05	0.04
F19	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.03	0.04	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.03	0.03
F20	0.03	0.03	0.05	0.03	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.05	0.04	0.03	0.04	0.03	0.03
	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 4.21 Normalised Geometric mean values of the responses of all experts

The average of each row values of the factors was calculated in Microsoft excel. This provided us the criteria weights (A). Then the each of the values in the rows of the geometric mean matrix was multiplied with the criteria weight of that factor. The sum of the rows provides the weighted sum (B). Then B was divided by A. The average of all B/A is the principal eigen value or lambda (λ)max which was 20.38986048.

	A		B	
Factor Number	Criteria Weights	Criteria Weight in %	Weighted Sum	B/A
F1	0.08255	8.26	1.68707	20.43580
F2	0.09183	9.18	1.87914	20.46419
F3	0.06047	6.05	1.23350	20.39983
F4	0.06730	6.73	1.37286	20.39760
F5	0.04448	4.45	0.90460	20.33907
F6	0.04561	4.56	0.92974	20.38254
F7	0.06450	6.45	1.31522	20.38946
F8	0.05889	5.89	1.20003	20.37782
F9	0.04004	4.00	0.81514	20.36050
F10	0.03332	3.33	0.67877	20.37200
F11	0.03628	3.63	0.73852	20.35384
F12	0.03115	3.12	0.63479	20.37593
F13	0.03167	3.17	0.64504	20.36562
F14	0.05127	5.13	1.04435	20.37153
F15	0.04150	4.15	0.84965	20.47471
F16	0.06227	6.23	1.27011	20.39524
F17	0.04932	4.93	1.00552	20.38882
F18	0.04415	4.42	0.90045	20.39339
F19	0.02842	2.84	0.57946	20.39039
F20	0.03497	3.50	0.71233	20.36892
Total	1	100		

Table 4.22 Criteria weights and weighted sum

Then consistency index was calculated using the formula given below it amounted to 0.020518972

$$\text{Consistency Index}(CI) = \frac{\lambda_{max} - n}{n - 1}$$

Then consistency ratio was calculated using the formula CR = CI /RI. The RI – Random Index value used was 1.6341 based on the literature review for factors size of 20 nos. The CR obtained was 0.012556742. This is well within the limit of 0.1, which was required for the usability of the values in AHP.

4.2 Research Question Two – Relationship between factors

4.2.1 Normalised matrix formation

The next phase was to understand the relationship between the 20 factors. This was done using the DEMATEL method. The pairwise influence of a factor over other factors were obtained from 23 experts, i.e. 400 comparisons by every expert. As per the process the simple average of all 23 experts' answers was taken (Shieh et al., 2010). A 20X20 average matrix was constructed as shown in table 4.23. The diagonal of the matrix was filled with Zeros as the influence between the same factors is not possible. Then the matrix was normalised. This was done by taking the sum of all rows as well as sum of all columns as indicated in table 4.23. The maximum sum was computed, which was 55.52. Each of the cells of the matrix was then divided by 55.52 to normalise the matrix. Table 4.24 indicates the normalised average direct relation matrix (X). The value of every element in this normalised matrix is between 0 and 1 and diagonal values remain 0.

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	0.00	3.87	2.70	3.35	2.83	2.48	3.13	3.26	2.00	1.87	2.09	2.52	3.09	2.96	2.00	2.43	1.91	2.39	2.04	2.26
F2	3.57	0.00	2.96	2.78	2.09	1.65	1.57	1.78	1.78	1.26	1.52	2.00	1.91	1.83	1.78	2.57	1.30	1.78	1.43	1.43
F3	2.91	3.43	0.00	2.96	3.00	2.61	2.00	2.52	1.48	1.22	1.43	2.13	1.48	1.83	1.78	1.91	1.26	1.91	1.78	1.91
F4	3.30	2.91	2.57	0.00	1.91	1.43	1.57	2.43	1.48	1.30	2.57	1.70	1.70	2.13	1.35	3.00	1.57	1.48	1.43	1.70
F5	3.30	3.39	3.17	3.30	0.00	2.87	3.00	2.87	2.48	2.74	2.52	2.91	2.87	2.65	2.09	2.83	2.35	1.96	2.65	2.39
F6	2.78	2.83	2.96	2.17	2.70	0.00	2.61	2.61	1.43	1.52	1.52	2.22	1.78	1.91	2.09	2.35	1.87	1.96	1.65	1.96
F7	3.35	2.57	2.52	2.35	2.74	2.30	0.00	3.04	1.70	1.39	1.57	1.96	1.78	2.43	1.87	1.78	1.39	1.83	1.65	1.48
F8	3.30	2.96	2.87	2.57	2.35	2.43	2.96	0.00	1.43	1.22	1.91	2.00	2.09	2.48	1.65	2.43	1.43	1.52	1.57	1.30
F9	3.00	2.78	2.43	2.13	3.00	1.57	2.09	2.04	0.00	1.70	1.83	2.00	2.43	2.30	1.83	2.13	1.61	1.70	2.26	1.83
F10	2.00	1.61	1.74	1.78	2.74	1.52	1.57	1.52	1.65	0.00	2.13	2.65	2.39	1.35	1.57	1.83	1.78	1.22	2.22	1.48
F11	2.30	2.83	1.78	3.35	2.83	1.74	1.61	2.09	1.43	1.65	0.00	2.35	1.65	1.30	1.22	1.70	1.91	1.26	1.83	1.74
F12	2.57	2.65	2.30	2.30	2.83	2.00	2.04	2.13	1.96	2.43	2.35	0.00	2.39	2.17	1.83	1.83	1.83	1.87	2.22	1.91
F13	2.74	2.39	2.00	2.74	2.87	1.65	2.30	2.35	2.13	2.26	2.22	2.52	0.00	2.39	2.17	1.65	2.17	1.83	2.61	2.35
F14	3.22	3.00	2.57	2.61	2.74	1.83	2.61	2.00	2.00	1.04	1.22	1.65	1.57	0.00	2.22	1.70	1.35	2.13	1.78	1.57
F15	2.78	2.78	2.78	2.61	2.39	2.39	2.39	2.17	1.83	1.39	2.09	1.70	2.00	2.35	0.00	2.48	1.87	2.43	2.00	2.04
F16	3.26	3.30	2.61	3.48	3.26	2.04	1.70	2.04	1.57	1.52	1.78	2.00	1.26	1.52	1.57	0.00	1.52	1.87	1.70	1.65
F17	2.30	2.09	1.87	2.83	2.96	1.65	1.74	1.78	1.52	1.17	2.09	2.22	2.48	1.61	1.61	1.91	0.00	1.48	2.35	2.13
F18	3.22	2.57	2.91	2.22	2.22	1.87	2.00	1.78	1.48	1.17	1.35	1.78	1.57	2.48	2.57	1.70	1.43	0.00	1.91	1.61
F19	2.83	2.30	2.65	2.48	3.00	2.13	2.26	2.09	2.39	2.26	2.13	2.87	2.70	2.00	2.43	2.09	1.74	1.91	0.00	2.13
F20	2.78	2.78	2.65	3.39	2.83	2.30	2.35	2.26	1.70	1.39	2.52	2.43	2.78	1.96	2.22	2.61	2.74	2.13	2.57	0.00

Table 4.23 Average matrix of responses from experts

Factors	Sum of Rows	Sum of Columns
F1	49.17	55.52
F2	37.00	53.04
F3	39.57	48.04
F4	37.52	51.39
F5	52.35	51.26
F6	40.91	38.48
F7	39.70	41.48
F8	40.48	42.78
F9	40.65	33.43
F10	34.74	30.52
F11	36.57	36.83
F12	41.61	41.61
F13	43.35	39.91
F14	38.78	39.65
F15	42.48	35.83
F16	39.65	40.91
F17	37.78	33.04
F18	37.83	34.65
F19	44.39	37.65
F20	46.39	34.87
Max Value	52.35	55.52

Table 4.24 Sum of rows and columns of Average Matrix

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	0.00	0.07	0.05	0.06	0.05	0.04	0.06	0.06	0.04	0.03	0.04	0.05	0.06	0.05	0.04	0.04	0.03	0.04	0.04	0.04
F2	0.06	0.00	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.04	0.03	0.03	0.03	0.05	0.02	0.03	0.03	0.03
F3	0.05	0.06	0.00	0.05	0.05	0.05	0.04	0.05	0.03	0.02	0.03	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03
F4	0.06	0.05	0.05	0.00	0.03	0.03	0.03	0.04	0.03	0.02	0.05	0.03	0.03	0.04	0.02	0.05	0.03	0.03	0.03	0.03
F5	0.06	0.06	0.06	0.06	0.00	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.05	0.04	0.04	0.05	0.04
F6	0.05	0.05	0.05	0.04	0.05	0.00	0.05	0.05	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.04	0.03	0.04	0.03	0.04
F7	0.06	0.05	0.05	0.04	0.05	0.04	0.00	0.05	0.03	0.03	0.03	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03
F8	0.06	0.05	0.05	0.05	0.04	0.04	0.05	0.00	0.03	0.02	0.03	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.03	0.02
F9	0.05	0.05	0.04	0.04	0.05	0.03	0.04	0.04	0.00	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.04	0.03
F10	0.04	0.03	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.00	0.04	0.05	0.04	0.02	0.03	0.03	0.03	0.02	0.04	0.03
F11	0.04	0.05	0.03	0.06	0.05	0.03	0.03	0.04	0.03	0.03	0.00	0.04	0.03	0.02	0.02	0.03	0.03	0.02	0.03	0.03
F12	0.05	0.05	0.04	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.00	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.03
F13	0.05	0.04	0.04	0.05	0.05	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.00	0.04	0.04	0.03	0.04	0.03	0.05	0.04
F14	0.06	0.05	0.05	0.05	0.05	0.03	0.05	0.04	0.04	0.02	0.02	0.03	0.03	0.00	0.04	0.03	0.02	0.04	0.03	0.03
F15	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.03	0.04	0.04	0.00	0.04	0.03	0.04	0.04	0.04
F16	0.06	0.06	0.05	0.06	0.06	0.04	0.03	0.04	0.03	0.03	0.03	0.04	0.02	0.03	0.03	0.00	0.03	0.03	0.03	0.03
F17	0.04	0.04	0.03	0.05	0.05	0.03	0.03	0.03	0.03	0.02	0.04	0.04	0.04	0.03	0.03	0.03	0.00	0.03	0.04	0.04
F18	0.06	0.05	0.05	0.04	0.04	0.03	0.04	0.03	0.03	0.02	0.02	0.03	0.03	0.04	0.05	0.03	0.03	0.00	0.03	0.03
F19	0.05	0.04	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.00	0.04
F20	0.05	0.05	0.05	0.06	0.05	0.04	0.04	0.04	0.03	0.03	0.05	0.04	0.05	0.04	0.04	0.05	0.05	0.04	0.05	0.00

Table 4.25 Normalised Direct Relation Matrix

4.2.2 Cause Effect categorisation

Next, we obtained the Total relation matrix T using the Formula T = X (I– X) -1 where I is the identity matrix and X is the normalised direct relation matrix. The identity matrix I contains all diagonal values as 1 and remaining values as 0. The matrix I – X was obtained by subtracting every element of X from every element of I matrix. The I – X matrix is provided in the table 4.26. Then the inverse of I – X matrix was calculated in Microsoft excel itself using the formula MINVERSE(Matrix1). The inverse of (I – X) matrix is provided in the table 4.27. Next, the total relation matrix T was obtained by multiplying the X matrix with (I – X) inverse matrix. The matrix multiplication was done using Microsoft Excel formula MMULT(Matrix1, Matrix2). The Total Relation matrix is provided in the table 4.28. The next important step in the DEMATEL analysis was to obtain the sum of all rows R and sum of all columns C. This was done using the SUM formula in Microsoft Excel. The values of R and value of C for every factor were tabulated. Then R+C and R-C values were computed for each of the factors. The R+C values indicate the relational weights between the factors. R-C values were used to categorize the factors into cause factors and effect factors. The factors with positive R-C values were put under the CAUSE FACTOR group and factors with negative R-C values were put under the EFFECT FACTOR group. A threshold value Alpha (α) was computed by taking simple average of all the elements of the total relation matrix T. The value of Alpha (α) obtained was 0.14. The cells in the total relation matrix T with values greater than 0.14 were highlighted to indicate the extent of the influence of one factor over the other. In other words, it means that the influence of factors over other factors indicated by the column name where the cell value is less than 0.14 is negligible and can be ignored.

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.00	-0.07	-0.05	-0.06	-0.05	-0.04	-0.06	-0.06	-0.04	-0.03	-0.04	-0.05	-0.06	-0.05	-0.04	-0.04	-0.03	-0.04	-0.04	-0.04
F2	-0.06	1.00	-0.05	-0.05	-0.04	-0.03	-0.03	-0.03	-0.03	-0.02	-0.03	-0.04	-0.03	-0.03	-0.03	-0.05	-0.02	-0.03	-0.03	-0.03
F3	-0.05	-0.06	1.00	-0.05	-0.05	-0.05	-0.04	-0.05	-0.03	-0.02	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.02	-0.03	-0.03	-0.03
F4	-0.06	-0.05	-0.05	1.00	-0.03	-0.03	-0.03	-0.04	-0.03	-0.02	-0.05	-0.03	-0.03	-0.04	-0.02	-0.05	-0.03	-0.03	-0.03	-0.03
F5	-0.06	-0.06	-0.06	-0.06	1.00	-0.05	-0.05	-0.05	-0.04	-0.05	-0.05	-0.05	-0.05	-0.05	-0.04	-0.05	-0.04	-0.04	-0.05	-0.04
F6	-0.05	-0.05	-0.05	-0.04	-0.05	1.00	-0.05	-0.05	-0.03	-0.03	-0.03	-0.04	-0.03	-0.03	-0.04	-0.04	-0.03	-0.04	-0.03	-0.04
F7	-0.06	-0.05	-0.05	-0.04	-0.05	-0.04	1.00	-0.05	-0.03	-0.03	-0.03	-0.04	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
F8	-0.06	-0.05	-0.05	-0.05	-0.04	-0.04	-0.05	1.00	-0.03	-0.02	-0.03	-0.04	-0.04	-0.04	-0.03	-0.04	-0.03	-0.03	-0.03	-0.02
F9	-0.05	-0.05	-0.04	-0.04	-0.05	-0.03	-0.04	-0.04	1.00	-0.03	-0.03	-0.04	-0.04	-0.04	-0.03	-0.04	-0.03	-0.03	-0.04	-0.03
F10	-0.04	-0.03	-0.03	-0.03	-0.05	-0.03	-0.03	-0.03	-0.03	1.00	-0.04	-0.05	-0.04	-0.02	-0.03	-0.03	-0.03	-0.02	-0.04	-0.03
F11	-0.04	-0.05	-0.03	-0.06	-0.05	-0.03	-0.03	-0.04	-0.03	-0.03	1.00	-0.04	-0.03	-0.02	-0.02	-0.03	-0.03	-0.02	-0.03	-0.03
F12	-0.05	-0.05	-0.04	-0.04	-0.05	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	1.00	-0.04	-0.04	-0.03	-0.03	-0.03	-0.03	-0.04	-0.03
F13	-0.05	-0.04	-0.04	-0.05	-0.05	-0.03	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	1.00	-0.04	-0.04	-0.03	-0.04	-0.03	-0.05	-0.04
F14	-0.06	-0.05	-0.05	-0.05	-0.05	-0.03	-0.05	-0.04	-0.04	-0.02	-0.02	-0.03	-0.03	1.00	-0.04	-0.03	-0.02	-0.04	-0.03	-0.03
F15	-0.05	-0.05	-0.05	-0.05	-0.04	-0.04	-0.04	-0.04	-0.03	-0.03	-0.04	-0.03	-0.04	-0.04	1.00	-0.04	-0.03	-0.04	-0.04	-0.04
F16	-0.06	-0.06	-0.05	-0.06	-0.06	-0.04	-0.03	-0.04	-0.03	-0.03	-0.03	-0.04	-0.02	-0.03	-0.03	1.00	-0.03	-0.03	-0.03	-0.03
F17	-0.04	-0.04	-0.03	-0.05	-0.05	-0.03	-0.03	-0.03	-0.03	-0.02	-0.04	-0.04	-0.04	-0.03	-0.03	-0.03	1.00	-0.03	-0.04	-0.04
F18	-0.06	-0.05	-0.05	-0.04	-0.04	-0.03	-0.04	-0.03	-0.03	-0.02	-0.02	-0.03	-0.03	-0.04	-0.05	-0.03	-0.03	1.00	-0.03	-0.03
F19	-0.05	-0.04	-0.05	-0.04	-0.05	-0.04	-0.04	-0.04	-0.04	-0.04	-0.04	-0.05	-0.05	-0.04	-0.04	-0.04	-0.03	-0.03	1.00	-0.04
F20	-0.05	-0.05	-0.05	-0.06	-0.05	-0.04	-0.04	-0.04	-0.03	-0.03	-0.05	-0.04	-0.05	-0.04	-0.04	-0.05	-0.05	-0.04	-0.05	1.00

Table 4.26 Matrix I -X

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	1.17	0.23	0.20	0.22	0.21	0.16	0.18	0.19	0.14	0.13	0.15	0.17	0.18	0.18	0.15	0.17	0.14	0.15	0.15	0.15
F2	0.19	1.13	0.17	0.17	0.16	0.12	0.13	0.14	0.11	0.10	0.12	0.13	0.13	0.13	0.12	0.14	0.10	0.12	0.11	0.11
F3	0.19	0.20	1.12	0.18	0.18	0.14	0.14	0.15	0.11	0.10	0.12	0.14	0.13	0.13	0.12	0.14	0.11	0.12	0.13	0.12
F4	0.19	0.18	0.16	1.12	0.15	0.12	0.13	0.15	0.11	0.10	0.13	0.13	0.13	0.13	0.11	0.15	0.11	0.11	0.11	0.11
F5	0.24	0.23	0.21	0.23	1.17	0.18	0.19	0.19	0.15	0.15	0.17	0.19	0.18	0.18	0.15	0.19	0.15	0.15	0.17	0.16
F6	0.19	0.19	0.18	0.17	0.18	1.10	0.15	0.16	0.11	0.11	0.12	0.15	0.14	0.14	0.13	0.15	0.12	0.13	0.13	0.13
F7	0.20	0.18	0.17	0.17	0.18	0.14	1.11	0.16	0.12	0.10	0.12	0.14	0.13	0.15	0.12	0.14	0.11	0.12	0.12	0.12
F8	0.20	0.19	0.17	0.18	0.17	0.14	0.16	1.11	0.11	0.10	0.13	0.14	0.14	0.15	0.12	0.15	0.11	0.12	0.12	0.11
F9	0.20	0.19	0.17	0.17	0.18	0.13	0.15	0.15	1.09	0.11	0.13	0.14	0.15	0.15	0.13	0.15	0.11	0.12	0.14	0.12
F10	0.16	0.15	0.14	0.15	0.16	0.11	0.12	0.12	0.11	1.07	0.12	0.14	0.13	0.11	0.11	0.12	0.11	0.10	0.12	0.11
F11	0.17	0.17	0.14	0.18	0.17	0.12	0.13	0.14	0.10	0.10	1.09	0.14	0.12	0.12	0.11	0.13	0.11	0.10	0.12	0.11
F12	0.19	0.19	0.17	0.18	0.18	0.14	0.15	0.15	0.12	0.12	0.14	1.11	0.15	0.14	0.13	0.14	0.12	0.13	0.14	0.13
F13	0.20	0.19	0.17	0.19	0.19	0.14	0.16	0.16	0.13	0.13	0.14	0.16	1.11	0.15	0.14	0.14	0.13	0.13	0.15	0.14
F14	0.19	0.19	0.17	0.17	0.17	0.13	0.15	0.14	0.12	0.10	0.11	0.13	0.13	1.10	0.13	0.13	0.11	0.13	0.12	0.12
F15	0.20	0.19	0.18	0.18	0.18	0.15	0.15	0.16	0.12	0.11	0.14	0.14	0.14	0.15	1.10	0.16	0.12	0.14	0.14	0.13
F16	0.20	0.19	0.17	0.19	0.18	0.14	0.14	0.15	0.11	0.11	0.13	0.14	0.12	0.13	0.12	1.11	0.11	0.12	0.12	0.12
F17	0.18	0.17	0.15	0.17	0.17	0.12	0.13	0.14	0.11	0.10	0.13	0.14	0.14	0.13	0.12	0.13	1.08	0.11	0.13	0.12
F18	0.19	0.18	0.17	0.16	0.16	0.13	0.14	0.14	0.11	0.10	0.11	0.13	0.12	0.14	0.13	0.13	0.11	1.09	0.12	0.11
F19	0.21	0.19	0.18	0.19	0.20	0.15	0.16	0.16	0.14	0.13	0.14	0.17	0.16	0.15	0.14	0.15	0.12	0.13	1.11	0.14
F20	0.21	0.21	0.19	0.21	0.20	0.16	0.16	0.17	0.13	0.12	0.15	0.17	0.17	0.15	0.14	0.17	0.15	0.14	0.15	1.10

Table 4.27 Matrix I -X Inverse

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16	F17	F18	F19	F20
F1	0.17	0.23	0.20	0.22	0.21	0.16	0.18	0.19	0.14	0.13	0.15	0.17	0.18	0.18	0.15	0.17	0.14	0.15	0.15	0.15
F2	0.19	0.13	0.17	0.17	0.16	0.12	0.13	0.14	0.11	0.10	0.12	0.13	0.13	0.13	0.12	0.14	0.10	0.12	0.11	0.11
F3	0.19	0.20	0.12	0.18	0.18	0.14	0.14	0.15	0.11	0.10	0.12	0.14	0.13	0.13	0.12	0.14	0.11	0.12	0.13	0.12
F4	0.19	0.18	0.16	0.12	0.15	0.12	0.13	0.15	0.11	0.10	0.13	0.13	0.13	0.13	0.11	0.15	0.11	0.11	0.11	0.11
F5	0.24	0.23	0.21	0.23	0.17	0.18	0.19	0.19	0.15	0.15	0.17	0.19	0.18	0.18	0.15	0.19	0.15	0.15	0.17	0.16
F6	0.19	0.19	0.18	0.17	0.18	0.10	0.15	0.16	0.11	0.11	0.12	0.15	0.14	0.14	0.13	0.15	0.12	0.13	0.13	0.13
F7	0.20	0.18	0.17	0.17	0.18	0.14	0.11	0.16	0.12	0.10	0.12	0.14	0.13	0.15	0.12	0.14	0.11	0.12	0.12	0.12
F8	0.20	0.19	0.17	0.18	0.17	0.14	0.16	0.11	0.11	0.10	0.13	0.14	0.14	0.15	0.12	0.15	0.11	0.12	0.12	0.11
F9	0.20	0.19	0.17	0.17	0.18	0.13	0.15	0.15	0.09	0.11	0.13	0.14	0.15	0.15	0.13	0.15	0.11	0.12	0.14	0.12
F10	0.16	0.15	0.14	0.15	0.16	0.11	0.12	0.12	0.11	0.07	0.12	0.14	0.13	0.11	0.11	0.12	0.11	0.10	0.12	0.11
F11	0.17	0.17	0.14	0.18	0.17	0.12	0.13	0.14	0.10	0.10	0.09	0.14	0.12	0.12	0.11	0.13	0.11	0.10	0.12	0.11
F12	0.19	0.19	0.17	0.18	0.18	0.14	0.15	0.15	0.12	0.12	0.14	0.11	0.15	0.14	0.13	0.14	0.12	0.13	0.14	0.13
F13	0.20	0.19	0.17	0.19	0.19	0.14	0.16	0.16	0.13	0.13	0.14	0.16	0.11	0.15	0.14	0.14	0.13	0.13	0.15	0.14
F14	0.19	0.19	0.17	0.17	0.17	0.13	0.15	0.14	0.12	0.10	0.11	0.13	0.13	0.10	0.13	0.13	0.11	0.13	0.12	0.12
F15	0.20	0.19	0.18	0.18	0.18	0.15	0.15	0.16	0.12	0.11	0.14	0.14	0.14	0.15	0.10	0.16	0.12	0.14	0.14	0.13
F16	0.20	0.19	0.17	0.19	0.18	0.14	0.14	0.15	0.11	0.11	0.13	0.14	0.12	0.13	0.12	0.11	0.11	0.12	0.12	0.12
F17	0.18	0.17	0.15	0.17	0.17	0.12	0.13	0.14	0.11	0.10	0.13	0.14	0.14	0.13	0.12	0.13	0.08	0.11	0.13	0.12
F18	0.19	0.18	0.17	0.16	0.16	0.13	0.14	0.14	0.11	0.10	0.11	0.13	0.12	0.14	0.13	0.13	0.11	0.09	0.12	0.11
F19	0.21	0.19	0.18	0.19	0.20	0.15	0.16	0.16	0.14	0.13	0.14	0.17	0.16	0.15	0.14	0.15	0.12	0.13	0.11	0.14
F20	0.21	0.21	0.19	0.21	0.20	0.16	0.16	0.17	0.13	0.12	0.15	0.17	0.17	0.15	0.14	0.17	0.15	0.14	0.15	0.10

Table 4.28 Total Relation Matrix T

The values of R, C, R+C, R-C, Cause Effect relationship are summarized in table 4.29.

Factors	R	C	R+C	R-C	Cause Effect
F1	3.41	3.87	7.29	-0.46	Effect
F2	2.61	3.73	6.34	-1.11	Effect
F3	2.79	3.37	6.16	-0.58	Effect
F4	2.64	3.60	6.23	-0.96	Effect
F5	3.63	3.54	7.16	0.09	Cause
F6	2.88	2.72	5.60	0.15	Cause
F7	2.80	2.92	5.72	-0.12	Effect
F8	2.84	3.03	5.87	-0.19	Effect
F9	2.87	2.37	5.23	0.50	Cause
F10	2.46	2.17	4.63	0.30	Cause
F11	2.58	2.59	5.17	-0.01	Effect
F12	2.92	2.91	5.83	0.01	Cause
F13	3.04	2.80	5.84	0.24	Cause
F14	2.74	2.81	5.55	-0.07	Effect
F15	2.97	2.51	5.49	0.46	Cause
F16	2.80	2.90	5.69	-0.10	Effect
F17	2.68	2.32	4.99	0.36	Cause
F18	2.67	2.45	5.12	0.22	Cause
F19	3.12	2.62	5.74	0.49	Cause
F20	3.24	2.46	5.70	0.78	Cause

Table 4.29 Cause Effect Relationship of Factors

4.2.3 Cause Effect factors

A scatter plot was made with R+C as the X axis and R-C as the Y axis. The point on the top of the horizontal axis are the Cause Factors and the points below the horizontal axis are the Effect Factors

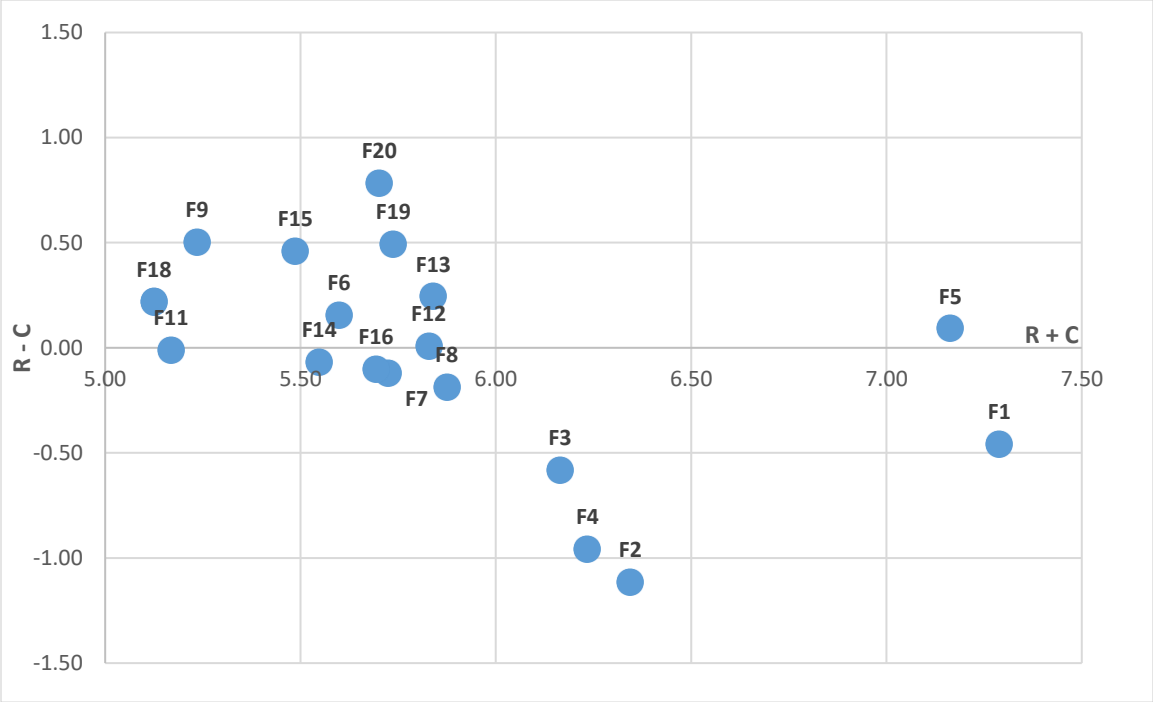

Figure 4.39 Scatter Plot for R+C Vs R-C.

4.3 Summary of Findings

Customer retention in the realm of Indian Commercial Vehicle space is an area where little information is available in the literature. This research is a humble beginning towards that journey of exploration of factors that affect the customer retention in After Sales Service of Indian Commercial Vehicles especially in the medium and heavy tonnage range. By exploring the various research works which had been done in the past, 38 factors which may have an effect on customer retention were shortlisted. These factors were then circulated amongst 34 industry experts who evaluated these factors for their significance

level. Based on the ratings provided by the 34 experts, 20 factors were finalised for AHP and DEMATEL study. 15 industry experts participated in the AHP study, and 23 industry experts participated in the DEMATEL study. Both AHP and DEMATEL are MCDM methods which have been used in various research in the past to evaluate criteria weights and inter relationships between criteria. In this research, under AHP study, 15 experts made 190 pair wise comparisons of the 20 factors shortlisted. The respondents' ratings were within the required consistency ratio of 0.1. The criteria weights were obtained and summarised in table 4.22. Similarly, 23 experts made 400 pairwise comparisons for the DEMATEL study. The average matrix was computed, which was then normalised. Using Microsoft Excel computations like matrix inverse and matrix multiplication, we derived the total relation matrix. The relational weights of the factors were obtained by computing R+C values and Cause Effect classification were done using the R-C values, which are presented in table 4.29.

4.4 Conclusion

The factors affecting customer retention, especially those which are related to Automobile After Sales Service, which were picked from extensive literature were subjected to evaluation by Industry experts where each expert had commercial vehicles after sales work experience of more than 10 years (the range is from 11 years to 32 years). The Multi Criteria Decision Making (MCDM) tools like Analytic Hierarchy Process (AHP) and Decision-Making Trial and Evaluation Laboratory (DEMATEL) were used and the weights of the factors and inter relationships between the factors were calculated. All the laid down methodologies and guidelines specified in the literature with regards to AHP and DEMATEL were adhered. The results obtained were used to formulate strategies for customer retention which are elaborated in the next section.

CHAPTER V:

DISCUSSION

5.1 Discussion of Results

5.1.1 Identification of factors

We obtained 38 factors from the literature review. These factors in some form or other has an influence on customer retention. We then reduced these to 20 factors based on experts first level evaluation on the significance of these factors (Mangla et al., 2016). 9 factors got an average rating of more than 4. This survey was just used to shortlist the factors for the next phase of research and also to check if any other factors than those obtained from the literature review have a role to play in the area of customer retention. Though the experts voiced to include many more factors, on checking back with the literature, they were somehow similar to the factors which were already stated. Hence no new factor was added. The count of factors were reduced from 38 to 20 for the AHP and DEMATEL study by dropping less significant factors (Mangla et al., 2016) and by grouping similar factors.

5.1.2 Significant Factors and linkage to theory

We used AHP & DEMATEL tools in our research, the former with the purpose of understanding the relative importance of factors and the latter to understand the relationship between the factors. The relative importance of the 20 factors as per AHP is depicted in table 5.1. We find that F2 > F1 > F4 are the top 3 factors as per the relative importance.

F2 – *Resolution of complaints in the first instance*, F1-*Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries*, F4 - *Quick Turn Around Time;* all these 3 factors fall under the category of service quality and Capability as per literature. Most of the customers

consider quality of service as the main reason to make repeat purchases (Srivastava and Tyagi, 2016). AUTOSERQUAL is a tool which was derived from SERVQUAL, a tool to measure service quality, which was developed over a period of 5 years (A. Parasuraman, Valarie A. Zeithaml, 1985). F2 – which speaks about resolution of complaints in the first instance is treated as one of the ten commandments of customer service (Sewel and brown, 2002). These 3 factors being the top factors, it clearly indicates that customers are still seeking for quality of service as their top preference. It means that these are hygiene factors and still foundation factors for all other factors. Though personalised services, hyper personalisation etc, seems to be the buzz words these days; with respect to truck business F19 - Customer relationship building marketing activities is still at rank 20. There is no point in wearing a façade and spend huge amounts of money on marketing activities without being strong enough in the fundamentals.

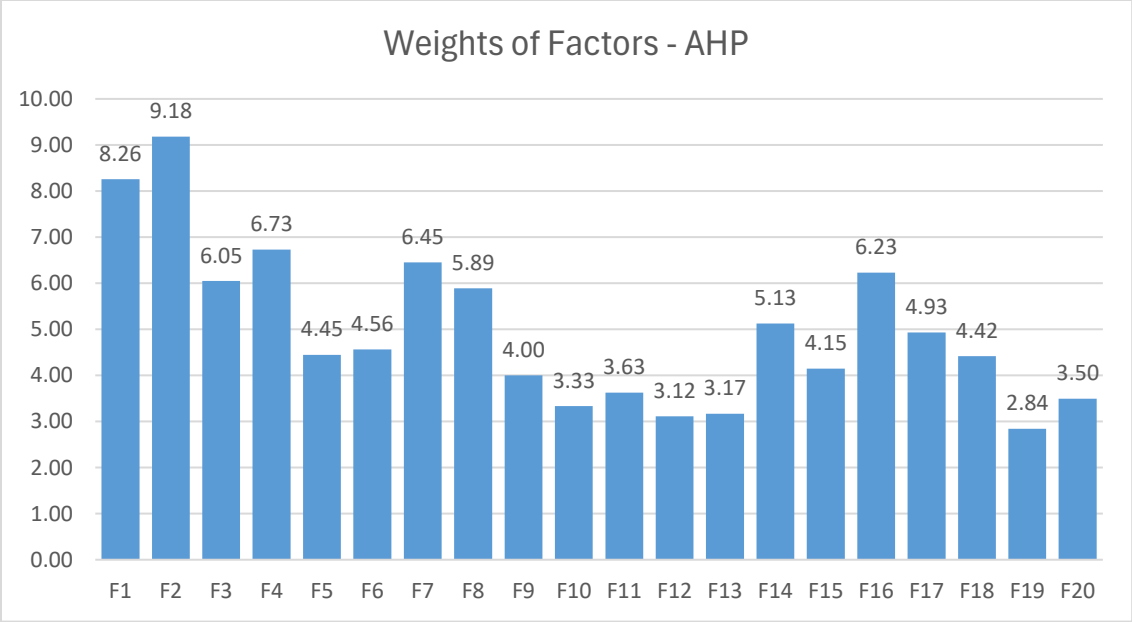

Figure 5.1 – Weights of factors - AHP

5.2 Discussion of Research Question One- relative importance of factors

Using AHP study, the criteria weights for each of the factors were obtained. The pareto and the tree map of the factors are provided in figure 5.2 and 5.3 respectively. The ranks of the factors are tabulated in Table 5.1. The factor F2 is at rank 1 with a criteria weight of 9.18% followed by factor F2 with a criteria weight of 8.26. In a similar AHP study done by A. Kumar et al. (2017) where 8 Factors were used to ascertain the customer retention factors in 2-wheeler industry, the rank 1 factor got a weightage of 27% followed by 17% for the rank 2 factor. In this research, the top 5 ranking factors as per AHP Study are F2 >F1 >F4 >F7 >F16. These top 5 rank factors put together has a combined weight of 36.85%. The number of criteria or factors picked for developing strategies from a AHP study varies from researcher to researcher and there is no clear-cut threshold mentioned in the literature (Schmidt et al., 2015). The CV manufacturers as per the availability of the resources, budget and time, can pick the factors based on its relative importance to develop actionable strategies.

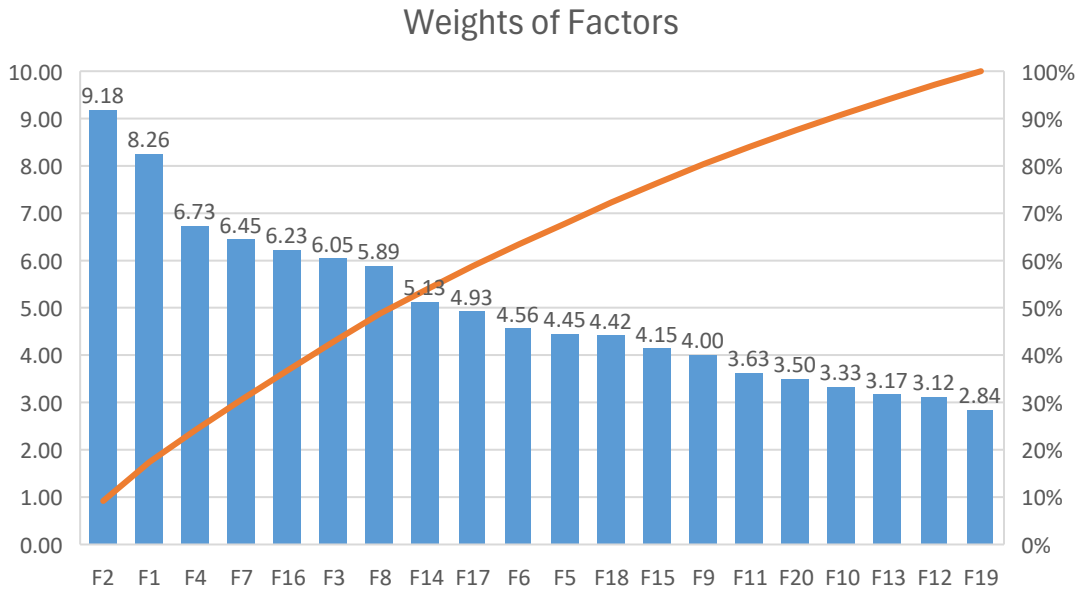

Figure 5.2 – Pareto Weights of Factors - AHP

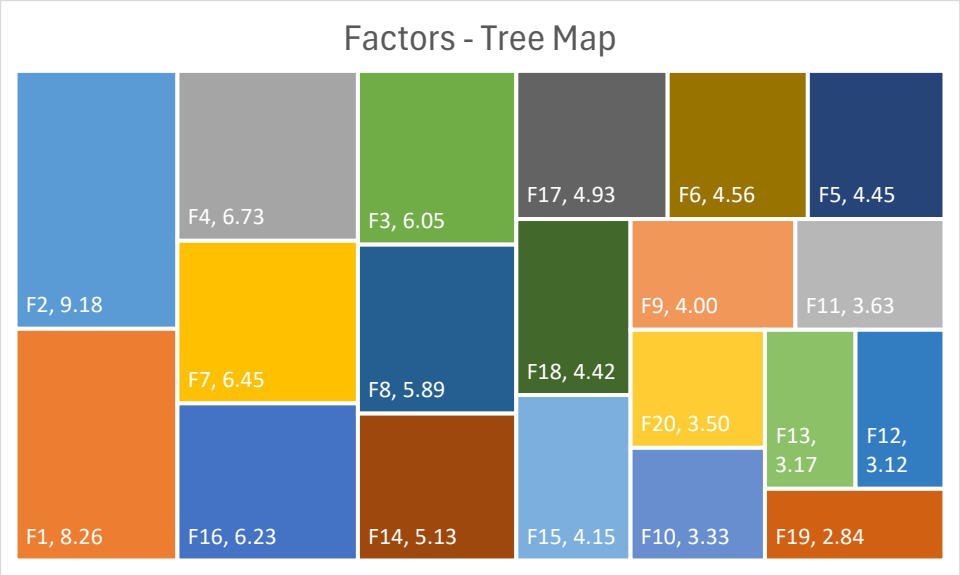

Figure 5.3 – Factors – Tree Map

It would be interesting to know that often we tend to give up our efforts to attract customers to authorised workshops and prevent them from going to local workshops by stating that customers prefer cheaper services and in no way authorised workshops can match the price and retain the customers. But this does not seem to be right always. F6-Price reasonableness of services is at rank 10, which indicates that customers still value many other things than price. This gives the motivation to the CV manufacturers to keep invested in their efforts to retain customers. This doesn't mean that CV manufacturers can charge customers abnormally high prices. The factor still accounts for 4.56%. Also, it seems that the latest buzz words like personalisation, CRM etc., still have time to be dealt with in the context of truck after sales service.

Factors	Criteria Weight in %	Criteria Rank
F2-Resolution of complaints in first instance.	**9.18**	**1**
F1-Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries	**8.26**	**2**
F4- Quick Turn Around Time	**6.73**	**3**
F7-Transparency in the transaction, correct billing with explanation	6.45	4
F16-Availability of required infrastructure (tools, equipment) & facilities for undertaking repairs	6.23	5
F3-Usage of genuine or original parts and availability of required parts at the workshop	6.05	6
F8-Providing correct Time estimate & Cost estimate for Repair	5.89	7
F14-Warranty Acceptance & Rejection Handling	5.13	8
F17-Location of the workshop or doorstep service support	4.93	9
F6-Price Reasonableness of the services	4.56	10
F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	4.45	11
F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product, maintenance schedules, benefits of its adherence, warranty terms etc	4.42	12
F15-Customer Attitude towards maintenance. Indifference to quality services by customer	4.15	13
F9-Availability of Customer Complaint Redressal system.	4.00	14
F11-Operating hours of the workshop	3.63	15
F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	3.50	16
F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	3.33	17
F13-Personalised attention of customers	3.17	18
F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	3.12	19
F19-Customer relationship Building Marketing Activities	2.84	20

Table 5.1 Criteria weights and AHP ranking.

5.3 Discussion of Research Question Two - Relationship between factors

5.3.1 Significant factors

The DEMATEL study was used to arrive at the cause effect relationship between factors. The R+C values of the total relation matrix provide the relational weights of the factors. Based on the R+C values, the factors are ranked for their importance (A. Kumar and Dash, 2016). Table 5.2 provides the ranks as well as the cause-and-effect nature of the factors. The top 5 ranks are held by F1>F5>F2>F4>F3.

5.3.2 Influence of factors

Out of the 20 factors, 11 factors are cause factors i.e. they are independent factors, and 9 factors are effect factors i.e. dependent factors as illustrated in Table 5.2. The threshold value of the total relation matrix was 0.14. Based on the threshold value, the number of factors which get influenced by each of the factors are depicted in Figure 5.5. F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness) influences all other factors, and it is at rank 2. It is also a cause factor. So, this factor is super important. Similarly, F1-Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries, influences 17 factors with rank 1 with effect factor tagging. Further F20-Customised Solution for category specific customers - At Site, Ecom, Passenger influences 16 factors. Though it is ranked at 11, it has very high R-C value i.e. a critical cause factor. Also, it can be seen that except for F5, no other factor has an influence on F9 & F10, which are also cause factors.

Factor Number	Factors	R+C	R-C	Cause Effect	Rank
F1	F1-Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries	7.29	-0.46	Effect	1
F5	F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	7.16	0.09	Cause	2
F2	F2-Resolution of complaints in first instance.	6.34	-1.11	Effect	3
F4	F4- Quick Turn Around Time	6.23	-0.96	Effect	4
F3	F3-Usage of genuine or original parts and availability of required parts at the workshop	6.16	-0.58	Effect	5
F8	F8-Providing correct Time estimate & Cost estimate for Repair	5.87	-0.19	Effect	6
F13	F13-Personalised attention of customers	5.84	0.24	Cause	7
F12	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	5.83	0.01	Cause	8
F19	F19-Customer relationship Building Marketing Activities	5.74	0.49	Cause	9
F7	F7-Transparency in the transaction, correct billing with explanation	5.72	-0.12	Effect	10
F20	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	5.70	0.78	Cause	11
F16	F16-Availability of required infrastructure (tools, equipment) & facilities for undertaking repairs	5.69	-0.10	Effect	12
F6	F6-Price Reasonableness of the services	5.60	0.15	Cause	13
F14	F14-Warranty Acceptance & Rejection Handling	5.55	-0.07	Effect	14
F15	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	5.49	0.46	Cause	15
F9	F9-Availability of Customer Complaint Redressal system.	5.23	0.50	Cause	16
F11	F11-Operating hours of the workshop	5.17	-0.01	Effect	17
F18	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product, maintenance schedules, benefits of its adherence, warranty terms etc	5.12	0.22	Cause	18
F17	F17-Location of the workshop or doorstep service support	4.99	0.36	Cause	19
F10	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	4.63	0.30	Cause	20

Table 5.2 Criteria weights and DEMATEL ranking.

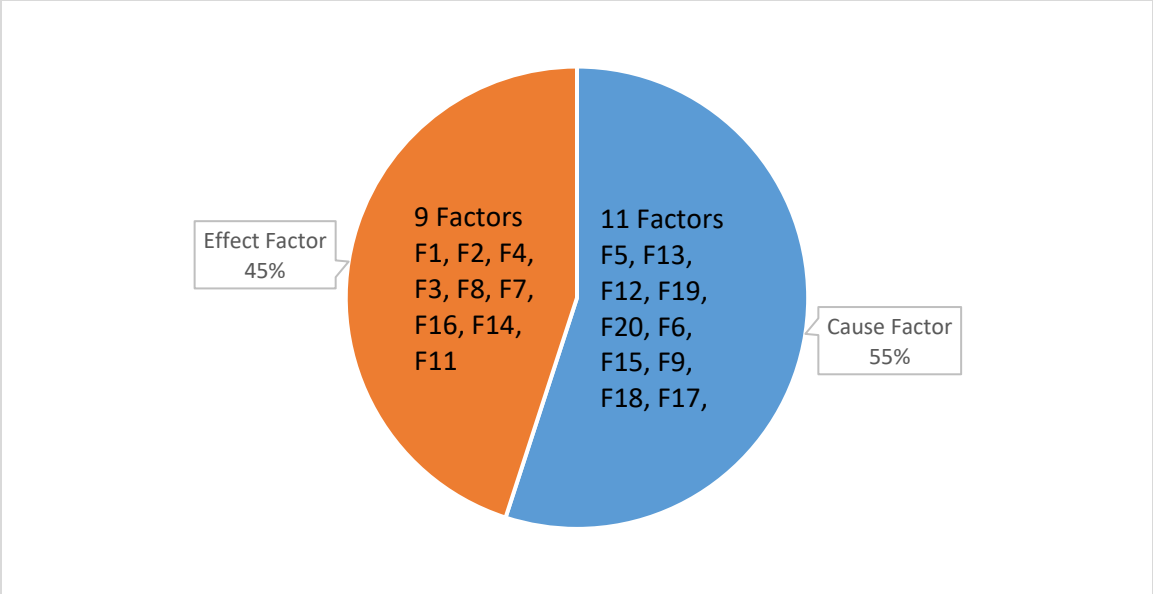

Figure 5.4 Cause Effect Factors

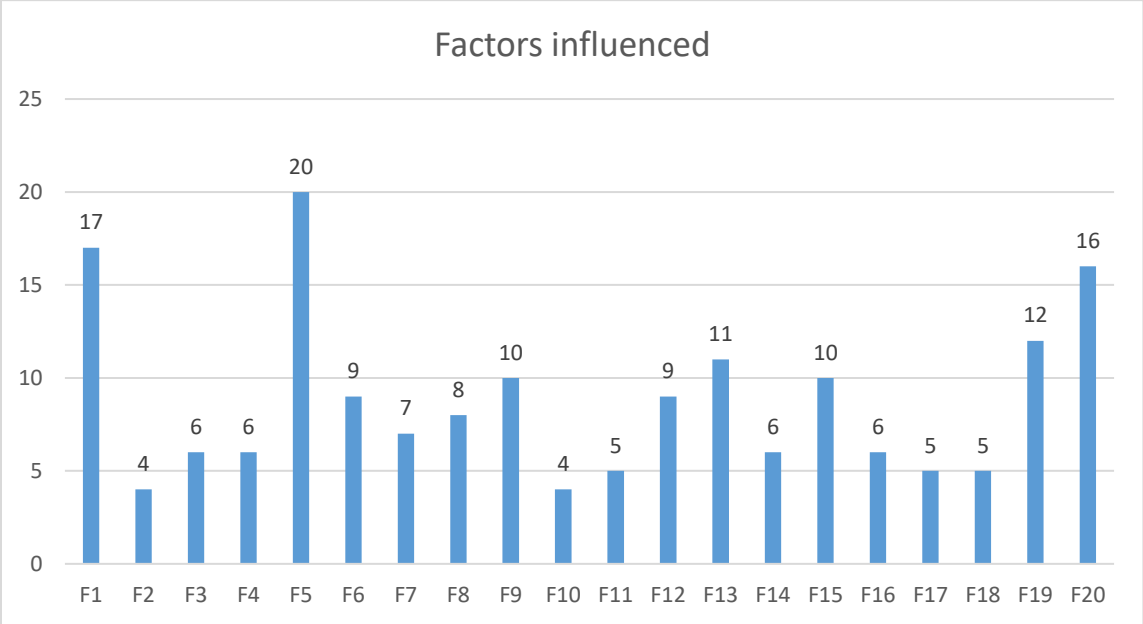

Figure 5.5 Factors influenced

5.3.3 Summary of DEMATEL Study

Overall, as per the DEMATEL results, we can say that F20, F9 and F19 are Key Influencers or Cause Factors, F2, F4, F3, F1 are key Effect Factors and F1, F5 and F2 are Central Factors with top ranks as depicted in Figure 5.6. It is interesting to note that the factors F20, F19, F9 which were at lower ranks in AHP study are found to be strong cause factors. i.e. they influence other factors strongly though they do not hold significant weights.

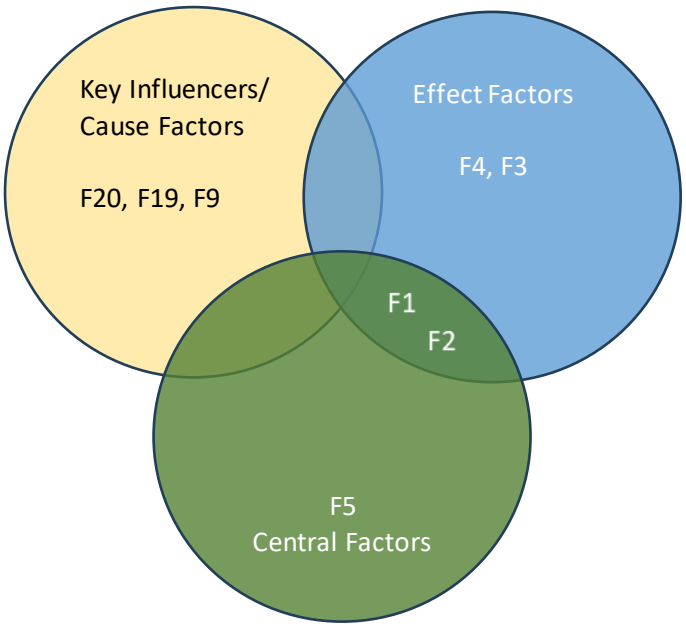

Figure 5.6 Venn Diagram

5.4 Combined Inference of AHP and DEMATEL study

The results of both AHP and DEMATEL were looked at together in order to develop strategies for the CV Manufacturer. Table 5.5 illustrates the combined results. Factors F1, F2, F4 are in the Top Ranks in both the study. It means these are really the super critical factors. Also, it was noticed that all these 3 factors are EFFECT Factors which means they are influenced by other factors. Hence it is essential to pick high ranking Cause factors like

F9, F20, F19. There are factors like F7 and F16 which are at 4th and 5th rank in AHP but not holding sufficient importance in DEMATEL study. We have used these factors as supporting factors to develop strategies. F5 behaviour seems peculiar, it is ranked 2 in DEMATEL, and it is a cause factor influencing all factors, however its AHP rank is 11. Based on it is peculiar nature, it has also been grouped along with the super critical factors. To summarise, the strategies have been arrived considering F1, F2, F4, F5 as super critical factors, F9, F20, F19 as important Cause Factors and F7 & F16 as supporting factors.

Factor	DEMATEL (R-C)	AHP Rank	DEMATEL Rank
F1-Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries	-0.46	2	1
F2-Resolution of complaints in first instance.	-1.11	1	3
F3-Usage of genuine or original parts and availability of required parts at the workshop	-0.58	6	5
F4- Quick Turn Around Time	-0.96	3	4
F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	0.09	11	2
F6-Price Reasonableness of the services	0.15	10	13
F7-Transparency in the transaction, correct billing with explanation	-0.12	4	10
F8-Providing correct Time estimate & Cost estimate for Repair	-0.19	7	6
F9-Availability of Customer Complaint Redressal system.	0.50	14	16
F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	0.30	17	20
F11-Operating hours of the workshop	-0.01	15	17
F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	0.01	19	8
F13-Personalised attention of customers	0.24	18	7
F14-Warranty Acceptance & Rejection Handling	-0.07	8	14
F15-Customer Attitude towards maintenance. Indifference to quality services by customer	0.46	13	15
F16-Availability of required infrastructure (tools, equipment) & facilities for undertaking repairs	-0.10	5	12
F17-Location of the workshop or doorstep service support	0.36	9	19
F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product, maintenance schedules, benefits of its adherence, warranty terms etc	0.22	12	18
F19-Customer relationship Building Marketing Activities	0.49	20	9
F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	0.78	16	11

Table 5.3 Combined results – AHP and DEMATEL Study

The table 5.6 illustrates the 9 factors which were picked to develop recommendations for strategies to improve customer retention MHCV space using the AHP and DEMATEL Study.

Factor	AHP Rank	DEMATEL Rank	Remarks
F2-Resolution of complaints in first instance.	1	3	1.Super Critical
F1-Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behaviour, grooming and speed to respond to queries	2	1	1.Super Critical
F4- Quick Turn Around Time	3	4	1.Super Critical
F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	11	2	1.Super Critical
F9-Availability of Customer Complaint Redressal system.	14	16	2.Cause Factor
F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	16	11	2.Cause Factor
F19-Customer relationship Building Marketing Activities	20	9	2.Cause Factor
F7-Transparency in the transaction, correct billing with explanation	4	10	3.Support Factor
F16-Availability of required infrastructure (tools, equipment) & facilities for undertaking repairs	5	12	3.Support Factor

Table 5.4 Factors for strategies

5.5 Strategies to retain customers

5.5.1 F2-Resolution of complaints in first instance:

Customers bring their vehicles to the workshops for periodic maintenance services, for getting fixed any issue in the vehicle, accident repair etc. It is essential to listen to the customers and understand what exactly is the inconvenience or trouble that they are facing in the vehicle. This requires an adequate knowledge level of the dealer executives who interact with customers (which is also part of F1). The complaint in the vehicle needs to be diagnosed properly by experts in the workshops and suitable remedy need to be worked

out. Customers are aware that Commercial Vehicle are susceptible to complaints. But they do not wish to revisit the service centre for the same complaint (James et al., 2020).

There could be a substantial number of reasons for a complaint not being fixed in the first instance. It could be a poor product quality, lack of skill and knowledge by the workshop team, non-availability of required genuine part, customer abuse of the product or non-usage as per the recommendations, non-availability of necessary tools etc. Since F2 is a super critical factor, the first step would be to understand how many vehicles revisit the workshop well before reasonable time and for the same complaint. A typical truck requires a visit to a workshop 2 to 3 times in a year. It is proposed to calculate the number of visits of the truck within 30 days, 60 days or 90 days from the date of first attention. Let us call this metric as Number of Revisits and in case if it is for the same complaint, let us call it as Repeat Complaint. Since almost all the CV manufacturers are using the Dealer Management Software (DMS) to capture all POS transactions, we can build a logic to alert workshop whenever there is a Revisit or Repeat Complaint and tag appropriate reason for the same. Based on the analysis of the data, appropriate actions can be taken by the CV manufacturer to eliminate or reduce unnecessary revisit and repeat complaints.

5.5.2 F1-Workshop Team presentation and capability

Human resource is a very important asset for every organisation. The step one would be to hire right talent. As per the experts of the industry, though CV manufacturers have well defined guidelines on hiring talent for their organisation, they usually do not interfere in the hiring process of their dealers. Though CV manufacturers provide the basic guideline on the quantity of people required and education qualifications for a particular role, the rest of the work is done by the dealer themselves. There are various categories of people who are required for running a workshop, namely Works Manager, Service Advisor, Supervisor,

Backend Data management team, Technicians, Helpers, Parts Manager and other support staff. It is understood from the experts that there are challenges in getting resources for workshop operations. It is proposed that CV manufacturer should work together with the dealers in finding the right talent. A trained talent pool needs to be created. Adequate efforts should also be taken to retain this talent. The next important step would be to continuously improve the capability of the team. This can be done by well-defined training program. CV manufacturers already have this in place. However, experts say, the Dealers at many times are reluctant to send their employees to the Training Centres of the CV manufacturer for various reasons. With many advancements in the digital training area, CV manufacturers should think how to take their digital trainer or virtual trainer to the dealer's work place itself. CV manufacturers should enable E-Learning platforms with augmented reality and gamification. On the job continuous assessment and re-training should be part and parcel of the regular work. CV manufacturers had been traditionally focusing more on the technical training. They need to focus on the soft skill part too. Today we have voice analytics tools to measure the sentiments of the conversations. These tools should be used to constantly monitor the behavioural aspects of the employees who are interacting with the customers either face to face, through telephone or email. To improve the speed of response to the queries of the customers, it proposed to implement the Gen AI tools at workshops. These tools should be used to assist employees in responding to the queries of the customers. Gen AI can also assist in diagnosis by pooling past technical reports. By equipping employees with these tools, their confidence level will improve and can in turn be more trustworthy and reliable to the customers.

5.5.3 F4- Quick Turn Around Time (QTAT)

This is an effect factor. Servicing or repairing the truck and giving it back to the customers in the quickest possible time requires effort from multiple stake holders. Availability of tools, parts, manpower, then adherence to SOP, quick trouble shooting, etc, all these will affect the turnaround time. CV manufacturers are already focusing on all these points, and they have strict audit/control mechanism to ensure the same. But Industry experts still claim that quick turnaround time is still an area of challenge. Then what is the issue? What else to be done? For this we need to get into the granular level. CV manufacturers need to adopt 3 strategies, one would be to understand the customer better, second would be eliminate the non-value adding tasks (NVAT) and third would be optimised load distribution. Customer is not exactly of one form, we have customer 1, customer 2, customer 3 and so on, i.e. every customer is different and have different requirements. Not all customers expect a quick turnaround time. Also, not for all type of repairs they expect the same turnaround time. Every customer has different zone of tolerance for the service time. An article indicates that an individual spends 37 billion hours each year waiting in line (Alex Stone, 2012). Some customers also associate quality of the service rendered proportional to the waiting time (De Vries et al., 2018). It is essential to identify QTAT focused customers and serve them accordingly. It will be also possible to charge a premium from these customers for a faster service. Express Bays or Quick Service bays can be setup for these trucks. On the other side some freebies or discounts can be given to those who opt for a slow service. Wating time can also be classified as actual wait time or perceived wait time. When Houston airport was faced with huge complaints of high baggage collection time, they increased the distance from the arrival gate to baggage conveyor belt, customers had to walk a long way to the baggage area and the baggage was available by the time they reached there, this almost eliminated the customer complaints; though the

actual wait time was still the same, the customer was pre-occupied with the walking process which reduced the perceived wait time (Alex Stone, 2012). CV manufacturer can design engagement activities for their customers / drivers while the trucks are getting serviced. These can be like free wi-fi and access to OTT / entertainment content, free eye check or health check, free yoga classes or other educational programs, etc. This will reduce the perceived wait time and improve the brand image of the service. The customers should also be given an advance information on the wait time as well as the repair time, for them to take an informed decision. Secondly, coming to reducing NVAT, an authorised workshop usually has more documentation activities in addition to the actual repair. Some CV manufacturers have allocated 2 to 4 hours of time for non-repair activities. From the customers point of view this is of no value. CV manufacturers should attempt to minimize documentation time and time required for adhering to SOPs etc. This can be done by improving the workshop layout, taking help of technology and digitisation of the process. The incoming trucks should be grouped based on the nature of the service / repairs which need to be carried out. Trucks requiring only scheduled service or minor repairs to be parked in the bays nearer to the entry / exit gate. Trucks requiring major repairs, aggregate overhauls, accident repairs can be placed in the interior bays. Similarly, the work teams/technicians can be mapped to jobs. For example, we can have a fixed dedicated team to carry out the scheduled services. Such exclusive teams by performing the same jobs repeatedly will also be able to grow on their learning curve and be able to complete the work faster as they gain experience. There should be near zero documentation for customers who have come in for a repair/task which takes less than 15 to 30 minutes. Now a days, many customers walk in to buy Adblue or to get their vehicles checked for error codes. Innovations like vending machines for Adblue and other lubricants purchase, do it yourself (DIY) error code scanning will help in reducing the service time. We can gamify

the process or provide loyalty points for customers who come forward to adopt these self-service options. Coming to the third point of load distribution, the vehicle inflow varies throughout the day as well as throughout the week. There is excessive pressure on the workshop teams during the peak hours/ peak days. This may result in omission of certain steps in SOP to achieve TAT, affecting the quality and also lower the motivation level of the team (De Vries et al., 2018). Hence CV manufacturers should look for ways to optimise the load distribution and have variable resource planning as per the varying load.

5.5.4 F5- Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)

Brand image of the workshop is a cause factor. CV manufacturers are already carrying out, many activities to improve their brand image. Also, Infrastructure standards and process standards for the workshops are also enforced strictly by them. Every workshop also has a brand image. Not all the workshops of the same CV brand have same brand weights in the minds of the customers. CV Manufacturers should urge as well as support individual authorised workshops to have their own brand building activities. They can create Customer Experience Teams who will focus exclusively on this. Also, efforts should be in place to build and connect aspirations in the customers / drivers. Make them aspire for the brand.

5.5.5 F9-Availability of Customer Complaint Redressal system

This is a cause factor. Any service is prone to misses and lapses (Hart et al., 1989). A good service provider quickly identifies the mistake and does the service recovery in an efficient manner. The very important thing in this entire service scenario is to understand quickly and correctly, when and where the mistake happened. This is possible only by a proper complaint redressal system. Almost all companies including the CV manufacturers have

some methodology to capture customer complaints and act on them. Then what else to be done? Service recovery is good but not as good as making the customer happy and satisfied in the first instance itself (Kau and Loh, 2006). Customers will appreciate service recovery for the first time, but if it happens again, they may move away from the service provider. Hence CV manufacturers should deploy technology and tag or classify customers based on service recovery interventions in the past. The front-line team should be guided and assisted to take care of this customer when he / she visits the workshop again post a service recovery intervention. The CV manufacturer should do KYC (Know Your Customer) in the real sense having a 360 view of the customer, thereby helping to provide personalised services and make them their customers for life.

5.5.6 F20-Customised Solution for category specific customers - At Site, Ecom, Passenger

As stated earlier every customer and their requirements are different and unique. Tipper customers expect At-Site service support for their fleet. Some conclude the sales deal only after finalising the service support deal. Similarly, with Ecommerce segment picking up, many logistics players are now partnering with Ecommerce companies. We all are aware of the tough competition amongst the e-com players. This in turn reflects in the tough SLAs with their logistics partners. The e-com operators cannot tolerate vehicle break downs. CV manufacturers should be agile and support these customer groups with customised solutions with vehicle uptime guarantee. There should be a sperate team to handle these customised operations.

5.5.7 F19-Customer relationship building marketing activities

This is also a cause factor. Relationship marketing is gaining importance in the Truck Business as well. An authorised workshop is an establishment of SOPs, designations, etc.

This is how some customers look at an authorised workshop. The workshop team are looked upon as just employees of an organisation. Whereas in many local garages where the owner also plays the role of a mechanic or chief mechanic, treats the customer/ driver as his family member. They exchange a lot of thoughts and feelings while the trucks are getting serviced (S. S. K. Kumar and Reddy, 2013). CV manufacturers should strive to create an emotional bond with the customers rather than just a transactional bond. For this we need to know the customer better. A good customer profiling is very essential. Hyper personalisation is already the talk in other service industries. CV manufacturers should design engagement activities, loyalty programs, educational programs not only for the owners of the trucks but also for all other stake holders like their family members, drivers, fleet managers, technicians and others. There should be a separate team, which will drive these initiatives and bring that culture across all front-line team.

5.5.8 F7-Transparency in the transaction, correct billing with explanation

This is a supporting factor. Most of the CV manufacturers have their software platform extended to their dealers to capture the point of sale (POS) data. It means CV manufacturers already have a lot of control in ensuring correct transactions and billing. However, explaining the transactions to the customers are still with the dealers. CV manufacturers can make use of latest technology in making the POS software even more transparent and accurate. When coming to the explanation of invoice to the customers, CV manufacturer need to put in more efforts in developing this capability in the workshop front-line team. Some virtual assistants or platform where customers can reach out to check correctness of the invoice will help in providing solace to the customers that they are not being over charged for the services availed. Also, it should be ensured that the failed materials pertaining to the repairs for which customers have paid should be handed over to them. In

case the customers do not wish to collect the failed materials, a token discount equivalent to the salvage value can be passed on to the customers. Photo proof of all failed materials and replacement of lubricants will add to the transparency of the process.

5.5.9 F16-Availability of required infrastructure (tools, equipment) & facilities for undertaking repairs

This is also a supporting factor. Availability of required tools, equipment and facilities is strict norm across most of the authorised workshops. CV manufacturers carry our regular audits at the premises of authorised workshops to ensure adherence to the same. They need to continue to do the same as these are considered as hygiene parameters for an authorised workshop by customers. Authorised workshops should showcase their facilities and capabilities to their customers by organising workshop tours, promotional materials, etc.

5.6 Suggestion for Customer Retention Metrics

This research did not cover evaluation of various customer metrics suitable for Truck After Sales Service, though this an important area which need to be worked upon in the future. Based on the information available in the literature, together with the author and experts view, some suggestions and future scope of work have been discussed here. We have now learnt about critical factors affecting customer retention and some strategies which could emulate the critical factors. But how do we know that the implementation of these strategies is yielding results. What metrics do we track? Literature has several metrics to measure customer retention like Word of mouth, Share of Wallet, Recency Frequency Monetary value (RFM), Customer lifetime value etc (Ascarza et al., 2017)(Fader et al., 2005).

With the advancement of product quality of MHCV, the requirement of it visiting a workshop has reduced drastically. Let us assume that the truck needs to visit a workshop

once every 6 months. By knowing the volume of vehicles sold in the market, we can arrive at the potential visits of these trucks to the workshops. The actual visits of the trucks can be obtained from the POS data. The ratio of the actual visits to the potential visits will provide us the Vehicle Retention which could be used as an indicator for customer retention. We already discussed earlier that there are about 26 million commercial vehicles on the road. However, it is estimated that the actual number of owners will be around 10 million. As vehicles are registered in different names, it is a challenge for the CV manufacturers to compute the actual number of unique customer groups. As of now there is no defined metric to compute how many customers are retained to the After Sales Service business. A customer may have a single truck or multiple trucks of different models and age category. It is proposed to call a customer as retained if at least one of the trucks owned by him/her visits the workshop at least once in six months. Further research is required in this area to arrive at a proper metric as literature has no information with respect to Indian Truck After Sales Service. Most of the CV manufacturers offer Annual Maintenance Packages (AMC) to their customers as a service product. Customers can purchase these products and offload the vehicle maintenance aspects to the CV manufacturer. It means that CV manufacturers have a good idea of the expenses involved maintaining a truck over a period of 6 to 10 years. CV manufacturers can use Share of Wallet or Service Revenue Market Share as another metric for customer retention, which is the ratio of actual revenue to the estimated revenue. We have discussed 3 metrics namely % Vehicles retained, % Customers retained, % Service market share. All these are trailing indicators of customer retention. We had already learnt that customer retention can be both behavioural and attitudinal (Aspinall et al., 2001). Assume that a customer who visited a workshop to get his/her truck repaired was not happy with the service and decided to take the truck to some other workshop for next service which is due after 6 months. The trailing indicators what

we learnt earlier will alert the CV manufacturer that this customer has been lost only after 6 months. But that would be too late. Though we can use some of the other scores like Net Promoter Score (NPS), number of complaints, etc to get an idea whether the customer is about to leave, further research is required in this area to define the right metrics.

CHAPTER VI:

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

6.1 Summary

Commercial Vehicles play a crucial role in the Indian economy. It is in fact one of the lifelines of the economy. Commercial Vehicles Business (Sales) is cyclical in nature. We have the after sales service to provide stability to this business. Data indicates about 26 million commercial vehicles on the road. These vehicles require regular services / repair for its optimal performance. This brings in the requirement for workshops. We call the workshops setup by the CV manufacturers as the authorised workshops and other workshops as unauthorised or local workshops. It is interesting to know that though CV manufacturers put in a lot of efforts and resources to expand their authorised service network, the customers try to show tendency of reduced utilisation of the service of authorised workshops as the vehicles turn older and prefer local workshops. In this research, the factors which affect the customers to be retained to authorised workshops have been studied in detail. The shortlisted factors were subjected to AHP and DEMATEL studies. From the results of these 2 studies, the weights, criticality and relationship of the factors were evaluated. Finaly 9 factors, grouped under Super Critical, Cause Factors and Supporting factors were carved out to formulate the strategies for customer retention. The strategies were recommended based on data available in the literature, latest technology trends in other industries combined with the rich experience in the field of customer service by the author as well as other experts who participated in this research. Literature does not have any information on any research done in this area with respect to India Truck After Sales Service, though plenty of work are available in other countries and other industries. This research is in the direction of eliminating the contextual research gap in this area and

we believe this is just a beginning. Much more need to be done to find out the dynamics of the After Sales Service.

6.2 Implications

Though customer retention is one of the most researched topics, only a little research has happened in the past with respect to Indian Automobile Landscape and nothing done with respect to commercial vehicles after sales service. This research is a commencement of a journey to reduce the contextual research gap. We know the Commercial Vehicles is one of the lifelines of the Indian economy. Any work of research which adds value to the commercial vehicle business will in fact add value to the Indian economy.

Commercial Vehicles Business has many stake holders small and big. The CV manufacturer produces vehicles which touches the lives of vehicle owner, the driver, the end user, the technicians, dealer owners, parts distributors and many more. A lot of technological interventions like alternate fuel vehicles, autonomous vehicles are in the pipeline waiting to disrupt this industry. Many researchers should come forward and carry out research in this industry and guide the leaders and entrepreneurs of this industry and uplift the lives of the less privileged group of drivers, technicians and others.

We have 26 million commercial vehicles on road and after sales market associated with it is huge. The CV manufacturers with their authorised workshops alone cannot completely cater to this market. Hence many local workshops/ garages, parts retailers have sprung up to have a share of this pie. Though this research is aimed at strategies for the CV manufacturers, it can very well be used by unauthorised workshops as well. This research will also provoke ideas of customer retention, customer loyalty in the minds of anyone associated with After Sale Service, which will foster customer-first mindset. Anyone who

focuses on the customer will definitely strive hard to improve the quality of the product and services offered.

6.3 Recommendations for Future Research

This research is just a beginning in the area of customer retention in Indian Truck After Sales Service landscape. Only a drop in the ocean has been explored. Though the research is on customer retention, it revolved around the data available in the literature and evaluation by the industry experts. The actual end customers did not participate in this research. We need to consider the experience and feedback of actual customers also and that too varied segment of customers. Segmentation of customers, understanding of each of the segment and developing strategies specific to the segment will be required in the future.

Very preliminary research techniques have been used here. The factors can also be evaluated based on other MCDM techniques available. The results can be compared, and the inferences can be further fine-tuned. The research was limited to only evaluation of the factors, the strategies proposed were not subjected to quantitative or statistical analysis which could be explored in the future. There is no research available on the appropriate metrics which can be used to measure customer retention performance with respect to truck after sales service. Research in that area will help CV manufacturers to monitor those metrics and take customer experience to the next level. After Sales Service consists of various stake holders. Not much research is done on the influence of stake holders like technicians and drivers; such research will help in elevating their stature in the society. Let 360-degrees analysis of the Indian Truck After Sales be done in the days to come, which will make India, a global automotive hub for commercial vehicle business.

6.4 Conclusion

The research helped in understanding the factors which affects customer retention in Indian Truck After Sales Service and also some strategies which can be deployed leveraging the factors shortlisted. With many disruptions waiting alongside the journey, it is essential to develop the entire eco system. Though the research was mainly focussed on the CV manufacturer, it has to be admitted that CV manufacturers alone cannot cater to the entire population of vehicles. We require the local workshops as well. Both have their own strengths, and we need to work out strategies to co-exist and co-create thereby developing the entire eco system which would make the world to admire and appreciate.

APPENDIX A

SURVEY COVER LETTER

Dear Sir,

This is Joiestin David, I am pursuing my doctorate at the Swiss School of Business and Management, Geneva. My research is in the area of customer retention with respect to Indian Commercial Vehicles After Sales Service. I am reaching out to you to support my research by providing the expert advice based on your vast experience in the After Sales Service Domain. All the information collected will be used strictly for the purpose of research only. No personal identifiable data will be used in any part of the thesis. No company / organisation related data will be collected from you during the survey. I will be requiring your support on 3 surveys. The details on how to fill out the surveys are explained in the survey document shared with you. I will also be reaching out to you and have either face-to-face conversation or conversation over phone to explain the concepts and requirements.

- Based on the literation review, I have shortlisted certain factors which affect customer retention. Request you to evaluate and provide the significance level of each of the factors. Also please highlight if any of the important factors have been missed.
- Based on the earlier survey, 20 factors have been shortlisted for the Analytic Hierarchy Process (AHP) study. Request you to make pair wise comparisons and indicate the degree of importance of one factor over the other.
- Based on the earlier survey, 20 factors have been shortlisted for the Decision-Making Trial and Evaluation Laboratory (DEMATEL) study. Request you to make pair wise comparisons and indicate the degree of influence of one factor over the other.

  Thanks for your support.

APPENDIX B

INFORMED CONSENT

All the experts who participated in this research by expressing their views through surveys have been informed adequately about the research, data collection methodology, non-collection of any company specific information, non-disclosure of personally identifiable data etc. All the experts are well known to the author / researcher and have been working together currently or have worked in the past together. The experts have voiced their feedback to add significant information to the already existing body of knowledge.

APPENDIX C

INTERVIEW GUIDE

The experts have been given adequate information on the survey methodology and procedure to fill in the google forms and google sheets. The author/researcher also had face to face or over the phone conversation with the experts to explain the survey methodology in detail. The experts have participated in the survey with complete understanding of the purpose of the research and the probable outcomes.

APPENDIX D:

SURVEY 1 - FACTORS IDENTIFICATION

Factors Affecting Customer Retention at Authorised Commercial Vehicles' Workshops

Listed in this form are factors which will influence the decision of the customer to bring his/her vehicle to the authorised dealer or workshop for service/repair. Please rate these factors for their criticality based on your understanding and rich experience in Automotive field. Thanks for your support.
Regards
Joiestin David (DBA Student at Swiss School of Business and Management - Geneva)

* Indicates required question

1. Email *

2. Name *

3. Years of experience in Automotive Service *

4. 1. Availability of required infrastructure & facilities for undertaking repairs * (Please select Others if this can be clubbed with another factor)

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

5. 2. Neatly Dressed Staff (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

6. 3. Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

7. 4. Trustworthiness & Behaviour of the staff (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

8. 5.Knowledge level, understanding, diagnosis skill, communication of the staff (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

9. 6. Price Reasonableness of the services (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

10. 7.Resolution of complaints in first instance. (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

11. 8.Providing correct Time estimate & Cost estimate for Repair (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

12. 9. Quick Turn Around Time (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

13. 10.Staff speed to respond to queries (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

14. 11.Transparency in the transaction, correct billing with explanation (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

15. 12.Repairs as per the SOPs (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

16. 13.Usage of genuine or original parts (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

17. 14. Personalised attention (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

18. 15.Easiness of payment transactions (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

19. 16.Freebies and promotional/ seasonal campaigns (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

20. 17.Presentation of vehicle after service (Washing, Cleaning) (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

21. 18.Availability of required parts at the workshop (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

22. 19.Awareness by the customer of sophistication of the product, technical expertise required to handle the product and benefits of proper vehicle maintenance (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

23. 20.Operating hours of the workshop (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

24. 21.Location of the workshop (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

25. 22.Door Step Service by the workshop (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

26. 23.Cost of switching for the customer to another workshop (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

27. 24.Information on Warranty (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

28. 25.Warranty Acceptance Rejection Handling (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

29. *

26.Brand Image of the workshop (Trust, Word of mouth, relative attractiveness) (Please select Others if this can be clubbed with another factor)

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

30. 27. GST, Input Tax credit and compliance makes the Transporter prefer certain workshops / authorised workshops (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

31. 28.Solution for category specific customers - At Site, Ecom, Passenger (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

32. 29.Disposable income with the transporter (will he prefer quality service if the disposable income increases) (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

33. 30.Influence of Technicians (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- 1-Least significant
- 2-less significant
- 3-Significant
- 4-Highly significant
- 5-Most significant
- Other: _____

34. 31.Influence of Truck Drivers (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

35. 32.Influence of Fleet Managers (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

36. 33.Health & Safety Regulations compliance by workshops (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

37. 34.Technology sophistication in the trucks (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

38. 35.Customer Attitude towards maintenance. Indifference to quality services by customer (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

39. 36.Availability of Customer Complaint Redressal system (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

40. 37. Customer relationship Building Marketing Activities (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

41. 38. Availability of facility for proper / complete maintenance records of the vehicles (Please select Others if this can be clubbed with another factor) *

Mark only one oval.

- ◯ 1-Least significant
- ◯ 2-less significant
- ◯ 3-Significant
- ◯ 4-Highly significant
- ◯ 5-Most significant
- ◯ Other: _____

42. Any other significant factors which will affect customer retention

_____

_____

_____

_____

_____

APPENDIX E:

SURVEY 2 - AHP STUDY

	A
1	**Instructions to fill the excel template**
2	1. Please fill only the cells in Navy Blue Colour
3	2. In Column A - a) If the Header Factor is **more** important than Row Factor wrt Commercial Vehicles customer retention select **">"** b) If the Header Factor is **less** important than Row Factor wrt Commercial Vehicles customer retention select **"<"** c) If the Header Factor is **equally** important as Row Factor wrt Commercial Vehicles customer retention select "="
4	2. In Column C - a) Please select the degree of relative importance between Header and Row Factor i.e. If you have selected ">" in column A, you should indicate on a scale of 2 to 9, how much **more important** is Header Factor wrt to Row factor. e.g. if we select 8, it means Header factor is 8 times **more** important than row factor. b) Please select the degree of relative importance between Header and Row Factor i.e. If you have selected"<" in column A, you should indicate on a scale of 2 to 9, how much **less important** is Header Factor wrt to Row factor. e.g. if we select 8, it means Header factor is 8 times **less** important than row factor. c) Please select the degree of relative importance between Header and Row Factor i.e. If you have selected **"="** in column A, you can leave column C blank.
5	3. As per the AHP (Analytic Hierarchy Process) Technique, for accurate analysis, the responses of the respondents need to be consistent. Watch the video available at https://www.youtube.com/watch?v=Ks0hw9Hmv8k&t=6s for better understanding of the concept of consistency. Hence please watch of the cell C1 while filling the excel template. This is the consistency Ratio and it should be less than **0.1**. The cell C1 should be **GREEN** once all the questions are filled. If it is in **RED**, please review the answers and make necessary changes so that the Cell C1 is GREEN

Consistency Ratio (your repsonses are consistent only if the cell is GREEN i.e. < 0.1)		0.0991
Importance	Factor	By how much
F1-Workshop team's knowledge level, understanding, diagnosis skill, communication,trustworthiness, behaviour, grooming and speed to respond to queries		
=	F2-Resolution of complaints in first instance.	
>	F3-Usage of genuine or original parts and availability of required parts at the workshop	9
=	F4- Quick Turn Around Time	
>	F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	9
=	F6-Price Reasonableness of the services	
=	F7-Transparency in the transaction, correct billing with explanation	
=	F8-Providing correct Time estimate & Cost estimate for Repair	
>	F9-Availability of Customer Complaint Redressal system.	6
>	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	9
>	F11-Operating hours of the workshop	9
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	4
>	F13-Personalised attention of customers	9
>	F14-Warranty Acceptance & Rejection Handling	2
<	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	9
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
>	F17-Location of the workshop or door step service support	9
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	4
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	4
F2-Resolution of complaints in first instance.		
=	F3-Usage of genuine or original parts and availability of required parts at the workshop	
=	F4- Quick Turn Around Time	
>	F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	9

>	F6-Price Reasonableness of the services	2
=	F7-Transparency in the transaction, correct billing with explanation	
>	F8-Providing correct Time estimate & Cost estimate for Repair	9
=	F9-Availability of Customer Complaint Redressal system.	
>	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	3
>	F11-Operating hours of the workshop	3
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	3
>	F13-Personalised attention of customers	6
>	F14-Warranty Acceptance & Rejection Handling	9
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
>	F17-Location of the workshop or door step service support	2
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	9
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	9
F3-Usage of genuine or original parts and availability of required parts at the workshop		
=	F4- Quick Turn Around Time	
>	F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	3
>	F6-Price Reasonableness of the services	3
=	F7-Transparency in the transaction, correct billing with explanation	
=	F8-Providing correct Time estimate & Cost estimate for Repair	
=	F9-Availability of Customer Complaint Redressal system.	
>	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	4
>	F11-Operating hours of the workshop	2
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	4
>	F13-Personalised attention of customers	5
=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	

=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	4
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F4- Quick Turn Around Time		
=	F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	
=	F6-Price Reasonableness of the services	
=	F7-Transparency in the transaction, correct billing with explanation	
=	F8-Providing correct Time estimate & Cost estimate for Repair	
=	F9-Availability of Customer Complaint Redressal system.	
>	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	2
=	F11-Operating hours of the workshop	
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	3
>	F13-Personalised attention of customers	4
=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	2
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	2
F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)		
=	F6-Price Reasonableness of the services	
=	F7-Transparency in the transaction, correct billing with explanation	
=	F8-Providing correct Time estimate & Cost estimate for Repair	
=	F9-Availability of Customer Complaint Redressal system.	
=	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	
=	F11-Operating hours of the workshop	
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	2
=	F13-Personalised attention of customers	

=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
=	F19-Customer relationship Building Marketing Activities	
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F6-Price Reasonableness of the services		
<	F7-Transparency in the transaction, correct billing with explanation	3
<	F8-Providing correct Time estimate & Cost estimate for Repair	3
<	F9-Availability of Customer Complaint Redressal system.	2
=	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	
=	F11-Operating hours of the workshop	
=	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	
=	F13-Personalised attention of customers	
<	F14-Warranty Acceptance & Rejection Handling	2
<	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	2
<	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	2
<	F17-Location of the workshop or door step service support	4
<	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	2
>	F19-Customer relationship Building Marketing Activities	2
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F7-Transparency in the transaction, correct billing with explanation		
=	F8-Providing correct Time estimate & Cost estimate for Repair	
=	F9-Availability of Customer Complaint Redressal system.	
>	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	2
=	F11-Operating hours of the workshop	
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	2

>	F13-Personalised attention of customers	4
=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	3
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	2
F8-Providing correct Time estimate & Cost estimate for Repair		
=	F9-Availability of Customer Complaint Redressal system.	
>	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	2
=	F11-Operating hours of the workshop	
>	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	2
>	F13-Personalised attention of customers	3
=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	3
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	2
F9-Availability of Customer Complaint Redressal system.		
=	F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	
=	F11-Operating hours of the workshop	
=	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	
>	F13-Personalised attention of customers	2
=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	

<	F17-Location of the workshop or door step service support	2
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	2
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	2
F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area		
=	F11-Operating hours of the workshop	
=	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	
=	F13-Personalised attention of customers	
=	F14-Warranty Acceptance & Rejection Handling	
<	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	2
<	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	2
<	F17-Location of the workshop or door step service support	2
<	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	7
=	F19-Customer relationship Building Marketing Activities	
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F11-Operating hours of the workshop		
=	F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	
=	F13-Personalised attention of customers	
<	F14-Warranty Acceptance & Rejection Handling	2
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
<	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	2
<	F17-Location of the workshop or door step service support	2
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
=	F19-Customer relationship Building Marketing Activities	
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians		
=	F13-Personalised attention of customers	
=	F14-Warranty Acceptance & Rejection Handling	
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	

<	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	4
<	F17-Location of the workshop or door step service support	3
<	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	2
=	F19-Customer relationship Building Marketing Activities	
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F13-Personalised attention of customers		
=	F14-Warranty Acceptance & Rejection Handling	
<	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	2
<	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	3
<	F17-Location of the workshop or door step service support	2
<	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	2
=	F19-Customer relationship Building Marketing Activities	
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F14-Warranty Acceptance & Rejection Handling		
=	F15-Customer Attitude towards maintenance. Indifference to quality services by customer	
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	2
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F15-Customer Attitude towards maintenance. Indifference to quality services by customer		
=	F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	2

=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs		
=	F17-Location of the workshop or door step service support	
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	2
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	
F17-Location of the workshop or door step service support		
=	F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	
>	F19-Customer relationship Building Marketing Activities	4
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	2
F18-Awareness by the customer on sophistication of the product, technical expertise required to		
>	F19-Customer relationship Building Marketing Activities	4
>	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	2
F19-Customer relationship Building Marketing Activities		
=	F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	

APPENDIX F:

SURVEY 3 - DEMATEL STUDY

The survey questionnaire is 60+ pages. Hence a few pages of the survey questionnaire are enclosed here. The complete survey questionnaire can be found at this link - https://drive.google.com/file/d/1Hnx3c1FEv5z9ihKwi0ssaapaYh6u9Q98/view?usp=sharing

Header Factor F1 - Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behavior, grooming and speed to respond to queries *

Compare the Header Factor with each of the row factors.
In each row select **the extent of influence of the header factor on the row factor**
0 - No Influence
1 - Low influence
2 - Medium influence
3 - Strong Influence
4 - Very Strong Influence

	0 - No Influence	1 - Low Influence	2 - Medium Infleunce	3 - Strong Influence	4 - Very Strong Influence
F1-Workshop team's knowledge level, understanding, diagnosis skill, communication, trustworthiness, behavior, grooming and speed to respond to queries	○	○	○	○	◉
F2-Resolution of complaints in first instance.	○	○	○	○	◉
F3-Usage of genuine or original parts and availability of required parts at the workshop	○	○	○	◉	○
F4- Quick Turn Around Time	○	○	○	○	◉
F5-Brand Image of the workshop (Trust, Word of mouth, relative attractiveness)	○	○	○	◉	○
F6-Price Reasonableness	○	○	◉	○	○

F7-Transparency in the transaction, correct billing with explanation	○	○	◉	○	○
F8-Providing correct Time estimate & Cost estimate for Repair	○	○	○	◉	○
F9-Availability of Customer Complaint Redressal system.	○	○	◉	○	○
F10- Availability driver/customer convenience facilities like Customer Lounge, Driver rest area including bedding facility	○	○	○	◉	○
F11-Operating hours of the workshop	○	○	○	◉	○
F12-Influence of Truck Drivers, Fleet Managers, Workshop Technicians	○	○	◉	○	○
F13-Personalised attention of customers	○	○	◉	○	○
F14-Warranty Acceptance & Rejection Handling	○	○	○	◉	○
F15-Customer Attitude towards maintenance. Indifference to	○	○	◉	○	○

quality services by customer					
F16-Availability of required infrastructure (tools, equipments) & facilities for undertaking repairs	○	○	○	◉	○
F17-Location of the workshop or door step service support	○	○	○	◉	○
F18-Awareness by the customer on sophistication of the product, technical expertise required to handle the product , maintenance schedules, benefits of its adherence, warranty terms etc	○	○	◉	○	○
F19-Customer relationship Building Marketing Activities	○	○	○	◉	○
F20-Customised Solution for category specific customers - At Site, Ecom, Passenger	○	○	◉	○	○

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