Viability and Economic Contribution of Shared Ride Taxis: A Case Study of Francistown Metropolis

By

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Statement of originality

Appending the signature below, the undersigned, I, confirm the Study is my original work done during my tenure as a student at Botho University in partial fulfilment of the requirements for a Masters in Business Administration (MBA) Degree. I attest full acknowledgement of other people's ideas in Harvard referencing style.

Candidate's Name: Chimwa Titos

Signature: _____

Signature of supervisor _____

Dedication

Special dedication is made to my wife Pamela and kids, they encouraged me to embark on the study for a Masters Degree in Business administration and endured my pressure during the course of studies. I equally want to dedicate it to my supervisor Professor Olumide Jaiyeoba who made it possible through his gentle and unwavering guidance.

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Table of Contents

Abbreviations and acronyms

BWP	Botswana Pula
GDP	Gross Domestic Product
GPS	Global Positioning System
SPSS	Statistical Package for Social Sciences
USD	United States Dollar
KM	Kilometre
NT	Not tested

List of Tables

List of Figures

Abstract

The scope of the study was to ascertain the viability of the cruise taxi business in Francistown metropolis. The business is dominated by black entrepreneurs supported by local authority to ply the metropolitan routes. A semi-structured questionnaire was introduced and issued to commuters who were randomly selected on their way to pick a taxi at their terminus. Collected data were analysed using IBM SPSS Statistics ver. 26. A Cruise taxi driver's level of education influenced time taken to pick and drop off passengers, commuting market choice and Saturday income (P<0.05). Passengers were found to be satisfied and willingly preferred using cruise ride taxis. Day of the week significantly influenced various parameters including breakdown expenditure, number of vacant seats and ranking time (P<0.05) with a toll on viability. The cruise ride business was inferred to be viable and efficient considering they earned more than other sectors of the economy and they sat on the average income earned across all sectors. The cruise taxis in the metropolis generated revenue of BWP 48 million per year. It is recommended the cruise taxi business embrace evolving technologies like e-hailing systems to enhance viability. This will enable real time data collection to analyse their business as well as comparing it at global level.

Key Words

Botswana, Shared ride, Cruise taxis, Economic contribution, Efficiency, Francistown metropolis, Preference, Vacant trips, Viability.

CHAPTER 1

1 Overview of the study

1.1 Introduction

Shared ride taxis are utilized virtually by majority of people all over the world including many groups and individual people of Botswana. The taxis are a great complement to larger and traditional public transportation system because of their capability to operate day and night, delivery service of door to door as well as their flexibility which was observed by Bailey and Clark (1987). The chapter will outline the background of the study, its problem statement, research objectives and research questions. It will further outline the significance of the study, its limitations and delimitations.

1.2 Background

The taxi system was outlined by Mulley and Nelson (2009a) as composed of Cabs, Cruise taxis, minibuses and pirate (discount) taxis. According to Fagnant and Kockelman (2018), just as practiced in Botswana, cabs wait for clients at a stand or get a telephone call, they are metered, and do not pick passengers on the road side. In Botswana they have similar number plates to private cars which are white (front) and yellow (rear). Cruise taxis as well as minibuses are identified with a blue number plate (front) and yellow (rear) in Botswana, Cabs are not statutorily enforced to undergo road fitness test as compared to cruise ride taxis during renewal of their license.

The disabled and elderly communities regarded as less mobile value the taxi system including the cruise ride system. More so, many different ranges of communities utilize taxi systems for example people who do not own cars, tourists, business communities as well as travelers who utilize them as back up form of transportation in periods of adversities like rain, transport break downs and civil strife. Employees who experience extended hours of work as well as those who work deep into the night find the taxi service useful.

Mini-buses in Francistown metropolis were the sole means of transportation between the city and suburbs as well as within. Minibuses were stated by Cervero (1999) to have a seating capacity of 16 passengers while the cruise taxis have 4 passengers. Nipha (2016) pointed out that mini buses take long to fill up than cruise taxis. Taxis charge more than mini buses by

BWP 1 on similar distance travelled in Francistown Metropolitan area. Mini buses' fare is BWP 4 per trip one way while cruise taxis fares BWP 5 for similar trips.

Substitution of 16-seater mini buses by cruise ride taxis poses an interesting scenario as the cruise ride taxis continued to implement the business model that was exploited by mini buses. As portrayed by Teal *et al* (1980) they depend on luck to pick up passengers flagging on the road-side. Minibuses employed a ranking system just like what cruise ride taxis are doing. Despite the differences in loading capacity and fuel efficiency, these modes of transport travelled similar distances. This leaves one wondering whether the cruise ride taxis are making business or the minibuses were profiteering.

Lin *et al* (2012) reported cruise ride taxis transporting commuters in the confines of business hours as well as night economy. They directly and indirectly generated business in the metropolis. A wider range of stake holders partake in regulating the taxi business as well as their components in order to ensure that cruise taxis operate smoothly, offering safety and appropriate service to commuters. Gholami and Mohaymany, (2012) noted the participants in this industry being licensing departments, taxi owners and drivers, networking providers as well as those supplying services and goods including oils and fuels, insurance, mechanics, component manufacturers among others. However, the direct contribution through fares in this research is of interest. The extent of direct economic contribution is not documented and quantified in Francistown metropolitan area.

Efficiency of cruise ride taxis in Francistown metropolis is also undocumented. The problem of scheduling vehicle and routing to enhance efficiency has been always associated with management of taxis as outlined by Jung *et al* (2014). Cruise ride operations that do not have restrictions and priority systems during operations were identified by Jung, Jayakrishnan and Park *et al* (2016) as routing problems, in this case one would be dealing with challenges associated with scheduling and routing. These challenges were found by Jung *et al* (2014) to be associated with issues of prioritizing tasks and time line limitations. Challenges of prioritizing task delivery as well as picking up and dropping of passengers were noted by Jung *et al* (2014) to get complicated when the same vehicle was used .

Cruise taxis can be efficient enough to satisfy passengers' customized requirements. Passengers have access to convenient, comfortable and fast trips. Cervero (1985) outlined that

taxis make available unloaded ratio that offers better options on already strained resources of the roads. When the riding service is spread wide like that, it should efficiently influence positive results (Gholami and Mohaymany, 2012). As noted by d'Orey, Fernandes and Ferreira (2012) proper organization, efficient management as well as right scheduling are elements required in achieving results in this shared ride business. The operating mode of the taxis signify demand responsive transit (DRT) (Cervero, 1985), its routing is a particular practical application of the cruise as well as dial a ride problem. The study seeks to establish efficiency of the shared ride cruise taxis in the metropolis as it is still a grey area.

The research will also studied the preference of Francistown metropolis passengers in utilizing cruise ride system. There is also lack of information on passenger preference in utilizing taxi system. d'Orey, Fernandes and Ferreira (2012) noted that passengers look forward to be picked efficiently with convenience, enjoying low transportation cost structures. Shorter passenger waiting time, convenience of the taxis, fare structure and safety are some of the parameters that drives intrinsic willingness of passengers to utilize the shared ride system. On the other hand, taxi drivers would opt to charge fairly as detailed by (Nelson *et al* (2010) at the same time making profits. This makes the objective of a passenger (low cost) and the aim of the taxi driver (profit) contrast. Appropriate route choice and efficiency is of dire importance in order to optimize cruise ride business. Viability and economic contribution of the shared ride cruise taxis is not documented, a paucity which is sought to be bridged buy this study.

1.3 Problem Statement

Transportation sector is a business which should generate revenue. People transportation in Botswana is made of various modes like buses, mini buses, metered and shared ride cruise taxis among others. Most of these modes of transport are treated as businesses with auditable financial statements. In the contrary, cruise ride taxis are largely, individually owned and operated without checks and balances. The business generated by cruise ride taxis is not documented either on a daily operational basis or in literature. For this business to be quantified, it is necessary to research and document its viability and economic contribution to Francistown metropolis. More so, people who purchase a fuel efficient car targets converting it to a cruise ride taxi. Documenting this business viability and market also assist aspiring entrepreneurs make appropriate investment decisions.

1.4 Research Objectives

1. To assess the efficiency of cruise ride taxi business in Francistown metropolis.
2. To examine the business viability of cruise ride taxis in Francistown metropolis.
3. To describe passenger perception on cruise ride taxi business in Francistown metropolis.
4. To determine the extent of direct economic contribution of cruise ride taxi business to Francistown metropolis.

1.5 Research questions

The current research was expected to address the following questions:

1. Is there efficiency in the way cruise ride taxis perform business in Francistown metropolis?
2. Is there viability in Francistown metropolis cruise ride taxi business?
3. What is the perception of passengers who utilize cruise ride taxi service in Francistown metropolis?
4. How much business does the cruise ride taxi business directly contribute to the economy of Francistown metropolis?

1.6 Significance of the study

Businesses are made and managed to generate revenue (Nelson *et al*, 2010). Profit making in business ensures continuity. Failure to understand the gains and losses is tantamount to business failure. Black ethnicity entrepreneurs thronging the cruise taxi business need information about its performance to be able to make informed decisions. There is a common phenomenon studied by Nelson *et al* (2010) that if one starts a certain small venture, every one follows suit which is currently happening as owning a taxi is taken as an achievement in Francistown metropolis. This business has not been dissected to outline its profit making ability and sustainability.

In Botswana, anyone can register his or her own car as a shared ride cruise taxi with the Ministry of Transport and Communication. It is very common for the residents to use fuel efficient cars as cruise taxis. The Ministry of Transport and communication formally acknowledge existence of the taxi through the registration process (Ofstad, 2017). A total number of 614 cruise taxis ply their business in the metropolis. It is not documented if the metropolis gets involved further in operational activities of the taxis to enhance their mobility

and operational efficiency because its involvement enhances performance of the cruise taxis. The research seeks also to generate information about involvement of Ministry of Transport and Communication in the business. Too, drivers of efficiency (Zhou *et al.*, 2015) of cruise ride taxis in the metropolis are not defined for example total driving time, pick up and drop off times as well as ranking times. The information generated will be used by cruise taxi drivers to review their performance. Local authorities will also be able to use the information in enhancing mobility of the drivers as they take an integral part in metropolis business.

Street hailing is a common phenomenon in flagging down a cruise ride taxi. A first come first service approach is practiced by drivers as they depend on absolute coefficient of luck described by Hosni *et al* (2014) to pick one especially when returning to the taxi stand. There are various factors affecting mobility of cruise rides including among others road surface conditions, traffic congestion, passenger waiting time, safety and convenience. These factors put together, it is not known if the passengers willingly prefer to ride the cruise taxis lest they are an only option. Documentation of passengers' preference to utilize the mode of transport is of significance to cruise ride operators. If the passengers are seem to be fed up, cruise ride operators will need to be more innovative and move in the direction of passenger interest. Local authority of the metropolitan area will be able to use the research information to prepare for passenger preferences. Local authorities use access to transportation sector as a tool to improve livelihoods as observed by Woolf and Joubert (2013). When the transport operates efficiently, as a prime mover of people and goods, its accessibility improves people's quality of life because the population gets access to services from their locality and beyond borders.

Nipha (2016), identified the most affected group by inefficient transport system as the low income bracket. This does not exclude the use of taxis by medium to high income group, in Francistown, all people are free to access cruise taxi service. The findings of the study could be a stimulating factor for the government to assist (Fagnant and Kockelman, 2015) a black dominated enterprise to uplift standard of life for its citizens.

1.7 Scope of the study

The study focused at Francistown metropolis' cruise taxi business. Viability of the business was examined as suggested by Santi *et al* (2014). Another scope was to determine if the passengers were satisfied with the service so that they willingly prefer to continue riding. Of

note was the direct economic contribution of the business to the metropolis and its efficiency. The study however did not dwell on other modes of transport and the influence of demography on other psychographic variables.

1.8 Limitation of the study

The study was done through administration of semi-structured questionnaires to shared ride cruise taxis and passengers. Authenticity of respondents could not be verified when respondents completed the questionnaires. That suggests possibility of bias which could dent reliability of the study.

1.9 Delimitation of the study

The geographical location of the research as required by Ofstad, (2017) was Francistown metropolis in Botswana. Francistown is the capital of Northern Botswana, which is 400km North East of the capital city Gaborone. It is situated at the confluence of Inchwe and Tati Rivers that lies in proximity to a tributary of Limpopo called Shashe River. The metropolis is 90km from the international boundary with Zimbabwean Republic. Its GPS Coordinates are $21^0$10'25"S $27^0$30'45"E with an elevation of 1.001 meters above sea level.

The study was conducted by administering questionnaires which were semi-structured in line with the approach of Nipha (2016) during the study of South African taxis. Some questions required scoring which were developed using Likert type scale Gan *et al* (2013) where '1' represented disagreeing strongly, extended to '5' which represented strongly agreeing. Taxi drivers were part of target population as principal hour-in, hour-out movers of people through their automotives. Passengers were interviewed as outlined by Martinez, Correia and Viegas (2015a) to describe their level of satisfaction with the cruise taxi service as well as their preference to continue using the mode of transport.

The Ministry of Transport participated in outlining their roles in cruise ride taxis where they register them and enforce the traffic act. They were not involved in any way of facilitating the cruise taxis' conduct of business. A total of 100 cruise taxi drivers and 100 passengers were interviewed. Taxi drivers interviewed made 16.29% of the total (614) taxis in the metropolis. The data thus collected were subjected to descriptive statistical and other analyses including

Chi-square tests using the IBM SPSS statistical package in a way proposed by Palinkas *et al* (2015).

1.10 Summary

As demonstrated in the chapter, transport sector is a vital organ in many economies because it is a prime mover of goods and services. The chapter was introduced outlining the public transportation industry in Botswana and later gave a background to the study. The problem statement was generated focusing on undocumented viability, efficiency, passenger preference and direct economic contribution of the cruise ride taxis in Francistown metropolis. The scope of the study and the limitations were outlined. The key limitation was authenticity of respondents as responses were not verifiable due to lack of documentation in the cruise ride taxi business as well as honesty of respondents. Delimitations to the study were presented indicating area of study, target population, administrations of questionnaires, number of taxi driver and passenger respondents as well as subjection of collected data to SPSS for analysis.

CHAPTER 2

2 Literature Review

2.1 Introduction

People rely on taxis for leisure, social and business purposes, among various uses they can be put to according to Nipha (2016). Taxis are a convenient and indispensable mode of transport for short distances in the cities, Gan *et al* (2013) highlighted they are accessible easily and tend to be comfortable than other modes of transport. Taxi business as portrayed by Glazer and Hosni *et al* (2014) forces taxi operator's key objective being maximization of revenue. Extensive research has been however done in different parts of the world pertaining shared ride efficiency, income levels, and other parameters (Cramer and Krueger, 2016; Gan *et al,* 2013). Despite these studies, research on the performance of shared ride taxis with reference to viability and economic contribution in Francistown metropolis has not been done.

Variability of business performance is determined by factors like infrastructural development, population and its spatial distribution among other factors. A survey of academic documents will be carried out in this chapter in order to give an overview of earlier studies. Key developments in the spheres of research problem, findings and concepts will be over viewed. The research problem is approached to evaluate economic contribution, and viability of the cruise ride taxis. It also goes on to evaluate preference of the passengers in utilizing the cruise ride.

2.2 Theoretical Framework

Douglas (1972) was the first researcher who focused on taxi business. The researcher looked at taxi market where taxis were hailed anywhere on the streets. The taxis were dispatched by relevant authorities at a specified fare. Using the Aggregate Supply and Demand Theoretical model, he theorised that maximum income was achieved by taxis where demand was not maximum. Douglas (1972) characterized social welfare as the best performing, but with deficit equilibrium. He demonstrated that when social welfare was utilized, taxi points showed maximized number of active taxis hours. The aggregated theory was later improved to cater for different types of markets (monopoly and competitive) as described by Salanova *et al* (2011) where fares and entries were regulated or not. The aggregate model in monopolistic taxi system states maximization of total benefits while in the competitive solution, the owner targeted to maximize own benefits. The aggregated theory emphasize that prices which are

efficient minimizes output and any increase in regulated pricing potentially enhance capacity in a competitive market than monopolistic one. In an unorganized taxi industry, price is not regulated by market, it increases without resistance thereby reducing utilization rate of taxis. When prices are fixed in a monopolistic situation, lower output is achieved compared to competitive markets. Chang and Huang (2003) did some work to expand aggregate models to optimize empty seats and fares. Chang and Chu (2009) pursued Chang and Huang's 2003 study this time utilizing a generalized model with their objectives set at welfare maximization averting the elasticity constraint. The model analysed, and was able to optimize empty seats and fares charged. Some of the Aggregate supply and demand theoretical models assumptions considers the relations between waiting times, vacant taxi hours, hourly operational costs, demand and passenger waiting time. The research leans on the Aggregate Supply and Demand theoretical model because it suits the study better than Equilibrium models.

2.3 Conceptual Framework

The framework of the research is similar to Yang *et al* (2010) which dwells on the urban taxi movement just like Francistown metropolis. The framework considers **I** and **J** as passenger origins and destinations respectively (fig1) and **K** is considered as meeting point for passengers and taxis. The framework considers meeting point to be anywhere on the street of either commercial or residential areas, taxi rank or stand.

A passenger who initiates a journey of **I**2***l*** (fig1), will have to trek to **k**2**K**, to get a taxi, then travels to **j**2**J**, by a taxi. A taxi that picks a passenger from **k**2**K** meeting point, will travel to passenger destination **j**2**J**, via the shortest route. The taxi becomes vacant after delivering the passenger and then chooses a meeting location to pick the next client. A taxi that is occupied travels on solid line of the schematic diagram while vacant one use broken lines linking nodes **j**2**J** and **k**2**K**. The schematic diagram accommodates chances that the customer may originate closer to the taxi-passenger meeting place and or may coincide with another client's destination. A node becomes an origin and a destination as well as a meeting location. Some dummy nodes can be added as necessary to isolate the issues like where origin, destination and meeting point occurs at once.

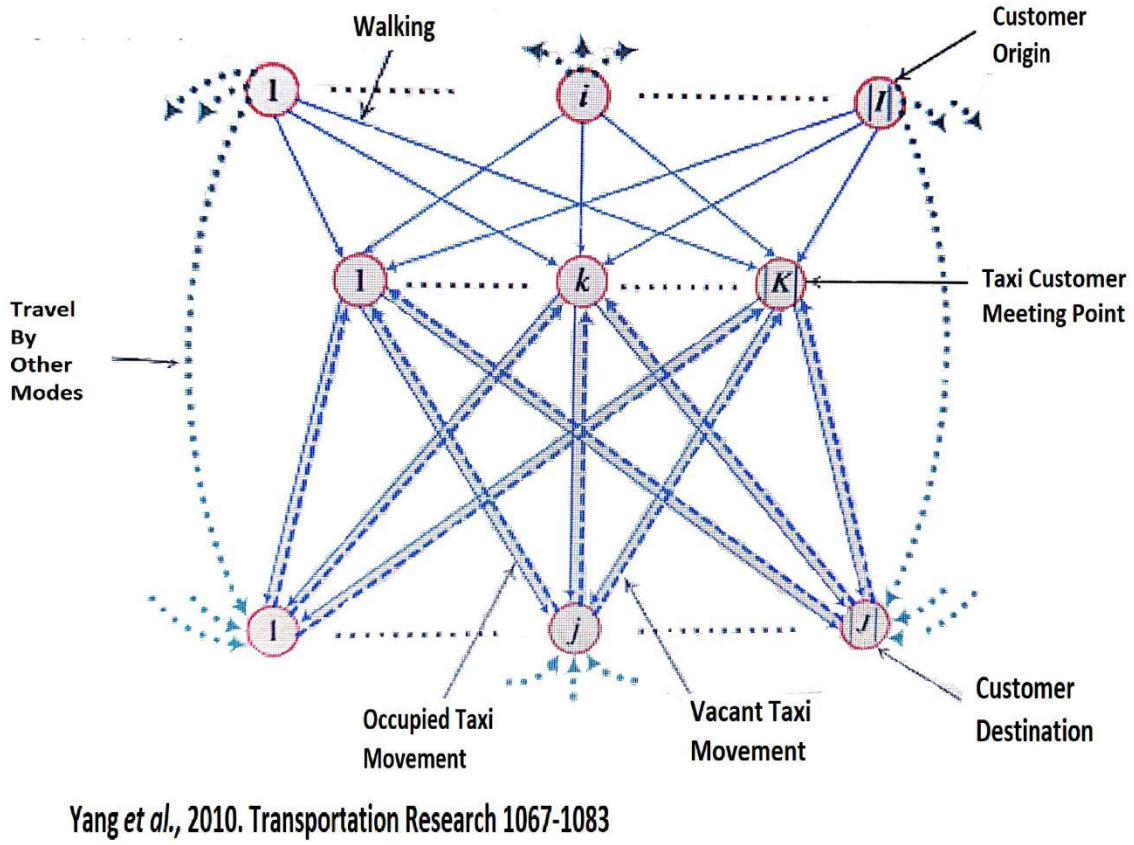

Figure 1 Conceptual framework for the cruise ride taxis

2.4 The link between Objectives, sub-objectives and the sub-questions

Table 1 outlines the relationships between objectives, sub objectives and questions in effort to understand the linkages in a manner the researcher views them.

Table 1 Objectives, sub-objectives and sub-questions link

	Objective	**Research Questions**
Efficiency	□ To determine efficiency of cruise taxis in Francistown metropolis and identify its important drivers.	□ Are cruise taxis efficient? What factors determine their efficiency?
Viability	□ To establish if the cruise taxi business is making money, outline factors underlying profitability of the venture.	□ Is the cruise taxi business profitable? What is it that drivers should observe to be viable? How is it comparable to other forms of employment?

Preference	To determine willingness of passengers to use cruise taxis	Do commuters prefer cruise ride taxis? If they do, what are the reasons? Do they find cruise taxis convenient?
Economic contribution to the metropolis	To find out the size of revenue generated by taxis in the metropolis which contributes to GDP.	How much do taxis generate as income per day, month and per year?

2.5 Viability

In many ways, Glazer (1982) demonstrated that the fare for a shared ride taxi is a function of the length of the trip. A taxi operator can enhance daily collections by taking a circuitous rather than direct routes. Cramer and Krueger (2016) went on to outline that economic viability of shared ride taxis can be affected by excessive statutory regulations. Regulations are implemented by governments to enhance consumer safety and operational controls. Koehler (2004) further explained that taxi regulations started as early as the 1960s. Regulations in many regions, among other stipulations, allocate areas of taxi operations restricting them to pick outside the areas of jurisdiction according to Cramer and Krueger (2016). This increases empty trips eventually affecting daily income. As examined by Koehler (2004) taxi economic regulations zeroed on fares, quality and quantity but did not dwell on the business as an entity to establish its viability which is sought to be addressed by this study in Francistown metropolis.

Studies by Gan *et al* (2013) in Beijing stated that taxi fares are calculated based on distance travelled which remains in force for that day. This is in contrary to a study done by Koehler (2004) in London and USA taxi sectors as well as Li (2006) in New York taxis where prices were state regulated, a situation similar to what is happening in Francistown metropolis regardless of distance travelled. In China, in the presence of high demand, and fare structure, price was observed by Gan *et al* (2013) to be distance based. However, during peak hours characterized by slow traffic, some taxi drivers were seen by Gan *et al* (2013) choosing to stay put because operational costs threatened viability. Some research has been covered by Gan *et*

al (2013) in determining equilibrium of taxi market in different parts of the world and cannot represent Francistown metropolitan area. The scope of operations and regulations differs between countries. Botswana utilizes different types of taxis which are either metered or not (cruise ride). Yang *et al* (2005a) in another study sought to establish taxi market equilibrium under traffic congestion but did not include the bigger picture of its viability because at the end of the day it is how much business the shared ride taxi accomplish that enable it to operate the next day. Another study was done by Yang *et al* (2005b) looking at the market of taxis putting to perspective its variance throughout the day.

The viability of the taxi business was not considered in the study. Gan *et al* (2013) went on to propose attachment of incentives for taxi drivers that worked during the rush hours as has been adopted in other countries. The approach was intended to enhance driver efficiency which ultimately increase daily income, the study did not dwell on the viability of the business as a whole. The optimal pricing system for multiple periods as driver-incentive proposal by Gan *et al* (2013) is not applicable in Francistown metropolis because the fares are stipulated by the state. In order to have a better viability assessment of the shared ride cruise taxis, it is necessary to use the fares as charged in Francistown metropolis which is the approach taken by this research.

In New York City, Li (2006), noted taxis drivers earning USD 158 (BWP 1731) per shift after settling a lease, fuels and consumables. A shift constituted 10 hours of work per day covering 210 km. For the same year, in another study Kamga *et al* (2013) separated owner-drivers as earning USD 220 (BWP 2410) and leasing-drivers earning USD 150 (BWP 1643) per day after expenses. It would be ideal to undertake a research and establish the viability of the cruise ride taxis which dominates our Francistown metropolitan area.

2.6 Economic Contribution

Koehler (2004), in discussing regulation and deregulation of taxi industry, outlined that the deregulated taxi markets charged higher fares than regulated taxi markets. Koehler (2004) went on to summarize revenue annually generated by European taxis as tabulated.

Table 2 European Annual revenue per taxi in Euro

Country	Revenue per taxi in Euro
Denmark	100,000
Sweden	85,000
Netherlands	45,000
France	56,000
United Kingdom	40,000
Belgium	25,000
Germany	25,000

Adapted from Koehler (2004)

The money earned per year ranged from 25000 Euro (BWP 301,476) to 100 000 Euro (BWP1, 206, 113). Li, (2006) pointed that even though taxis charge higher than other modes of transport, and working more than 10 hours a day, they struggled to earn a sustainable income. New York City taxis as alluded by Li (2006) annually moved 200 000 000 passengers, covering a distance of 100 000 000 kilometres per year and most importantly contributed $1 000 000 000 in revenue to the city. The drivers earned USD 158 per shift after paying for fuel, consumables and lease. In the same city, taxis remained available 24 hours (Li, 2016) a day although supply of taxis was more than demand of passengers exhibited by vacant trips. These economic situations and contributions leaves one wondering how much is the local shared ride cruise taxi generating in Botswana and particularly Francistown metropolitan area. Koehler (2004) bemoans taxi turnover in many countries as unavailable which applies the same to the study area. On the other hand Li (2006) noted that in New York, drivers made a mean of 30 trips per shift serving about 42 passengers who paid a fare of USD 10.34. Kamga *et al* (2013) observed a double price structure (USD 20) per hour in temporary and weather related variations including Friday and Saturday evenings, drivers were observed to end their shifts after earning income targets.

2.7 Passenger preference

Rong *et al* (2016) researched on the driver's decision making process and regarded it as one of the key components in improving shared ride efficiency and profits. Li (2006) identified taxi fleet size, hot spots and passenger concentrations as important attributes in determination of taxi efficiency. Rong *et al* (2016) only put passenger distribution in to perspective in taxi

mobility to maximize driver profits. The passenger distribution in question was centred on historical data without interacting with the clients which makes a difference from this research. Li (2006) did some work on passengers covering all modes of transport but in the United States of America, despite big scope of taxi business, argued that taxi service is regarded as the least preferred mode of transport. They ranked 6.2 satisfaction level on a scale of 1-10 (1 being least preferred and 10 being extremely preferred. Li (2006) went on to outline passenger issues as difficulties faced by passengers in hailing them when needed, queried value for money, safety, operator impoliteness, and poor driver knowledge of city geography. Verma *et al*, (2015) studied on augmenting taxi driver's decision making process through Reinforcement Learning for Improved Revenues. The author focused on the driver side and did not dwell on the passenger's intrinsic preference for the cruise taxis studied.

The studies by Li (2006) interacted with passengers to determine their satisfaction levels with the taxi system in the United States. The operational environment in USA is quite different from Francistown metropolis considering that the USA had already sub way trains, 24 hour taxi service and bigger population. This makes it appropriate to determine and describe passenger perception and preference of particularly cruise ride taxis in Francistown.

2.8 Efficiency

Rong *et al* (2014) acknowledged that improvement of taxi efficiency is imperative in societies as it directly enhance driver's revenue, reduce fuel consumption as well as gas emissions. As outlined by Cramer and Krueger (2016) and Rong *et al* (2016), efficiency of shared ride taxis is assessed by a segment of the time a fare paying passenger is aboard. Rong *et al* (2016) outlines that efficiency can also be determined by the fraction of mileage travelled by the driver with a paying passenger inside. Efficiency is relatively influenced by people movement and ease of shared ride taxi movement.

In some shared ride systems as stated by Cramer and Krueger (2016), taxi drivers had paying passengers in their cars at an average of 30 - 50% of their working time depending on their cities of operation. These findings are similar to Li (2006) who observed 61% of taxi mileage spent on passenger transportation in New York taxis. In shared ride systems that used mobile applications, UberX had better efficiency compared to taxis. When using time and mileage to measure capacity utilization UberX was 30% and 50% higher respectively than Taxis (Cramer

and Krueger, 2016). Taxi licensing regulations were suggested to have effect on the efficiency of taxis as they could not make business in areas outside their jurisdiction. It was also outlined by Cramer and Krueger (2016) that population density affect efficiency, densely populated areas support high efficiency than sparsely populated areas.

Traffic congestion too, costs efficiency. Gan *et al* (2013) observed in Beijing that most taxi drivers intentionally avoided working in peak hours because they consumed more fuel and time even if there was high taxi demand. Gan *et al* (2013) went on to notice passengers waiting for taxis for as long as 2 hours during the peak hour, ended up switching to unlicensed taxis which charged them more. Since the fare was flat throughout the day, the costs associated with congestion were not adjusted for peak hours. Gan *et al* (2013) suggested incentives to taxis that operated during peak periods which is in contrast to previous studies by consideration of variation of market on different times of the day and scheduling challenges as drivers made profit decisions.

Kamga (2013) observed a pattern of taxi occupancy throughout the week. Occupancy during the week averagely stayed the same increasing on weekends with Saturday being the busiest. It is ideal to study efficiency of cruise ride taxis in the environment of Francistown metropolis and generate information that will be utilized as benchmark by the same cruise ride drivers as well as interested stake holders.

2.9 Conclusion

Literature review chapter was introduced outlining the roles played by shared ride cruise taxis. A theoretical frame work was described where the Aggregate Supply and Demand theory was used at the expense of Equilibrium theories because of its suitability to the study. Conceptual framework was discussed showing mobility of taxis and passengers in a city that is akin to the research proposed. Literature was pursued in objective areas namely viability, efficiency and economic contribution of the shared ride cruise taxis as well as willingness of passengers to use them. The literature review was utilised to discuss the findings of earlier research in the subject matter.

CHAPTER 3

3. Research Design and Methodology

3.1 Introduction

The methodology chapter details procedures of the study which sought to determine the viability, efficiency and economic contribution of cruise ride taxis in Francistown metropolis. The methods employed were also intended to describe the preference of passengers in utilization of the shared ride taxis. The chapter focused on research orientation, research design, and data collection procedures. Key concepts employed in the research (mobility, accessibility, transferability, transport efficiency, viability and preference) were described in the scope of the research.

The site of research was described, its population characteristics as well as study population. Data collection procedures were dealt with as well as the analysis. The chapter proceeded to outline credibility, transferability and dependability of the research.

3.2 Research Orientation

One of the research focus area was to assess viability as stated by Ooms, Werker and Hopp (2018) of the cruise ride taxis in the metropolis. The research went on to focus on the efficiency of the cruise ride taxis. Efficiency was deduced from aspects like passenger pickup and drop off times as well as earnings per kilometre. The study focused on passenger preference to continue utilizing the cruise ride taxis and the contribution of the taxis to Francistown metropolis. The respondents in the research were passengers, cruise ride taxi drivers and the Ministry of Transport and communication.

3.3 Research Design

A survey was implemented in the research for the viability and economic contribution of taxis in the metropolis. Taxi efficiency and passenger preference were covered in the research through the same questionnaire administered in Francistown metropolis case study.

3.4 Interview - Individual

The interviews were conducted with the aid of semi structured questionnaires during data collection. The ministry of Transport and Communication, passengers and cruise taxi drivers formed the target population described by Taylor *et al* (2015) in a similar study. Respondents provided their opinions and experiences as well as their ideas probed by the questionnaires.

3.5 Key concepts definition

Concepts central to the research were defined. The definitions outlined the author's perspectives about the concepts.

3.5.1 Accessibility

Accessibility refers to the easiness the passengers get and ride a cruise taxi from their dwelling place resulting in "the ease with which any land-use activity can be reached from a location using a particular transport system" (Geurs and Van Wee, 2004). Easily accessible transportation enhances the quality of life as well as individual's wellbeing.

3.5.2 Mobility

Mobility can be defined as the ability to move between points relatively easily. Mobility is directly related to capability of development of an area in the long term. It is a vital requirement for groups and even individuals in reaching crucial nodal points, opportunities of economic development, communities, and social facilities as well as other dwellers that affect social networks and livelihoods.

3.5.3 Transport efficiency

Li, Gartner, Technische and Huang (2017) defined transport efficiency as the capability to travel between points relatively easily observed on stipulated time frames cognizant of other operational factors that influence it. As stated by Li *et al* (2017) "similar to any social service, efficiency and performance measures in public transport are necessary to monitor progress toward a result or goal".

3.5.4 Viability

This is economic feasibility influencing capacity of the cruise taxis to secure finance from financial institutions which can be public sources, commercial banks and financiers or concessional resources. Remarkable ventures are profitable and have an impact which is positive to the environment and society. Cruise ride taxis are a form of business that is people centred, Woolf and Joubert (2013) noted that they serve the interests of the people before anything else.

3.5.5 Preference

It is imperative to understand passenger preferences so that their behavior can be understood. The author considered utility as a pivot in passenger preference. Utility is the total psychological satisfaction a passenger gets from the shared cruise ride service.

3.5.6 Economic contribution

The cruise taxi business directly contributes to the economy of Francistown metropolis. The research considered the monetary contribution through fare structure into the metropolis. Other forms of indirect contribution like fuel, oils, purchase of spare parts, and manufacturing industries were not covered in the study.

3.6 Sampling Technique

Random sampling technique was employed in the research. Randomly approached respondents were allowed to consent and participate in the interview if they had used cruise ride at least once. Such a respondent were able to provide sufficient information as required by the research (Plowright, 2011; Coyne, 1997). Cruise ride taxi drivers were also randomly selected and interviewed with consent. One key official was approached for interview pertaining the roles and responsibilities of the Ministry of Transport and Communications in the affairs of the cruise ride business.

3.7 Site and Population

The study was done in Francistown metropolitan area. The city was founded and named after an English prospector called Daniel Francis in 1897. The Liverpool English man had prospecting rights as early as 1869. Francistown metropolis is situated 21.17° South latitude,

27.52° East longitude and 1001 meters altitude. Francistown is Republic of Botswana's second capital city which is always dubbed the capital of the North. It lies 400km North East of the capital of Botswana - Gaborone. It sits at the confluence of Tati and Inchwe rivers. It is close to a tributary of Limpopo River called Shashe River. Farncistown is 90 km from international border with Zimbabwe.

Francistown's last known population was 99 000 inhabitants (year 2011). This was 4.736% of Botswana's total population. If population growth rate remained the same as 2001-2011 (+1.77%/year), Francistown population in 2019 would be 113 888 (Botswana Statistics, 2011). Francistown is located along Botswana's key rail, road and air network. A railway line links Bulawayo and Harare in Zimbabwe through Ramokgwebana border and links Kazungula, Kasane and Maun. Mining, commerce and agriculture drive the economy with government and private sector benefiting the economy. The city has diverse religious beliefs and worships as well as diverse education including private and public at primary, secondary or tertiary levels.

Semi-arid climate dominates the city characterized by mild winters and hot summers. Average rainfall is 460mm per year spanning from December to March experiencing a long dry season of 8 months.

3.8 Study Population

People of Francistown metropolis made up the study population, they utilize the cruise ride every day as passengers or taxi owners. The metropolis has 614 taxis of which 100 taxi operators were interviewed. A total of 100 passengers were also interviewed. The ministry of transport also participated during administration of a semi structured questionnaires, they outlined their involvement in the cruise ride business. There was no limit to data collection during the period of study.

3.9 Sampling Criteria

It was imperative to approach respondents randomly and interview those who consented and had utilized the cruise ride at least once thus possessing required characteristics needed in the study as alluded by Martínez-Mesa *et al* (2016). Passengers who were not interested in participating were allowed to go. The taxi operators were randomly selected and approached. Through coordination with their rank marshals, they participated with enthusiasm. The

principal officer at the ministry of Transport and communication was interviewed to detail the involvement of the department in the cruise ride business.

3.10 Data Collection procedures

Data were collected through administration of a semi-structured questionnaires (Martínez-Mesa *et al,* 2016) posed on one-on-one interviews. The questionnaire was introduced to respondents assuring them of anonymity and that the questionnaire was for the purpose of study, encouraging them to respond as honestly as they could.

3.11 Interview guide

To assist manage interaction between interviewer and interviewee an interview guide recommended by Martínez-Mesa *et al* (2016) was developed. The interview guide assisted the interviewer to pose questions, sequence and follow them up.

3.12 Data analysis procedures

Data were analysed using IBM SPSS Statistics ver. 25 through descriptive statistics, correlation analyses, cross tabulation and χ^2 tests similar to Naji *et al* (2017) approach. Average of all incomes were computed (Suriarachchi and Pallickara, 2015) and used to reflect on income collection per kilometer. All statistical computations were conducted at 5% level of significance.

3.13 Credibility

In the stages of study design and the implementation of the research, it is imperative that all researches should bring in, and ingratiate strategies and plans to enhance credibility as emphasised by Coyne (1997).

To enhance reliability and validity, the strategies discussed were implemented. The study accept possibilities of biases stated by Baxter and Eyles, (1997) in the process of data collection from respondents because there were no ways of authenticating their responses. However there were some questions which were responded to by a negligible number of taxi drivers. They were discarded to enhance the validity of the findings. Data were grouped as done by Shenton

(2004) and subjected to statistical analyses where correlations were computed and significance tested at 95% confidence interval.

3.14 Transferability

The research findings can be related to other contexts. The degree to which it can be referred is transferability defined by Harrell (2015). In this thesis, readers are expected to study and note specific research methods and details and transfer them to situations they are familiar with (Thomas and Magilvy, 2011) getting similar out comes. Specific checks implemented in the research were however developed to enhance transferability.

3.15 Dependability

According to Riege (2003), efforts to ensure the research is credible makes the findings consistent and repeatable. The way a research is conducted and analysed measures dependability. During the study, every research process was systematically presented in detail so that any researcher should be able to validate by another parallel research, finding similar outcomes and inference as mentioned by Morse *et al*, (2002). Statistical analyses made are dependable and repeatable.

3.16 Ethical Considerations

Respondents in the study participated willingly (Koch, 2006). Respondents especially passengers who were not willing to participate were freed. The interviewer introduced the questionnaire outlining the purpose of the research and seeking consent so that respondents give their opinions from an informed point of view as idealised by Martínez-Mesa *et al* (2016). It was necessary that respondents understand the research was academic so that they respond honestly. During and after an interview no names or coding of respondents were used on questionnaires, they remained anonymous in the manner suggested by Plowright (2011).

3.17 Summary

The research orientation was on viability, efficiency and economic contribution of the cruise ride to the metropolis of Francistown. The key concepts were defined. The site of study was described including its population and the study population. A survey was implemented in data collection procedure that was randomly administered through a semi structured questionnaires

to 100 cruise ride taxi drivers and 100 passengers. Data analyses procedures were outlined, it was subjected to SPSS for determination of correlations, associations and chi square. Credibility, transferability and dependability of the data was discussed as well as ethical considerations during data collection.

CHAPTER 4

4 Presentation of results and discussions

4.1 Introduction

The chapter presents data generated from the research that were analysed and interpreted. It starts by descriptive analysis where results were graphically presented. Data on drivers' experience, insurance cover, types of cars purchased and preferred among others were presented. Passenger demography, frequency of riding, preference to ride and passenger waiting time were graphically presented. Efficiency and preference were determined through χ^2 tests with 5% level of significance. Level of education and driving experience were tested against time spent picking and dropping passengers among other parameters. Correlations were computed to assess viability.

4.2 Descriptive Analysis

4.2.1 Drivers

The sample population constituted majority of taxi drivers of 31-40 years (70.7%) while an age group of 18-30 years followed with 18.2%. Age group of 40-50 years made up to 10.1% while, surprisingly, 1% was made of 51-60 years of age.

The majority (98%) of the taxi drivers were black and a few did not complete their ethnic race. The sample population captured data from 79.4% of drivers being full time drivers and 20.6% being part time drivers.

It is interesting to note that there were taxi drivers who committed their lives to the business (Fig 2). About 36% of the sample population wanted to drive forever while near majority still wanted to drive for more than a year, seeing how the business perform. Drivers who postulated a short service time of 4-6 months constituted a negligible number while those who still thought they would push for a year stood at low numbers (Fig 2).

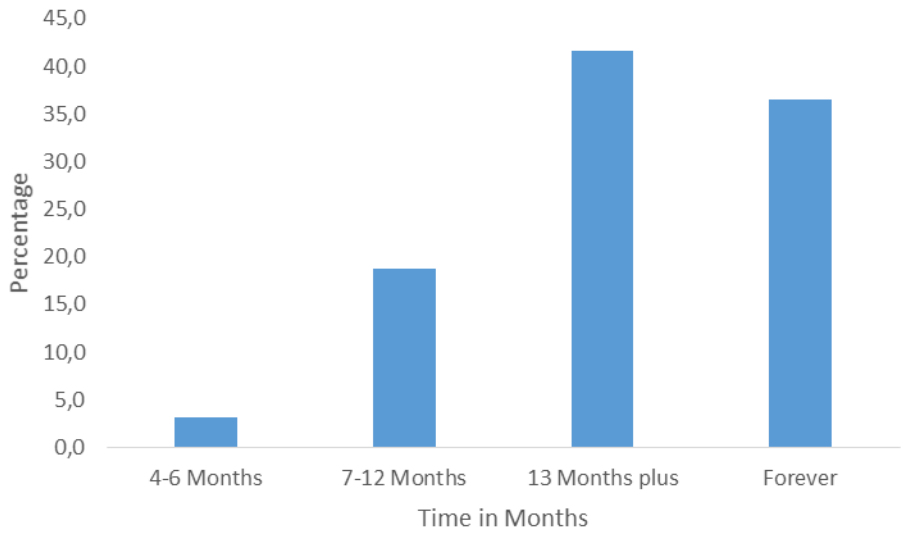

Figure 2. Expected time of continued taxi driving

4.2.2 Insurance Cover

It was appalling that taxi business was operating with the majority not insured (82.1%). A small proportion of taxi drivers (15.4%) was covered by insurance while 1% did not know whether they were covered because they were employees. The majority of the drivers (54.5%) did not know what insurance was all about. Only 13% were knowledgeable while 13.6% were very knowledgeable. On the other hand, Taxi drivers to the tune of 84.5% did not have health insurance cover while 15.5% had.

4.2.3 Car type bought

Cruise taxi entrepreneurs were able to generate business enough to increase their fleet. Fuel efficient cars dominated (Toyota Corolla, 25%, Toyota RunX, 24%) the purchases with Honda Fit topping the choices 51% (Fig 3).

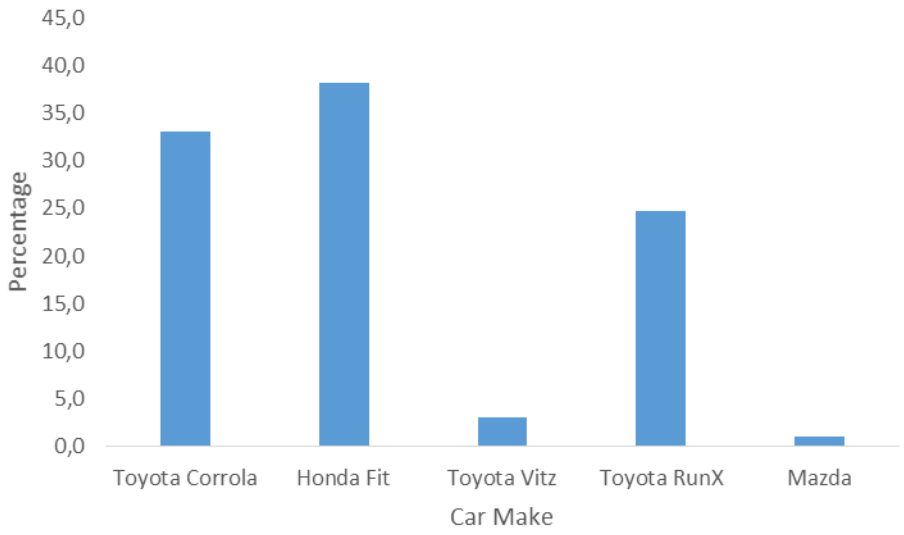

Figure 3. Preferred car makes by taxi drivers

There was a propensity to prefer semi compact cars that were fuel efficient. By makes, Honda Fit topped the preferred cars with 38.1% followed by Toyota Corolla (33%) while Toyota RunX was a third preference with Mazda make being least preferred.

4.2.4 Taxi driver's level of education

The highest level of education among taxi drivers was popularly high school 73.6%. Due to unemployment, 21.8% of the drivers have been to college and attained a Diploma or equivalent, and of interest, 3.4% of the taxi drivers were degreed. It was noted that 66.3% of the drivers were entrepreneurs driving for themselves while 30.6% were employed. Only 3.1% were hire-purchasing the taxis. Drivers valued safety first than anything else, making money was their second priority and efficiency did not matter much to them.

4.2.5 Ranking time

The majority of the taxis (79.3%) spent between 30 minutes and 1 hour at the taxi terminus waiting for a turn to pick a full load (Fig. 4). Some drivers (11.5%) consumed 30 minutes and under to make a full load at the terminus. The terminus was controlled by the rank Marshall who ensured taxis joined a queue and pick passengers in an orderly manner.

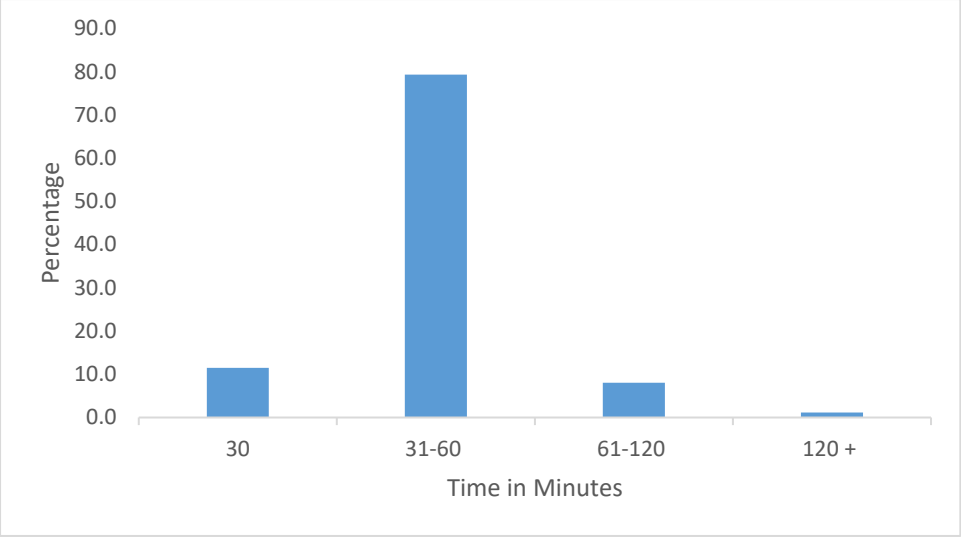

Figure 4. Ranking duration

4.2.6 Uber Knowledge status

Despite that Uber and Lyft are taking the taxi industry by storm world wide, 98.2% of the taxi drivers did not know anything about Uber. This was further supported by 95.1% who did not know if the Uber oriented taxi business would work out in Francistown. The taxis that were individually owned were individually serviced and those with owners separate from drivers were owner serviced.

4.2.7 Passenger gender

The sampled passengers composed of 70.8% females and 29.2% males.

4.2.8 Passenger demography

Passengers interviewed were all of black ethnicity, in the age groups of 31-40 years (44.2%) as well as 18-30 years (43.2%) as shown in Fig. 5. Majority of the passengers (67%) had used the taxis at least once, 19% had used them for more than 51 times while 12% had 6-10 time rides.

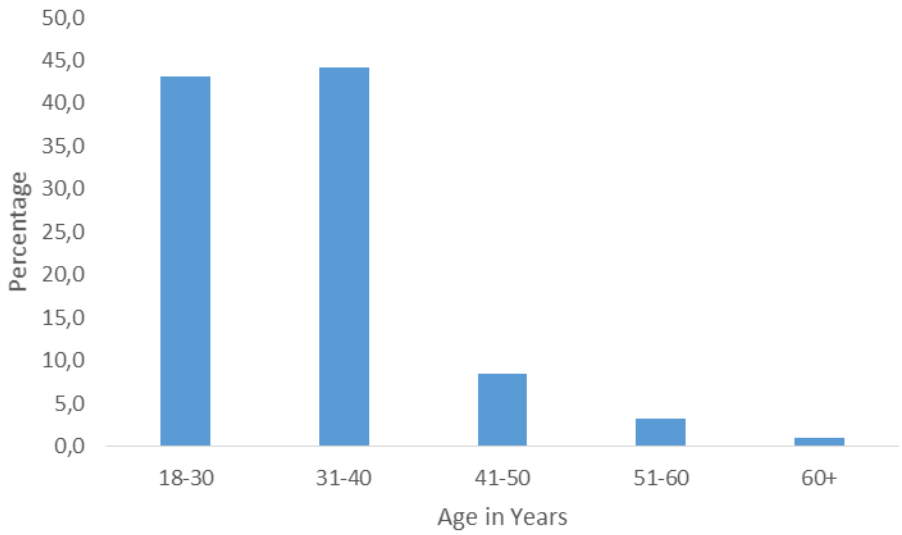

Figure 5. Passenger demography

4.2.9 Reasons for continued use of cruise taxis

The passengers who preferred to continue with shared ride did so because it was the only option (42.6%) and it was affordable (40.4%) as indicated on Fig 6. The preference was not based on customer service (2.1%), nor door to door delivery potential (6.4%). Street hailing was predominantly done (96.9%) where a passenger stood by the road side to flag down an approaching cruise taxi. There were unique circumstances where one would pick a call to hire a cruise ride taxi.

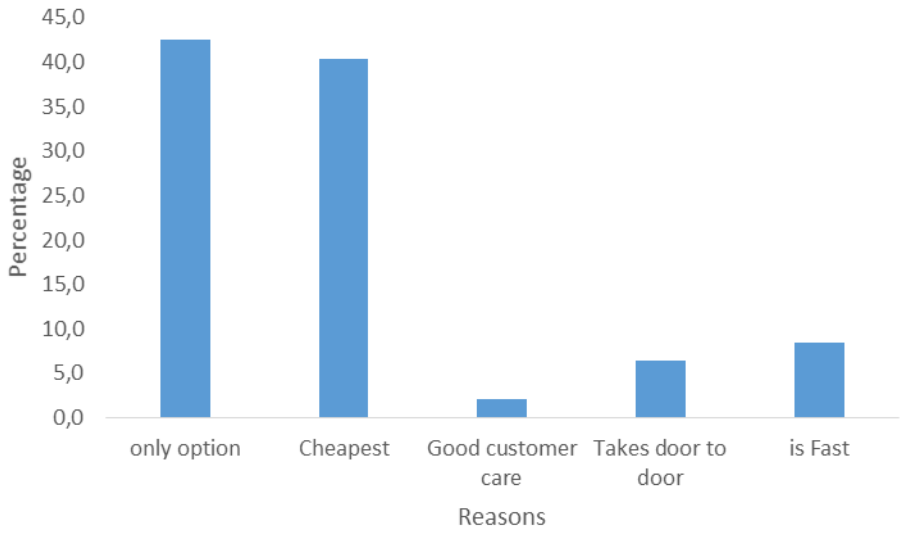

Figure 6. Reasons for continued use of cruise taxis

4.2.10 Taxi passenger waiting time

The taxis cruised up and down the streets and took normally 6-10 minutes (59.4%) and 0-5 minutes (20.8%) to get one (Fig. 7). Some passengers (16.7%) however waited for an average of 11-20 minutes.

When the taxi pulled off the road, within 30 seconds, 55.7% of the commuters jumped in to the taxi for a ride while 28.9% took 31-60 seconds to get in (Fig 7). A smaller proportion of the interviewed passengers (15.5%) took more than 60 seconds to get in the taxi. The majority of commuters (56%) jumped in to any taxi for a ride while 43.2% preferred certain vehicle makes.

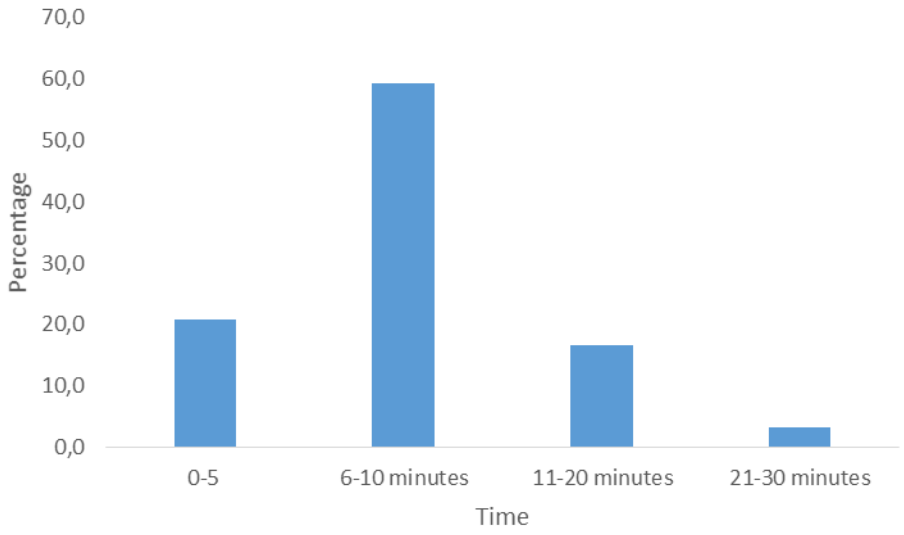

Figure 7. Passenger waiting time

4.2.11 Passenger reasons for choosing specific taxi

The reason why commuters inclined to prefer certain makes of taxis (43%) was due to their ability to drop them door to door (Fig. 8). Taxis of choice were also associated with good customer care (19.5%). Some taxi makes were known for fast driving such that 12.2% preferred them.

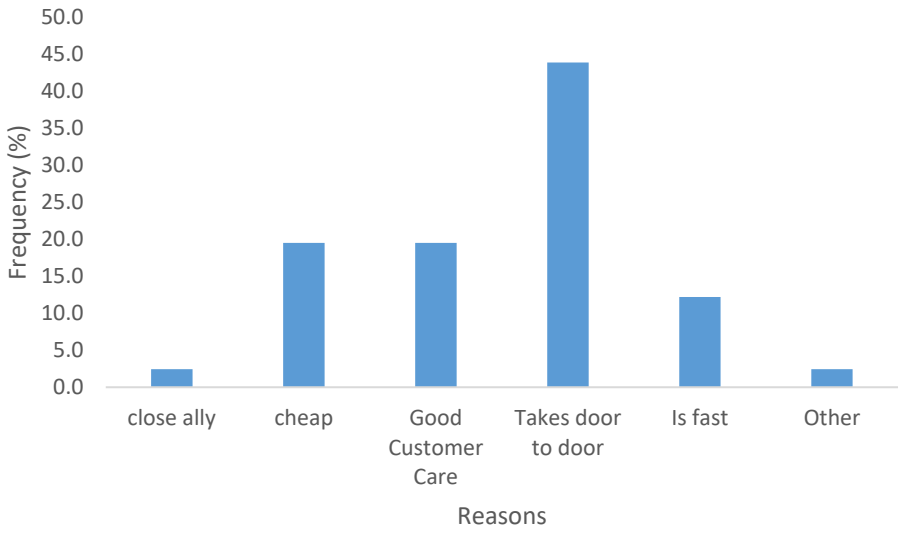

Figure 8. Reasons for passengers to prefer a certain make of taxi

4.2.12 Preferred car make

The most preferred cruise taxi make was the Toyota Corolla (49%), followed by Honda Fit 29.2%, whilst the least preferred was the Toyota Vitz (3.1%) as shown in Fig.9.

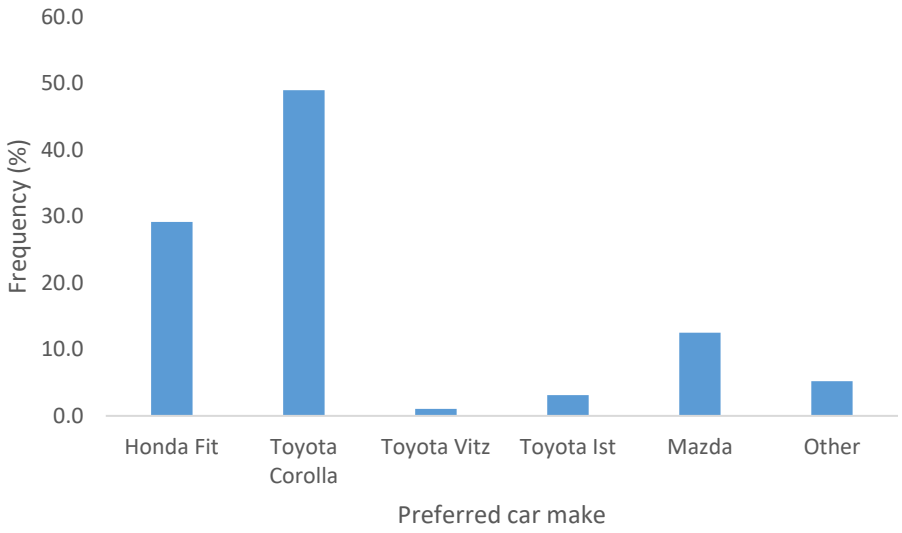

Figure 9. Preferred car make by passengers for cruise taxi riding

4.2.13 Passengers' perception of cruise ride taxis

There was observed a similar pattern in all categories as numbers of respondents were similar. It was observed that a slight majority preferred to continue riding also noting that some

commuters were fed up with the cruise taxis but they were left with no options since they are a sole source of transport (Fig. 10)

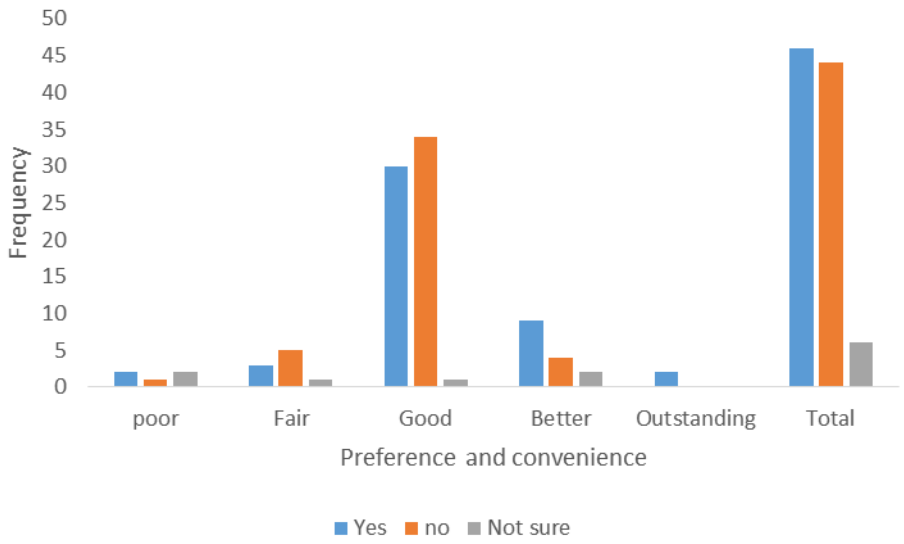

Figure 10 Cross tabulation of passenger's perception on cruise taxi's convenience and their willingness to continue riding

4.2.14 Daily Income

There were differences in daily income of commuter drivers (Fig 11). Commuters generally made daily income of BWP 251-300 throughout the week. On Sundays commuters made income under BWP200. Saturday was observed as the best performing day of the week.

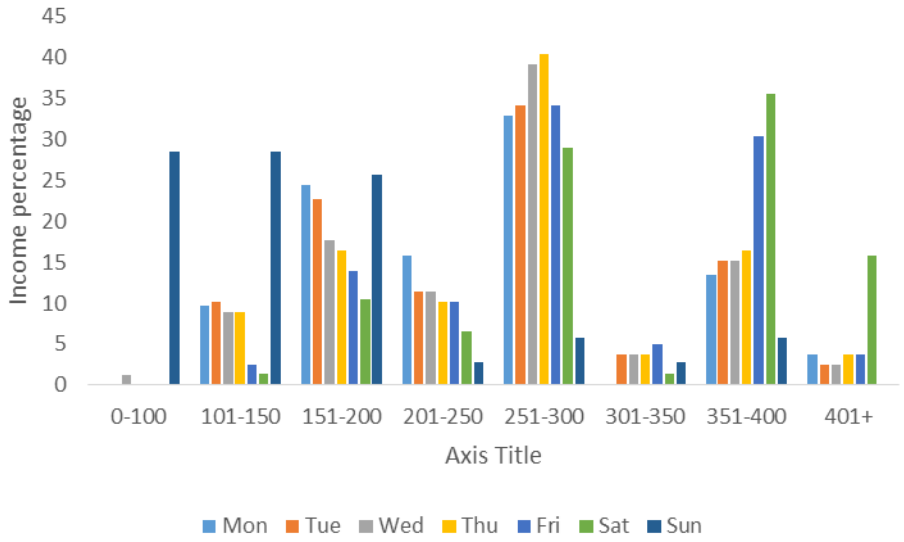

Figure 11 Daily income

4.2.15 Comparison of Saturday income and driver's experience

Experienced drivers earned more income than inexperienced drivers. Drivers with 4-6 months appeared to earn BWP 201-250 with a low proportion of 20%. The drivers with 7-12 months experience dominated poor collection and slid lower as the expected collections increased. The drivers who had 13-24 months of taxi driving dominated collection of BWP 301-350 but lacked consistency attained by highly experienced drivers who maintained more than 80% on high collections (Fig. 12).

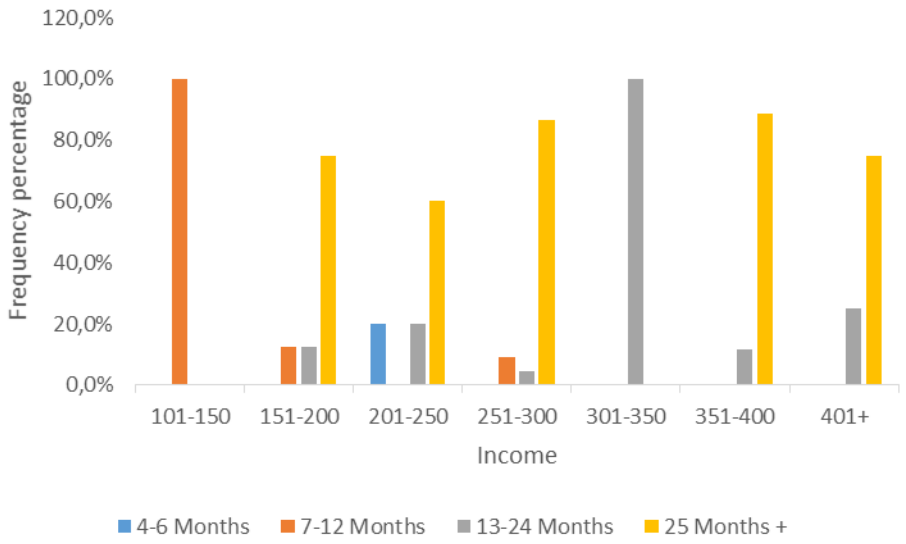

Figure 12 Saturday collection and experience in driving

4.2.16 Taxi Income per Km

The cruise ride taxis travelled for 229 km per day earning an average of P255 per day after expenses (fuel and oils, rank marshal, etc.) They therefore earned BWP 1.13 per Km (Appendix 4) throughout the week transporting an average of 51 paying passengers per day.

4.3 Reliability & Validity

Validity and reliability of data are as outlined in Methodology section 3.16.

4.4 Correlation

A (Pearson) correlation was computed in SPSS in order to establish possibility of variables, the computations also attempted to determine the extent of correlations when there were linear

associations as advised by Silverman (2018). Data was subjected to statistical significance-test for correlations assuming independent observations and normality for sample size where *n* was less than 25 in a manner recommended by Agresti (2018).

4.4.1 Commuter willingness to continue riding

When the taxi convenience was checked against the time commuters waited to pick a cruise taxi, an association was observed ($\chi^2 = 24.65$, df = 12, P=0.017) (table 3). All the respondents among commuters who happened to be picked by the taxis in the first 5 minutes of standing by the road side graded the convenience of cruise taxis as outstanding while 33.3% of those picked in the first 5 minutes, 6-10 minutes as well as 11-20 minutes regarded the convenience of the cruise taxis as better (table 4). Commuters who classified taxi service as good were made of 13.8% picked in the first 5 minutes, 66.2% picked in 5-10 minutes, 15.4% picked in 11-20 minutes as well as 4.6% picked in 21-30 minutes (table 4). Majority of commuters were satisfied with cruise taxi service.

An association was observed between commuter's taxi preference and taxi convenience ($\chi^2 = 12.29$, df = 4, P<0.05) as shown on table 3. Commuters (100%) who preferred certain vehicle makes regarded taxi service as outstanding. Commuters regarded the cruise taxi business as good, this group was made of 35.4% commuters who preferred certain types of taxis as well as 64.6% who would take any taxi (table 4). It is noted that the commuters who had a tendency of choosing certain taxi makes classified the taxi service as poor perhaps because their preferred makes were not much.

An analysis of taxi convenience and key reasons for riding was done. A positive association between the two was observed ($\chi^2 = 18.03$, df = 8, P<0.05) as shown in table 3. The category that regarded the cruise taxi service outstanding was made by all who rode on social grounds. Commuters who felt that the taxi service was better were business commuters (Table 4), taxi convenience was appreciated by majority of the commuters.

There was an association between the time a passenger took to get in the cruise taxi and the time a commuter waited for that taxi ($\chi^2 = 12.88$, df = 6, P<0.05, table 3)). As shown on table 5, commuters who waited for a short period of time to pick a taxi jumped quicker into a car than those who endured longer to pick a taxi. Seventy percent (70%) of commuters who picked

a taxi within 5 minutes were observed to jump in within the first 30 seconds while 15% took 31-60 seconds and 15% took 61 and more seconds (table 5).

An association was observed between commuters' willingness to continue riding cruise taxis and their waiting times to get a taxi ($\chi^2 = 15.26$, df = 6, $P<0.05$ (Table 5)). The proportion of commuters who preferred to continue riding mostly consisted of those picked in the first 10 (table 5) minutes. The commuters who did not prefer to continue riding were composed of those picked after 10 minutes of waiting. This suggests that waiting time affects choice of a transport mode. Commuters who were not sure if they preferred riding were those picked after 10 minutes of waiting.

There was a significant association between taxi preference and likelihood of passengers to continue riding cruise taxis ($\chi^2 = 10.07$, df = 2, $P<0.05$ (table 6)). The commuters who shown to have choices of specific makes of taxis were largely not willing to utilize the cruise taxis probably due to limited choices (Table 6). Majority of commuters who were not taxi-selective remained not sure whether they liked to continue riding cruise taxis.

An association was observed between commuters' preference to continue riding and convenience of cruise taxis ($\chi^2 = 18.81$, df = 8, $P<0.05$ (Table 3)). Most of commuters remarked taxi service as good while a minority regarded it as poor (table 4). Those that did not prefer to continue riding the cruise taxis still regarded the service as good while those who were undivided about continued use of taxis largely denoted the service as poor.

Table 3. χ^2 test for willingness of commuters to continue riding cruise taxis

Aspect	Taxi convenience			*Passenger taxi waiting time*			Willingness to Continue Riding		
	χ^2	df	*P-value*	χ^2	df	*P-value*	χ^2	df	*P-value*
Number of times passenger took a taxi	20.49	12	0.058	NT	NT	NT	NT	NT	NT
Passenger waiting time for a taxi to pull over	24.65	12	0.017	NT	NT	NT	NT	NT	NT
Any taxi preference	12.29	4	0.015	NT	NT	NT	NT	NT	NT
Key Reasons for Riding	18.03	8	0.021	NT	NT	NT	NT	NT	NT
Preference to continue riding taxis	18.81	8	0.016	NT	NT	NT	NT	NT	NT
Time to get in the car	NT	NT	NT	12.88	6	0.045	NT	NT	NT
Preference to continue riding a taxi	NT	NT	NT	15.26	6	0.018	NT	NT	NT
Any taxi preference	NT	NT	NT	NT	NT	NT	10.07	2	0.007

NT Not tested

Table 4. Taxi convenience cross tabulation

		Taxi convenience				
Times Passenger rode a Taxi x How convenient are Taxis	Times passenger rode a taxi	poor	Fair	Good	Better	Outstanding
	1 to 5	3,1%	10,80%	67,70%	16,9%	1,50%
	6 to 10	0%	8,30%	66,70%	25%	0,00%
	11 to 20	0%	100,00%	0,00%	0,00%	0,00%
	51+	15,8%	0,00%	73,70%	5,30%	5,30%
How long one wait for Taxi x How convenient are Taxis	Time in Minutes					
	0-5 Minutes	60%	11.1%	13.8%	33.3%	100%
	6-10 minutes	20%	88.9%	66.2%	33.3%	0.0%
	11-20 minutes	20%	0.0%	15.4%	33.3%	0.0%
	21-30 minutes	0%	0.0%	4.6%	0.0%	0.0%
Any Taxi Preference x How convenient are Taxis	Choice					
	Yes	100%	33.3%	35.4%	57.1%	100%
	No	0,00%	66.7%	64.6%	42.9%	0,00%
Key Reasons for riding x How convenient are Taxis	Key Reasons					
	Business	80%	88.9%	83.1%	53.3%	0,00%
	Social	20%	0,00%	13.8%	40%	100%
	Other	0,00%	11.1%	3.1%	6.7%	0,00%
	Convenience					
Taxi convenience x Prefer continue riding	Yes	4.3%	6.5%	65.2%	19.6%	4.3
	No	2.3%	11.4%	77.3%	16.7%	0
	Not sure	33.3%	16.7%	16.7%	33.3%	0

Table 5. Taxi waiting time cross tabulations

		Time to get into the taxi			
Taxi waiting time x Time to get in the car	**Time in seconds**	0 to 5	6 to 10	11 to 20	21 to 30
	30	70%	57,90%	37,80%	33,30%
	31-60	15%	35,10%	25%	33,30%
	60+	15%	7%	37,50%	33,30%
Taxi waiting time x Prefer continue riding Taxis	**Preference**				
	Yes	75%	37,50%	50%	66,70%
	No	20%	58,90%	31,30%	33,30%
	Not sure	5%	3,50%	18,80%	0%
Taxi waiting time x Taxi-make Preference	**Preference**				
	Yes	66,70%	33,30%	37,50%	100,00%
	No	33,30%	66,70%	62,50%	0,00%

Table 6. Taxi preference and willingness to continue riding cross tabulation

	Any Taxi Preference	
Willingness to continue riding	yes	No
Yes	46,7%	53,3%
No	32,6%	67,4%
Not sure	100,0%	0,0%

4.4.2 Efficiency of Cruise ride taxis

A significant association was observed between taxi driver's level of education and time spent picking up a passenger ($\chi 2 = 10.38$, df = 3, $P < 0.05$ (table 7)). The majority of cruise taxi drivers with at least a high school qualification, diploma or equivalent picked passengers within 30 seconds of pulling over while a small number of degreed drivers picked the same in 30 seconds (table 8). Most of drivers who completed studies at high school picked passengers within 60 seconds of stoppage time, a negligible number of drivers holding a diploma or equivalent picked passengers in the same time frame implying that level of education influenced speed of picking passengers where the educated picked faster than the lesser (table 8).

There was an association between taxi driver's educational level and time spent dropping passengers in a similar fashion to the passenger picking association ($\chi 2 = 7.85$, df = 3, $P < 0.05$ Table 7)). Educated drivers dropped passengers faster than the less educated (table 8). This could be associated with mobility intelligence.

The total amount of money collected by cruise taxis on Saturdays was associated with educational level ($\chi 2 = 24.97$, df = 12, P< 0.05 (Table 7)) where in this case, on this day majority of high school drivers dominated collections followed by diploma or equivalent holders and yet degreed drivers, irrespective of discipline, collected the least revenue (table 8).

There was an association between commuting market and years of experience in cruise taxi driving ($\chi 2 = 40.26$, df = 24, P< 0.05 (Table 7)). It was observed that inexperienced cruise taxi drivers (4-6 months) dominated their mobility at the outskirts of the metropolis where business was not vibrant. The drivers with medium experience occupied areas between the city and its outskirts while experienced drivers were more centred in the city deep which could be the reason they earned more than their counter parts (Table 8).

A positive association was observed between years of cruise taxi driving and time taken to drop passengers ($\chi 2 = 13.4$, df = 3, P< 0.05 (Table 7)). Experienced drivers were observed to drop their passengers faster than the inexperienced ones (Table 8 and 9) when they were able to drop them within 30 seconds while the in-experienced one needed at least 60 seconds (Table 8 and 9).

Table 7 χ^2 test for Efficiency of cruise taxis

Aspect	**Level of education**			**Driving experience**		
	χ^2	**df**	***P-value***	**χ^2**	**df**	***P-value***
Time taken to pick a passenger	10.38	3	0.016	NT	NT	NT
Time taken to drop off a passenger	7.85	3	0.049	NT	NT	NT
Total Saturday income	10.38	3	0.016	NT	NT	NT
Commuting market	24.97	12	0.015	NT	NT	NT
Time taken to drop off a passenger	NT	NT	NT	13.40	3	0.004
How long a driver is willing to continue	NT	NT	NT	44.32	9	0.00
Saturday income	NT	NT	NT	45.26	18	0.000

NT Not tested

Table 8. Level of Education cross tabulations

		Level of education		
	Income	High School	Diploma or equivalent	Degree
Saturday Income x Level of Education	101-150	100,0%	0,0%	0,0%
	151-200	62,5%	37,5%	0,0%
	201-250	60,0%	0,0%	40,0%
	251-300	90,0%	10,0%	0,0%
	301-350	0,0%	100,0%	0,0%
	351-400	65,0%	30,0%	5,0%
	401+	60,0%	40,0%	0,0%
Commuting Market x Level of Education	Market			
	Monarch	83,3%	0,0%	16,7%
	Area S	0,0%	100,0%	0,0%
	Donga	66,7%	33,3%	0,0%
	Blue Town	91,7%	8,3%	0,0%
	Blocks	75,0%	0,0%	25,0%
	Area W	100,0%	0,0%	0,0%
	White City	100,0%	0,0%	0,0%
	Selepa	80,0%	15,0%	0,0%
Time dropping a passenger x Level of Education	Time			
	30 seconds	0,0%	66,7%	33,3%
	60 seconds	67,3%	26,5%	4,1%
Time spent picking a passenger x Level of Education	Time			
	30 seconds	45,2%	45,2%	9,7%
	60 seconds	81,8%	13,6%	0,0%

Table 9. Years taxi driving cross tabulations

		years taxi driving			
Time spent dropping passenger x Years taxi driving	Time	4-6 Months	7-12 Months	13-24 Months	25 Months +
	30 seconds	0,0%	50,0%	0,0%	50,0 %
	60 seconds	1,8%	3,5%	14,0%	80,7 %
Expected time to continue driving x Years taxi driving	4-6 Months	33,3%	0,0%	33,3%	33,3 %
	7-12 Months	0,0%	16,7%	22,2%	61,1 %
	13 Months plus	0,0%	2,5%	15,0%	82,5 %
	Forever	0,0%	2,9%	2,9%	94,3 %
Saturday Income x Years taxi driving	Income				
	101-150	0,0%	100,0%	0,0%	0,0%
	151-200	0,0%	12,5%	12,5%	75,0 %
	201-250	20,0%	0,0%	20,0%	60,0 %
	251-300	0,0%	9,1%	4,5%	86,4 %
	301-350	0,0%	0,0%	100,0 %	0,0%
	351-400	0,0%	0,0%	11,5%	88,5 %
	401+	0,0%	0,0%	25,0%	75,0 %

4.4.3 Viability of Cruise ride taxis

A correlation was observed between total amount collected on Sunday and breakdown expenditures by cruise taxis (χ^2 = 37.95, df = 24, P<0.05 (Table 10)). Taxis that had little income were observed to spend less on break downs for example the ones which had Sunday income of up to BWP 100 spent BWP 0-200 while the ones which earned BWP 301-350 spent 1001-1500 (Table 11) on break downs showing spending power.

There was observed an association between total income collected on Sunday and empty seats per day (χ^2 = 25.62, df = 12, P<0.05 (Table 10)). The taxis that incurred more empty seats collected less than those that had few empty seats (Table 11 & 12). Sunday was different because more income was realized when taxis had more vacant seats because of hiring. A single person who hired a taxi paid a premium covering for the empty seats. On Friday and Saturday commuting days, the less the vacant seats, the more taxi drivers earned (Table 11 & 12).

A strong association was observed between total amount collected on Sunday and ranking time (χ^2 = 46.94, df = 12, P=0.000 (Table 10)). The more the cruise taxi took while ranking, the less the amount they collected on Sundays. Another strong association, similar to Sunday income and ranking time was observed on total Saturday collection and ranking time (χ^2 = 35.42, df = 12, P=0.000 (Table 10)), taxis that took more time ranking earned less.

Table 10. χ^2 test for viability of the Cruise Taxi Business

Daily revenue	Breakdowns expenditure			Number of empty seats per trip			Ranking time		
	χ^2	df	P value	χ^2	df	P value	χ^2	df	P value
Sunday	37.95	24	0.035	25.62	12	0.012	46.94	12	0.000
Tuesday	44.24	24	0.007	NT	NT	NT	NT	NT	NT
Thursday	39.51	24	0.024	NT	NT	NT	NT	NT	NT
Friday	51.28	24	0.001	32.96	12	0.001	NT	NT	NT
Saturday	NT	NT	NT	35.91	12	0.000	35.42	12	0.000

NT Not tested

Table 11. Income and breakdown expenditure cross tabulations

	Amount Spent on Breakdowns					
	Income	0-200	201-400	401-700	701-1000	1001-1500
Sunday Income x Amount Spent on Breakdowns	0-100	55.6%	0.0%	11.1%	33.3%	0.0%
	101-150	16.7%	0.0%	0.0%	66.7%	16.7%
	151-200	33.3%	33.3%	0.0%	33.3%	0.0%
	201-250	0.0%	0.0%	100.0%	0.0%	0.0%
	251-300	100.0%	0.0%	0.0%	0.0%	0.0%
	301-350	0.0%	0.0%	0.0%	0.0%	100.0%
	351-400	0.0%	0.0%	0.0%	100.0%	0.0%
Tuesday Income x Amount Spent on Breakdowns	101-150	28,6%	0,0%	14,3%	28,6%	28,6%
	151-200	50,0%	14,3%	0,0%	35,7%	0,0%
	201-250	0,0%	20,0%	20,0%	60,0%	0,0%
	251-300	13,3%	20,0%	33,3%	33,3%	0,0%
	301-350	100,0%	0,0%	0,0%	0,0%	0,0%
	351-400	22,2%	0,0%	11,1%	66,7%	0,0%
	401+	0,0%	0,0%	0,0%	0,0%	100,0%
Thursday Income x Amount Spent on Breakdowns	101-150	33,3%	0,0%	33,3%	33,3%	0,0%
	151-200	33,3%	11,1%	0,0%	55,6%	0,0%
	201-250	0,0%	25,0%	0,0%	75,0%	0,0%
	251-300	33,3%	14,3%	23,8%	23,8%	4,8%
	301-350	0,0%	0,0%	0,0%	0,0%	100,0%
	350-400	11,1%	11,1%	11,1%	66,7%	0,0%
	401+	50,0%	0,0%	0,0%	0,0%	50,0%
Friday Income x Amount Spent on Breakdowns	101-150	0,0%	0,0%	100,0%	0,0%	0,0%
	151-200	25,0%	12,5%	12,5%	50,0%	0,0%
	201-250	42,9%	14,3%	0,0%	42,9%	0,0%
	251-300	31,3%	18,8%	31,3%	18,8%	0,0%
	301-350	0,0%	0,0%	50,0%	0,0%	50,0%
	351-400	18,8%	6,3%	6,3%	68,8%	0,0%
	401+	33,3%	0,0%	0,0%	0,0%	66,7%
Saturday Income x Amount Spent on Breakdowns	101-150	0,0%	0,0%	100,0%	0,0%	0,0%
	151-200	33,3%	16,7%	16,7%	33,3%	0,0%
	201-250	50,0%	25,0%	0,0%	25,0%	0,0%
	251-300	40,0%	20,0%	20,0%	20,0%	0,0%
	351-400	20,0%	6,7%	20,0%	46,7%	6,7%
	401+	10,0%	0,0%	10,0%	60,0%	20,0%

Table 12. Income and Empty seats cross tabulation

		Income						
	Empty seats	0-100	101-150	151-200	201-250	251-300	301-350	351-400
Empty seats per day x Sunday Income	0-10	35,30%	11,80%	29,40%	5,90%	0,00%	5,90%	11,80%
	11-20	25,00%	43,80%	25,00%	0,00%	6,30%	0,00%	0,00%
Empty seats per day x Friday Income	0-10	6,90%	27,60%	13,80%	27,60%	3,40%	17,20%	3,40%
	11-20	0,00%	7,30%	2,40%	36,60%	7,30%	43,90%	2,40%
	21-30	0,00%	0,00%	100,00%	0,00%	0,00%	0,00%	0,00%
Empty seats per day x Saturday Income	0-10	3,60%	25,00%	10,70%	32,10%	0,00%	17,90%	10,70%
	11-20	0,00%	2,60%	0,00%	20,50%	2,60%	53,80%	20,50%
	21-30	0,00%	0,00%	100.00%	0,00%	0,00%	0,00%	0,00%

Table 13. Ranking time and Income cross tabulation

		Income						
	Ranking time in Minutes	101-150	151-200	201-250	251-300	301-350	351-400	401+
Ranking time x Saturday Income	30	0,0%	0,0%	11,1%	11,1%	0,0%	44,4%	33,3%
	31-60	0,0%	3,8%	1,9%	32,7%	1,9%	44,2%	15,4%
	61+	16,7%	50,0%	0,0%	33,3%	0,0%	0,0%	0,0%
Ranking time x Sunday Income	30	0,0%	20,0%	60,0%	0,0%	0,0%	20,0%	0,0%
	31-60	28,6%	33,3%	19,0%	4,8%	9,5%	0,0%	4,8%
	61-120	0,0%	66,7%	0,0%	0,0%	0,0%	0,0%	33,3%

4.5 Summary

Data was analysed and interpreted in this chapter. Graphical presentation of descriptive statistics was done. Graphical presentations featured in both passengers and taxi drivers, their demographics, driver insurance cover, car purchases and car preferences were presented. Majority of the drivers were not insured. The preferred car in the cruise taxi by operators was a Honda Fit while passengers preferred a Toyota Corolla. Passenger riding times, taxi preferences and reasons for riding made up some of graphical presentations. Preference to ride taxis was analysed with generally majority of the passengers being satisfied with the cruise ride business. χ^2 test was computed for significance tests with various factors tested. The taxi

business proved to generate revenue. Efficiency of the business was also determined. The results will therefore be discussed.

4.6 Discussion

4.6.1 Introduction

This section focuses on discussions of the research findings after data collected were subjected to descriptive analyses as well as χ^2 tests at 95% confidence interval. Commuters were part of the focal point. Key parameters were determination of passenger's intrinsic willingness to ride taxis in light of other factors like convenience, passenger waiting time and willingness to continue riding cruise taxis. The chapter also discussed viability of the cruise ride business, its efficiency and economic contribution to Francistown metropolis.

4.6.2 Discussion body

According to Wong *et al* (*2015*), passengers prefer hailing taxis where there is less walking time. Wong *et al* (2015) also observed that commuters preferred to wait longer time at the street side than at taxi stands which could justify why predominantly taxi ranking time was 31-60 minutes in Francistown as possibly passengers preferred to stand by road side. This possibly ended up being the cause of longer (6-10 minutes) passenger waiting time on the streets. Wong *et al* (2015) also described a mismatch between demand and supply of taxis resulting in passengers making long queues which was evidenced in the metropolis during the peak hours of the day. These long queues described by Yang, Yang and Wong (2014) obstructed flow of traffic on the road, the whole process making taxis to be a nuisance to both passengers (as they wiggle through traffic) and other motorists. In this scenario, Wong *et al, (*2015a) pointed out that taxi system becomes inefficient resulting in customer frustration which could be the starting point of passenger dissatisfaction observed in the research.

During peak hours, taxis were observed to transport those within shorter distances agreeing to Wong *et al* (2015) leaving the long distance commuters frustrated. However, the findings of the research agrees with Wong, Szets and Wong (2018) that the longer the passengers waited for taxis, the longer they took to jump in when it arrives. The association observed between passenger waiting time and passenger perception of quality service concurs with Zhong and

Wu (2015). Passengers who were picked in the first 5 minutes perceived the taxi service as outstanding while ones picked after a long wait expressed the taxi service as dis-satisfactory.

Zhou and Wu (2015) observed 88.32% of passengers in China waiting for more than 10 minutes to catch a ride while 53.77% endured more than 30 minutes to catch a taxi. The disparity between the taxis and passengers was identified as one of the causes of elevated rates of vacant cruise time which concurs with the findings of this research. During rush hour that encompass periods immediately before and after work, aggravated by congestion and slow driving speeds, supply of taxis was overtaken by passenger demand causing commuters to wait longer on the queue as also noted by Dong, Zhang, Fu , and Xie, (2016). Consequently, due to tilted supply and demand, Watling and Cantarella, (2015) and Wei, Yuan, Liu and Wu (2017) recorded passengers opting for other modes of transport.

Majority of passengers were willing to continue utilizing the cruise ride taxi system in Francistown metropolis even if a reasonable number was fed up with them. However, despite that, passengers were satisfied with the service rendered by taxis. This infers that passengers of Francistown metropolis willingly prefer to continue riding cruise taxis.

The perceived quality of cruise taxi service were noted by Rahel (2016) and Zhang *et al* (2018) to hinge on, among others, the waiting time to get a taxi. The taxi system in any metro is complex because it lies on the organization between the passengers and drivers. More empty trips were associated by Zhang *et al* (2014) with inefficiency and long waiting time for the passengers which was also observed in the research. The cruise taxis depended on chance, similar to notation of Zhang *et al* (2018) to pick passengers as they drove back to the terminus. The group of educated drivers were noted to be efficient in picking and dropping passengers. They too earned more on Saturdays agreeing to Koch and Nafziger, (2009) who noted that some workers were able to exploit neoclassical inter-temporal substitution. Wei *et al* (2017) observed that the educated taxi drivers did not need to work long hours or carry more passengers and yet earned more income per day, agreeing with the research findings.

Dong *et al* (2016) further noted that educated workers were not sensitive to reaching their daily needs, in the same study, daily needs did not vary by educational status. The educated workers were more patient, loss evasive and had time consistence which would apply the same to the efficiency observed in this research. The current study thus agrees with Dupal *et al* (2013) that

educational status has potential role in the efficiency of the taxis. It further agrees with Rong, Wang, Zheng, Hu, Rong, Ai and Sangaiah (2017) and Rong, Zhou, Yang, Shafiq and Liu (2016) who observed top performing drivers earning 25% more than the mediocre ones.

Efficiency of top drivers increased and decreased when observed by Tang *et al* (2017) and Jan, An, Wang, Sun, and Shi (2013) while that of ordinary drivers just remained unchanged without fluctuations. Top drivers were seen to change their operational areas during the course of the day which could have been exploited by educated drivers. This is so as Yang *et al* (2014) identified education as one of the key factors influencing taxi pick up and drop of trips. They indicated an average decrease of 36 taxi trips an hour over a ten month period as transit access time was increased by one minute.

Despite presence of passengers, passengers still, were reported by Gian *et al* (2013) to spend up to 2 hours waiting for taxis that were waiting for congestion to clear during peak hours. This is contrary to Francistown metropolis, existence of long queues and longer passenger waiting time which were due to a tilt in passenger demand and taxi supply. It is possible that even in the metropolis, as similarly studied by Zong, Sun, Zhang, Zhu, Fang, Xiumen, Qi and Wentian (2015), 40% of total daily mileage was spent with no passengers in their studies in Beijing and 36 - 51% in New York as reported by Lee and Sohn (2017) translating to 13 L of fuel consumption without passengers per day. Lee and Sohn (2017) also observed that, in Taiwan, taxis ran without passengers for 3.6 hours per day wasting 90 million litres of fuel per year.

Driver income observed in this research agrees with Gama (2016) and Zhang *et al (*2018) who confirmed that income differed with taxis and depended on the effort of the driver, hours of operation, skill and experience. A positive association between driver income (Saturdays and Sunday) and driver status whether full time or part time depended on experience which was also observed by Liang *et al* (2010). Sundays were much less active than Saturdays and experienced drivers earned more because they increased hiring prices as well as using skills especially on Saturdays as noted by Farber (2008) when he was developing labour supply model on daily basis using preferences which depended on daily income levels.

Saturday cruise ride business benefited more as the events were mixed with business and leisure. Lee *et al (*2012) detailed how a skilled driver manoeuvre in the city exploiting shortcuts that do not consume more fuel and by pass traffic jams, stops and robots. This explains why

seasoned drivers earned more in Francistown metropolitan area. As has been reported by Agrhaug (2016), the metropolis observed revenue variation between taxis and between days of the week with a pattern of repeating demand in peak and off peak times of the day. Camerer, Babcock, Loewenstein and Thaler (1997) also observed income variability within and between days as it followed the number of hours worked by drivers. During days with low passenger demand, drivers tended to drive long distances in search of passengers as also observed by Camerer (1997). On the other hand Naji, Wu and Zhang (2017) observed that even if cruise drivers drove on the same streets, their income varied. Dupas *et al* (2013) went on to observe a similar phenomenon that income target, likely, would be determined by expectations based on the earnings as cruise taxi entrepreneurs would want to settle dues and make some targeted savings.

Impact of the time of the day and availability of the taxi have been extensively studied by Wong *et al* (2014). The findings of this research agrees with Zhang, Ukkusuri and Yang (2018) who observed that it is not only time of the day but also day of the week that determines the number of empty seats which directly impacts daily income. Zhang *et al* (2018) also observed that seasons impacted the taxi business. During the off peak period, taxi operators were observed to divert routes (Zhang *et al,* 2018) and concentrate on spots which normally gave them riding activities.

Taxis that collected more revenue generally incurred few empty seats compared to those with low income. When there was high demand during peak periods like mornings as people were going to work and evenings when people return home, as well as during night economy, taxis exhibited behaviour observed by Zhang *et al* (2018) that cruise taxis showed a tendency of willingness to wait for customers than cruising in search of them. The impact of empty seats was higher after dropping all passengers concurring with Zhang *et al* (2018) who further recorded that taxis then depended on chance to pick a passenger driving back to the terminus. As would be expected, high profitability drivers had high occupancy compared to moderate and low profitability drivers. The low profitability drivers had lowest occupancy which was attributed by Naji *et al* (2017) to lack of experience in picking spots and limited knowledge of the city. High profitability drivers in Francistown metropolis were found to be located in densely populated areas which was similar to medium income drivers but experience was suggested to be the greater of income variation.

In the metropolis, low income earners were found to be plying in peripheral areas of the city, so picked less commuters and incurred low occupancy levels which had direct effect on their profitability. As outlined by Cramer and Krueger (2016), and Rong *et al* (2016), efficiency of shared ride taxis is assessed by a segment of the time a fare paying passenger is aboard. Rong *et al* (2016) outlines that efficiency can also be determined by the fraction of mileage travelled by the driver with a paying passenger inside. The cruise ride taxis in Francistown covered an average of 229 km per day earning an average of BWP 255 per day translating to BWP 1.13 per kilo meter after expenses. Conclusively, the average taxi waiting time of 6-10 minutes is comparable to other cities of the world and considering the growing economy of Francistown metropolis, the efficiency of cruise ride taxis is acceptable despite it is less than that of developed world.

Naji *et al* (2017) defined taxi driving profitability as a product of distance and income. Naji *et al* (2017) approached driver profitability by clustering them as high, medium and low profitability classes. They observed that moderately profitable drivers had large numbers of parked taxis and congestion clusters than high and low profitability drivers resulting in low occupancy ratio. High profitability drivers had low congestion and parking times resulting in increased occupancy. Li *et al* (2012) observed low profitability drivers having greater congestion and parking times as drivers preferred to wait for passengers than cruising. A very strong association was observed in this research on both Saturday and Sunday incomes against ranking time. The more time taxis spent at a rank, the less it earned for the day. Ranking time was associated with passenger availability. Experienced drivers with mobility intelligence were possibly, as detailed by Zhang *et al* (2018) during these times, navigated between areas which demanded taxi services to increase their collections.

The income realized by Francistown taxis of BWP 255.58 (± USD 25.56 per day) falls on the lower end (USD 20-121 per day) of income by taxi drivers in Singapore observed by Li *et al* (2012) and Ryko (2016). The revenue observed in this study is also lower than an average of USD70 per day in China (Zhang and Wang, 2017). In the New York City, Li (2006), noted taxis drivers earning USD 158 (BWP 1731) per shift after settling expenses of lease, fuels and consumables which is way higher than Francistown metropolis. A shift constituted 10 hours of work per day covering 210 km similar to Francistown cruise ride parameters. For the same year, in another study Kamga *et al* (2013) separated owner-drivers as earning USD 220 (BWP

2410) and those leasing-drivers earning USD 150 (BWP 1643) per day after expenses which is by far higher than Francistown metropolis.

Mileage covered by taxis per day was computed and compared with daily income. Cruise ride taxis collected more income on Saturdays when people commuted not only to work and back home, but to socialize too. Sundays were observed to have least business because mostly the industry was closed as well as some businesses, driver experience was observed to reign supreme as experienced drivers earned more income than the in-experienced. The cruise taxis generated more monthly income (P 6630) than workers in Agriculture (BWP 1720), Manufacturing (BWP 4819), Construction (BWP 4919), Wholesale and retail trade (BWP 3583), Hotel and restaurants (3459) (Botswana statistics, 2017). Monthly earnings were similar to private and parastatal employees (BWP6082), Real Estate and Business Activities (BWP 6950) (Botswana statistics, 2017). They fall in the same bracket of average employee salaries in Botswana of BWP 6038 across all sectors (Botswana statistics, 2017). Conclusively, cruise ride taxi business is a viable venture which can attract financing from different sectors.

Economic contribution of the cruise ride sector was examined. Francistown metropolis, which had 614 registered taxis was seen to generate (per taxi) an average revenue of BWP 255 per day (51 passengers) working effectively 6 days a week. Each taxi contributed BWP 79 560 per month resulting in collective BWP 48 849 840 per year for all cruise ride taxis. Transport and communication contributed 3.4% to Botswana Gross Domestic product in 2005 and increased over the years to 6.33% in 2017 (Botswana Statistics, 2017). This GDP does not include business generated by cruise ride taxis, buses, mini buses and all categories of para transit. The focused areas were those directly achieved through railway transportation, airlines and cargo to name a few. If the statistical department zoomed in on business generated by commuters, the magnitude of transport and communication contribution to GDP would increase since only 614 registered taxis in Francistown metropolis could generate BWP48 849 840 in annual revenue. Further studies should be undertaken to ascertain how much cruise taxis, and if possible buses, mini buses and other modes of paratransit are contributing to Botswana as a whole. It would be appropriate also to establish if 614 taxis are enough to move a section of 113 329 population of Francistown as postulated population in 2019.

CHAPTER 5

5 Conclusions and Recommendations

5.1 Conclusion

It is noted that passengers in Francistown metropolis are generally satisfied with the only formally available cruise ride taxis for commuting up and down the metropolitan area. The populace willingly prefer to utilize this mode of transport. This suggest that the taxi system should thrive to continue differentiating its services in order to remain the only preferred mode of transport in the city. The average passenger waiting time of 6-10 minutes is comparable to developed nations. The efficiency of amount generated per kilo metre is acceptable to a growing economy like Francistown metropolis even if it is lower than developed nations which have superior facilities and infrastructure. The cruise ride business was found to be viable because it was also demonstrated to generate more revenue than other sectors of economy and was just at the average level of income across all sectors of Botswana economy. The cruise ride taxis generated BWP 48 million that contributes to the economy of Francistown metropolis.

5.2 Recommendations

The study centered on cruise taxis and did not focus on other forms of public transportation. It is recommended to do a further study that includes mini buses, buses, cabs and pirate taxis in the metropolis and Botswana as a whole to establish the size of business public transport sector contributes to the economy. Since GDP contribution from Transport and communication does not consider revenue generated by buses, and other forms of para transit it is recommended that the department of Botswana statistics consider generating data from these modes of transport as they are making reasonable revenue.

Department of labor in collaboration with Ministry of transport are recommended to initiate an educational program to cruise taxi operators and owners in the metro to emphasize the benefits of insurance cover to them and their businesses so that the enterprises are sustained. This comes after over 80% of the taxi drivers operated without insurance cover, some lacking knowledge and appreciation of insurance.

The cruise ride taxi business should embrace advancing technology by utilization of e-hailing which should improve driver revenue and passenger waiting time.

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APPENDICES

Introductory letter

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To the Taxi Driver/ Passenger

The study explores the viability and economic contribution of cruise ride taxis servicing Francistown metropolitan area. There is lack of information about how much business the cruise ride business make in the metropolis and to what extent it contributes to the economy of the city. Generated information will be used by this business fraternity as a benchmark. The local authorities will also be able to appreciate how much valuable the cruise ride is and in many ways assist to enhance its efficiency. Facilitation of cruise ride business efficiency bears fruits for the taxi operators as they earn more income, it also benefits passengers who get quality service.

The research seeks to as well establish passenger's level of satisfaction with operations of the cruise ride taxis, information which can be used by the taxi operators to improve their business to meet passenger expectations. The research is purely academic, you are requested to freely participate by responding to the questionnaire which is our research tool to the best of your knowledge and experience.

By
Titos Chimwa
Researcher, student No. 1817417 (Botho University)
NB: For verification please feel free to contact my supervisor: Professor Olumide Jaiyeoba
Contact details: 3919999 / 3635438/ 72 880 532/ 73 055 167.

Informed Consent Form

Botho University
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I want to attest that the researcher Mr Titos Chimwa / Enumerators - Ms Pamela Chivige and Ms Gamuchirai Mbada have outlined the purpose of the research being done with regards to viability and economic contribution of cruise ride taxis in Francistown metropolis. I wish to confirm that my participation is voluntary and I know that as agreed:

- I will remain anonymous throughout the research be it data analysis and publication
- I am capable of withdrawing from my participation at any point in time of the research
- My participation in the research will be solely used for the purpose this study
- I am allowed to ask questions during the period of participation and research and
- I will not be legally held against my contributions

I, _____, confirm my participation in the study.
Signature: _____
Date: _____

Researcher /Enumerator's name: _____
Researcher/ Enumerator's signature: _____
Date: _____

NB: For verification please feel free to contact my supervisor: Professor Olumide Jaiyeoba
Contact details: 3919999 / 3635438/ 72 880 532/ 73 055 167.

Questionnaire

This questionnaire is intended to gather data on cruise ride taxi passenger preference. We tremendously value your participation. Collected information will remain anonymous and specifically intended for academic research. It is requested you respond to the best of your knowledge.

Ministry of Transport

Gender

(1) Male ● (2) Female ● (3) Transgender ●

2. Age

(1) 18-30 ● (2) 31-40 ● (3) 41-50 ● (4) 51-60 ● (5) 61+ ●

3. Ethnicity.

(1) Asian ● (2) White ● (3) Black ● (4) Other: ●

4. Ranking of the respondent Ministry of Transport officer…….

5. How many registered taxis are in Francistown Metropolis?

6. How much licence renewal fee does a Blue number plate taxi pay per year…….

7. How much do they pay for commercial licence (for being a taxi)?

8. What else do they pay for?

9. When do they renew fitness test……if they pay for the service, how much?

7. How does the transport department assist flow of blue number plate taxi business in the metropolis for example, provision of taxi lane, own queue for fast registration.

8. What are key punitive measures does the Transport department impose on rogue drivers/vehicles to ensure passenger safety

9. Drivers: for example heavy fine for negligent driving……

10. Vehicles: for example impounding un-road worth taxis……..

Driver

1. Gender
   (1) Male ● (2) Female ● (3) Transgender ●

2. Age
   (1) 18-30● (2) 31-40 ● (3) 41-50● (4) 51-60 ● (5) 61+ ●

3. Ethnicity.
   (1) Asian ● (2) White ● (3) Black ● (4) Other: ●

4. Are you a full-time or part-time driver?
   (1) Full-time ● (2) Part-time ●

5. How much longer do you plan on working in cruise ride economy?
   (1) 0-3 months ● (2) 3-6 months ● (3) 6-12 months ● (4) 12 months+ ●
   (5) Forever ●

6. What is your current insurance situation while cruise ride driving? ●
   (1) I am covered by my personal auto insurance policy ●
   (2) I am covered by the owner of the taxi ●
   (3) I specifically bought a rideshare insurance policy for my rideshare work ●
   (4) I don't know ●
   (5) I'm not covered ●
   (6) Other: ●

7. Do you understand how insurance coverage from your cruise ride platform / Company works? 1 = No Knowledge, 2 = Very Knowledgeable. ……3 = Not sure

8. Is your personal insurance company aware that you are a cruise ride driver?
   (1) Yes ● (2) No ● (3) Other: ●

9. Do you have health insurance?
1) Yes ● (2) No ● (3) Not sure ●

10. How do you settle your taxes every year?
   (1) CPA ●
   (2) I do them myself (using software like TurboTax) ●
   (3) Going in person to a tax chain (like H&R Block) ●
   (4) Other: ●

11. Have you purchased or leased another vehicle AFTER starting as a rideshare driver?
(1) Yes ●
(2) No ●

12. If yes, which car ●
(1) Toyota Corolla ●
(2) Honda Fit ●

(3) Toyota Run X
(4) Mazda 6

13. If you were to purchase another car tomorrow for cruise ride share driving, what would it be? (Year/Make/Model/Engine), e.g. 2016 Honda Accord Hybrid

(1) Toyota Corolla
(2) Honda Fit
(3) Toyota Vitz
(4) Toyota Run X
(5) Mazda

14. What market do you primarily drive in? Please list the city AND Suburb (i.e. Francistown - Monarch)

(1) Monarch
(2) Area L
(3) Area S
(4) Donga
(5) Blue Town
(6) Blocks
(7) Area W
(8) White city
(9) Selepa

15. Education: What is the highest degree or level of school you have completed? If currently enrolled, highest degree received.

(1) High school
(2) Diploma or the equivalent
(c) Degree

16. How long have you been a cruise ride driver for?

(1) 0-3 months (2) 4-6 months (3) 7-12 months (4) 13-24 months
(5) 25+ months

17. Which service do you PRIMARILY drive for? Please pick the one service you log the most hours for, in an average week

(a) A taxi company (b) Personal car (g) Rent to buy

18. Rank the most important of the three things to you as a driver when driving passengers 1?

(1) Money (2) safety) (3) Efficiency

19. Rank the most important three things to you as a driver when driving passengers 2?

(1) Money (2) safety) (3) Efficiency

20. Rank the most important three things to you as a driver when driving passengers 3?

(1) Money ● (2) safety) ● (3) Efficiency ●

Efficiency

21. How many trips do you do per day?
(1) 0-5
(2) 6-10
(3) 11-15
(4) 16-20
(5) 21

22. What is the range of kilometres you can cover per day?
(1) 100 or less
(2) 105-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 301+

23. How many, averagely empty seats do you incur because of lack of passengers per trip?
(1) 1
(2) 2
(3) 3
(4) 4
(5) 5

24 How many, averagely empty seats do you incur because of lack of passengers per day?
(1) 1-10
(2) 11-20
(3) 21-30
(4) 31-40

?

25, How much stoppage time does it take to pick a passenger?
(1) 30 seconds
(2) 60 seconds
(3) 90 seconds

26 How much stoppage time does it take to drop a passenger?
(1) 30 seconds
(2) 60 seconds
(3) 90 seconds

27. How much stoppage time does it take to rank?
(1) 30 minutes
(2) 31-60 Minutes
(3) 61-120 minutes
(4) 120+ minutes

28. How much time does it take as from leaving the rank till you come to rank again without diverting a route?
(1) 0-30 minutes
(2) 31-60 Minutes
(3) 61-120 minutes
(4) 120+ minutes

29 How much time does it take as from leaving the rank till you come to rank again with diverting a route?
(1) 0-30 minutes
(2) 31-60 Minutes
(3) 61-120 minutes
(4) 120+ minutes

30 What is Uber?
(1) Knows
(2) doesn't know

31. What technology does it use?
(1) Knows
(2) doesn't know

32. Will it work in Francistown?
(1) Yes
(2) No
(3) Doesn't know

Viability
33. How much is a price per rider?
(1) 5 Pula
(2) 10 Pula
(3) 15 Pula
(4) 20 Pula

34 How many hired trips on average do you make per day?
(1) 0-2
(2) 3-5
(3) 6-8
(4) 9-11
(5) 12-14
(6) 15+

35 What is the cost for hiring?
(1) 25 Pula
(2) 25 + Pula

36. How much average money in Pula do you rake on Monday?
(1) 0-100
(2) 101-150

(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

37. How much average money in Pula do you rake on Tuesday?
(1) 0-100
(2) 101-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

38 How much average money in Pula do you rake on Wednesday?
(1) 0-100
(2) 101-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

39 How much average money in Pula do you rake on Thursday?
(1) 0-100
(2) 101-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

40 How much average money in Pula do you rake on Friday?
(1) 0-100
(2) 101-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

41How much average money in Pula do you rake on Saturday?
(1) 0-100

(2) 101-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

42 How much average money in Pula do you rake on Sunday?
(1) 0-100
(2) 101-150
(3) 151-200
(4) 201-250
(5) 251-300
(6) 300-350
(7) 350-400
(8) 401+

43. Do you rent or own the taxi?
(1) Rent
(2) Own

44. Who services the taxi?
(1) Me
(2) Owner

45. What is the cost of service in Pula?
(1) 500
(2) 600
(3) 700
(4) 800
(5) 900
(6) 1000
(7) 1001+

46. How much on average do you spend on breakdowns in Pula?
(1) 0-200
(2) 201-400
(3) 401-700
(4) 701-1000
(5) 1001-1500
(6) 1501+

47. How much do you pay for ranking in Pula?
(1) 5
(2) 10
(3) 15

Passenger

1. Gender?
   (1) Male ● (2) Female ● (3) Transgender ●

2. Age?
   (1) 18-30 ● (2) 31-40 ● (3) 41-50 ● (4) 51-60 ● (5) 61+ ●

3. Ethnicity
   (1) Asian ● (2) White ● (3) Black ● (4) Other: ●

4. How many times did you ride a taxi

   (1)1-5 times ● (2) 6-10 times ● (3) 11-20 times ● (4) 21-50 times ●
   (5) 50 + times ●

5. Would you want to continue riding taxis
   (1) Yes ● (2) No ● (3) Not sure ●

6. If the answer is yes, why? ●
   (1) Is the only option ●
   (2) Is the cheapest ●
   (3) There is good customer service ●
   (4) Takes me door to door ●
   (5) Its fast ●
   (6) Other: ●

7. How do you hail a taxi
(1)Call (2) stand by road side ● (3) through mobile/Website application ●

8. How long do you usually wait for the taxi to appear
   (1) 0-5 minutes ● (2) 6-10 minutes ● (3) 11-20 Minutes ● (4) 20-30 minutes ●
(5) 30+ Minutes ●

9. How much time do you take to get in the car?
(1) 30 seconds or less ● (2) more than 30 seconds to 1 minute ● (3) More than a minute ●

9. Do you have a taxi of preference?
(1) Yes ●
(2) No

If yes, why?
   (1) Its family/colleague/relative (2) Is the cheapest ● (3) There is good customer service ● (4) Takes me to my door ● (5) Its fast ●
   (6) Other: ●

11. How convenient are taxis to your journeys on 1-5 scoring when 1 is poor to 5 Outstanding
   1 Poor ● 2 fair ● 3 Good ● 4 Better ● 5 Outstanding ●

12. Which type of car do you prefer to hail?
(1) Honda Fit (2) Toyota Corolla (3) Toyota Vitz (4) Toyota Ist
(5) Mazda (6) Other

13. What are key reasons for riding?
(1) Business (2) Social (3) Night economy (4) Other

Frequency tables

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	18	17.8	18.2	18.2
	31-40	70	69.3	70.7	88.9
	41-50	10	9.9	10.1	99.0
	51-60	1	1.0	1.0	100.0
	Total	99	98.0	100.0	
Missing	System	2	2.0		
Total		101	100.0		

Ethnicity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	White	2	2.0	2.0	2.0
	Black	97	96.0	98.0	100.0
	Total	99	98.0	100.0	
Missing	System	2	2.0		
Total		101	100.0		

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	76	75.2	76.8	76.8
	Female	23	22.8	23.2	100.0
	Total	99	98.0	100.0	
Missing	System	2	2.0		
Total		101	100.0		

Full time or Part time					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Full Time	77	76.2	79.4	79.4
	Part time	20	19.8	20.6	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

Current Insurance					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes personal and general	12	11.9	15.4	15.4
	Don’t know	1	1.0	1.3	16.7
	Not covered	64	63.4	82.1	98.7
	Other	1	1.0	1.3	100.0
	Total	78	77.2	100.0	
Missing	System	23	22.8		
Total		101	100.0		

Level if understanding Insurance					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not knowledgeable	12	11.9	54.5	54.5
	Knowledgeable	3	3.0	13.6	68.2
	Very knowledgeable	3	3.0	13.6	81.8
	4.00	1	1.0	4.5	86.4
	5.00	3	3.0	13.6	100.0
	Total	22	21.8	100.0	
Missing	System	79	78.2		
Total		101	100.0		

Health Insurance					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	14.9	15.5	15.5
	No	82	81.2	84.5	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

Type of car bought					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Toyota Corolla	17	16.8	25.8	25.8
	Honda Fit	33	32.7	50.0	75.8
	Toyota RunX	16	15.8	24.2	100.0
	Total	66	65.3	100.0	
Missing	System	35	34.7		
Total		101	100.0		

New taxi purchase					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	77	76.2	85.6	85.6
	No	13	12.9	14.4	100.0
	Total	90	89.1	100.0	
Missing	System	11	10.9		
Total		101	100.0		

Highest level of education					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High School	64	63.4	73.6	73.6
	Diploma or equivalent	19	18.8	21.8	95.4
	Degree	3	3.0	3.4	98.9

	4.00	1	1.0	1.1	100.0
	Total	87	86.1	100.0	
Missing	System	14	13.9		
Total		101	100.0		

Years of taxi driving					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4-6 Months	1	1.0	1.0	1.0
	7-12 Months	6	5.9	6.1	7.1
	13-24 Months	13	12.9	13.3	20.4
	25 Months +	78	77.2	79.6	100.0
	Total	98	97.0	100.0	
Missing	System	3	3.0		
Total		101	100.0		

Travelled kilometers per day					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	100 or less	1	1.0	1.2	1.2
	101-150	9	8.9	11.0	12.2
	151-200	36	35.6	43.9	56.1
	201-250	10	9.9	12.2	68.3
	251-300	11	10.9	13.4	81.7
	301+	15	14.9	18.3	100.0
	Total	82	81.2	100.0	
Missing	System	19	18.8		
Total		101	100.0		

Ranking time					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30 minutes	10	9.9	11.5	11.5
	31-60 minutes	69	68.3	79.3	90.8

	61-120 minutes +	7	6.9	8.0	98.9
	120 + minutes	1	1.0	1.1	100.0
	Total	87	86.1	100.0	
Missing	System	14	13.9		
Total		101	100.0		

Monday Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	101-150	8	7.9	9.8	9.8
	151-200	20	19.8	24.4	34.1
	201-250	13	12.9	15.9	50.0
	251-300	27	26.7	32.9	82.9
	351-400	11	10.9	13.4	96.3
	401+	3	3.0	3.7	100.0
	Total	82	81.2	100.0	
Missing	System	19	18.8		
Total		101	100.0		

Travelled distance in km per day

Range distance	Mean distance	Frequency	Total distance
100 or less	100	1	100
101-150	176	9	1584
151-200	251	36	9036
201-250	326	10	3260
251-300	401	11	4411
301+	300	15	4500
Total		82	22891
Mean distance travelled by 100 cruise ride taxis			229 km

Tuesday Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	101-150	8	7.9	10.1	10.1
	151-200	18	17.8	22.8	32.9
	201-250	9	8.9	11.4	44.3
	251-300	27	26.7	34.2	78.5
	301-350	3	3.0	3.8	82.3
	351-400	12	11.9	15.2	97.5
	401+	2	2.0	2.5	100.0
	Total	79	78.2	100.0	
Missing	System	22	21.8		
Total		101	100.0		

Wednesday Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-100	1	1.0	1.3	1.3
	101-150	7	6.9	8.9	10.1
	151-200	14	13.9	17.7	27.8
	201-250	9	8.9	11.4	39.2
	251-300	31	30.7	39.2	78.5
	301-350	3	3.0	3.8	82.3
	351-400	12	11.9	15.2	97.5
	401+	2	2.0	2.5	100.0
	Total	79	78.2	100.0	
Missing	System	22	21.8		
Total		101	100.0		

Thursday Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	101-150	7	6.9	8.9	8.9
	151-200	13	12.9	16.5	25.3
	201-250	8	7.9	10.1	35.4

	251-300	32	31.7	40.5	75.9
	301-350	3	3.0	3.8	79.7
	350-400	13	12.9	16.5	96.2
	401+	3	3.0	3.8	100.0
	Total	79	78.2	100.0	
Missing	System	22	21.8		
Total		101	100.0		

Friday Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	101-150	2	2.0	2.5	2.5
	151-200	11	10.9	13.9	16.5
	201-250	8	7.9	10.1	26.6
	251-300	27	26.7	34.2	60.8
	301-350	4	4.0	5.1	65.8
	351-400	24	23.8	30.4	96.2
	401+	3	3.0	3.8	100.0
	Total	79	78.2	100.0	
Missing	System	22	21.8		
Total		101	100.0		

Saturday Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	101-150	1	1.0	1.3	1.3
	151-200	8	7.9	10.5	11.8
	201-250	5	5.0	6.6	18.4
	251-300	22	21.8	28.9	47.4
	301-350	1	1.0	1.3	48.7
	351-400	27	26.7	35.5	84.2
	401+	12	11.9	15.8	100.0
	Total	76	75.2	100.0	
Missing	System	25	24.8		

Total		101	100.0		

Sunday Income					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0-100	10	9.9	28.6	28.6
	101-150	10	9.9	28.6	57.1
	151-200	9	8.9	25.7	82.9
	201-250	1	1.0	2.9	85.7
	251-300	2	2.0	5.7	91.4
	301-350	1	1.0	2.9	94.3
	351-400	2	2.0	5.7	100.0
	Total	35	34.7	100.0	
Missing	System	66	65.3		
Total		101	100.0		

Passenger Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	41	40.6	43.2	43.2
	31-40	42	41.6	44.2	87.4
	41-50	8	7.9	8.4	95.8
	51-60	3	3.0	3.2	98.9
	60+	1	1.0	1.1	100.0
	Total	95	94.1	100.0	
Missing	System	6	5.9		
Total		101	100.0		

Times Passenger rode a Taxi					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 times	65	64.4	67.0	67.0
	6-10	12	11.9	12.4	79.4
	11-20 times	1	1.0	1.0	80.4

	51+ times	19	18.8	19.6	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

Preference to continue riding Taxis					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	46	45.5	47.9	47.9
	no	44	43.6	45.8	93.8
	Not sure	6	5.9	6.3	100.0
	Total	96	95.0	100.0	
Missing	System	5	5.0		
Total		101	100.0		

Reasons to continue riding					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	only option	20	19.8	42.6	42.6
	Cheapest	19	18.8	40.4	83.0
	Good customer care	1	1.0	2.1	85.1
	Takes door to door	3	3.0	6.4	91.5
	is Fast	4	4.0	8.5	100.0
	Total	47	46.5	100.0	
Missing	System	54	53.5		
Total		101	100.0		

Taxi make Preference					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	41	40.6	43.2	43.2
	No	54	53.5	56.8	100.0
	Total	95	94.1	100.0	
Missing	System	6	5.9		

Total	101	100.0		

If preference is Yes, Why?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	close ally	1	1.0	2.4	2.4
	cheap	8	7.9	19.5	22.0
	Good Customer Care	8	7.9	19.5	41.5
	Takes door to door	18	17.8	43.9	85.4
	Is fast	5	5.0	12.2	97.6
	Other	1	1.0	2.4	100.0
	Total	41	40.6	100.0	
Missing	System	60	59.4		
Total		101	100.0		

How convenient are Taxis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	poor	5	5.0	5.2	5.2
	Fair	9	8.9	9.3	14.4
	Good	66	65.3	68.0	82.5
	Better	15	14.9	15.5	97.9
	Outstanding	2	2.0	2.1	100.0
	Total	97	96.0	100.0	
Missing	System	4	4.0		
Total		101	100.0		

Key Reasons for riding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Business	74	73.3	77.1	77.1
	Social	18	17.8	18.8	95.8
	Other	4	4.0	4.2	100.0
	Total	96	95.0	100.0	

Missing	System	5	5.0		
Total		101	100.0		

Cross tabulations

Saturday Income x years of experience in taxi driving

Cross tabulation						
Count						
		years taxi driving				
		4-6 Months	7-12 Months	13-24 Months	25 Months +	Total
Amount Raked on Saturday	101-150	0	1	0	0	1
	151-200	0	1	1	6	8
	201-250	1	0	1	3	5
	251-300	0	2	1	19	22
	301-350	0	0	1	0	1
	351-400	0	0	3	23	26
	401+	0	0	3	9	12
Total		1	4	10	60	75

Chi square test for Willingness of commuters to continue riding taxis

Taxi Convenience x Number of times passenger used cruise ride taxis

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	20.485a	12	0.058
Likelihood Ratio	16.730	12	0.160
Linear-by-Linear Association	1.124	1	0.289
N of Valid Cases	97		

Taxi Convenience x Passenger waiting time

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.646a	12	0.017
Likelihood Ratio	24.549	12	0.017
Linear-by-Linear Association	0.038	1	0.845
N of Valid Cases	96		

Taxi Convenience x Taxi preference

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.291a	4	0.015
Likelihood Ratio	14.861	4	0.005
Linear-by-Linear Association	0.026	1	0.873
N of Valid Cases	95		

Taxi Convenience x Key reasons for riding

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.034a	8	0.021
Likelihood Ratio	16.920	8	0.031
Linear-by-Linear Association	2.620	1	0.106
N of Valid Cases	96		

Taxi Convenience x Preference to continue riding

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.814a	8	0.016

Likelihood Ratio	15.562	8	0.049
Linear-by-Linear Association	4.188	1	0.041
N of Valid Cases	96		

Passenger waiting time x Time to jump in to the car

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.879a	6	0.045
Likelihood Ratio	11.855	6	0.065
Linear-by-Linear Association	5.403	1	0.020
N of Valid Cases	96		

Passenger waiting time x Preference to continue riding

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	15.260a	6	0.018
Likelihood Ratio	14.528	6	0.024
Linear-by-Linear Association	1.903	1	0.168
N of Valid Cases	95		

Taxi preference x Willingness to continue riding

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.065a	2	0.007
Likelihood Ratio	12.326	2	0.002
Linear-by-Linear Association	0.467	1	0.494
N of Valid Cases	94		

Chi-Square Tests for efficiency of cruise taxis

Level of education vs Time taken to pick passengers

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.389a	3	0.016
Likelihood Ratio	12.234	3	0.007
Linear-by-Linear Association	3.676	1	0.055
N of Valid Cases	53		

Level of education vs Time taken to drop off passengers

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.853a	3	0.049
Likelihood Ratio	7.340	3	0.062
Linear-by-Linear Association	4.951	1	0.026
N of Valid Cases	52		

Level of education x Total Saturday income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.965a	12	0.015
Likelihood Ratio	19.703	12	0.073
Linear-by-Linear Association	.163	1	0.687
N of Valid Cases	65		

Level of education x commuting market

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.306a	24	0.290
Likelihood Ratio	26.860	24	0.311
Linear-by-Linear Association	0.974	1	0.324
N of Valid Cases	81		

Driving Experience x time taken to drop off a passenger

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	40.265a	24	0.020
Likelihood Ratio	26.173	24	0.344
Linear-by-Linear Association	1.735	1	0.188
N of Valid Cases	91		

Driving experience x how long driver will continue in this business

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.321a	9	0.000
Likelihood Ratio	19.822	9	0.019
Linear-by-Linear Association	13.792	1	0.000
N of Valid Cases	96		

Driving experience x Saturday Income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	45.259a	18	0.000

Likelihood Ratio	24.450	18	0.141
Linear-by-Linear Association	4.153	1	0.042
N of Valid Cases	75		

Viability of Cruise ride taxis

Break down expenditure x Sunday revenue

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.948a	24	0.035
Likelihood Ratio	26.566	24	0.325
Linear-by-Linear Association	1.095	1	0.295
N of Valid Cases	25		

Break down expenditure x Tuesday income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	44.235a	24	0.007
Likelihood Ratio	36.626	24	0.048
Linear-by-Linear Association	1.129	1	0.288
N of Valid Cases	52		

Breakdown expenditure x Thursday income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	39.506a	24	0.024
Likelihood Ratio	30.588	24	0.166
Linear-by-Linear Association	.733	1	0.392
N of Valid Cases	52		

Break down expenditure x Friday income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	51.280a	24	0.001
Likelihood Ratio	38.657	24	0.030
Linear-by-Linear Association	2.397	1	0.122
N of Valid Cases	53		

Number of empty seats x Saturday income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.266a	6	0.012
Likelihood Ratio	10.357	6	0.032
Linear-by-Linear Association	1.444	1	0.129
N of Valid Cases	33		

Number of empty seats x Friday income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	25.616a	12	0.001
Likelihood Ratio	21.106	12	0.029
Linear-by-Linear Association	8.160	1	0.004
N of Valid Cases	71		

Number of empty seats x Saturday Income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.906a	12	0.000

Likelihood Ratio	29.109	12	0.004
Linear-by-Linear Association	12.031	1	0.001
N of Valid Cases	68		

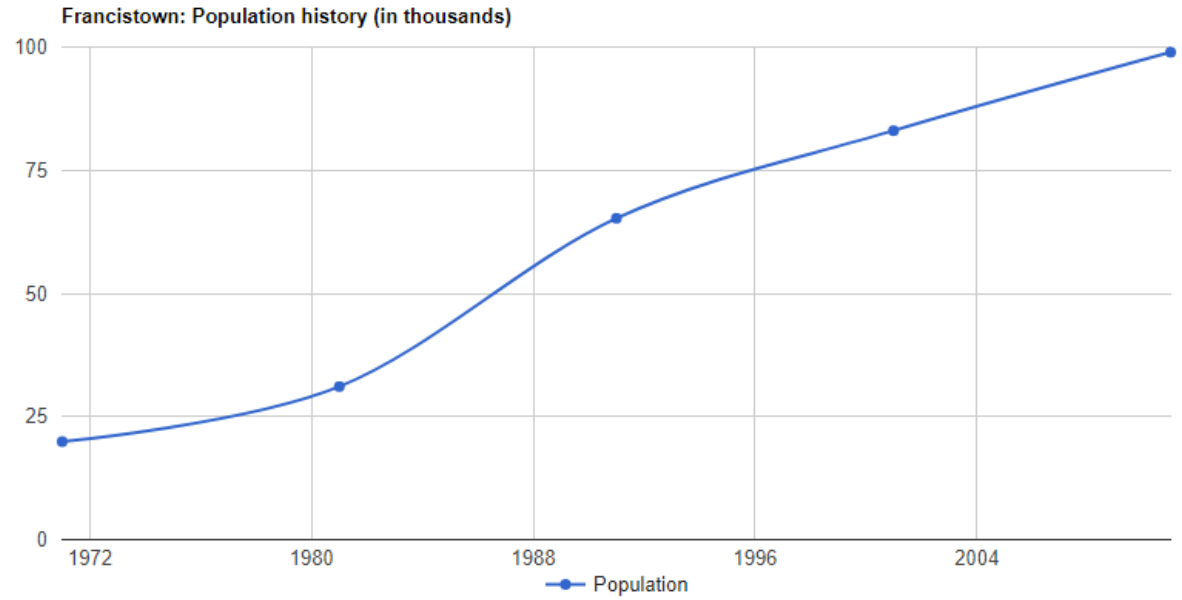
Ranking time x Sunday Income

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	46.941a	12	0.000
Likelihood Ratio	16.377	12	0.003
Linear-by-Linear Association	0.007	1	0.002
N of Valid Cases	29		

Ranking time x Saturday collection

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.419a	12	0.000
Likelihood Ratio	25.675	12	0.012
Linear-by-Linear Association	13.148	1	0.000
N of Valid Cases	67		

Francistown Population growth



Francistown Annual population development

Annual population change

[1971-1981] +**4.55** %/year
[1981-1991] +7.7 %/year
[1991-2001] +**2.44** %/year
[2001-2011] +**1.77** %/year

Rainfall and Temperature Chart

Climate data for Francistown													
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Average high °C	29	28	28	27	24	22	22	25	28	29	30	29	27
Average low °C	22	21	19	16	12	8	8	11	16	19	20	21	16
Average precipitation mm	99	84	61	25	7.6	2.5	0	0	7.6	28	58	91	460
Source: Weatherbase 2019													

The Francistown Metropolis schematic diagram

Research Permit

Republic of Botswana
Ministry of Transport and Communications
Department of Road Transport and Safety
P.O. Box 128, Francistown, Botswana, Tel: (+267) 2415578 Fax: (+267) 2412000

Our Ref: DRTS/VTS/4/12/4 I (139) 27th March 2019

Mr Titus Chimwa
P O Box 21250
Gaborone

Dear Sir

RE: REQUEST FOR PERMISSION TO RESEARCH - YOURSELF

The above captioned matter refers.

This communiqué serves to inform you that permission to research has been granted to you.

Please be informed that the information will not be shared or will only be used for the purposes of studying only. You are advised to share the report with the office after completion of the research.

Thank you.

Yours faithfully

.....
Katlego K. Kgare
STATION MANAGER

BOTSWANA
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Editor's Letter

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25 September, 2019

To whom it may concern,

Dear Sir/Madam,

Re: Letter of confirmation of language editing

The thesis "Viability and economic contribution of shared ride taxis: A case of Francistown Metropolis" by Titos Chimwa (1817417) was language and typographically edited. Corrections were also suggested with regard to technical editing, citations and referencing techniques. Final corrections as suggested remain the responsibility of the student.

Yours faithfully,

Dr Joel M. Magogwe
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