A STUDY ON VEHICAL USER'S BEHAVIOUR LEADING TO PARKING PROBLEMS IN URBAN AREAS

With special references to two selected Cities in Colombo, Sri Lanka

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Degree of M.Sc. in Town & Country Planning

2011/2014 Programme

Department of Town & Country Planning

University of Moratuwa

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Declaration

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B.A.R. Ajith kumara
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Synopsis

Sri Lanka has experiencing the continuous incensement of motor traffic. Approximately 350,000 vehicles have been yearly added to the vehicle volume in Sri Lanka. It also affects adversely on city functioning by creating compound problem of parking. People make their parking decisions thus, the parking behaviour to be determined by their attitudes and behavioral intentions. On the other hand, an individual's perception has been influenced by the determinant factors of the same. This study is trying to analyze the relationship between the perception determinant factors and parking determinant factors in order to recognize how far they have influenced on the inferences of the parkers in their behaviour.

This study proves that majority of parkers viewed that parking is as a facility not a requirement of a city functioning. As long as the users think that the parking is a facility, they tend to park at any vacated space within the city without considering other issues that can arise due to their behaviour based on perception as analysed. The factors that are contributing to the user behaviour are the distances to the desired destination from the palace of parking based on Gender. Age is a factor even the aged parkers like to park as much as close to their desired destination than young users. In terms of safety, females and older aged parkers are very concern about the safety of their vehicle. It has anticipated, with a full cover insurance parkers may accept to park at a considerable distance such as 200 meters. However, the study revealed that in terms of safety the full cover vehicle insurance has no effect on selecting the parking location. Further the study revealed that in prioritizing the distance to the desired destination and the safety disregarded other factors, majority of the parkers are selecting close proximity than the safety. The behaviour of parkers against the parking fee proved that the paid parking at the city center is acceptable. It signifies that the parkers are willing to bear the cost of parking if available at convenient location in the city Center. In summarizing the above factors, it indicates that the user behaviour of the parkers has been affected by their own individual perception for increasing trend on, on-street parking which ultimately led to parking problems.

Key words: Parking, Problem, Perception

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CHAPTER I

INTRODUCTION

1.1 Introduction to the Chapter

This study was undertaken in response to a research proposal submitted to the partial fulfillment of the requirements of Master of Science Degree in Town & Country Planning offered by the Department of Town & Country Planning of University of Moratuwa, Sri Lanka.

The chapter one introduces the research background, problem statement, objectives, limitations and significance of the research as well as the study process.

1.2 Background

Parking is an important part of urban traffic and consequently an important factor for the well-being of a city. However, in urban areas, parking causes more problems that threaten the quality of daily life and the accessibility of the city by its users. One of the predominant understandings of the traffic congestion is the cruising for parking that is in urban areas and the parking shortage in the cities is perceived to threaten the proper functioning of the cities. The stores and the shops in the cities fear to lose future returns when the accessibility and the number of parking spaces are not increased while residents in urban areas fear the raising amount of traffic and the related pollution when the availability of parking is increased.

Since an urban area is mostly governed by the non-residential activities, all the required activities are generated in different volumes and directions of traffic flow at different times of a day. Accordingly, a series of vehicular traffic is generated throughout the day. This vehicular traffic brings advantages to an urban area. On the other hand, it affects adversely on city functioning by creating compound problem of parking. All vehicles must be parked before the occupants that can be used for

undertaking any activity. Parking is thus an essential component of any trip. The rise of vehicular ownership leads the parking problem which is an issue of strategic planning and policy in an urban area (Hensher& Button, 2002). Moreover, in an urban system, there can be seen inter-relationship between land uses, people and the transportation. Transportation itself is a subsystem that encompasses parking also. Different land uses generate different volumes and patterns of traffics and ultimately, demands parking within its surroundings. The requirement of parking determined by the availability of space, type of activity and the frequency and nature of the traffic, it generates. However, the users of these parking areas respond to the parking differently.

Sri Lanka Department of Motor Traffic has reported that since year 2007 approximately 350,000 vehicles have been yearly added to the vehicle volume in Sri Lanka. Further, at the end of 2014, a total of 5,633,234 were registered under the Department of Motor traffic. This continuous addition indicates the increase of vehicular ownership and the use of vehicles for personal and non-personal trips. All these vehicles should be flowing through the existing road network and required parking at desired destinations.

Due to increasing the use of private vehicles, most of Sri Lankan cities encounter with inadequate parking spaces. Because of the increasing social and environmental consciousness, growing environmental pollution in urban areas and the worsening financial position of many local authorities, parking has changed from being an issue of building regulations to an issue for town and traffic planning problem (GFIVT, 2009). Although, the city plans are prepared and being enforced, managing and practicing the planned proposals or regulations on parking have become hard, as a result of the increasing demand for parking within city centers by the users.

In the above context, this thesis aims to explore by mean of a survey among users of parking spaces in two selected cities on how vehicle users' behavior contributes to exaggerate the parking issues in cities. Though, it has to be clarified that the aim of this study is not to critic whether the expressed behavior of the users are right or

wrong but only to investigate whether their own behavior is the latent issue in urban parking at selected locations.

1.3 Problem Statement

In most of the cities in Sri Lanka, especially in urban areas, parking is a serious question for its users. Inadequate parking spaces, higher parking space tariffs, insecure parking spaces and generation of traffic congestions due to vehicle users who search for parking places are only a few examples of everyday parking issues at urban areas. Many urban areas diagnose these issues, but the solution proves to be very complex and expensive. Consequently, the core of finding parking space for vehicle user question lies on behavior of its users at urban parking spaces. Major issues are perceived with different users' behavior and their own needs. This creates the problem statement of the study;

- *Different users of the cities within the parking space perceive space for vehicle parking through their own user requirements and behavior, as it is making even harder to plan and manage effective vehicle parking space for diverse users.*

1.4 Objective of the Study

The objective of this study is to explore user behavior leading to create parking problems in the cities by investigating perceived behavior of different users at two selected cities in Sri Lanka.

1.5 Specific Objectives of the Study

- To identify how user perception leading to parking problems at pre-selected urban parking spaces;
- To determine the factors contributing to behavior of users at pre-selected urban parking spaces;

- To determine the relationship in-between access to parking, security of the vehicle and parking tariff with regard to vehicle parking issues at pre-selected urban parking spaces.

1.6 Limitations of the Study

Different users have different opinions about parking of vehicle at city space as an issue while others don't see parking in the city space is a problem at all. Therefore, it is hard to develop widespread accepted parking policies and plans when there is no shared understanding of actual problem. Therefore, this study is limited to behavior of vehicle parkers which has been determined by key determinants such as 1) access to safe parking;2) security of vehicle; 3) parking tariff; and 4) Parking regulations.

According to the existing literature, individual's behavior is determined by their own perception which has been shaped by both internal and external factors. Due to limited time period for the study, four internal factors namely, 1) Accessibility; 2) Price; 3) Safety; and 4) Management have been tested to identify the above mentioned behavior of vehicle parker's key determinants. Moreover, this study focuses more on perception of different users which determined their user behavior of the particular parking spaces in the selected cities. Moreover, studying the perception which affects the user behavior at particular space is a complex concern tangled with personal, social and functioning roles of the particular space. Therefore, the result of this study is not necessarily applicable to solve the parking problems prevail at other cities in the Country.

1.7 Contribution of the Study

The review of the existing studies related to the parking problem highlighted the gap in the literature on the effect of user perception on parking problem. The available studies on parking behavior indicate that the user perception on parking related components has significantly contributed to aggravate the parking problem at different locations. Many of the studies had been conducted in mega or metropolitan

cities in Western and European cities rather than the cities in developing countries. Considering Sri Lanka as a developing country, it is encountering parking problem at every city or town area. Unavailability of data related to parking becomes a principal issue leading the provision of parking space and parking management problems. This circumstance inevitably relates with the misunderstanding of user behavior and responds towards the parking problem in Sri Lanka.

1.8 Study Process

This Master Thesis is structured in four main parts. Firstly, literature related to the above topic is reviewed. Secondly, the survey and the methodology of analysis are described. Thirdly, the results are presented with figures and tables and compared to the results of a similar survey conducted in the other countries. Finally, the thesis ends with a discussion of the most important findings and implications for further discussion and research in order to find a relationship.

1.9 Conclusion

In conclusion of this chapter, the author has indicated the rationale for studying user behavior and factors contributing the user behaviour for generating parking problems in the cities. Further, this chapter provides the problem statement with the objectives. Finally, this section provides the limitations of the study. In addition, this chapter highlights the importance of studying user behavior such as “user perception on urban parking” for the creation of cities with less traffic congestion and present definite knowledge gaps that exists in understanding the user perception of the urban parker’s for a healthy functioning of the city.

CHAPTER II

LITERATURE REVIEW

2.1 Chapter Introduction

This chapter gives an overview of the rising amount of literature about the urban traffic and parking. The literature review is structured among the most important issues regarding the urban parking problems.

First of all, the differences in perception are investigated and the general impact of parking on urban traffic congestion is reviewed. Secondly, parking in cities is reviewed in depth.

2.2 Popular Definitions of "Vehicle Parking"

According to the definition given by the University of Brunswick, parking is "Standing or halting of a vehicle, whether occupied or not, except when standing or halting temporarily for the purpose of and while actually engaged in loading or unloading of material or passenger"(University of Brunswick). Furthermore, University of Texas under their Parking & Traffic Regulations 2015-2016 defines a vehicle park as where "vehicle stopped on a surface lot, parking garage, or on the street, attended or unattended by any person authorized to move it or capable of moving it immediately upon the direction of a law or traffic enforcement officer" whilst State Statute of Illinois defining the term parking under the section 625 ILCS 5/1-156 defines "Park or Parking means the standing of a vehicle, whether occupied or not, otherwise than when temporarily and actually engaged in loading or unloading merchandise or passengers".

2.3 Concepts related to user behavior on vehicle parking

2.3.1 Choice of Parking

The choice of parking location is varying according to the land uses. Urban residents pointed out the willingness to have parking near their residential units. However, drivers want to park the vehicle close to their desired destinations. Nevertheless, availability and the price alter the people's choice of the parking location. Since the motor vehicles are commonly used, the facilities for parking are provided in combination with the most of the buildings. The provision of parking facilities include indoor and outdoor of private property belonging to the building, the side of the road, a parking lot or parking zone and indoors or out door multi storied structures.

The vehicle parking pattern of its user changed from a finding of parking space easily. Convenient and free parking at destination into more efficiently provided alternative options available nearby with information regarding parking tariff.

A study conducted by Stephane Hess and John W. Polak revealed that there are important differences across decision-makers in their reaction to changes in various attributes of a given alternative; such as a specific type of parking and specific locations. Such differences in choice-making behavior are known as taste variation (Stephan, 2009).

2.3.2 Willingness and Likeness of Parking

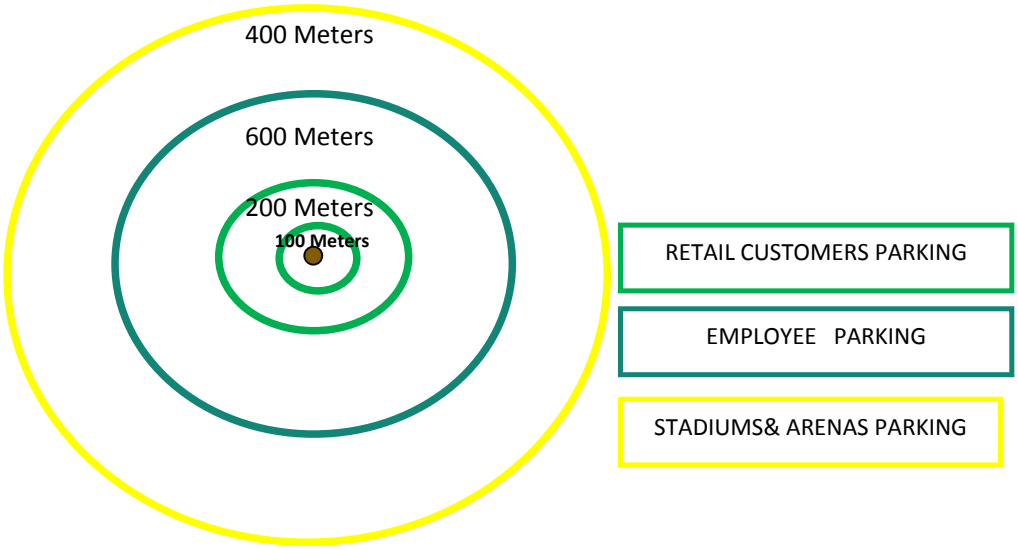
The willingness and likeness of parking at a particular location is varying due to the behavioral factors of the user. This indicated the heterogeneity effects on the parking type choice. Accommodating this heterogeneity leads to significantly different conclusions regarding the influence of substantive factors such as access, search and egress time and on the treatment of potential fines for illegal parking(Stephan, 2004)

It also has important effects on the implied willingness to pay for time saving. Differences in parking behavior across different journey purposes reveal an important location effects. Parking behavior of a user can be classified based on the long term parking and short term parking.

2.3.4 Parking and maximum walking distance

Maximum walking distance to the desired destination plays a major role in selecting parking location. The willingness of parking as much as close to the desired destination makes considerable impact on parker's behavior. In urban planning and designing point of view, this has to be taken into account in order to achieve an effective function of a city. According to Smith, Thomas and Butcher, the parking designers usually use as maximum walking distances between **300 and 600 feet** for **retail customers,** but between **1,200 and 1,500 feet for employee parking**. This distance is increase even more at special events such as for theme parks, **stadiums and arenas as high as 2,000 feet** (Mary S. Smith, P.E. and Thomas A. Butcher, P.E., 2008).

Figure 2.1 Maximum walking distance between parking facility and final destination (Developed after Mary S. Smith, P.E. and Thomas A. Butcher, P.E., 2008. Pp. 31)



2.3.5 Parking and Commuting

Hess (2001) also wrote an article about parking and commuting. He developed a mode choice model to predict the mode choice of commuters as a function of the price of parking. Hess's study in Portland (Oregon, United States) predicts that a daily parking fee of 6$ results in a reduction of 21 cars driven for every 100 commuters. (Marting Becamann,C,B, Mcguire, Christopher B. Winston, 1956).

Shoup (2006) studied this problem and identified a set of conditions under which car users are more inclined to drive around and look for an on street parking place, instead of off street parking. On street parking could be cheap, off street parking could be expensive, fuel could be cheap. if the car user wants to park for a long time or the car user is alone and saving time, it is not important. Shoup also states that the search for an on street parking place generally takes between 3.5 and 14 minutes.

2.3.6 Price sensitivity of on street parking

Kelly and Clinch (2006) studied the price sensitivity of on street parking for business and non-business trips. Their study in Dublin (Ireland) showed that the gap in price sensitivity between business and non-business trips increases as the price of parking rises. At first, the impact of a change in the price of parking affects all trip purposes in the same way, but as price further increases, a progressively widening gap between business and non-business trips arises. (Rik Alebregtse, 2009).

2.3.7 Institutional structures

Button (2006) examined the effects of institutional structures on the development of economic policies. The author argued that in some cases parking policy is used as a second best solution to address the congestion problems. A large percentage of congestion in urban areas (8% to 74%) is caused by automobiles in search for a parking place.

Marsden (2006) studied the effects of parking policies on commuting, non-commuting and residential parking behavior. He also evaluated the impact of parking policies on the attractiveness of competing economic centers. The author concluded that there is no supporting evidence, but in some cases even evidence opposed to the statement that is constraining parking measures damage the attractiveness of the city centers.

Another study has been conducted by Arnott (2006). He looks at the possibility to develop an optimal parking policy in urban districts where parking garages are faced with spatial competition. In his article Arnott derives equilibriums for different situations; without on-street parking, with on-street parking and for the situation where mass transit is present.

2.4 Types of Urban Parking

The most popular parking method is the shares parking facility. It shared the available parking space among the different buildings and facilities in an area to get the advantage of different peak periods. For instance, a shared parking of an office complex at week days can be used for restaurant or theater at the weekends or at evenings. The shared parking is important at the clusters of land use activities and where the parking cost are very high. There are three types of shared parking such as;

1) ***On street parking***: This known as "Curb Parking" as the space to halt the vehicle that is provided on the street. This is the commonly used parking method. Most of this type of parking is short term parking such as 1 to 2 hours.
2) ***Off street public parking***: These are less convenient provided separately from the road with adequate accessibility. These are longer period parking such as residents or employees parking.
3) ***Off street private parking***: This is also a convenient parking provided by private sector at a particular site serving to the nearby activities at peak time.

2.5 Significance of understanding on street parking

According to the literature related to the parking, the significances are able to be identified in two categories as impacts of on street parking and advantages of on street parking. On street parking visually separates the pedestrian and often moving traffic. The individuals on the sidewalks have also faced the visual obstructions on road intersections and in pedestrians trying to cross the road have the high probability of having accidents (Edquist, 2011).The on street parking has its own tradeoffs as follows;

1. **Lack of availability of parking space:** Most of the cities in the world are suffered with the lack of space for parking at downtown. The allocated space for parking is not adequate due to the high usage of private motor vehicles. Allocation space for parking at down town also become critical with the high land values prevail in the Central Business Districts (Cerreño 2002).

2. **Conflict between need and interest of different users:** Residents, visitors, businesses, and other groups all have different needs and desires when it comes to on-street parking.

3. **Abuse of permits for disabled persons:** In developing countries, there are reserved parking spaces for handicapped people. It becomes a mandate of parking practice that even Sri Lanka is also now practicing. However, there are instances that non-handicapped people also parked their vehicles on these reserved lots if they couldn't find a space for parking and enjoying the concessions of rates (Cerreño, 2002).

4. **Idling and high level of emission:** When the parker had to wait until a space to be vacant, the vehicle emits a considerable smoke. This in turn becomes an environmental problem with air pollution (Shoup1997).

5. **Conflict between other uses:** On-street parking also competes with other uses of roadways including additional lanes for traffic flow, bike lanes and wider sidewalks that are often encroach.

6. **Improper locations for parking:** Improper location for parking can lead to traffic congestion, stress, discomfort to the drivers and time consuming.

7. **Cruising for parking:** At peak hours for on street parking, the parker has to cruise to find a curb. This ultimately leads to excess drive with lower speed which cause to traffic congestion and high level of emission.

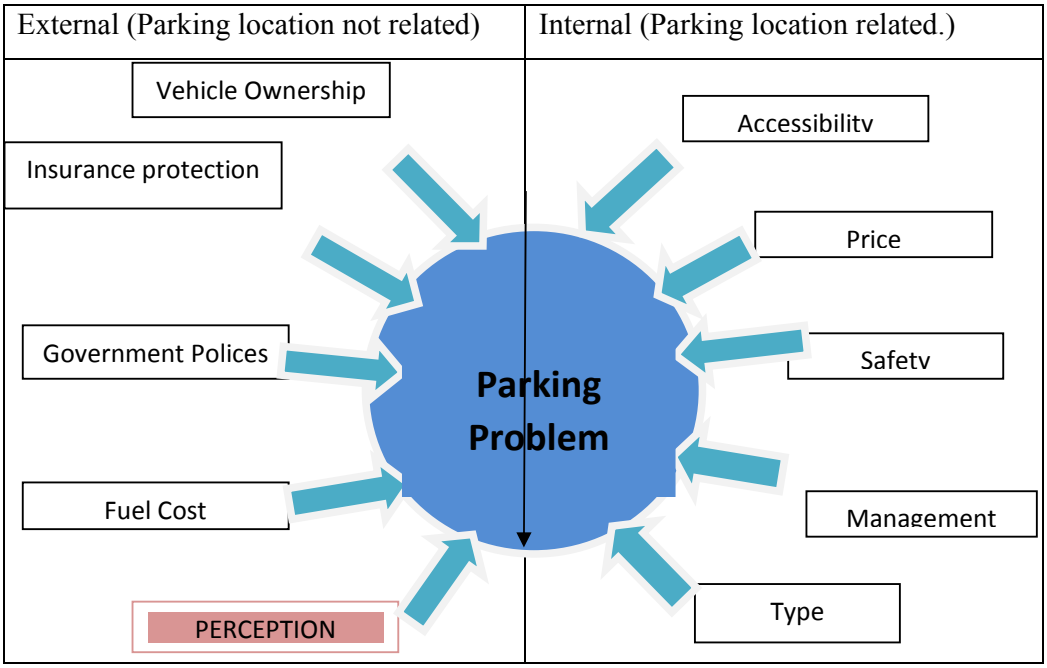
2.5.1 Perception

Perception can be defined as the recognition and interpretation of sensory information. It also includes how an individual respond to information. It can be considered as a process where an individual takes in sensory information from his or her environment and use that information in order to interact with such environment. Perception allows taking the sensory information in and making it into something meaningful. Therefore, the perception can be defined as a process by which an individual selects, organizes, and interprets information inputs to create a meaningful picture about the surrounding environment. It depends not only on the physical stimuli, but also on the stimuli's relation to the surrounding field and on conditions within the individual. The key point is that perception can vary widely among individuals exposed to the same reality. Walker (2010), in the research of perception in risk of parking has been identified that the age and gender has influenced on the decision of parking risk.

As the one study that deals with the perception of parking problems is the article of Ligocki and Zonn (1984). They explained the parking problems in American central business districts. According to them, an important part of the parking problem is the fact that different people have different parking needs and thus define each problem within the context of their own needs. A certain parking situation might be

problematic for a person or a group, while the same situation may cause no problems for other users or groups. As a result, Ligocki and Zonn stress that the definition of a problem depends on individual perspectives. In order to be able to define parking problems for specific groups, the authors developed a matrix of recognized parking problems. Persons from different interest groups were interviewed and asked whether or not a certain parking problem existed. Results show that different interest groups indeed perceive parking problems in different ways. Parking facility managers complained that new parking facilities were built too small to accommodate parking demand and that low parking fees caused low profits in the parking business. Brokers and construction personnel identified poor efficiency of land use and economic feasibility as the major problem areas within parking.

Figure 2.2 Factors affecting individual's behaviour on vehicle parking



The external and internal factors are differentiated based on studies conducted by different researchers over the years with regard to vehicle parking. The internal factors are determined as the factors which do not have direct relationship with the parking location while external factors were determined as the factors which have direct relationship with the location of parking (Figure 2.2).

2.5.2 People's perception on Urban parking problems

Rye (2008) investigated the role of market research and consultation in developing parking policy. Interestingly, they found a strong difference between a survey among actual users of downtown car parks and telephone interviews of respondents that are not recently using downtown parking. They found that the different feeling about the availability must be caused either by a lack of knowledge about parking spaces not located in the busiest roads or the believe that the parking fields around the center are considered to be too far away.

In Bakersfield, a huge discussion about the availability of parking spots occurred lately. The director of the city's Department of Economic and Community Development identified that the problem lies only on the perception of the problem. According to her, as an expert, there are enough parking spaces available in the neighborhood of the central business district and a parking shortage does not exist if people are willing to walk 50 meters more to reach their shopping destination.

In a study about parking problems in American central business districts Ligocki and Zonn (1984) discovered that the respondents define parking problems according to their needs. In other words, the problems are defended according to the own perception. This implies that a different parking situation may be problematic for one group but not for another group.

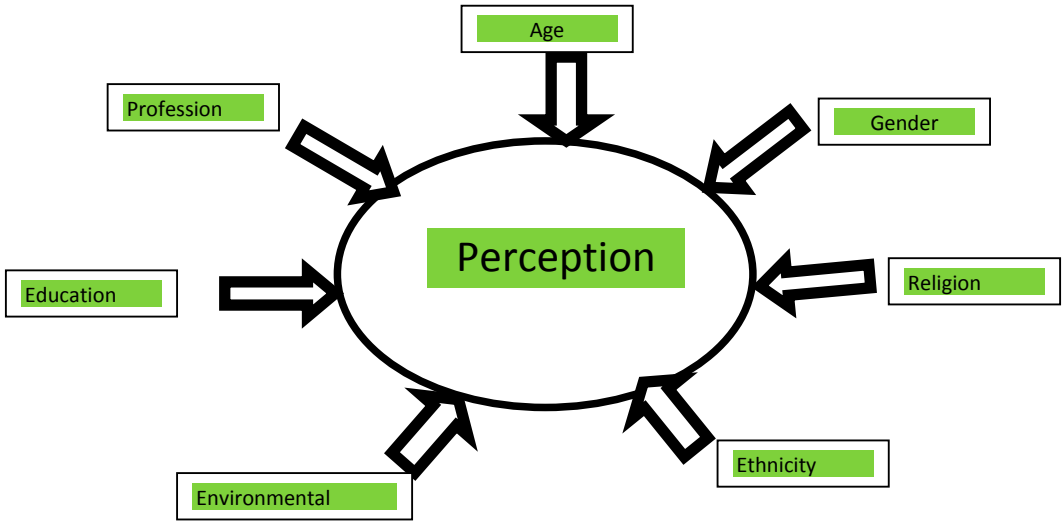
Schoenfeld and Herrmann (1982) investigated the difference in perception between experts and novices. They directly examined student's perception of a mathematical problem before and after training. The study found that trained students perceive the problem in a deeper structure than novice students. This can also be applied to parking experts. Professionals in parking are likely to perceive parking problems more deeply by taking into account more factors.

The above examples show that the perception of the urban parking problems differs from the user perspective.

2.5.3 Attributes of perception

Ligocki and Zonn((1984)concluded that continued identification and evaluation of the attributes of perception in general are also associated with the vehicle parking as it is useful for the effective decision making by the users. These were the concerns for the safety, costs and the environment not only for vehicle parking in general. In summary, the main attributes affecting to an individual's perception can be illustrated as in Figure 2.3.

Figure 2.3Factorsaffecting people's perception



2.6 The Most relevant Research Studies

Parking Policies: Scholars, Rye and Ison (2006), Marsden (2006) also studied the effects of parking policies on commuting, non-commuting and residential parking behavior. He also evaluated the impact of parking policies on the attractiveness of competing economic centers. The author concludes that there is no supporting evidence, but in some cases, even evidence opposed to the statement that constraining parking measures damage the attractiveness of the city centers.

Spatial competition & optimal parking policies: Another study that is relevant to this thesis is done by Arnott (2006). He looks at the possibility to develop an optimal parking policy in urban districts where parking garages are faced with spatial competition. In his article, Arnott derives equilibriums for different situations; without on-street parking, with on-street parking and for the situation where mass transit is present.

Amount and location: Ray and Stubbs in 2007 identified the amount and location of parking can influence the condition of traffic on roads in the city, 2002 respectively has the demand for the public transport in the city, the form and functioning of the area and the environmental quality of the city.

Price sensitivity: Kelly and Clinch (2006) study the price sensitivity of on street parking for business and non-business trips. Their study in Dublin (Ireland) shows that the gap in price sensitivity between business and non-business trips increases as the price of parking rises. At first, the impact of a change in the price of parking affects all trip purposes in the same way, but as the price further increases, a progressively widening gap between business and non-business trips arises.

Parking attitudes: Young 2004 has identified that the people drive and park in busy areas despite the inconvenience. In their study, it is further described how people make their parking decisions thus, the parking behavior to be determined by attitudes and behavioral intentions.

Parking regulations and enforcement: Aaron Adive and Wanzhi Wang of US department of transport in 1987 viewed that, “it is a common knowledge that parking regulations in general are often violated. Parking regulations and parking management are effective only as long as they are accompanied by and associated with strong enforcement by the police or other parking enforcement agencies.” Further, in a research study undertaken on the on street parking behavior revealed that the violations of parking meter regulations are part of wider phenomenon involving relationships among compliance with traffic and parking laws, enforcement of these

laws, drivers' perception of risk and the tradeoffs among time, cost and expected penalty. However, in developing countries, with the increase of vehicular ownership, the problem of parking becomes more complicated than that of other problems related to traffic. This problem is grave at the city center than the peripheral areas.

Parking & commuting: Hess (2001) also wrote an article about parking and commuting. He developed a mode choice model to predict the mode choice of commuters as a function of the price of parking. He studied in Portland (Oregon, United States) predicted that a daily parking fee of 6$ results in a reduction of 21 cars driven for every 100 commuters.

Cruising: According to Shoup, A large percentage of congestion in urban areas (8 to 74%) is caused by automobiles in search for a parking place. Shoup (2006) studied this problem and identified a set of conditions under which car users are more inclined to drive around and look for an on street parking place, instead of off street parking. On street parking could be cheap, off street parking could be expensive, fuel could be cheap. If the car user wants to park for a long time or the car user is alone and saving time, it is not important. Shoup also stated that the search for an on street parking place generally takes between 3.5 and 14 minutes.

CHAPTER III

RESEARCH DESIGN

3.1 Chapter Introduction

This chapter describes the research design, research question, conceptual framework, data collection and the analytical methods applied in the research study. This research study is primarily based on subjective matters, therefore, mainly qualitative approaches were applied. The chapter also describes the criteria used for the selection of study locations for this research study and selection of respondents are described followed by data collection method, methods of data analysis, unit of analysis and the limitations of the research data collection were also discussed.

3.2 Research Question

The research questions of this thesis are:

Does the individual user perception contribute or is their behavior leading to vehicle parking issues in urban areas?

3.3 Conceptual Framework of the Study

Before describing the method of data collection, it is needed to conceptualize the research question. For example, how do we define different user parking and how they define the urban parking problem? Moreover, urban parking problem also needs to be conceptualized. To start with, author decided to focus specifically on urban areas for several reasons.

The most important reason is that parking causes more problems in high-density urban areas than in suburban or rural areas and thus considering urban areas are more

important regarding this. Furthermore, it is important to limit the scope of this study to urban areas in order to make sure that the respondents all more or less take the same area into account. Otherwise, every respondent could apply the questions to his or her personal situation, which might be a suburban area with totally different parking problems involvement.

To translate the urban parking problem into something measurable, author developed a number of problems and challenges into number of statements based on the reviewed literature. Different aspects of parking problems are covered including price - related issues, parking and business, however, the lack of relevant data. Various urban activities such as offices, markets, shops, sports, churches and leisure places often generate enormous parking demands and the difficulty of parking vehicles at desired destinations particularly, when located within the central areas of the city constitutes a major problem.

Illegal parking is also a major problem in urban environment and roadside parking is a common phenomenon in developing countries especially, where there are few designated parking space. Unauthorized and indiscriminate parking along streets within the urban core is a serious impediment to smooth urban movement and is indicative of lack of adequate parking space.

3.4 Methods

The Collection of data for user perception is unlike the collection of other data types, because the Problems are possible to be seen in different perspectives by the different users. Different users have different opinions about certain problems while others may not see the same as a problem. Therefore, it is hard to develop a common concept about parking, as there is no shared understanding of the actual problem. Since perception encompasses different characteristics which demonstrate the real nature of perception, it is needed to select a data collection method very carefully. Therefore, this chapter is dealing with the way of the ground-based study that was designed and the data were collected related to parking perception.

3.5 Populations & The Sample

In selecting the sample, a non-probability sampling method that convenient to this research study was used. The principal factors for this selection were the time, cost and the access to the information as the survey employed the self-reporting method in order to obtain data. This method helps researcher to achieve the sample in a relatively fast and an inexpensive way.

A pre - windscreen survey had been conducted before the commencement of the data collection in order to understand the volume of parking during the expected time of survey and the problems in parking. After examine the parking nature, it has decided to select100 population of sample which becomes one out of each four vehicles at critical parking locations approximately.

3.5.1 Selection of the Study Locations

In Sri Lanka since the vehicle population has increased by 8 % per Annum during the last seven years and the city of Colombo and the suburbs suffered a lot from parking problem due to the lack of parking spaces at convenient locations. Although, the Colombo Municipal Council provides paid parking spaces for the car population entering to the city of Colombo, the Colombo suburb local authorities are failing in this respect.

The adjoining local authority areas of Colombo such as Sri Jayewardenepura Kotte, Dehiwala Mt. Lavinia, Kaduwela, Maharagama, Homagama, Moratuwa and Kesbewa are suffering with the lack of provision of convenient parking. There are many attractive townships like Nugegoda, Battaramulla, Dehiwala, Maharagama, Kottawa, Homagama and Kaduwela that are located within these suburban areas. The attractiveness of these townships is based on the service they provided as shown in table 3.1.

Table 3.1 Significance of the Cities

No.	Name	Service Provided	Population (Approx.) 2011
1	Nugegoda	Shopping, Education, Recreational	48554
2	Battaramulla	Institutional, Shopping, Recreational	8142
3	Dehiwala	Shopping,	24280
4	Maharagama	Shopping, Educational, Institutional, Recreational	15254
5	Kottawa	Shopping,	18154
6	Homagama	Shopping, Educational,	8845
7	Kaduwela	Shopping	14173
8	Piliyandala	Shopping, Educational, Institutional, Recreational	9395

Source: DCS, 2011.

Among the above-mentioned townships, Maharagama, and Nugegoda, townships are the most attractive for commuters and these towns are performing as service centers for its large residential area. The most of popular shopping complexes and private educational centers other than the government schools are located within the town centers and it creates an enormous traffic problem with various issues of parking. While considering the prominence of these two town centers, this study has focused on Nugegoda and Maharagama for the collection of ground based data to analyze the perception of the vehicle parkers.

The most important reason for selecting these areas is that the inadequacy of parking spaces that can be observed in relation to the parking demand during the day time. The provision of parking becomes hassle to the city administrative authorities, as the convenience of both pedestrian and parkers should be overseen simultaneously. Moreover, a lot of parking problems are observed in Maharagama & Nugegoda city areas and some problems are more sites specific.

3.6 Definition of Urban Parking

Although, there are many definitions described, the parking, this study uses the working definition for this study as the parking area is an area used for the parking of motor vehicles.

3.6.1 Criteria used to select the sites for survey

Since the townships do not have specific administrative boundary, the study considers the areas with high densities of buildings in terms of physical development and the concentration of commercial, administrative, educational and recreational activities within them. The reason for the selection is that parking causes more problems in high-density areas than in the other low-density areas. In addition, it assists the respondents to consider the same area while preventing the impact of their own situations at different areas or environments in other towns on the responses.

In this study, possible phenomena are translated into a measurable form using statements. Since the parking problem has many dimensions, the consideration of this study has focused on the accessibility from parking location to the desired destination, safety and parking fee to measure how the respondent's perception caused on the parking to become a problem in the city.

Among the external and internal factors that effect on an individual's perception, the study has limited to test how the individuals' gender, age, education level and occupation effect on the above mentioned parking dimensions in order to select the parking location which causes to emerge a parking problem.

3.7 Data Collection Techniques

The objectives of this study is to test relationship in-between access to parking, security of the vehicle and parking tariff with regard to vehicle parking issues at pre-selected urban parking spaces and whether there is any relationship between user

behavior and their perception leading to vehicle parking problem in the city center. The identified dimensions of distance, fee, safety and management in parking problem have been transformed into number of statements under each dimension. In addition to that, few other aspects also considered in the form of statements to ascertain the external impacts if exist. The respondents of the survey were asked to judge to what extent they agreed with each of the statements from strongly agree to strongly disagree. Before conducting the survey, the statements had been tested in a pilot survey undertaken at the same location in order to minimize the unclear or ambiguousness of the statements.

It is noteworthy to mention that some of the facts revealed during the literature review had been used in forming the statements such as about 200m maximum walking distances from parking location to the desired destination in order to examine how parkers think about the accessibility.

3.7.1 Questionnaire Survey

As stated before, the main part of the survey consists of statements. Respondents were asked to what extent they agreed with each of these statements. The study chose to use a Likert scale of five choices for each of the statements. Strongly disagree, disagree, neither agree or disagree, agree, and strongly agree were the five options. Further, respondents had the possibility to select the option of 'no opinion'. Since some statements require certain specific knowledge, everyone might not be able to answer those questions. Also, when the choice option 'no opinion' is left out, respondents might use the option 'neither agree nor disagree' instead (Raaijmakers et. al., 2000).

This would damage the robustness of the results at neither agree nor disagree that represents the 50% choice of each. Some statements are quite 'black and white'. It assumes that respondents would be more inclined to choose for 'neither agree nor disagree' with the absence of nuance in the possible alternatives

The questionnaire has comprised of two parts as general information, and attitude measurements. The general information section has included the personal and socio data related to the respondent and the attitude measurement section comprises of statements designed to express the perception of the respondent on selected dimensions.

Six possible responses are orderly placed along the scale to measure the people's attitudes. The agreement for the statements is aiming to capture the table 3.7.1.1 that shows the expected possible responses and there definitions within this study.

Table 3.2.Expected Responses and Definitions

Assigned Value	Expected Response	Definition
0	No Opinion	I'm not aware
1	Strongly Disagree	I refuse the statement.
2	Disagree	I believe it is wrong
3	Moderate (Neither Disagree nor Agree	I believe 50% of both
4	Agree	It is true
5	Strongly Agree	Yes, It should be.

3.7.1.1 Use of Likert Scale

An American psychologist of Rensis Likert was introduced the Likert scale method to measure the people's attitude. At the outset, this method has used for medical investigations in order to understand the patients' situation such as level of pain suffering etc. Subsequently, this method has commonly used by the socio demographic surveys to scale the people's attitudes on different objects or phenomenon. This is a self-reporting method scaling the responses similar to the rating scale. The values were horizontally scaled from negative to positive with equidistant intervals from 0 to 10 though the commonly used scale varied from 0 to 5.

When responding to a Likert questionnaire item, respondents specified their level of agreement or disagreement on a symmetric agree-disagree scale for a series of statements. Thus, the range captured the intensity of their feelings for a given item.

3.8 Secondary Data Collection

The Secondary data are data that have already been collected for purposes other than the problem at hand. These data can be located quickly and inexpensively. For the purpose of this study, secondary data were collected from Department of Motor traffic and the Google earth maps were used to prepare the location maps of the study.

Since the study involves qualitative information, the author used primary information using the questionnaire survey.

3.9 Data Analysis Techniques

The study focuses to define the relationship between the user's attitude and dimensions of parking where there is no general agreement captured in the past literature of parking problem. In order to correctly analyze the data collected during the survey, a Spearman's rank correlation analysis has been used using statistical software. i.e. SPSS 16.0.0 version.

3.9.1 Spearman's rank correlation computation

Charles Spearman introduces this method for the nonparametric measurement of statistical dependence between two variables denoted by the Greek letter ρ (rho) or as r_s. It assesses how well the relationship between two variables can be described using a monotonic function. The relationship between two variables denotes by a coefficient of +1 or −1. In analyzing the ranked variables, the technique has known as Pearson correlation coefficient computed using the following equation.

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}.$$

Where sample of size *n*, the *n* raw scores X_i, Y_i are converted to ranks x_i, y_i, and ρ is computed from:

$d_i = x_i - y_i$, which gives the difference between ranks.

The sign of *X* (the independent variable) of the Spearman correlation indicates the direction of association between *X* and *Y* (the dependent variable). If *Y* tends to increase when *X* increases, the Spearman correlation coefficient is positive. If *Y* tends to decrease when *X* increases, the Spearman correlation coefficient is negative. A Spearman correlation of zero indicates that there is no tendency for *Y* to either increase or decrease when *X* increases. When *X* and *Y* are perfectly monotonically related, the Spearman correlation coefficient becomes 1. A perfect monotone increasing relationship implies that for any two pairs of data values always have the same sign. A perfect monotone decreasing relationship implies that these differences always have opposite signs.

3.10 Conclusion

This research is focused to analyze how parkers making their decision on selecting parking location based on their internal characteristics and how far such decision affects to create parking problem at central business districts. Conceptualization of the study objectives is firstly introduced then the survey design process illustrated the core part of the survey design that had been allocated for the questionnaire. Since the target data was the personal information about the parker and their attitudes against selected dimensions of parking, the used semi structured questionnaire properly fits to the task. The formulation of total required factors into number of statements made easy to the respondents to express their attitudes. The Likert scale formulation for the level of agreement made easy to the respondents to think and answer how far they

have agreed to the particular statements. Since the responses were collected under gropes, Spearman's correlation coefficient analysis method become more suitable as the data was nonparametric.

CHAPTER IV

ANALYSIS AND RESULTS

4.1 Chapter Introduction

In this chapter the results of the survey will be discussed. As mentioned in the early chapter, the study used non-probability random sample to collect the data. It has been expected to collect at least hundred and thirty completed sample however, the respondents are reluctant to wait and fill the questionnaire. 100 questionnaires were successfully completed by the respondents during the given time period. The completed responses then were filtered to identify the relationship between the respondent's attitudes towards the city parking and to what extent it contributes to the parking problem.

4.2 Overview of Results

In this section it gives an overview of the sample selected used for this study with its general characteristics. Consequently, total of 100 vehicles were randomly sleeted and Collect the responses for the questions listed in the Annex III

4.2.1 Respondents' Profile

The sample consisted with 64 male parkers and 36 female parkers who came to the city by a vehicle for their requirements. 70% of the vehicles within the sample were parked on street and out of them, Maharagama 46% - Nugegoda 22%- were cars and 12% - Nugegoda11% were three wheels. 69% of the parkers in the sample were educated at least advanced level and only 31% of them have completed Ordinary Level education.

As anticipated, all the vehicle users are between 20 years old to 65 years old and 29% of them were between 21years to 25 years old. In general, 66% of the parkers in the sample were below or at 40 years old.

4.3 Location Profiles of the selected locations

4.3.1 Site 1 - Maharagama City

Maharagama is a large suburb of Colombo city in Colombo District, Sri Lanka on the High-Level (A4) Road about 15 km from the center of the commercial capital. It developed rapidly in the 1980s as a dormitory suburb. Governed by the Maharagama Urban Council, the town possesses facilities like supermarkets, department stores, and clothing, food and beverages shops to fulfill the needs of citizens. There are number of bus routes passing the area and starting from the suburb that connect Maharagama to all the suburbs. There's a depot of the Sri Lanka Transport Board in Maharagama.

Moreover, Maharagama is popular among the small-scale cloth businesses from the other parts of the country and therefore, it's relatively a busy town which starts its work from very early morning around 3.00am. Pamunuwa is a suburb of Colombo city and near to Maharagama in Sri Lanka and is famous as a destination for clothing and textile. It is located within the Western Province. Due to the availability of raw materials needed in textile industry to ready-made garments, Pamunuwa has been a center of attraction to people all over the country. For the people who seek bargain shops to purchase material needed for small and medium scale clothing and tailoring businesses and for the people who seek clothing items at competitive bargain prices are eventually drawn to Pamunuwa. Thousands of people visit Pamunuwa area in each and every day, with this amount is enormously increased in Sinhalese New Year season in April. However, with hundreds of small shops and stalls and a large number of big shops, Pamunuwa is crowded from the early morning until the evening. The Maharagama Railway station is also located at the border of Pamunuwa area. Pamunuwa has become synonymous with cheap readymade

garments, fabric and cut-piece textiles. It all began with the growth of garment factories in the 1980s. As the factories looked to offload their excess products or those which had not met quality standards due to a small defect, a niche was created for small traders who began purchasing these clothes from factories and selling to local consumers at a low rate. The Pamunuwa road located almost next to the main bus stand in Maharagama became home to a few clothes stalls in late 1970s and with the growth in garment factories in the vicinity, the stalls began to grow in number too. Today, the road is completely packed with shops, small stalls and even pavement hawkers; each one sells some kind of textile, clothing or related accessories. Over the years, the traders sourced their clothes from factories all over the country and a thriving business in readymade clothes of all kinds was established (Figure 4.1).

Figures 4.1: Schematic Map of the Parking Locations of Maharagama City

Source: Google Earth, Author, 2015

4.3.2 Site 2 - Nugegoda City

Nugegoda was a small town a few decades ago but has seen a high degree of growth and development recently. In the 1960s there were already several established stores along the main street that known then as Church Road. It was renamed Stanley

Tillakaratne Mawatha after the popular politician in the 1970s during the wave of Sinhala nationalization, the road was widened to accommodate the increased traffic.

Nugegoda had its own cinema house and was also a major train station along with the Kelani Valley line - one of the last active single gauge train lines. There has been a huge increase in buildings and a great reduction in trees and green areas. Agricultural lands like paddy fields (still present in the early 1990s) have largely been used for building and development. At present, a number of educational institutes are found here, such as St. John's College - Nugegoda, Anula Vidyalaya, Samudradevi Balika Maha Vidyalaya (originally St John's Girls' School), Sakya Institute and the famous Rotary Tuition Classes.

A flyover has been constructed and opened for public usage since 2009 at the town center of Nugegoda. The first stage is directed towards Maharagama - Colombo. The Government says the second stage will be started in the near future. Nugegoda is a consumer hotspot especially during the festival seasons. Nugegoda is also famous for its high quality cloth stores near the famous Bogaha Junction in the High-level Road that sits beside a famed Bo tree.

Nugegoda is also the hub city of Sri Lanka's number one book store chain Sarasavi Bookshop. The Nugegoda "Pola" is one of the major markets in Sri Lanka full of various vegetables, fruits, fish &meats. It's active throughout the week. The weekly market takes place every Sunday besides the High-level road and has any agricultural product one can ask for. The Mirihana borough hosts the Mirihana Police Station

which hosts the Communication Division HQ of Sri Lanka Police as well as the offices of DIG Western Province south and SSP Nugegoda (Figures 4.2).

Figures4.2. Schematic Map of the Parking Locations of the Nugegoda City

Source: Google Earth, Author, 2015

Table 4.1 Classification of the Vehicles

Location	Vehicle Type-Maharagama						Total
	Car	Jeep	Bus	Mo. Bicycle	Three Wheel	Van	
Off Street	11%	3%	4%	6%	2%	4%	30%
On Street	30%	6%	10%	19%	10%	7%	70%
Total	**46%**	**11%**	**14%**	**18%**	**12%**	**11%**	**100**

	Vehicle Type-Nugegoda						
	Car	**Jeep**	**Bus**	**Mo. Bicycle**	**Three Wheel**	**Van**	
Off Street	15%	5%	10%	12%	8%	10%	60%
On Street	7%	1%	4%	5%	3%	22%	40%
Total	**22%**	**6%**	**14%**	**17%**	**11%**	**32%**	**100**

Source: Author, 2015

According to the above table 4.1, it indicates that the vehicle parkers at both locations are providing inadequate parking space. Therefore, most of them park their vehicles on street. According to the above table 4.1, cars at both locations occupy most of the parking spaces. The Private cars occupy considerable amount of parking spaces at Maharagama while most of the parking spaces at Nugegoda were occupied by school vans. Moreover, the onsite parkers are also cruising for parking. The on street parkers at both locations mostly consider distance between the parking and the intended destination of the users. In addition, most of the time, conflict between User Vs. Parker is similar at both locations.

4.3.3 Purpose of parking at selected place

The purposes of their visits are varying from personal to official. The Distribution of the purpose of their visits is shown in the table 4.3 below.

The average parking duration of the vehicles was approximately 3 hours and majority of the population tend to park vehicles about four hours. However, the duration of parking had been varying from10 minutes to about 14 hours. The long duration had been occurring due to the parkers have used the particular location as “park and ride” space.

Table 4.2 Statistical analysis of Parking Duration

Total Sample	**100hrs.**
Mean	162.75
Median	120.00
Mode	30
Std. Deviation	165.7
Minimum	10
Maximum	840

Source: Author, 2015

In this chapter, the results of the survey will be discussed. As mentioned in early chapter, the study used non probability random sample to collect the data. It has been expected to collect at least hundred and thirty completed sample. However, the respondents are reluctant to wait and fill the questionnaire. 100 questionnaires were successfully completed by the respondents during the given time period. The completed responses then were filtered to identify the relationship between the respondent's attitudes towards the city parking and to what extent it contributes to the parking problem.

Table 4.3: Purpose of parking at selected place

	Purpose of Parking	**Maharagama City (n=60)**	**Nugegoda City (n=40)**
1.	Banking	6	4
2.	Business	4	3
3.	Education	6	11
4.	Daily needs	3	3
5.	Hiring	7	3
6.	Job	3	4
7.	Official	2	3
8.	Services	6	2
9.	Shopping	13	3

	Purpose of Parking	Maharagama City (n=60)	Nugegoda City (n=40)
10.	Visiting	10	4

Source: Author, 2015

4.4 Findings of the Questionnaire survey

4.4.1 Accessibility

Accessibility is one of the main determinants in parking problem. The study expects to identify the relationship between parkers thinking and the distance to their desired destination from the location of parking. In order to capture all aspects of the parkers perception, the study forward 10 statements which describe the level of perception of the parker's. The results are described below:

4.4.2 *Parking is a facility provided by either the Businessman or the Local Authority for the customers coming to the city*

Table 4.4 ***Parking is a facility provided by either the Businessman or the Local Authority for the customers coming to the city***

Category	Frequency	Percentage
Strongly Disagree	6	6.0
Disagree	11	11.0
Neither Agree nor Disagree	11	11.0
Agree	38	38.0
Strongly Agree	34	34.0
Total	**100**	**100.0**

Source: Author, 2015

In terms of Urban Planning, parking is one of the main categories of urban land use which assist the smooth function of traffic flow through the city roads. Absence of

parking space leads the on street parking resulting in the traffic congestion and fatal accidents perhaps. Therefore, the study presumes that the parking is a requirement that every city management authorities must involve to provide adequately.

Consequently, the statement one had been formulated to ascertain the parkers' perception on the parking whether they presume it as a requirement or a facility. The responses resulted that 34% of them strongly agreed and 38% agreed. The total 72% of this agreement indicated that the parkers believed that the parking is a facility instead of a requirement. However, only 17% responded as the parking is not a facility though 11% had indifference attitude against the parking which is to be neither facility nor requirement.

4.4.3 *Parking should be located less than 200 meters from the destination.*

This is the main statement made under the parking determinant of accessibility. The outcome of the respondents is shown in the table 4.5

Table 4.5: Parking should be located less than 200meters from the destination.

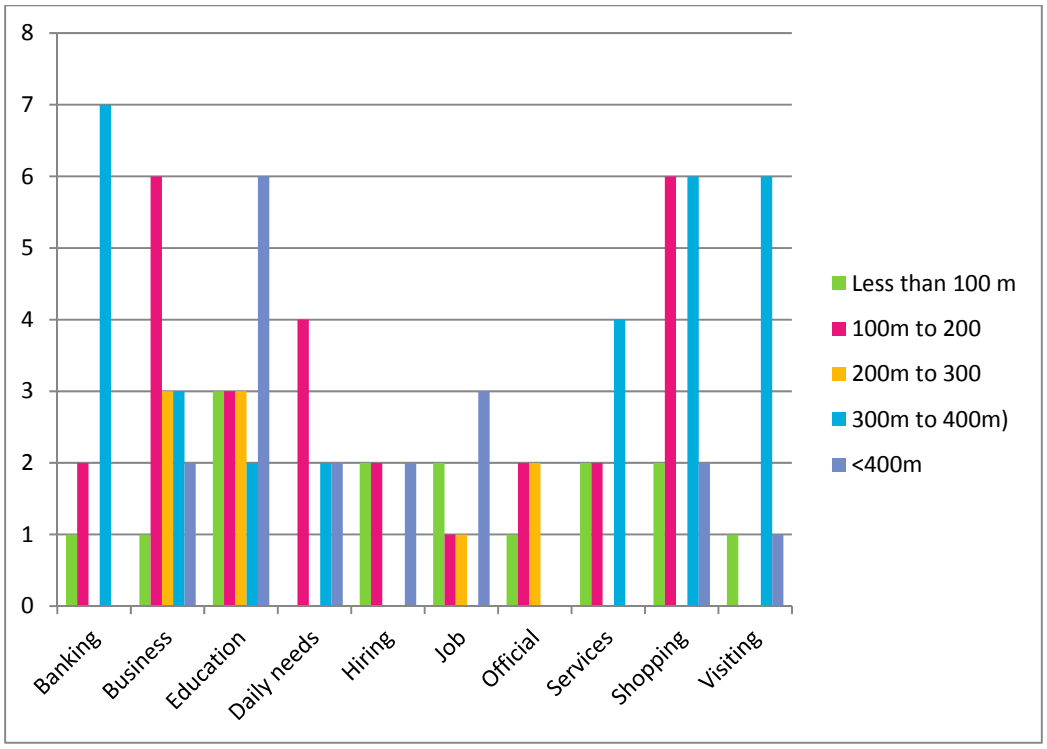
Level of Agreement	**Percentage**
Strongly Agree (Less than 100 m)	15
Agree (100m to 200)	28
Neither Agree nor Disagree (200m to 300)	09
Disagree (300m to 400m)	30
Strongly Disagree (<400m)	18
Total	**100**

Source: Author, 2015

The overall result of the responses has implied a paradoxical notion regarding the distance to the desired destination from the parking location. 15% of the respondents have strongly believed that the parking location should not be located beyond 200 meters and 28% also agreed on the same. Conversely, 30 % of the respondents

accepted that the parking space located beyond 200 meters and 18% of the respondents strongly believed that the parking space should not be located within 200 meters from the destination. In addition, 9% had an indifference feeling regarding the distance to the destination from the parking space location.

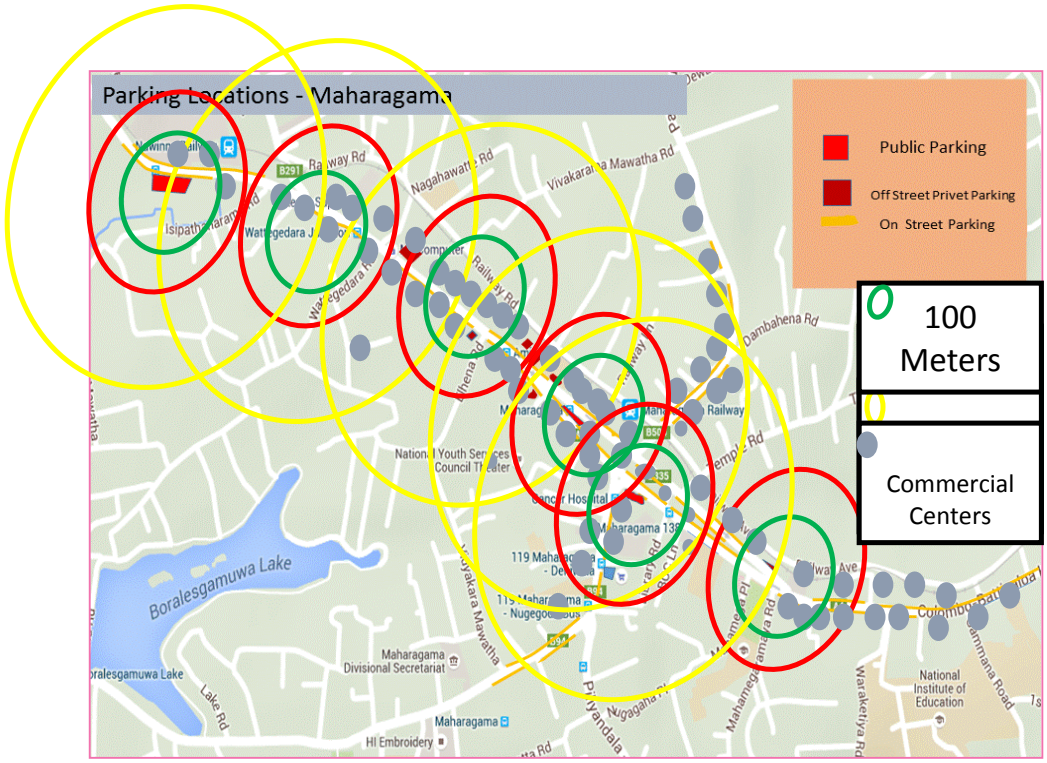
Figures4.3: Maximum Walking distance according to the purpose



Source: Author, 2015

Consequently, the results imply that 43% consider the distance from the parking space to the desired destination is a matter of fact for their inferences to select the parking location nevertheless, 48% of the respondents thinks the opposite. The figure 4.3 indicates the willingness distance of the respondents to park their vehicle according to their purpose of the trip. Respondents came to the city for Business purposes, Shopping and Daily needs and they parked their vehicles within 100 to 200 meter distance from the destinations.

Figure 4.4 Walking Distance between Parking Facility and Final Destination



Source: Google Earth, Author, 2015

4.5 Relationship between gender and the distance to the parking location.

Under this study, the Gender of a respondent is considered as a factor that influences on the inferences of selecting parking location. Accordingly, it is expected to be tested whether there is any relationship between gender and the distance to the parking location. Since the variables used for the test is ranked, the Spearman's rank correlation was applied.

The hypothesis tested under this is,

- H_1 = Females desire more to park their vehicles as much as close to their destination than males.

- $H_0 \neq$ when selecting a parking location for an individual, his or her Age has not important factor for destination.

Table 4.6 Correlation between gender and distance

	Correlation	**Gender**	**Distance**
Gender	Correlation Coefficient	1.000	.130
	Sig. (2-tailed)		.252
	N	100	100
Distance	Correlation Coefficient	.130	1.000
	Sig. (2-tailed)	.252	
	N	100	100

Source: Author, 2015

The Spearman's rho or coefficient (ρ) is interpreted as where the value closer to +1 is denoted the strong relationship and closer to -1 denoted the week relationship between two variables.

Accordingly, two variables results +0.130 spearman's correlation coefficient that indicate the two variables have positive relationship. Consequently, it has to be accepted the hypothesis that the females desire more to park their vehicles as much as close to their destination than males and to be rejected the null hypothesis.

4.5.1 Relationship between age and distance to parking location

Age is one of the factors that affects on the individuals' perception. This study has tested whether there is any relationship between the parker's age and the distance from parking location to the destination. The hypothesis is used to test the relationship is:

- $H_1 =$ With the increase of aged users are reluctant to walk longer distance from the parking space to their destinations.

- H_0 = In selecting parking location for an individual, his or her Age has not affected on his or her decision.

The spearman's correlation test results following outcome:

Table 4.7: Relationship between age and distance

Correlations			**Age**	**Distance**
Spearman's rho	Age	Correlation Coefficient	1.000	.567**
		Sig. (2-tailed)	.	.000
		N	100	10
	Distance	Correlation Coefficient	.567**	1.000
		Sig. (2-tailed)	.000	.
		N	100	100

** Correlation is significant at the 0.01 level (2-tailed).

Source: Author, 2015

The Spearman's correlation coefficient (ρ) between the variables of age and distance results the value is .567 and significant value is p =. 001. It denotes the moderate relationship between two variables. However, the positive value indicates the positive relationship between two variables. When interpretation of the results, it has to be accepted H1 hypothesis and rejected the null hypothesis. Accordingly, with the increase of the age individuals are reluctant to walk from the parking space to the desired destination. (r_s= .567, n=100, p<.05).

4.5.2 Relationship between education and distance to the parking location

The literature on individuals' perception highlighted that among other factors the level of education has the ability to transform the way of thinking of a person. Accordingly, Spearman's correlation test had been conducted to discover the type of relationship between the education and the distance from the parking space to the desired destination. Hypothesis used for the test was:

- H_1 = Higher educated individuals have considered the distance from the parking space to the desired destination in order to select the parking space.
- H_0= Education has not made any influence on the decision of selecting parking space
- The test results are shown in the table 4.8 .below.

Table 4.8: Relationship between the education and the distance

Correlations			**Education**	**Distance**
Spearman's rho	Education	Correlation Coefficient	1.000	.198*
		Sig. (2-tailed)	.	.048
		N	100	100
	Stat 4.5	Correlation Coefficient	.198*	1.000
		Sig. (2-tailed)	.048	.
		N	100	100

** Correlation is significant at the 0.05 level (2-tailed).

Source: Author, 2015

The positive Spearman's correlation coefficient of (ρ) denoted that the two variables have positive relationship and the value of the coefficient of .198 it denotes week relationship between two variables. Therefore, the H1 hypothesis has to be accepted and the null hypothesis has to be rejected. It shows that the education level has no impact on their parking destinations.

4.5.3 Relationship between occupation of user and the distance to the parking space.

In the study, it is accepted that ED to test the relationship between the user's occupation and the distance from the parking space to the desired destination. Study assumes that due to the busy schedule of high responsible individuals' tend to park their vehicles as much as close to their desired destinations.

The following hypothesis is tested:

- H_1 = the users employed in high responsible professions have considered the distance from the parking space to the desired destination as a matter in selecting the parking location.
- H_0= the level of the profession has no influence on the distance from parking space to the desired destination in selecting the parking location.

The test results are:

Table 4.9 Relationship between occupation and distance

Correlations			**Occupation**	**Distance**
Spearman's rho	Occupation	Correlation Coefficient	1.000	.147
		Sig. (2-tailed)	.	.144
		N	100	100
	Distance	Correlation Coefficient	.147	1.000
		Sig. (2-tailed)	.144	.
		N	100	100

Source: Author, 2015

The Spearman correlation coefficient value .147 denoted that the occupation and the distance to the parking location have a week relationship. It shows that with the increase of the profession level, there is a tendency to select the parking location close to the desired destination. Accordingly, the study has to accept the H_1hypothesis and reject the null hypothesis.

4.6 Safety

Among the determinants of parking problem, safety becomes a major component. The study expects to identify the relationship between parkers and the safety of their vehicles. In order to capture all aspects of the perception, the study forwards 06

statements to the parkers to define their level of agreement against the statements. The results are described below:

4.6.1 Off street parking is safer than on street parking

This statement has formulated to capture how the users think about the safety of their vehicle during parking. The respondents view regarding the above statement that is shown in the table no 4.10

The statistics review that only 23% think that the off street parking is safer than on street parking thus, 28% think opposite of that and especially 7% strongly disagreed to the statement. In addition, 18% think that the current location is somewhat safer.

Table 4.10 ***Off street parking is safer than on street parking***

Agreement Level	Percent
Strongly Agree	23
Agree	31
Neither Agree nor Disagree	18
Disagree	21
Strongly Disagree	7
Total	**100**

Source: Author, 2015

4.6.1.1 Use of Insurance Policies

Insurance policy is a mandate of the use of a vehicle in Sri Lanka. The insurance provides safety for the vehicle as well as the rider and the parties outside the vehicle that can cause damages. The type of insurance policy has immensely been helpful to recover in case of accidents or the theft of vehicle parts.

At two sample locations, it has revealed that 63% of vehicles under study at Nugegoda have Full Cover Insurance policies and at Maharagama it was 50%. The table 4.10.1 below indicates that at Nugegoda 70% of on street parked vehicles

covered by the full insurance policies and at Maharagama it was 43%. Concisely, it is revealed that the majority of the vehicles are tended to have full cover insurance policies than Third Party insurance policies regardless of the location of Vehicle Park.

Table 4.11: Classification of Vehicle insurance policies

No	Type of Insurance policy	Nugegoda (n=40)		Maharagama (n=60)	
		Off Street (n=24)	On Street (n=16)	Off Street (n=18)	On Street (n=42)
1	Full Insurance Policy	60%	70%	66%	43%
2	Third Party Insurance Policy	40%	30%	34%	57%

Source: Author, 2015

4.6.2 Parking type (Off street or on street) is regardless if the vehicle covered by a full option insurance.

Under this statement the study assumes that the users are conscious on the safety of their vehicles and tend to obtain full cover vehicle insurance. The full cover vehicle insurance has considerably minimized the anticipated risks that are possible during the use of the vehicle. Provided with the full cover vehicle insurance, users may disregard the location of parking. Responses to the statement reveal that 13% disagree to the statement and 3% strongly disagreed. Only 39%agreed to the statement and only 37%strongly agreed to the statement. The results furnished that 8% have indifference thinking regarding the safety of the vehicle at particular location. The responses indicated that if the vehicle has the full cover insurance, the parking location has been disregarded. Thus, a substantial proportion of 16% disagreement indicates that the users regardless of the location of parking had taken the safety of the vehicle into account.

Table 4.12: Parking type (Off street or On street) is regardless if the vehicle covered by a full option insurance

Agreement Level	**Percent**
Strongly Agree	37
Agree	39
Neither Agree nor Disagree	8
Disagree	13
Strongly Disagree	3
Total	**100**

Source: Author, 2015

4.6.3 Users are more concern on parking at close proximity to their desired destination than vehicle safety.

The study formulates this statement in order to capture how users are prioritizing the two determinants of the safety and the distance in selecting parking location. The responding results are in the table 4.12. The results furnished that 44% strongly agreed to the statement and 41% agreed. Altogether, 85% prioritized the distance of parking location than the safety. The especial feature that is possible to note is that 5% have no opinion.

Table 4.13*Users are more concern on parking at close proximity to their desired destination than vehicle safety*

Agreement Level	**Percent**
Strongly Agree	44
Agree	41
Neither Agree nor Disagree	5
Disagree	5
Strongly Disagree	5
Total	**100**

Source: Author, 2015

4.6.4 Regardless of the type of parking, paid parking is safer than the unpaid parking.

Under this, the study aims to ascertain how users evaluate the parking fee and the safety. The results of the responses are in table 4.13.

Table 4.14*Regardless of the type of parking, paid parking is safer than the unpaid parking.*

Agreement Level	Percent
Strongly Agree	19
Agree	15
Neither Agree nor Disagree	23
Disagree	26
Strongly Disagree	17
Total	**100**

Source: Author, 2015

The table 4.14 indicates that there is no strong perception that the paid parking is safer than the unpaid parking. 43% of the respondents disagree to the statement and 23% neither agree nor disagree to the statement. Consequently, 19% strongly agree to the statement 17% strongly disagree to the statement. Only 15% of the respondents agree to the statement.

4.6.5 Relationships between Gender, Age, Education level and Occupation and safety.

This section of the research focuses to capture the respondents' way of thinking regarding the safety in terms of gender, age, education level and occupation. The above mentioned four statements were tested with each of the four factors of perception. The table 4.15 furnishes the Spearman's rank correlation coefficient or rho (ρ) between the variables under the consideration.

Table 4.15 Relationship between safety and perception

Factor of perception	Safety of parking- Spearman's Correlation coefficient (ρ)			
	Off street parking is safer than on street parking	*Parking type(Off street or On street) is regardless, if the vehicle covered by a full option insurance.*	*Users are more concern on parking at close proximity to their desired destination than vehicle safety.*	*Regardless of the type of parking, paid parking is safer than the unpaid parking.*
Gender	(*a*) -0.094 Sig. (2 tailed)0.354	(*b*) - 0.062 Sig((2 tailed)0.540	(c) 0.061 (Sig 2 tailed)0.553	(d) -0.040 Sig (2 tailed)0.696
Age	(e) 0.409** Sig. (2 tailed) 0.000	(f) -0.507** Sig. (2 tailed) 0.000	(g) -0.068 Sig. (2 tailed) 0.510	(h) 0.315** Sig. (2 tailed) 0.001
Level of Education	(i) 0.272** Sig. (2 tailed) -0.006	(j) -0.074 Sig. (2 tailed) 0.464	(k) -0.326** Sig. (2 tailed) 0.001	(l) -0.288** Sig. (2 tailed) 0.004
Occupation	(m) 0.203* Sig. (2 tailed) 0.043	(n) -0.033 Sig. (2 tailed) 0.741	(o) - 0.305** Sig. (2 tailed) 0.003	(p) 0.209* Sig. (2 tailed) 0.037

Source: Author, 2015

In the cage (*a*) of table 4.15 above indicated that females likely to select off street parking in safety point of view than males. The negative but week relationship (i.eρ = -0.062) at cage (*b*) denoted that males paid attention in selecting safer parking space unless they have full cover insurance. Hence, females are thinking opposite though

they have full cover insurance for the vehicle. The negative value in the cage (*c*) 0.061indicated that week relationship between the gender and preference for the parking at close proximity to the desired destination. It is possible to interpret as that males prefer than females to park at close proximity regardless of the safety of the vehicle. The coefficient value at cage (d) -0.040 indicated that males do not think that paid parking is safer than unpaid parking. Thus, females think opposite of that.

Considering the age as one of the variables, the value in cage (e) i.e $0 \leq 0.409$ denoted a moderately strong positive relationship between age and the preference to off street parking in safety point of view. With the incensement of the age limits, respondents dislike the off street parking.

In cage (f) the coefficient value of $-1 < -0.507$ denoted a strong relationship between two variables where respondents think that the full cover insurance has no effect on the safety of the vehicle on off street parking. Further, with the incensement of the age limits, it is possible to see transformation of the thinking that paid parking is safer than unpaid parking. It is denoted by the coefficient value of 0.315 in cage (*h*).

Considering the education as a factor of individuals perception, with the incensement of the education level, respondents tend to shift from agree to disagree indicating the transformation of their thinking as that off street parking is safer than on street parking. The coefficient value in cage (i) 0.272** denoted that.

Cage (m) in the table 4.15 represents the combination of occupation and the responses to the statement 1. The two variables indicated a positive relationship with each other having correlation coefficient of 0.203. The value denoted that with the enhancement of occupation, the selection of parking location moving from on street parking to off street parking regarded the safety. Even the attention on parking with safety also had been significant considering the coefficient value of -0.033 in cage (n). The negative value of cage (o) i.e. -0.305 denoted that with the increase of the occupation, the respondent considers the safety of their vehicle.

4.7 Parking Fee

Parking fee is one of the main determinants in selecting parking location. The study focus to grasp the way of thinking of the parkers against the parking fee that levy on particular location. Under this determinant, 5 statements were formulated and the responses for them are described below.

4.7.1 Parking fee should be enforced/levied within the core area of the town.

The responses to the statement furnished that the 11% strongly agreed and 35% agreed on the levy of parking fee in the city centre. However, another 21% have indifference thinking on the parking fee. However, 33% disagreed on levying a fee for parking at city centre.

Table 4.16 Parking *fee should be enforced/levied within the core area of the town*

Agreement Level	**Percent**
Strongly Agree	11
Agree	35
Neither Agree nor Disagree	21
Disagree	25
Strongly Disagree	8
Total	**100**

Source: Author, 2015

4.7.2 Parking fee should be levied only for off street parking spaces.

The formulation of this statement aims to capture how the respondents evaluate on street parking and off street parking in terms of parking price. The results represent that 51% agreed to levy a fee for off street parking and 17% strongly agreed.

Table 4.17 ***Parking fee should be levied only for off street parking spaces***

Agreement Level	Percent
Strongly Agree	17
Agree	51
Neither Agree nor Disagree	16
Disagree	11
Strongly Disagree	5
Total	**100**

Source: Author, 2015

4.7.3 Relationship between age, gender, education level and occupation and parking fee.

This section of the research intends to identify the type of relationship between the respondent and parking fee in terms of respondent's age, gender, and occupation and education level. The Spearman's coefficient correlations between these factors have been shown in the table 4.18

Table 4.18: Relationship between parking fee and age

Factor of perception	**Parking fee** **- Spearman's Correlation coefficient (ρ)**	
	Parking fee should be enforced / levied within the core area of the town.	**Parking fee should be levied only for off street parking spaces.**
Gender	**(*a*) -0.057** Sig. (2 tailed)0.574	**(*b*) -0.111** Sig((2 tailed)0.435
Age	**(c) -0.092** Sig. (2 tailed) 0.365	**(d) -0.153** Sig. (2 tailed) 0.129
Level of Education	**(e) 0.052**	**(f) -0.172**

	Sig. (2 tailed) 0.608	Sig. (2 tailed) 0.088
Occupation	**(g) 0.083** Sig. (2 tailed) 0.410	**(h) -0.270**** Sig. (2 tailed) 0.007

Source: Author, 2015

The correlation coefficients in the table 4.18indicated that two variables of gender and the agreement on levy of parking fee have a negative relationship which is denoted by the negative values in the cage (a) and (b) the coefficient values of -0.057 and -0.111 indicated a week relationship between two variables. In interpretation of the phenomena, it is furnished that the females agreed to parking though, the males think opposite.

In considering the age of the respondents, the correlation coefficients in cage (c) and (d) denoted that the agreement to the levy of parking fee and age have a negative relationship which indicated by the values of -0.092 and -0.153 in cage (c) and (d) respectively. The low values have furnished the week relationship between the two variables. This result implies that young parkers refuse to pay parking fee and older parkers presume that, disregarding the location of parking on street or off street, parking fee should be levied.

It should be noted that the two variables of the respondents' education and the agreement to levy parking fee have somewhat interesting behavior. The correlation coefficient in cage (e) denoted a positive relationship. However, the value of 0.052 shows that the relationship is week. This indicates that respondents with high education have agreed on levying fee for parking though the low educated respondents think opposite. Even the low educated respondents think that if it is needed to levy a fee for parking, it should be limited only for the off street parking excluding on street. The positive correlation coefficient in cage (e) and the negative correlation coefficient in cage (f) have denoted that.

Similarly, the occupation levels and the agreement to levy a parking fee too furnish the same situation as the correlation coefficients in cage (g) and (h) denoted that a

positive value and a negative value. The value in cage (g) of 0.083 denoted that a week relationship which can interpret as the respondents with high occupation had agreed to levy a fee for parking in the city center though they are thinking that parking fee should not be limited to the off street parking. It is denoted by the negative value of -0.270** in cage (h).

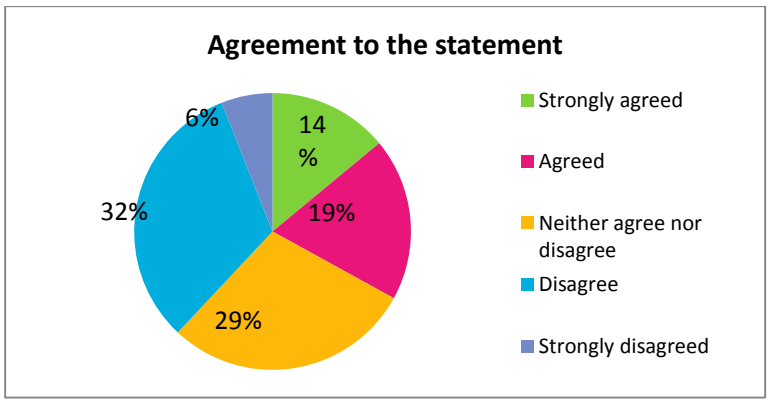
4. 8 General Factors

This section of the study expects to highlight the parking user's attitude on significant general factors. The parking user is violating most of the parking regulations. This too had contributed substantially to occur a parking problem within the city. Following statements were tested during the study to identify how parkers think about parking regulations.

4.8.1 All parking users are well aware of the parking regulations

Accordingly, the following figure 4.5 indicated that the users think. So, only 33% think that all drivers are aware of all parking regulations though 32% disagreed that and 6%strongly disagreed to that which implies that majority of parkers believe that all parking users are not well aware of parking regulations.

Figure 4.5 ***All parking users are well aware of the parking regulations***

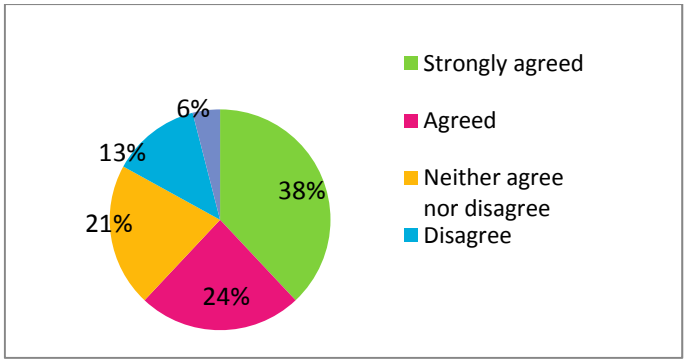


Source: Author, 2015

4.8.2 Parking regulations should be strictly enforced within the city

The respondents have strongly agreed to the statement which shows by the 62% agreement of them. This implies that the city parking management authorities should have enforced and implemented the parking regulations to control the parking problems.

Figure 4.6 ***Parking regulations should be strictly enforced within the city***

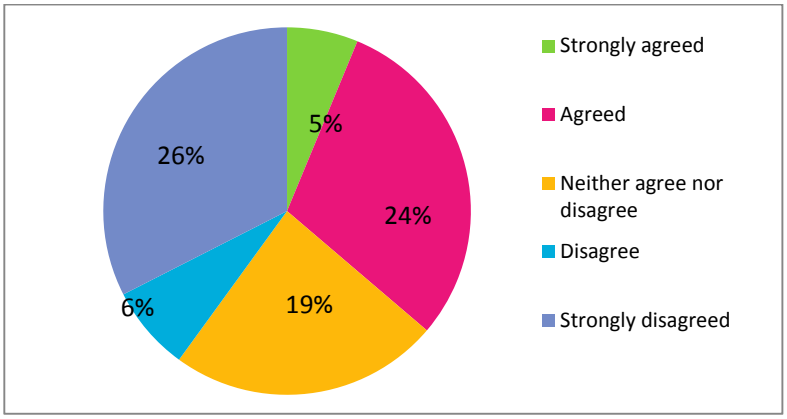


Source: Author, 2015

4.8.3 Private sector has properly managed their parking space and all users are aware of the amount of parking fee.

The statement purposely forwarded to capture the parkers' attitude on parking management of the public sector and the private sector. Only 29% think that the private sector has properly managed their parking spaces though 26% strongly disagreed to that.

Figure 4.7 ***private sectors has properly managed their parking space and all users are aware of the amount of parking fee***

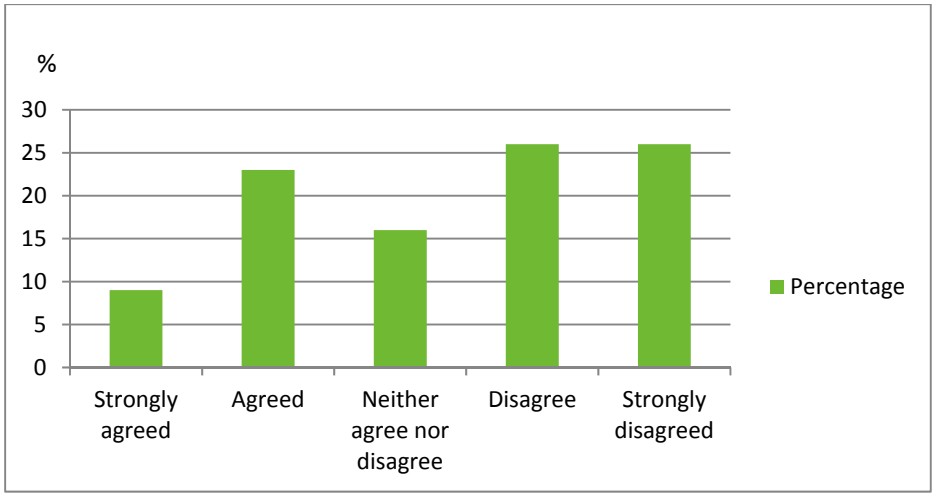


Source: Author, 2015

4.8.4 Sri Lanka has a parking policy

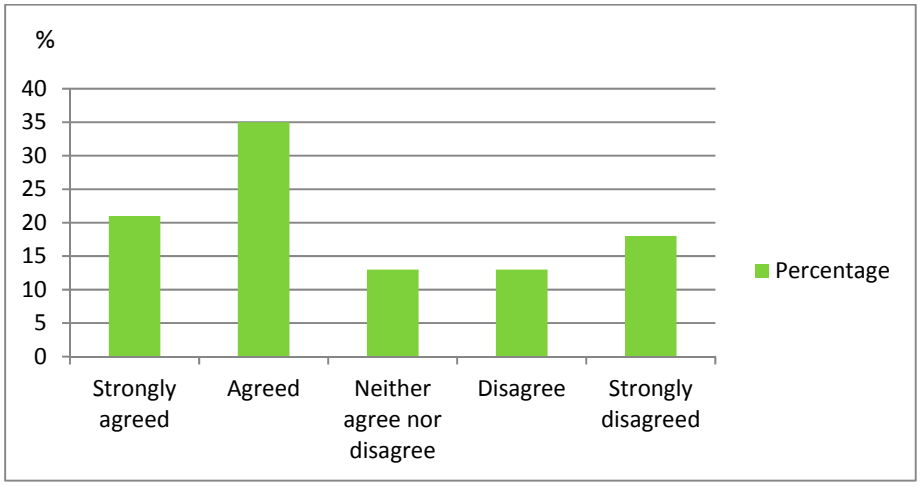
This statement had been asked to find out how far they have concerned and been aware of parking policies. The results indicated that the majority of them have disagreed to the statement that indicated by the 50% of the respondents approximately. However, 61% think that the existing traffic congesting will be possible to be reduced by introducing parking policy as per figure 4.8.

Figure 4.8 ***Sri Lanka has a parking policy***



Source: Author, 2015

Figure 4.9 Agreement to the parking policy and traffic reduction

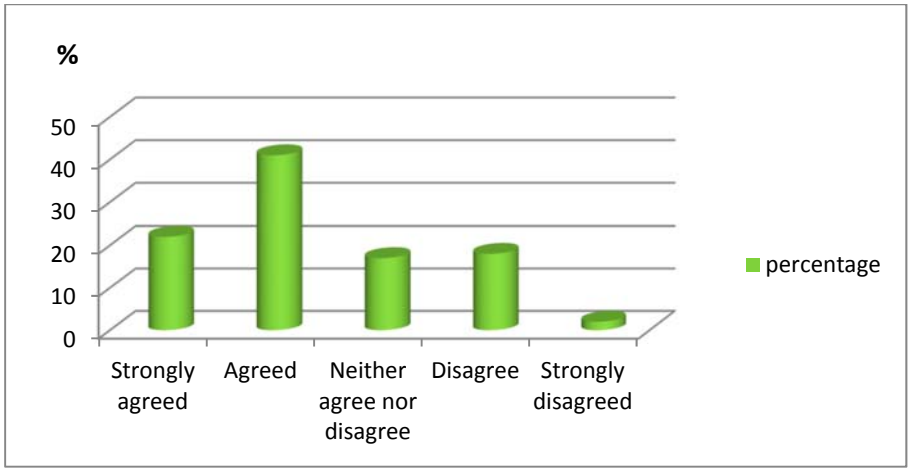


Source: Author, 2015

4.8.5 Multi-storied car parking should be introduced to the cities.

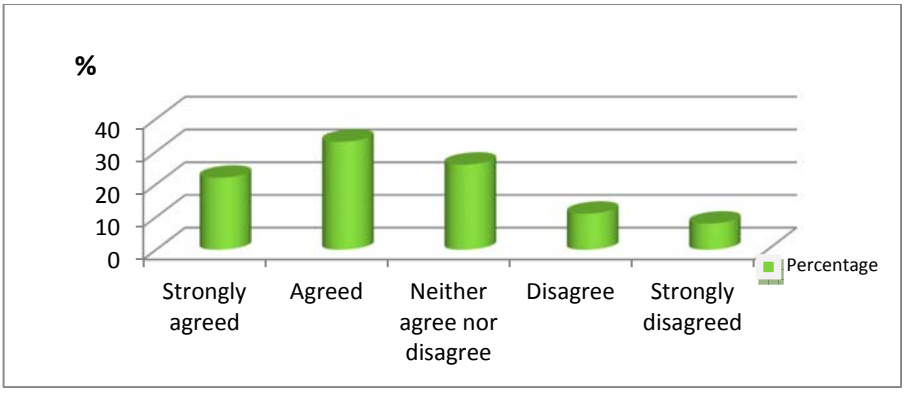
The respondents think that than existing parking type, the multi storied parking would be more suitable to a city. The 60% agreement to the statement has indicated that. In addition, the respondents have agreed to the introduction of park and ride systems to cities which shows in the figure 4.10, 4.11

Figure 4.10 *Multi-storied car parking should be introduced to the cities*



Source: Author, 2015

Figure 4.11 Introducing park and ride method



Source: Author, 2015

CHAPTER V

CONCLUSIONS

5.1 General Conclusions

This research study has aimed to capture how parkers think about parking determinants of accessibility, safety and the parking price when they choose a location for parking. The explored literature related to the parking has highlighted that there are limited researches that undertake to study the perception of parking users in their inference of parking location. A number of parking behavioral studies had been carried out though they have not particularly studied which factors that effects on the parkers inference before they choose a parking location. Consequently, this study had traced out that there are two types of factors that can be categorized as externalities and internalities that together shape an individual's perception. Since this study has limited for the selected internal factors it becomes easy to analyze them in detail.

Continuous increasing of its vehicular ownership in Sri Lanka, our cities got flooded with parked vehicles where the city managing authorities fail to provide adequate parking space. This situation has aggravated by the absence of parking policy for either each city or to the country. The exiting transport policy had been formulated to encompass all transport modes only. Even the Department of Motor Traffic has been performing a role to only register the vehicles and has not included any provision of parking of these registered vehicles either on the road or off the road.

In such environment, the parkers' behavior has contributed substantially to generate the parking problem within the cities especially in city centers. The factors of age, gender, education level and the occupation of individual parkers subsequently affect to generate a parking problem through their inference of selecting a parking location.

This study proves that the majority of parkers have viewed that parking is as a facility not a requirement of a city functioning. As long as the users think that the parking is a facility, they tend to park at any vacated space within the city without considering other issues that can arise due to their behaviour based on perception as analysed.

Further, the distance to the desired destination from the place of parking is matter for male parkers than female parkers. Even the older aged parkers too like to park as much as close to their desired destination than young parkers. The physical stability of older aged parkers may cause them to park the vehicle at close proximity. In addition, parkers with above executive levels rend to park at close proximity than non executive parkers. This character had been proved in the analysis of the education level of the parkers where the level of education has directly related with the occupation status.

In terms of safety, females and older aged parkers are very concerned about the safety of their vehicle. Because of such thinking, the roadside parking inevitably occurs although they are willing to walk a few distances from the parking.

At the inception of the research, it has been expected that with a full cover insurance parkers may have accepted to park at a considerable distance such as 200meters. However, the study revealed that in terms of safety the full cover vehicle insurance makes no effect on selecting the parking location. Further, the study revealed that in prioritizing the distance to the desired destination and the safety, disregarding other factors, majority of the parkers are selecting close proximity than the safety.

The behavior of parkers against the parking fee proved that the paid parking at the city center is acceptable. It signifies that the parkers are willing to bear the cost of parking if available at convenient location such as city centre.

In summarizing the above factors, it shows that the consequences of the way of thinking of parkers have been affected to increase on street parking which ultimately led to may paring problems as well as traffic problems.

This study has solely conducted to identify the internal factors affecting to the parkers perception. As the way forward, an opportunity is further available to study in detail how these perception affects on violating the parking laws which are common in most city centers.

Since this study has identified of the willingness to pay for the parking, an opportunity is available to research that how much that the parkers are willing to pay for parking on what basis or the suitable method for charging such as parking meters, parking bill, or electronic payments etc.

5.2 Future Research

In general, it is believed that the parking assignment framework is capable of evaluating parking related behavior. In this section, future studies are made on behavioral Research. These recommendations are considered as further steps for improving the components of this thesis with a strong focus on the further development of the parking assignment.

In the behavioral research, the suggestions mainly lay on the perception of the users and their behavior in given condition. It is suggested to limit the scope of future studies, on this subject and conduct more specialized studies with the focus on components of the parking decision process and its' development finally, it is important to investigate further the case of the users as it seems that they are the ones who would potentially use a smart parking system.

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ANNEXURES

Annex I * Total Vehicle Population (2007- 2014)

CLASS OF VEHICLE	2007	2008	2009	2010	2011	2012	2013	2014
Motor cars	36121	381448	387210	410,282	468168	49714	566874	566874
Motor Tricycle	36172	1760,600	443895	529543	667969	766784	929495	929495
Motor Cycles	1604648	406531	1896021	2100832	2354163	2546447	2988612	2988612
Buses	79870	81050	8 1789	84280	88528	91623	97279	97279
Dual purpose vehicles	193380	196216	197516	209228	242 746	280143	325545	325545
Lorries	262584	276622	284847	296692	311510	323776	334769	334769
Land vehicles-Tractors	221326	245683	259634	276997	297070	315520	333362	333362
Land vehicles-Trailers	41048	42823	44156	46,457	49578	53020	57298	57298
Total	**3125794**	**3390993**	**3595068**	**3954311**	**4479732**	**4877027**	**5203678**	**5633234**
Motor cars	36121	381448	387210	410,282	468168	49714	566874	566874
Motor Tricycle	36172	1760600	443895	529543	667969	766784	929495	929495

Source: Department of Motor Traffic

Annex II - New Registration (2007 – 2014)

CLASS OF VEHICLE	2007	2008	2009	2010	2011	2012	2013	2014
Motor cars	22603	20237	5,762	23072	57886	31 546	28380	38780
Motor Tricycle	43068	44804	37364	85648	138426	98,81 5	83673	79038
Motor Cycles	182508	155952	135421	204811	253331	192284	169280	272885
Buses	2637	I 180	739	2491	4248	3095	1805	3851
Dual purpose vehicles	5193	2856	1280	11712	3351 8	37397	24 603	20799
Lorries	18408	14038	8225	11845	14818	12,266	5872	5121
Land vehicles-Tractors	21346	24357	13915	17363	20073	18,450	10772	7070
Land vehicles-Trailers	2129	1775	1333	2301	3121	3442	2266	2012
TOTAL	**297892**	**269199**	**2040075**	**359243**	**525421**	**397295**	**326651**	**429556**
Motor cars	22603	20237	5,762	23072	57886	31 546	28380	38780
Motor Tricycle	43068	44804	37364	85648	138426	9881 5	83673	79038

Source: Department of Motor Traffic

Annex III - Questionnaire for survey

University of Moratuwa

Department of Town and Country Planning

A STUDY TO UNDERSTAND THE USER PERCEPTION ON URBAN PARKING PROBLEMS

Name	: .....
Date	: .....
Location	: .....

01. General Information :

a. location : .....
b. Parking Type : .....
c. Type of Vehicle : .....
d. Vehicle Condition : New / Old

02. User Details :

a. Gender : .....
b. Age : .....
c. Occupation : .....
d. Education : .....
e. Type of ownership : owner /Rent/ Temporary/ Leasing

03. Purpose of the trip :

a. Purpose : .....
b. Frequency per week : .....
c. Duration of parking : .....
d. Usual Location : .....

Please spacify How far you havebagreed to the following statements using ✓

1. Strongly Agreed.
2. Agreed.
3. Neither Agreed nor Disagreed
4. Disagreed.
5. Strongly Disagrees

04. Location:

I. Parking is a facility by either local authority or the developer.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. Parking spaces are located at suitable location within the city.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. The city has adequate parking spaces.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

IV. Parking spaces should be provided by the local authority within the city.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

V. Parking spaces should be located within 200m from the destination.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

100m 200m 300m 400m 600m

VI. Parkers prefer to park their vehicle on off-street parking than on street

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

VII. Long duration parking should be disacouraged within the city centres.

☐ ☐ ☐ ☐ ☐

VIII. Parking should be located out of the streets/ carriage way.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

IX. The city has adequate parking spaces.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

05. Safety :

I. Off street parking is safer than on street parking.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. Parking type is regardless if the vehicle covered by full option insurance.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. Existing parking location is a safer place.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

IV. Vehicle insurance is activated during the parking period of the vehicle.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

V. Users are more concerned on parking location than the safety of the vehicle.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

VI. Regardless of the type of parking, paid parking is safer than the unpaid parking.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

06. Fee :

I. Parking fee should be enforced/levied within the core area of the town**.**

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. Parking should be provided free of charge within the city.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. Parking fee should be levied only for off street parking spaces**.**

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

IV. Users prefer to park their vehicle on paid parking spaces even though it is located away from the destination.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

V. Parking fee indicates the safety of the vehicle.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

07. Regulations :

I. All drivers aware of the parking regulations**.**

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. All developers should be provided with adequate parking spaces

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. Parking regulations should be strictly enforced within the city center**.**

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

IV. All parking regulations are important.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

V. Since the existing regulations are not adequate, new regulations should be introduced.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

08. Parking Management:

I. All parking locations should be managed regardless of the ownership

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. Local Authorities do not manage parking spaces properly

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. Parking spaces are properly managed by the private sector

IV. 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

V. Parking at the close proximity is important regardless of the price of parking.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

09. Parking Policy :

I. Sri Lanka has a parking policy.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. The attention of relevant institutions on parking management and control is inadequate.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. Parking problems are aggravated due to the poor attention on that by the local authority.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

IV. Traffic congestion can be reduced by introducing parking policies.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

10. Parking types :

I. Multistoried car parking should be introduced at city centers.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

II. On street parking should be encouraged.

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

III. New parking strategies should be introduced. (Park & Ride)

1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

Annex IV – Purpose of Parking

#	Purpose	Maharagama City center (n=60)	Nugegoda City center (n=40)	Total	Maximum walking distance Purpose of parking				
					Less than 100 m	100m to 200	200m to 300	300m to 400m)	<400m
1	Banking	6	4	**10**	1	2	0	7	0
2	Business	12	3	**15**	1	6	3	3	2
3	Education	6	11	**17**	3	3	3	2	6
4	Daily needs	5	3	**8**	0	4	0	2	2
5	Hiring	3	3	**6**	2	2	0	0	2
6	Job	3	4	**7**	2	1	1	0	3
7	Official	2	3	**5**	1	2	2	0	0
8	Services	7	2	**9**	2	2	0	4	0
9	Shopping	12	3	**15**	2	6	0	6	2
10	Visiting	4	4	**8**	1	0	0	6	1
	Total	**60**	**40**	**100**	**15**	**28**	**9**	**30**	**18**