

**YANGON UNIVERSITY OF ECONOMICS**  
**DEPARTMENT OF COMMERCE**  
**MASTER OF BANKING AND FINANCE PROGRAMME**

**CUSTOMER PERCEPTION ON USE OF CARD PAYMENT  
SYSTEM IN YANGON PUBLIC TRANSPORTATION**

**THAN HTIKE SOE**  
**(MBF – 4<sup>TH</sup> BATCH)**

**DECEMBER, 2018**

# **CUSTOMER PERCEPTION USE OF CARD PAYMENT SYSTEM IN YANGON PUBLIC TRANSPORTATION**

A thesis submitted as a partial fulfillment towards the requirements for  
the degree of Master of Banking and Finance (MBF)

## **Supervised by**

Daw Khin Nwe Ohn  
Associate Professor  
Department of Commerce  
Yangon University of Economics

## **Submitted by**

Than Htike Soe  
Roll No. 84  
MBF 4<sup>th</sup> Batch  
2016-2018

DECEMBER, 2018

## ACCEPTANCE

Accepted by the Board of Examiners of the MBF Programme, Department of Commerce, Yangon University of Economics, in partial fulfillment for the requirement of the Master of Banking and Finance (MBF).

-----  
Chairman  
Prof. Dr. Tin Win  
Rector  
Yangon University of Economics

-----  
(Examiner)  
Prof. Dr. Daw Soe Thu  
Programme Director  
MBF Programme  
Yangon University of Economics

-----  
(Supervisor)  
Daw Khin Nwe Ohn  
Associate Professor  
Yangon University of Economics

-----  
(Examiner)  
Prof. Dr. Tin Tin Htwe  
Professor  
Yangon University of Economics

-----  
(Examiner)  
Prof. Dr. Aye Thu Htun  
Associate Professor  
Yangon University of Economics

-----  
(Examiner)  
Daw Yee Yee Thein  
Associate Professor  
Yangon University of Economics

DECEMBER, 2018

## **ABSTRACT**

This study mainly intends to focus on the customer perception on use of card payment system in Yangon public transportation. Therefore, objectives of this study are to identify the card payment system of Yangon public transportation and to examine the customer perception on use of card payment system in Yangon public transportation era. To achieve these objectives, both primary and secondary data are collected with using well established questionnaires. The convenience sampling method is used and 200 commuters are chosen. The variables used to evaluate for perception of commuters are costs of using card system, secure in using card system and convenience of card system. According to findings, the commuters has good perception on all variables but among them secure of card payment system is rather less perception. Especially, the commuters worry about high selling price for card and loss of card. Overall, commuters get more opportunities with card payment system in public transportation to overcome the existing challenges with many benefits. According to findings, the authorized person of public transportation sector should to regard in secure and convenience card payment system and set suitable selling price of card for more satisfaction of public.

## **ACKNOWLEDGEMENTS**

First of all, I would like to express my sincere gratitude to Professor Dr. Tin Win, Rector of Yangon University of Economics, and one of the members of MBF Committee who taught us the various topics and present developed technical know-how apply in financial sector for three years to complete this course and encouragement to the participants of the MBF Programme.

First and foremost, I would like to express my sincere thanks to the Master of Banking and Finance Programme for providing us a great opportunity to learn master level studies. And I would like to extend my warmest and special sincere thanks to Professor Dr. Soe Thu, MBF Programme Director, Head of Department of Commerce, Yangon University of Economics, for her kind guidance, encouragement and suggestions during these three years.

Moreover, I would like to express my heartfelt thanks to my supervisor Daw Khin Nwe Ohn, Associate Professor, Department of Commerce, Yangon University of Economics, for her supervision and invaluable advices throughout developing this paper. I also would like to give special thanks to all Professors, Associate Professors, Lecturers and distinguished visiting Lecturers from Yangon University of Economics for a great variety of knowledge and concept of banking and finance during the study period of Master of Banking and Finance (MBF) Programme.

Finally, I wish to acknowledge the kindness, friendliness, unselfishness of my colleagues (classmates) and banks/company/bus operator managements & team members and I would like to extend my sincere gratitude to MBF 4<sup>th</sup> Batch.

# TABLE OF CONTENTS

	Page
<b>ABSTRACT</b>	i
<b>ACKNOWLEDGEMENTS</b>	ii
<b>TABLE OF CONTENTS</b>	iii
<b>LIST OF TABLES</b>	v
<b>LIST OF ABBREVIATIONS</b>	vi
<b>CHAPTER I</b>	
<b>INTRODUCTION</b>	1
1.1 Rationale of the Study	2
1.2 Objectives of the Study	4
1.3 Scope and Method of the Study	4
1.4 Organization of the Study	5
<b>CHAPTER II</b>	
<b>LITERATURE VIEW</b>	
2.1 History of Card Payment System	6
2.2 Types of Smart Payment Card System	8
2.3 Octopus Card Payment System in Hong Kong	10
2.4 Advantages and Disadvantages of using Card	13
2.5 Previous Studies of Customer Perception	14
<b>CHAPTER III</b>	
<b>PROFILE OF YANGON PUBLIC TRANSPORTATION SERVICES</b>	
3.1 Bus Public Transportation System in Myanmar	17
3.2 Profile of YPS and ASTI	18
3.3 Card Payment System Project of Yangon Public Transportation	

**CHAPTER IV ANALYSIS OF CUSTOMER PERCEPTION ON USE OF CARD  
PAYMENT SYSTEM IN YANGON PUBLIC  
TRANSPORTATION**

4.1	Survey Design	25
4.2	Demographic Characteristics of Respondents	25
4.3	Customer Perception on Use of the Card Payment System	30

**CHAPTER V CONCLUSION**

5.1	Finding	35
5.2	Suggestion	36
5.3	Need for Further Study	37

**REFERENCES**

**APPENDICES**

## **LIST OF TABLES**

<b>Table No.</b>	<b>Title</b>	<b>Page</b>
4.1	Number of Respondents by Gender	26
4.2	Age Group of Respondents	27
4.3	Education Level of Respondents	27
4.4	Number of Respondents by Occupation Status	28
4.5	Number of Respondents by Monthly Income	29
4.6	Cost of using Card System	30
4.7	Secure in using Card System	32
4.8	Convenient of using Card System	33

## LIST OF ABBREVIATIONS

3DESE	-	128-Bit Triple DES Encryption
AFC	-	Automatic Fare Collection
API	-	Application Programming Interface
APTS	-	Advanced Public Transportation System
ASTI	-	Asia Starmar Transport Intelligent Co., Ltd.
ATIS	-	Advanced Traveler Information System
ATM	-	Automotive Teller Machine
ATMS	-	Advanced Transportation Management System
AVMs	-	Add-Value Machines
BIS	-	Bus Information System
BRT	-	Bus Rapid Transit
BTO	-	Build–Transfer–Operate
CBM	-	Central Bank of Myanmar
CBTS	-	Cashless Bus Ticketing System
C-ITS	-	Cooperative Intelligent Transport System(s)
CEO	-	Chief Executive Officer
EFT	-	Electronic Fund Transfer
EMTS	-	Electronic Money Transfer System
ETCS	-	Electronic Toll Collection Services
FVMs	-	Fare Value Machines
GST	-	Golden Southern Transport Co., Ltd.
GIS	-	Geographical Information Systems
GPS	-	Global Positioning System
ITS	-	Intelligent Transport System(s)
NFC	-	Near Field Communication
PCD	-	Proximity Coupling Device
PCIDSS	-	Payment Card Industry Data Security Standards
PICC	-	Proximity Integrated Circuit Card
POS	-	Point of Sales Terminal (Device)
Reader	-	A point-of-sale device that communicates with cards to process

payment transactions.

RFID	-	Radio Frequency Identification Device
Skim	-	Electronic data stolen from a credit card's magnetic strip(e) and put on a counterfeit card used to make fraudulent purchases.
WBT	-	Water Bus Transportation
YBPC	-	Yangon Bus Public Co., Ltd.
YBS	-	Yangon Bus Services Public Co., Ltd.
YPS	-	Yangon Payment Services Public Co., Ltd.
YRTA	-	Yangon Region Transport Authority
YUPT	-	Yangon Urban Public Transport Public Co., Ltd.

## **CHAPTER I INTRODUCTION**

The popularity of Internet technology has increased substantially over the course of the last several years. As a result, organizations have worked diligently to develop new methods for interfacing with customers. Central to this process has been the development of e-tickets and payment card system (Borthick, 2003). Card system and e-tickets can be used by a wide range of organizations to provide services including coupons fore-shopping, to tickets for entrance into a concert or sporting event or public transportation. Although it is not fair to argue that e-tickets have become ubiquitous, it is evident that the proliferation of e-tickets represents a change in the way that traditional ticket purchasing occurs (Bukhari S.M.F. Gloneim A. Dennis C. & Jamjoom. B., 2013).

In addition, the cognitive elements of e-ticketing and payment card have become such an important issue of concern for organizations in recent years as efforts to expand e-ticketing progress (Lopez-Bonilla, 2013). Specifically, the issue of customer satisfaction in cash, e-ticketing or payment card has become a central issue of focus, prompting organizations to investigate the specific variables that shape customer outcomes when choosing cash, e-ticketing or payment card option. By correlating independent variables with customer satisfaction, it will be possible to acquire a deeper understanding of how customer perception and satisfaction is developed when it comes to e-ticket and payment card purchasing and use by consumers.

Increasing urbanization will lead to more stress on the resources that cities have available to meet growing demand for housing, infrastructure, transportation, energy and employment. There is a growing recognition of the benefits it can have on the environment, and how it can improve productivity, safety and overall quality of life. As the world becomes increasingly connected, advanced applications – known as intelligent transportation systems (ITS) – provide innovative solutions to better manage traffic and enable users to make safer and smarter use of transport networks and transportation digital payment system. Transportation and (card & mobile) digital payment that are operationally efficient and safe is an important part of this.

Challenges in transportation can be addressed by either adding new capacity where possible or by using existing resources smartly with the help of ITS. Indeed, the success of any organization depends largely on the extent to which that organization could integrate its knowledge about the customer needs, wants and preference with its own creative capacity and skills.

Together with changing paradigm in Myanmar payment sector, the new payment companies (FinTech Companies) enter into the market and competition tends to increase. In order to services and prosper in the payment industry, payment company has strike to improve the quality of services offering to the customers and need to know how customers perceive the level of service they have rendered. Those payment companies need to explore more customers' satisfaction on financial payment service provided by them and other private banks and customers requirement, expectations and to create customers value and satisfaction for the future success.

### **1.1 Rationale of the Study**

City public transportation is an important pillar for quality of life of citizens in a city. Currently, in most of the cities, public and private road transportation is the key mode of commuting and logistics. (Vishvesh Prabhakar. Sanjeev Gupta. Rajul Mehrotra., 2015) Some large and mega cities have metro and local train network as the backbone transportation mode.

Lack of quality and safe public transportation, inadequate capacity of public transportation, road safety concerns, bus fare, overcrowded road network, poor traffic management, parking issues, theft, poor road conditions, lack of modal options (including pedestrian walkways) remain the key issues in most of the cities. Most cities also lack the integrated transportation plans leading to huge demand-supply gap and poor transportation network. For transport operators, huge demand-supply gap, under recovery and poor asset management remain the key issues.

In Myanmar, since many years back, according to Ma Hta Tha's statistics, over 6,500 buses from over 350 bus lines are running on 17 routes in the Yangon region, transporting over 2.5 - 3 million commuters every day. Traffic jams in Yangon are caused not only by buses because irresponsible private vehicles and taxis are also to be blamed. And it is true that buses are racing each other to get more passengers. Even with rising prices in Yangon, bus fares have not been raised and should consider making bus fares reflect the present prices. Commuters also complain that most of the buses running in Yangon ask for higher fares than the standards set by Ma Hta Tha, the previous supervisory committee for motor vehicles. In Jan 2017, new government plan to transform the independent bus lines running in Yangon to a unified, publicly traded company (YBS) will be implemented in three to six months from now.

In response to the challenges and problems, all Yangon Bus Service (YBS) management is taken care of by Yangon Region Transport Authority (YRTA) and headed by Yangon Region Government. All the new bus systems, including reformation of Public-Private Partnerships and changing of bus routes are planned by the regional government office, not based on the master plan which was proposed by the JICA which foreign experts do not know the situation and needs of the country like local people. And the Yangon government officially announced that they will take strong action against bus drivers and conductors who will not adapt to the new policies yet familiar problems are being reported. Yangon regional government has also instructed bus operators/owners to install GPS systems and place CCTV cameras in all their buses to ensure that every bus line is under the control of YRTA. CCTV will also be installed at not only all traffic stations but also bus/ train stations. To begin with, 250 stations in major areas are going to be upgraded to meet international standard to ensure the prevention of pickpockets on the buses as well as protection of female passengers from sexual harassment. Moreover, some existing challenges are drivers are stealing bus fare during driving, commuters have trouble to change small notes to ride the bus and hard to get back refund money,

In Yangon, 70 percent of city commuters — an estimated 2.5 - 3 million people — relying on buses, the YBS' inadequate fleet has caused overcrowding and delays, especially in rush hours and late in the evenings daily. YRTA acknowledged that there were challenges during the transition, but the significant improvements had been seen over the past year and pointed out that the YBS has consolidated overlapping bus lines, bringing the total number down to 92 from more than 300 lines, partly to deter bus drivers from racing each other as they compete for passengers. The system also replaced conductors with fare boxes. Currently, there are 16 bus companies including two public-private partnership companies — YUPT and YBPC and six individual operators. Two thirds of all buses running now are operated by public companies.

Accordingly, the payment problem is faced in public transportation therefore, the transforming modern public transportation payment system is very crucial for the development of the people daily life and city. The development of modern digital payment services system of public transportation in Myanmar should be used. Hence, this study aims to pinpoint these challenges and future opportunities to use card system in public

transportation. This study aims to identify and mitigate how these challenges are overcome and how opportunities are able to use in smoother public transportation payment system implementation.

### **1.2 Objectives of the Study**

The objectives of this study are as in the followings:

1. To identify the card payment system of Yangon public transportation and
2. To examine customer perception on use of the card payment system in Yangon public transportation

### **1.3 Scope and Method of the Study**

Safe and efficient payment systems are a major precondition for financial stability and economic prosperity in a country. This is an analytical study based mainly on the primary data collected through structured questionnaire. The questionnaire has been personally administered on a sample size of 200 passengers. Secondary data are collected from YRTA, YPS, YUPT, ASTI, Internet, Websites and previous research papers. In spite of these limitations, it is hoped that, this work would provide very useful insights into the area of card payment systems services its importance in public transportation sector. Scope of this study would be challenges and opportunities of card payment system in public transportation, Yangon. In order to identify and analyze the challenges and opportunities of use of card payment system in public transportation, this research was carried out using a descriptive survey design. Among over 2.5 – 3 millions of daily commuters/passengers, this study only based on 200 commuters who are selected to conduct the survey on the challenges and opportunities of card payment system in public transportation. In this study, both primary and secondary were used.

To observe the customer perception on use of card payment system in public transformation, descriptive statistics method was used in this study. The personal interviews were also conducted with passengers who took the bus transportation daily and responsible persons from YRTA, ASTI, YUPT to collect the primary data. The secondary data were also collected from various published sources such as Website, Journals, News Channel, Newspaper, Reports, White Papers, Social Media and so on.

### **1.4 Organization of Study**

This study is organized to include five chapters at all. Chapter 1 deals with the introduction to the study, gives a brief detail about its rationale of the study, objectives and organization of the study. Chapter 2 presents the review of the related literature including the aspects for similar studies and it also explains the theoretical concepts used in the study. Chapter 3 is to identify the existing transportation and payment system practices of Yangon public transportation cash collection system for YBS. Chapter 4 presents the analysis regarding challenges and opportunities of card payment system in Yangon public transportation era. Chapter 5 mentions the conclusions and gives a summary of the main findings in relation to the original aims of the study, and also presents the appropriate suggestions based on the results obtained.

## **CHAPTER II**

### **LITERATURE VIEW**

In this chapter, represents the history of card payment system, types of smart payment card system, Octopus card payment system in Hong Kong and advantages and disadvantages of Octopus card in Hong Kong (HK).

#### **2.1 History of Card Payment System**

The availability of credit and store cards predates the introduction of electronic payment systems. Credit cards were first issued in the US by hotels at the beginning of the 20th Century. By 1914, large department stores and gas station chains were the first to issue store credit cards. It was not until the 1950s that third party cards began, first as travel entertainment cards and then as bank cards (Russell, 1975). During the 1960s Visa and the MasterCard largely eliminated competition and established the bank credit card industry. In consumer markets, the introduction and use of credit cards in the 1970s to facilitate exchanges initiated social comment and research. There was a spurt of interest in understanding by whom and how these cards were used but interest waned (Schreft, 2006). The advent of automated teller machines (ATMs), the point of sale electronic payment systems and the introduction of debit and smart cards rekindled interest in payment mode research. South Korea was one of the first countries to trial contactless ticketing in 1996. However, Hong Kong is considered the pioneer in smart card adoption. Its Octopus card was the world's first major public transport ticketing system to use the NFC technology in 1997. Octopus Cards Limited, the operator of the Octopus system, is a joint venture between all of the Hong Kong transportation agencies. This business model worked in Hong Kong for several reasons.

First, as a monopoly, Octopus Cards Limited dominates the transportation market, and is in a position to impose a new system. Moreover, with vehicle ownership in Hong Kong at a very low 20 percent, the majority of trips made on public transportation provided an enormous client base for conversion. Second, after 1997, Hong Kong experienced a coin shortage when consumers began stockpiling old coins believing that they would appreciate in value following the accession to China (ACNielsen, 2005). Third, customers became accustomed to using their transit payment cards as a lifestyle product to make everyday retail purchases. The Octopus card can be used beyond public transportation services at apparel stores, bakeries, car parks, cinemas, convenience stores, fast-food chains, household stores, leisure facilities, personal care stores, photo-finishing stores, photocopyers, supermarkets, and vending machines.

Another early mover in contactless transit cards is France, one of the nations considered to be the inventor of the smart card in the early 1970s. Paris's transit body, the Régie Autonomy des Transports Parisiens (RATP), is the third-largest transport network in the world, trailing Tokyo and New York City. With approximately 11 million inhabitants (about 20 percent of the population of France), Île-de-France, the Paris metropolitan area, is the nation's most highly populated area, and attracts approximately 60 million tourists each year (EUROSMART, 2004).

In response, in 2001, the public-transit operators in Paris introduced the first phase of the NAVIGO pass, the capital's card-based contactless fare-payment system. In May of 2006, public-transit operators in Paris expanded the NAVIGO card to replace the paper-based transit ticket that allowed unlimited weekly and monthly travel passes.

The United Kingdom engaged in a fast follower strategy, learning from the technology integration of Hong Kong's transit system. In May of 2003, Transport for London (TfL) in the United Kingdom introduced London's Oyster card. The "Oyster" educated the

population about a convenient and safe way to pay, and is now used in over 3.9 million journeys every weekday to pay on London's subway system, "the Tube," and for bus fares (Transport for London, 2006).

Currently at the forefront of the RFID market, Asia – with some of the largest and fastest growing economies – has implemented many of the early contactless ticketing transportation schemes. Malaysia is using "Touch & Go" cards for public transportation, toll-gate fare, movie tickets and other modes of micropayment consumption.

Thailand was one of the late majority countries to employ contactless solutions in Asia. As the population grew, so did the traffic – considered to be one of the worst in the world. To address these issues and encourage use of the more efficient underground subway and its elevated system, the Sky train, Thailand's two main transit operators modernized their transportation platform, which included implementation of contactless payment solutions in 2005 (Rapid Card).

## 2.2 Types of Smart Payment Card System

The contactless smart card – a credit card-sized card with an embedded antenna and computer chip (RFID tag) – is beginning to gain traction at public transit agencies. Smart cards may offer transit riders and operators some benefits over non-electronic payment methods: increased convenience, security, and flexibility; as well as reduced cash handling, maintenance, and security costs. A number of contactless payment systems are emerging in the transit industry.

A cashless payment system is dependent on specific instructions governing the transfer of funds from one account to another. EMTS can utilize web based technology, card based information or radio frequency identification (RFID) devices, (usually attached to cellular phones) to direct instructions (Khan, 2011). Card based systems allow access to accumulated and/or borrowed funds and take three forms - debit, smart and credit cards:

- **Credit Card** – From a cardholder's perspective, a credit card account represents an established credit line against which payments are deferred through creation of a loan from the sponsoring financial institution. There are three types of credit cards: bank card, travel and entertainment cards and proprietary cards. A bankcard is issued by a bank based on the credit rating of the applicant (e.g. Visa and MasterCard). Travel and entertainment cards are issued by private companies and may not offer instalment payment programs. Examples of travel and entertainment cards are American Express and Diners Club. Proprietary credit cards are issued by a private entity and are limited in negotiability. For example, a chain store (e.g. Sears) or hospitality company (e.g. Holiday Inn) may issue its own credit cards and therefore also serve as its billing and collection agency. To the vending operator a credit card purchase represents a deferred payment process that involves processing and handling fees.

- **Debit Card** – A debit card purchase thereby initiates a transaction in which the value of the transaction is subtracted from the card holder's account balance and transferred to the retailer.
- **Smart Card** – Normally requires the transfer of a specific amount of money onto the card. Such cards can be for specific purchases - e.g., travel or phone use, or simply for day to day purchases - normally such cards are not linked to savings accounts but can only access the amount stored.
- **Wireless Mobile Payment** – transaction processing in which the payer uses mobile communication techniques in conjunction with mobile devices for initiation, authorization and confirmation of an exchange of financial value in return for goods and services.

Debit and credit cards share similar characteristics in terms of accessing a potentially large amount of 'virtual' money with a high degree of security (Mann, 2002). Both types of cards require dial-up/broadband network for point of purchase transactions to occur. For debit purchase, money is directly transferred to the merchant bank and money is deducted from customer's accumulated funds. A credit card is a revolving credit instrument that does not need to be paid in full; no late fee is charged so long as the minimum payment is made at specified intervals. The balance is carried forward as an interest charging loan. On the other hand the 'Smart Card' application is based on charge card technology where one has to load or charge money on to the card to use as a fuel card, SIMs for mobile phones, public transport charge card or as a public phone card. Cryptographic protocols protect the exchange of money between the smart card and the accepting machine. No connection to the issuing bank is necessary, so the holder of the card can use it regardless of whether or not he is the owner.

Electronic money transfer systems (EMTS) enable cashless payment modes and their adoption has led to predictions of a 'cashless' society (Garcia-Swartz, 2007). Borzekowski, Kiser and Ahmed (2006) report that cheque usage has significantly declined (globally) since the mid-1990s; that debit card transactions grew at a rate of 20% (in the US) between 1996 and 2005 and that ATM withdrawals and credit card use flattened over that period. This suggests more people are using their debit cards to effect transactions. Electronic payment mechanisms and especially, mobile payments are gaining consumer acceptance in many economies due to infrastructure support (Herzberg, 2003). Smart payment systems are in operation. For instance, in Hong Kong, a contactless and rechargeable smart card (e.g. the Octopus Card) allows consumers to pay their bus and train fares, buy snacks at vending machines and cafes, pay parking fees and also pay for access to sporting facilities (Yoon, 2001).

For more than a decade, there have been several attempts to integrate 'smart card technology' into 'mobile devices' to enable mobile payments for business to consumer (B2C) payment transaction processing. In the era of third generation (3G) mobile network, mobile payment is imminent. Many European and Asian countries, including Korea, Singapore, and Japan have adopted this smart card technology (Pousttchi, 2009).

### **2.3 Octopus Card Payment System in Hong Kong**

This study of payment card system for Yangon Public Transportation which included business model, technical, and operation solution will take the example of Octopus card system. **Octopus card**, a fare-payment smart card for the Hong Kong passenger transportation system, has been so successful in gaining critical mass while other equally or better supported options such as those backed by the credit card operators did not perform equally well and it is developed by "Octopus Cards Limited" in Hong Kong. Launched in September 1997 to collect fares for the territory's mass transit system, the Octopus card system is the second contactless smart card system in the world, after the Korean U-pass, and has since grown into a widely used payment system for all public transport in Hong Kong, leading to the development of Oyster Card in London, Opal Card in New South Wales and many other similar systems around the world.

The Octopus card has also grown to be used for payment in many retail shops in Hong Kong, including most convenience stores, supermarkets, and fast food restaurants. Other common Octopus payment applications include parking meters, car parks, petrol stations, vending machines, fee payment at public libraries and swimming pools, and more. The cards are also commonly used for non-payment purposes, such as school attendance and access control for office buildings and housing estates.

The Octopus card won the Chairman's Award of the World Information Technology and Services Alliance's 2006 Global IT Excellence Award for, among other things, being the world's leading complex automatic fare collection and contactless smartcard payment system. According to Octopus Cards Limited, operator of the Octopus card system, there are more than 33 million cards in circulation, nearly five times the population of Hong Kong. The cards are used by 99 per cent of the population of Hong Kong aged 16 to 65. The system handles more than 14 million transactions, worth over HK\$180 million, on a daily basis.

(Richard MacManus., 2009) In order to enhance the level of security and technology, Octopus Company launched "replacement of First Generation On-Loan Octopus" programme in 2015. First Generation cards have no bracket in their card number. On successful transactions with first generation cards, the card reader will emit a "Do" sound three times to remind cardholders to replace their cards.

In 2015, at the initial stage, card holders of first generation cardholders may voluntarily replace their cards at an Octopus Service Point without charge. In 2017, the final call on card replacements was launched by Octopus company. First generation cards will be unusable by stages starting from January 2018. Cardholders can replace these cards without charge at MTR or KMB Customer Service Centers, and Octopus Service Points.

#### **2.3.1 Card usage in Hong Kong**

The Octopus card was originally introduced for fare payment on the MTR; however, the use of the card quickly expanded to other retail businesses in Hong Kong. (Octopus Holdings Limited., 2008) The card is now commonly used in most public transport, fast food restaurants, supermarkets, vending machines, convenience stores, photo booths, parking meters, car parks and many other retails business where small payments are frequently made

by customers. With over 33 million Octopus cards in circulation as of 2018, the Octopus card is used by 99 per cent of Hong Kongese.

Notable businesses that started accepting Octopus cards at a very early stage include PARKnSHOP, Wellcome, Watsons, 7-Eleven, Starbucks, McDonald's and Circle K. As of 21 November 2004, all parking meters in Hong Kong were converted. They no longer accept coins and Octopus became the only form of payment accepted.

Octopus cards also double as access control cards in buildings and for school administrative functions. At certain office buildings, residential buildings, and schools, use of an Octopus card is required for entry. (Richard MacManus., 2009)

Making or recording a payment using the card for public transport or purchases at Octopus-enabled retailers can be done by holding the card against or waving it over an Octopus card reader from up to a few centimetres away. The reader will acknowledge payment by emitting a beep, and displaying the amount deducted and the remaining balance of the card. Standard transaction time for readers used for public transport is 0.3 seconds, while that of readers used for retailers is 1 second. (Octopus Holdings Limited., 2008) When using the MTR system, the entry point of commuters is noted when a passenger enters, and the appropriate amount based on distance traveled will be deducted when the users validate their cards again at the exit point.

### **2.3.2 Balance Enquiries, Reloading and Refunds of Card**

**Balance Enquiry:** Enquiry machines in all MTR station and Octopus Service Point in some MTR station can be found. Cardholders can place their Octopus cards on these machines which display the balance along with a history of last ten usages. Card users may also check the card's balance and transactions on mobile with the Octopus app. For some Octopus cards, up to 40 transaction can be displayed on the app. After each payment, the remaining value and cash deducted are also shown on the card reader as well as the receipt.

**Top-Up:** Money can be credited to the card through a number of ways. In general, all cards can top-up in multiples of HK\$50. As for Elder cards, Personalised Octopus Cards with "Student" or "Person with Disabilities" identity, these cards can be in multiples of HK\$10. "Add Value Machines" are installed at all MTR station and they accept cash only. Alternatively, cards may be topped up with cash at authorized service providers such as PARKnSHOP, Wellcome, Watsons, 7-Eleven, Circle K, and Café de Coral, and also at customer service centers and ticketing offices at transport stations. In selected store, change can also be put into Octopus card after a cash payment. Other than that, a large number of spare coins can also be added into Octopus card on "Coin Carts", a vehicle operated by Hong Kong Monetary Authority.

The Octopus "Automatic Add Value Service" (AAVS) is an automatic top-up Octopus method. This service allows for money to be automatically deducted from a credit card and credited to an Octopus card when the value of the Octopus card is less than zero. The credit card used must be one offered by one of 22 financial institutions that participate in AAVS. Participating banks include HSBC, Bank of China, and Hang Seng Bank. Depend on applicants' default, HK\$150/250/500 is added to the card each time value is automatically added.

**Card Refund:** An Octopus card may be returned to any MTR Customer Service Centre for a refund of the remaining credit stored on it. A handling fee may be charged for the refund – HK\$9 for an anonymous On-Loan card that had been in use for fewer than three months, and HK\$10 for a Personalised On-Loan card that was issued on or after 1 November 2004. A refund is immediately provided at the time an anonymous On Loan card is returned, unless it has more than HK\$500 stored on it. A Personalised On-Loan card or an anonymous On-Loan card with more than HK\$500 stored on it needs to be sent back to Octopus Cards Limited for

refund processing, in which case, the refund for a Personalised On-Loan card would be available in eight days, and that of an anonymous On-Loan card would be available in five days. If a damaged card is returned for refund, a HK\$30 levy would be charged to the cardholder.

### 2.3.3 Card Security System

The Octopus card uses encryption for all airborne communication and performs mutual authentication between the card and reader based on the ISO 9798-2 three-pass mutual authentication protocol. In other words, data communications are only established when the card and reader have mutually authenticated based on a shared secret access key. This means that the security of the Octopus card system would be jeopardized should the access key be exposed. A stolen Octopus card reader could be used with stolen Octopus software, for example, to add value (up to HK\$1,000) to any Octopus card without authorization. Nevertheless, as of 2003, the Octopus card and system had never been hacked.

## 2.4 Advantages and Disadvantages of using Card

Cash is by far the worst way to pay for transport in Hong Kong, and should be avoided in pretty much all cases, with the exception of taxis (although these accept contactless and credit cards too). Usually, cash fares are much higher than the other payment options, plus some services, don't even accept cash any more. Basically, don't use cash to pay directly for the ticket fare in Hong Kong.

### Advantages of using Card

**It works and support is available.** As noted not all contactless cards work with the system but the Octopus card should always work. If there are problems, commuters can get support or get their credit refunded if payment card is registered on the Octopus official website. Also commuters are not necessary to carry cash or coins any more to take any mode of public transport in HK which save time and cost and safety for the commuters.

**Easier to keep track of spending:** Because commuters have to load their Octopus card, it's easier to keep an eye on how much they are spending on HK transport and they can set a limit much easier. They don't think this makes a great difference to the average commuters will likely have to travel anyway, but it's something to keep in mind if they like to restrict them spend on public transport.

**Supports travelcards:** One of the main advantages of the Octopus card is that it supports travelcards. These are fixed payment pre-paid options, where commuter pay a certain amount for unlimited travel inside HK for a weekly, monthly or annual price.

### Disadvantages of using Card

**Commuters have to pay a deposit:** When passengers first get an Octopus card, they have to pay some deposit. This is refundable if they don't need the card anymore, although many people forget about this, or just hang onto the card forever, meaning there's a tangible some cost associated with using it.

**It has to be recharged:** One of the main downsides of Octopus is that it's a pay as you go card that needs to have credit on it use it. This is fine if much of commuter travel is by bus as the majority of bus stations have machines that they can top-up on, but if commuters travel by bus a lot they'll have to go out of their way to find a charge point near by bus stops.

**No support for weekly capping:** Octopus cards support daily caps on travel, but they don't support weekly caps.

**Complexity of integration:** Octopus cards system has challenges to integrate with other payment system and micro-consumption.

## 2.5 Previous Studies of Customer Perception

(Hirschman, 1979) studied the impact of payment method on purchase behavior. He found that use of credit cards encourage more purchases than use of cash. (Avery, 1986) found that there was a strong positive correlation between income, education, wealth, urban variable and middle age and dependent variable credit card use. (Manohar, 1993) examined the factors influencing usage of credit cards issued by a bank in India. They found that that sex, age, educational qualification of card holders has no relationship with utilization of credit cards. They also found that occupation, income, employment status of spouse, mode of getting card has relationship with utilization of credit cards. (George, 1995) found that VISA and Master Card played a major role in international payment system. (Worthington S., 1995) expressed the view that the cashless society in which clumsy and expensive to handle coins and notes are replaced by efficient electronic payments initiated by various types of plastic cards is a good prospect for the twenty first century. (Radhakrishan, 1996) found that the debit cards have wide acceptability than credit cards because of assurance of payments to retailers and lack of some transaction charges. (Klee, 2005) found that time factors significantly determine the use of media of exchange in payment systems. They also found that sensitivity to time factors depend on the income, age and demographic characteristics local market. (Jain, 2006) expressed the view that electronic payments will be able to check black money. (Al-Laham, 2009) found that there was considerable interest in the development of electronic money schemes in recent years. He also said that Electronic money could become an important form of currency in the future.

Digital wallet or card payments bring extra convenience to shoppers by offering flexible payment additions and accelerating exchanges (Liu S, 2012). (Shin H, 2009) tested a comprehensive model of consumer acceptance in the context of mobile payment. It used the unified theory of acceptance and use of technology (UTAUT) model with constructs of security, trust, social influence, and self-efficacy. The model confirmed the classical role of technology acceptance factors (i.e., perceived to users' attitude), the results also showed that users' attitudes and intentions are influenced by perceived security and trust. In the extended model, the moderating effects of demographics on the relations among the variables were found to be significant. Digital wallets and contactless payment cards offer the consumers the convenience of payments without swiping their debit or credit cards. Instant Cash availability and renders seamless mobility is also a unique feature of these digital apps, for instance the

balance in user wallet can be very easily transferred to the bank account as and when user want. Following are some other advantages of making transactions through e wallets:

**Saves time:** digital wallets hold the amount in the electronic form so as to ease the payment process where users can make online payments without entering any card details. Contactless NFC payment card for public transportation also can make offline payments.

**Ease of use:** As digital wallet is like one click pay without filling details about card via card number and passwords every time, It allows user to link digital wallet to accounts and pay right away so that the consumers face no issues to enter the details every time a transaction happen.

**Security:** There is a good amount of security when payments are made through e wallets since the wallet does not pass the payment card details to the website. These virtual wallets allow users to lock their wallet.

**Convenient and information stored under one roof:** As digital wallets helps to eliminate need to carry the physical wallet they are highly convenient. Also a better management is possible as there is synchronization of data from multiple platforms like bank accounts, credit and debit cards, mobile accounts and billing portals.

**Attractive discount:** Cash back and discounts are being offered by most of the players along with providing offline wallet balance top up known as 'Cash Pickup' service. This service is being offered by Mobikwik that will facilitate cash to be directly added to MobiKwik wallet where consumers of even smaller towns can be benefited (SHAMSHER SINGH).

## **CHAPTER III**

### **PROFILE OF YANGON PUBLIC TRANSPORTATION SERVICES**

This chapter 3 identifies existing transportation system of Yangon and payment system project presents the historical background and transformation of public transportation system including card payment system in Yangon with the public announced by government data. There are following sections included which are historical background, vision, transformation of YBS, and revolution of the card payment system in public transportation in Yangon.

#### **3.1 Bus Public Transportation System in Myanmar**

Today is a time of transition for Myanmar. This paper will describe the transition in the first days of Ma Hta Tha to the YBS (Yangon Bus Services) system, and the role of new payment system in Yangon. Yangon is the second city of Myanmar and also the business city. Public transport system of Yangon in the past was Ma Hta Tha that means Yangon Division Motor Vehicles Supervisory Committee. This Committee was originally set up in 1962 and was dissolved on 15 January 2017. Yangon Region Transport Authority - YRTA, originally set up on 8 July 2016, replaced Ma Hta Tha with the Yangon Bus Services on 16 January 2017. This is now the operating transit agency for the Yangon Region. Passengers traveling outside in Yangon faced problems during the first days of transition from Ma Hta Tha to the YBS system. They were aided by Myanmar University students and volunteers helped passengers by giving those maps of the new bus lines at the bus stands. Myanmar journals featured pieces about the volunteers and how they aided the passengers. (Aye Nyein Win., 2017) These journals were interested in the transition in the Yangon Bus System. Coming 16<sup>th</sup> January 2019 will be 2<sup>nd</sup> anniversary of YBS and start the new payment system for public transportation (Bus) payment system in Yangon.

Yangon Region Chief Minister met with university students, members of philanthropic groups, and volunteers to discuss the city's new bus service on 13 January 2017 at the Yangon Regional Parliament. An announcement at a press conference stated that all 300 bus lines registered with the Yangon Division Motor Vehicles Supervisory Committee (Ma Hta Tha) would be replaced with 61 new bus lines by 18 Public Bus Operator Companies on January 16<sup>th</sup>, 2017. (Please see **Appendix A**)

Yangon Bus Service (YBS) is a bus transport network system which started operations on 16<sup>th</sup> January 2017, serving Myanmar's former capital city in Yangon. It's operated by the Yangon Region Transport Authority (YRTA) card payment system project of Yangon public transportation will managed by Yangon Payment Services Co., Ltd (YPS) by Yangon Regional Government.

In 16<sup>th</sup> January 2017, The Irrawaddy newspaper described, Yangon Chief Minister (CM) said that after the city's commuters get used to the new bus system (YBS), the government will improve the condition of the vehicles, then the security of the buses, and the card payment system. He hopes to finish the whole reform process by the end of 2017, allotting each area three month.

Prior to the implementation of the new bus network, Yangon's bus network was overseen by the Yangon Motor Vehicles Supervisory Committee (colloquially referred to as

“Ma Hta Tha”), and served a majority of the city's 2.5 - 3 million commuters daily. Private bus companies also ran lines throughout the city at a smaller scale. Of the 7,800 buses registered in Yangon, 4,000 of them plied the streets of Yangon daily, covering over three hundred bus lines.

A main reason for the overhaul of the bus network was the increasing number of complaints against bus operators for compromising passengers' safety in a bid to maximize profits, with bus drivers driving dangerously to pick up more commuters than their competition. The bus conductors (locally known as 'spares') were also heavily criticized for their poor attitude and constant overcharging. The CM of Yangon, who brought the issue of public transport reforms into the spotlight.

The new system would eliminate the overlap of bus lines in a move to avoid “races” between buses, a practice in which vehicles compete for passengers and make unscheduled stops. Residents hoped that this shift would also relieve some of the traffic congestion downtown. Under the plan, an estimated 3,000 buses will serve the city, with bus fares ranging from 100-300 kyats, depending on the distance of travel.

### **3.2 Profile of YPS and ASTI**

The Yangon Regional Government setup new company called Yangon Payment Services Company Limited on 31 Jan 2017 and has short listed three companies to implement the Yangon Payment Services (YPS) cashless payment system on all Yangon buses in 2018. After conducting checks and meeting with a total of 14 companies which tendered for the project, the Tender Supervisory Committee has selected Any Pay Payment Services Co., Ltd, Asia Stamar Transport Intelligent Co., Ltd and Excel KC Myanmar Co., Ltd. as the top three potential candidates for the job. The Yangon Regional Government reviewed the necessary documents and discussed plans at length with each company. The companies must reply to the governments queries urgently. On January 8 2018, the Yangon Regional Government will meet one final time with the three companies and announce the winner on the same day. After switching to the Yangon Bus Service (YBS) from the old Ma Hta Tha transportation system last January 2017, Yangon Regional Government is now focused on implementing YPS, which involves the use of prepaid cards to pay for the fares on all buses.

Under the new YBS system, old buses were replaced with new air-conditioned buses with cash boxes in all buses and bus lines were consolidated to just over 100 lines from more than 300 before. However, commuters abused the system by placing paper instead of cash into the boxes, while others paid torn or damaged notes. By implementing the new prepaid card system, the government hopes to solve these problems. According to the regional government office, the prepaid card can also be used in trains, water taxis, restaurants and supermarkets by connecting with the banks. Cash will be deducted directly from the cards and commuters will be charged based on distance in miles. Some MPs also voiced concern during regional parliament sessions over how the government would manage the companies involved in building the cashless, prepaid card system in public transportation in Yangon.

While the card payment system is not new in international countries, it is the first time Myanmar is attempting to go cashless.

The regional government originally selected Excel KC Myanmar as the cashless payment system service provider on January 10, 2018. After conducting checks and meeting with a total of 14 companies which tendered for the project, the Tender Supervisory Committee short listed AnyPay Payment Services Co, Asia Stamar Transport Intelligent Co., and Excel KC Myanmar as the top three potential candidates for the job. However, the authorities decided to annul the selection because of changes within Excel KC. The government said in April 2018 that Excel KC would no longer be eligible to build and implement a card payments system covering public transport one reason Excel KC Myanmar no longer qualifies is that Acer Company, which would have helped to raise foreign investment capital and contribute technological knowhow in the execution of YPS, had pulled out from the Excel KC Myanmar consortium, the regional government said. Among Excel KC Myanmar's strengths are its partners, including Acer, as they were able to bring in foreign capital as well as new technologies needed to build a competent YPS system. On April 9 though, Acer said it was pulling out of the consortium, essentially the disqualifying the whole consortium from carrying out the contract. Hence, the authorities decided that Excel KC did not have the necessary qualifications to implement the cashless payment system and that the company's status as tender winner for the project has been revoked.

After another two months following the cancellation, on June 13, 2018, the government announced Asia Stamar Transport Intelligent Co., Ltd (ASTI) as the winner of YPS payment system. The firm and the YPS will sign a contract to operate the payment system and will then outline the timeline for the services to be rolled out, according to Myanmar Times Newspaper.

### **3.3 Card Payment System Project of Yangon Public Transportation**

Yangon City Public Transportation & Micropayment Smart Card Project (hereinafter referred to as: "City Smart Card") is a systematic project cored by public transportation, gradually spreading to various fields of micropayment such as rent, ferry, parking, top-up, tourism, entertainment, catering, shopping and so on. The program brings together the latest achievements in the field of modern high technology such as the IC manufacturing technology, database technology, computer network technology and so on. Combined with advanced management methods and means, this program adopts advanced and reasonable operation mode and lays a solid foundation for urban informatization construction and handy service for public. As the leader and actual participant of city smart-card-system construction, the smart card operator will integrate project investment, system design, project operation, service support and other functions. This project is Build, Operate, Own and Transfer (BOOT) project with Yangon Payment Service (YPS) Company which is owned by Yangon Regional Government and project period is (6+1) years. After BOOT period ASTI must transferred whole system asset and project to YPS company, during period IP right is owned by ASTI and YPS is data owner of the project.

### 3.3.1 Overview of System Architecture

Yangon Payment IC card system solution—System Architecture: The clearing center contains storage servers, computing servers, encryption machine, switches, routers, firewalls; The storage servers are used for storing passenger information, IC card data, card data, etc.; The computing servers are used for processing data and completing instructions such as data sending, billing, querying, adding, and so on; The encryption machine analyzes every consumption and recharge data, and ensures the authenticity of the recharge and consumption data; According to the information transmitted, the switch transmits the information to right equipment; The router connects multiple logically separated networks that represents a single network or a subnet (For security, the network administrator can divide the clearing center network into several logical networks.); The firewall is a network security system between the internal network of the clearing center and the external network. Data can be allowed or restricted according to specific rules.

### 3.3.2 Management System Structures

- 1. Communication and transmission system:** This sub-system is to realize uploads and downloads of data including off-line and on-line transmission. This system receives uploaded data from various organizations/sectors, then verify completeness and authentication including terminal code, SAM serial number etc., concurrently download data to specific sectors such as reconciliation information, verification information and black list information etc.
- 2. Transaction Processing System:** This sub-system is to process all transactions of the One-Card-System including off-line and on-line transactions. Off-line transactions include top-up, consumption, interception, card issuance, annual renewal and replacement of card. On-line transactions include selling card/top-up, sign-in & sign-out, report loss/suspension/release, transfer balance, application of card return, consumption/top-up etc. The data of off-line transactions received by Communication and Transmission System will be read and separated as single independent transaction record with verified TAC, then to be bookkept. Therefore, all the off-line transaction files shall be processed by an Analytical process, and verified for TAC by a Security Verification sub-system, then to be submitted to respective business processing module for bookkeeping. Off-line transactions can be handled by batch processing to improve system efficiency.
- 3. Card Issuance and Management System:** This system is to realize initialization process of IC card. It connects encryption machine, computes card key, and drives card reader to complete card writing process. According to the volume of cards to be issued and the ways of selling cards, cards can be issued through self-service machine in batch or card reader one by one. The IC card company can customize industrial management structure for various acquirers of different industries, and provide the procedures of secondary card issuance to them to facilitate secondary card issuance.
- 4. Account Management System:** This system includes account management, transaction process, accounting process. The accuracy and completeness of such processes are guaranteed by a series of security systems. Accounting process is to handle accounting entry and report. All transactions in relation to transfer of fund must be processed by accounting process. All the results can be generated as reports and sent to accounting department for settlement. The functions of Account Management System include open account, activation, freezing, lost report, suspension, release, change password, cancellation etc. Account transaction functions mainly include top-up, consumption/revoke/return etc.

**5. Clearing System:** This sub-system is to realize data clearance and transaction settlement, provide daily, monthly and annually clearance function to acquirers and terminals, and provide functions such as reconciliation, clearing rule management, settlement cycle management, daily processing statistics, accounting adjustment, duplicate transaction records and key data etc. As daily or batch clearance, it can clear on transaction data, or by city, self-operated network, agent network, acquirer, merchant, supplier, bank and other clearing entities on sum, service charge, sharing rate of profit over total transaction amount etc. Further it can process the accumulation and statistics of transaction data by class of transaction, terminal, type of merchant, transaction result etc., which shall provide further inter-processed data support to subsequent analysis and statistics. The system shall sort out payable amount to various accounts, paid amount, and receivable amount from various accounts based on consolidated clearance data. Clearance amount shall include principal, service charge and refund charge etc.

**6. Business Management System:** This sub-system is the overall business management platform of the whole One-Card-System, mainly handling routine business management, as the interface between users and clearing center system. The users conduct business process by user end terminal. The functions include modules such as authority management, deployment, operational entity, equipment, black list, reporting, data downloading, data inquiry, information etc.

**7. Service Network System:** Service networks are the front service facilities directly facing card users. Such services include selling card, top-up/transfer, card return, replacement of card etc., and other optional services such as identity registration, lost report/release, cancellation, authorization, binding bank account, change PIN, withdraw etc. It can also provide management functions to service personnel such as daily clearance, closing account, escort fund, shift management etc.

### **3.3.3 System Financial Flow**

Operational units including the clearance center, the bus operators, the supermarket and other acquirers to the smart card system set up designated accounts in the bank for the management of funds incurred in the operation of the system.

For cash business (such as card selling, charging etc.) incurred in the service network, cash should be deposited by the network staff to the bank account of the unit to which the network belongs (the agent network belongs to the agent institution); for transfer business, the clearance center clears up all the accounts and notifies, in ways of bank statements or data transmission, the bank to allocate funds. After that, the bank will notify the clearance center, the operating units and agents in written forms.

The fund transactions between the operating units, the card selling and charging agents and the clearance center shall be uniformly allocated and managed by the clearing/settlement bank. No matter whether the operating units, agents and the clearance center are connected or not, the subordinate departments of these units and the clearance center should not have direct fund transactions. The internal fund settlement method and procedure of each operating unit and its subordinate departments shall be formulated by each operating unit itself.

### 3.3.4 Card Business Functions

As IC cards which can be used for offline payment are issued, while using the card, cardholders need such direct services as replacing the lost card or the damaged card. Various after-sale services are provided, such as card-selling, top-up/fund load, card-returning, card-replacing etc., and some optional services are offered, including card registration, report of loss, cancellation of loss report, account cancellation, pre-authorization, main account binding, PIN changing, unload, etc. The major business functions are as follows:

- **Card Selling:** Cards are classified into registered cards and non-registered cards. Registered cards are issued by the real identity system, and cardholders need to apply with their ID cards. If buying the card, users do not need to pay the deposits and cannot return the cards.
- **Recharge Service:** The cards can be recharged by cash top-up or loading from the account. When the terminal initiates a card online top-up transaction, the card top-up transaction information is sent to the backend system. The background verifies the transaction validity and obtains the top-up key to complete the top-up. When the top-up transaction is completed, the background system records the transaction flow.
- **Card Unlocking:** Cards are automatically locked by the system due to special reasons, such as the times of consecutive inputting wrong password exceeding the times set by risk control system. Cards can be unlocked in this function module.
- **Report of Loss:** For cards issued in real-name system, cardholders can report the loss of cards. The online account of the card is frozen once the loss report takes effect, and the card online consumption is prohibited. As offline consumption may still be available, and the blacklist data may not be downloaded to the POS in time, the loss cannot be completely avoided. According to general business rules, a risk exemption period will be set, such as the loss within 24 hours after reporting shall be borne by the user. The loss report is accepted in the customer service networks and completed online.

## **CHAPTER IV**

### **ANALYSIS OF CUSTOMER PERCEPTION ON USE OF CARD PAYMENT SYSTEM IN YANGON PUBLIC TRANSPORTATION**

This chapter includes survey design, demographic factors of customers, and customer perception on opportunities and challenges with card payment system in public transportation in Yangon.

#### **4.1 Survey Design**

This study assesses the challenges of payment system of public transportation in Yangon. To support the assessment, the required data were collected through sample survey. As a survey instrument, a structured questionnaire was used. The questionnaires instrument includes three main parts.

They are socio-demographic factors of the respondents, customer perception and challenges and opportunities with public transportation payment system in Yangon. Each challenge and opportunity was rated with five point Likert Scale ranging from “1” strongly disagree to “5” indicated strongly agree.

This survey takes with 200 commuters (respondents) who are taking public bus services which are YBS Line numbers 7, 18, 24, 46 and 62 with convenient sampling methods, survey start from December 1<sup>st</sup> to 15<sup>th</sup> 2018 at morning time (from 8am to 11am) at “San Pya Zay” and “Zawana” bus stops.

#### **4.2 Demographic Characteristics of Respondents**

First and foremost, it is important to study the demographic characteristics. The demographic characteristics of the respondents for the random sample 200 from day to day travelling passengers (commuters) with public transportation services. These characteristics include gender, age, education, occupation, and monthly income status of the sampled respondents. This section data of demographic information is obtained from the questioners collected are interpreted and summarized.

### Gender of Respondents

The following table (4.1) represents the results from the analysis of the gender of respondents. The respondents are not only males, but also females. Table (4.1) and shows the gender of respondents. Regarding to the participant rate, female includes higher position with 61% in the study.

**Table (4.1) Number of Respondents by Gender**

<b>Gender</b>	<b>Number of Respondents</b>	<b>Percentage</b>
Male	78	39
Female	122	61
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Survey data, 2018

As shown in Table (4.1) the sample consists of 78male and 122 female. In term of the percentages, male respondents share 39 percent of the sample while female respondents share 61 percent of the sample. Most of the commuters are from public who travelling with public transportation (Buses) day to day trips for their daily works.

### Age Group of Respondents

Table (4.2) respectively shows the frequency distribution of age in year. The age of commuters are grouped into five classes which are under 20 years, 21 years to 30 years, 31 years to 40 years, 41 years to 50 years and over 51 years. As shown in the table (4.2), 77 respondents fall in the age group between 21 and 30 years old, followed by 60 respondents who fall in the age group of 31 to 40 years old. After that 44 respondents is from under 20 years old age group and 16 respondents is from 41 to 50 years old age group and the least 3 respondents are from the age group of over 51 years old. In terms of percentage share, the age group 21-30 has the highest percentage share with 77% and the lowest percentage share is the age group above 51 years old which has only 1.5%. It can also be said that the middle age group of commuters between 21 and 40 years old who are more than 41-50 years old and over 51 years old commuters.

**Table (4.2) Age Group of Respondents**

<b>Age (in years)</b>	<b>Number of Respondent</b>	<b>Percentage</b>
Under 20	44	22.0
21-30	77	38.5
31-40	60	30.0
41-50	16	8.0
Over 51	3	1.5
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Survey Data, 2018

### **Education Level of Respondents**

Respondents were further requested to answer their education background. There are five categories of education status in questionnaires, namely (1) High School (Under Graduate), (2) Diploma, (3) Graduate, (4) Master Degree and (5) Others. These are presented as in the table (4.3) presents the distribution of education level of respondents. According to the table (4.3), it can be seen that 29% of respondents are under graduate (high school level), 10% of respondents are holding diploma, 41.5% of respondents are graduates and 3% of respondents are holding master degree and 16.5% of respondents are not describing their education or other education level.

**Table (4.3) Education Level of Respondents**

<b>Education Status</b>	<b>Number of Respondent</b>	<b>Percentage</b>
Under Graduate (High School)	58	29.0
Diploma	20	10.0
Graduate	83	41.5
Master Degree	6	3.0
Others	33	16.5
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Survey Data, 2018

The education levels of respondents can influence on the satisfaction of the card payment system quality of public transportation in Yangon. In numbers, most of the respondents are graduated with holder degree was 83 and the second largest numbers of respondents under graduate was 58, other 20 number of respondents are diploma and 6 number of respondents are Master level degree and last 33 number of respondents are education levels are others such as basic education, middle education, and no education etc.

### **Occupation Status**

When the selected respondents are asked about their occupation result is shown in the Table (4.4). This table (4.4) is the analysis on the positions of the respondents. Basically, the occupational status are classified by five types, namely, (1) Student, (2) House wife, (3) Retired, (4) Employees and (5) Own Business owners. In this study, the occupational status of sample respondents are round in table (4.4). It is noted that highest number of respondents are employees and the minimum number of respondents are retired person. The majority of

the respondents are employees and second largest respondents are the students who taking public buses transportation for their day to day trips.

**Table (4.4) Number of Respondents by Occupation Status**

<b>Occupation Status</b>	<b>Number of Respondent</b>	<b>Percentage</b>
Student	60	30.0
House wife	18	9.0
Retired	3	1.5
Employees	90	45.0
Own Business	29	14.5
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Survey Data, 2018

There are five categories of occupation in survey questionnaire, students, house wife, retired, employees, and self-employed. It is found that 60 respondents are students, 18 respondents are house wife, 3 respondents are dependents (retired). 90 respondents are working for companies/other businesses and 29 respondents are working own business.

In term of percentage share, the categories of respondents (commuters) who are working for other private company is highest with 45.0%, followed by respondents who are still studying is 30.0%, 14.5% of the respondents are running their own business, commuters who are working for their own family (house wife) with 9.0% and 1.5% of respondents are retired according to table (4.4).

### **Monthly Income**

In this study, approximate monthly average income is broadly divided into six levels. Table (4.5) shows the distribution of income level of all respondents. As commonly found, the majority of respondents earn middle income while a small group of respondents earn highly income. In this case, 16.5 % of respondents earn below MMK 2 lakhs monthly, 28% of respondents earn between 2 lakhs and 3.5 lakhs, 39.5% of respondents earn also between 3.5 lakhs and 5 lakhs, 10% of respondents earn also between 5 lakhs and 7 lakhs, 4% of respondents earn also between 7 lakhs and 10 lakhs where as 2% of respondents earn monthly MMK 20 lakh and above. As their income level determines the type of industry they are involving, most of respondents are representative of private companies.

**Table (4.5) Number of Respondents by Monthly Income**

<b>Monthly Income (MMK)</b>	<b>Number of Respondent</b>	<b>Percentage</b>
Below Ks 200,000	33	16.5
Ks 200,000-350,000	56	28.0
Ks 350,000-500,000	79	39.5
Ks 500,000-700,000	20	10.0
Ks 700,000-1,000,000	8	4.0
Above 1,000,000	4	2.0
<b>Total</b>	<b>200</b>	<b>100</b>

Source: Survey Data, 2018

### 4.3 Customer Perception on Use of the Card Payment System

Indeed, the card payment system will bring many opportunities to commuters (passengers) with following advantages and challenges which people are expecting. Therefore, in this section, interval scale measurement is employed to measure the customer perception on using card payment system for public transportation.

#### 4.3.1 Cost of using Card System

Regarding to the cost matter of using card system, respondents are required to respond to five statements which are basically measured to find out the level of customer perception on cost. Firstly, it is evaluated that currently how commuters are difficult to find small changes (200 kyats) to ride for their daily trip and that issue will overcome for commuters by using card system. Moreover, the following Table (4.10) indicates that commuters are willing to get more discount when they ride short trip by using card system and they can pay exactly bus fare amount by using card and no need to worry for cash refund.

**Table (4.6) Cost of using Card System**

No	Statement	Mean	Standard Deviation
1	The card payment system using in bus is not need to find small change for bus ride	4.39	0.65
2	The card payment system will get discount on bus fare for short distance trip	3.65	1.00
3	The card payment system able to pay exact bus ticket fare and commuters no need to worry for refund money	4.32	0.69
4	I am not worry about card selling price and able to pay more than 2000 kyats	2.72	0.98
5	I am willing to pay more bus fare for long-distance ride base on distance fare calculation by card payment system	3.08	0.99
<b>Overall Mean</b>		<b>3.63</b>	

Source: Survey Data, 2018

Beside commuters are worry about card selling price will too high and they do not want to pay more than 2000 kyats and they worry about bus fare will increase and cost more for long distance ride. Finally, it is evaluated that how customers' perception is showed on cost of using card payment system.

Above table (4.6) reports the individual mean score of the five statements of customer perception on use of card payment system for public transportation. The most current challenging part of finding small change to ride the bus will eliminate by using card system with customer perception mean value of 4.39 and standard deviation of 0.65 is found on the statement of the card payment system using in bus is not need to find small change for bus ride. Commuters perception which able to pay exact bus fare by using card system with mean value of 4.32 and standard deviation of 0.69 on the statement number 2. And Commuters perception to get discount on short distance trip by using the card system with mean value of 3.65 and standard deviation of 1.0. Beside the commuters are not willing to pay more bus fare for long-distance ride by distance fare calculation of card system with mean value of 3.08 and standard deviation of 0.99. The minimum mean score is 2.72 and standard deviation 0.98 is found on the statement of commuters who are worry about card selling price and they do not want to pay more than 2000 kyats for the card price. The overall mean score for cost of using card system is 3.63. It can be concluded that there has cost factor for customer perception on

use of card payment system in public transportation since the results of respondents above average agreement level.

#### 4.3.2 Secure in using Card System

Regarding to the use of card system, respondents are required to respond to five statements which are basically measured to find out the level of customer perception on security of using card system. Table (4.7) lists out commuters' perception on security concern which includes the card security for their daily usage and they have concern about trust on use of the card as per their previous bad experiences. And commuters are worry about bus fare deduction correctly and they would like to able to trace back their usage history of the card. As per respondents' result, they worry to deposit more than 30,00 kyats into the card and they want to get support to transfer back their balance amount from their lost card to new card. Commuters worry about bus fare card reader on the bus as per their responds which mean they want the card readers are always online and good condition during operation hour.

**Table (4.7) Secure in using Card System**

No	Statement	Mean	Standard Deviation
6	I want secure card and would like to safe by using Card	4.53	0.64
7	I'm worry about bus fare deduction because of Card System error and want to trace back card usage records	3.69	0.94
8	I like to deposit money more than 30,000 kyats into my card	2.46	0.90
9	I'm worry about the stability of bus fare reader machines which are always working as normal	3.03	1.00
10	I want to get back my balance money if I lost the card	4.30	0.69
<b>Overall Mean</b>		<b>3.60</b>	

Source: Survey Data, 2018

Table (4.7) reports the individual mean score of the five statements of customer perception on use of card payment system for public transportation. Commuters are concern on security and safe by using the card with customer perception mean value of 4.53 and standard deviation of 0.64 which are the highest respond of the respondents. Another customer perception on secure their money inside the card with mean value of 4.30 and standard deviation of 0.69 is found on the statement of commuters who want to get back their balance money inside the card if they lost. Commuters are also worry about bus fare deduction from their card because of Card System error occurred and they want to check and trace back their card usage history records with mean value of 3.69 and standard deviation of 0.94. Moreover, commuters worry about the stability of bus fare reader devices on the buses during operation hour when they respond the result with mean value of 3.03 and standard deviation of 1.0. The minimum mean value of 2.46 and standard deviation of 0.90 is found on the statement of respondents who like to deposit more than 30,000 kyats into card. The overall mean score for secure in using card system is 3.60. Which means customer perception on use of card system in public transportation also has card's security factors since the results of respondents above average level.

### 4.3.3 Convenient of using Card System

Regarding to the use of card payment system, respondents are required to respond to five statements which are basically measured to find out the level of customer perception on convenient of using card system. Table (4.8) lists out commuters' perception on benefit of using card in convenient factors which includes the respondents will convenient and safe by using card with many access points when they want to top-up/recharge into the card with the receipt. Respondents want to use one card system not only for bus but also for other transport modes like train or ferry. As per respondents' result, they would like to use the card easily for other micropayments consumption in near future such as grocery stores and bill payments etc. Beside customer perception on convenient of using card system, respondents are also able to use their bank cards and QR codes with their mobile for the bus ride which will make more convenient for the commuters.

**Table (4.8) Convenient of using Card System**

No	Statement	Mean	Standard Deviation
11	The card payment system using in bus will more convenient	4.16	0.90
12	I want to get more access points to top-up/recharge cards and easy to recharge with receipt	4.40	0.74
13	I want to use card not only for bus ride but also other transportation modes easily	3.91	0.98
14	I want to use my bank card and QR code for bus ride with mobile phone	3.79	0.99
15	I also want to use card for micropayments consumption	3.82	0.94
<b>Overall Mean</b>		<b>4.01</b>	

Source: Survey Data, 2018

Table (4.8) reports the individual mean score of the five statements of customer perception on convenient of using card payment system for public transportation. Respondents have more concern on ease of access to more touch points/access points for their cards to top-up/recharge for the convenient of using the card system with customer perception mean value of 4.40 and standard deviation of 0.74 which are the highest respond of the respondents. And customer perception on convenient of using the card system with mean value of 4.16 and standard deviation of 0.90 is found on the statement of respondents who believe that they are more convenient and safe by using the card system. Respondents want to use single card system not only for bus ride but also for other modes of transport like train, ferry and so on with mean value of 3.91 and standard deviation of 0.98. And respondents also want to use card for micropayments consumption with mean value of 3.82 and standard deviation of 0.94. The minimum mean value of 3.79 and standard deviation of 0.99 is found on the statement of respondents who want to use their existing bank cards and QR code for bus ride with their mobile phone. Result obtained from the analysis, overall mean value 4.01 is the highest respond of customer perception on use of card payment system in Yangon public transportation for convenient of using card.

## **CHAPTER V CONCLUSION**

In this chapter of research, findings are summarized and concluded to derive the answers of research questions. This chapter includes three main sections: findings, suggestions, as well as limitations and needs for further research.

### **5.1 Findings**

The study analyzed the customer perception on use of card payment system in Yangon public transportation and identify the card payment system. The analysis is on the level of cost and benefits involves in use of card payment system in public transportation industry. The preference for each opportunities and challenges is considered in terms of five points Likert scale, namely, strongly agree, agree, neutral, disagree and strongly disagree. Mean values indicate the average of agreements the expression by respondents on use of card payment system in public transportation era. Finally, these analyzes are described that the overall mean score values of customer perception on use of card payment system with cost of using card system, secure in using card system and convenient of using card system.

Result obtained from the final analysis, the commuters will get more benefits than the cost with the card payment system of public transportation in Yangon. Moreover, card payment system benefits all commuters, bus operators, bus drivers and merchants which enables consumers to participate in the digital economy, expanding their choice immensely. And of course, there is the convenience and security card payments have over cash. In addition, card payments reduce merchant costs due to less cash and check handling costs and by enabling self-service options in many countries and they have access to a large pool of customers with guaranteed payment. Moreover, card payment system has the added benefits of reducing central bank costs in providing currency and eliminates a substantial portion of the gray economy, leading to increased tax revenues.

The analysis on use of card payment system showed that commuters will get more benefits with card payment system which can eliminate the difficulties to find & hold the small notes 200 kyats and no need to pay extra with card which will save cost. Commuters are easy & fast to pay exact bus fare with the card and no need to worry about refund. And commuters will get discount with card payment base on distance fare and maximum cap amounts with easy to trace back travel expenses.

Moreover, commuters will get more benefit by using card system on other modes of transport which also able to use for micropayment consumption with more discounts and benefits. To fully reap these benefits, the following conditions must be met: Trust in card payments is a key factor, the reliability of systems and the assurance & convenient that the card or digital method will work when needed are important. And a critical mass of merchants and public transportation accepting these methods is required to instill the confidence for people to fully embrace modern payment methods. Finally, needless to say, financial literacy and an understanding of how modern payment methods work is a fundamental pre-requisite for a consumer to even consider using them.

### **5.2 Suggestion**

Study results indicated that there are various opportunities that the commuters would get with new card payment system platform/solution. Reduce in cost and waiting time, improve efficiency, enabling adoption of new customer centric strategies, enhancing public services & convenient and personalized service and incorporating new and increased business opportunities with customer big data analytic. Challenges will face in the process of new payment system implementation & development include agreeing on what are actually necessary, security issues, educating & empowering the public (people), convincing to the

people & bus operators to use the new payment system, solution partners' capabilities and credentials, risk of software capability to meet public requirements and expectations, unavailability of the diverse skills and awareness required and data & communication infrastructure. Incomplete of suitable legal and regulatory framework for public transportation system and electronic payment is another impediment for the adoption of new payment technology in the public transportation industry.

Findings also indicate that to implement modern card payment system has a contribution to the modernization of public transportation industry in Yangon for daily commuters who will more convenient, safe & save money in particular and to the economic development of the country in general. Base on the above findings, the following recommendations were made. Firstly, the implementation service provider Yangon Payment Services (YPS) should identify the challenges relating to the card payment system and should proper plan and implement properly with ASTI. Secondly, the commuters (passengers) should appreciate the card payment system technology is an enabler and should adapt to change that make the public transportation services transformation. Lastly, the new payment service provider should have the proper maintenance plan sustainable service development and enhancement plan in order to continuously upgrade and integrate with the card payment system and others.

### **5.3 Need for Further Study**

There was time and relation constraint limitation in more carrying out detail for the research with Bus operator companies, other government authorities and other transportation sector. Most of the respondents are daily passengers who take public bus transportation daily. Some of the passengers work for bus operator companies who were biased since they feared disclosing the weaknesses of the bus operator companies' actual situation. This study mainly focuses on customer perception on use of the card payment system in public transportation (only Bus) in Yangon. Further studies can be focused on the customer satisfactions towards the use of card payment system offered by YPS and Service providers. It will also determine the benefits derived and challenges faced by customers who use such public transportation services daily.

**APPENDICES A**  
**YBS New City Bus Operator Companies & Bus Quantity**

No	Company Names	Total Buses	Run/Day	Run/Month
1	Aero Star Public Co., Ltd.	-	-	-
2	Always Green/Lucky Family/Shwe Phyi Thar Tha Co., Ltd.	126	67	2,006
3	Bandoola Public Co., Ltd.	253	221	6,639
4	Golden Southern Transport Public Co., Ltd.	166	131	3,929
5	GYCT Public Co., Ltd.	479	282	8,454
6	Holiest Vim Transport Group Public Co., Ltd.	104	71	2,119
7	KhitThitBaYintNaung Public Co., Ltd.	312	236	7,072
8	KoneBaung Yangon Public Co., Ltd.	169	130	3,880
9	LuHtuMateSwe Public Co., Ltd.	200	137	4,098
10	Omini Focus General Service Public Co., Ltd.	339	227	6,803
11	Power Eleven Public Co., Ltd.	262	191	5,379
12	Rapid City Bus Transportation Co., Ltd.	144	89	2,682
13	San Wai La Public Co., Ltd.	43	28	837
14	Shwe LannKhynn Co., Ltd.	70	59	1,760
15	Trans Link Public Co., Ltd.	60	49	1,476
16	Yangon NorhearTakikyither Public Co., Ltd.	59	38	1,145
17	YBPC Public Co., Ltd.	615	430	12,892
18	YBS (31)	40	20	602
19	YBS (45)	25	22	665
20	YUPT Public Co., Ltd.	1,052	855	25,638
<b>Total Bus</b>		<b>4,518</b>	<b>3,283</b>	<b>98,436</b>

Source: YRTA

## **APPENDICES B**

### **ANALYSIS OF CUSTOMER PERCEPTION ON THE OPPORTUNITIES AND CHALLENGES OF PAYMENT SYSTEM OF PUBLIC TRANSPORTATION**

#### **(QUESTIONNAIRES)**

##### **Demographic Profile**

**1. Gender Analysis**

- Male
- Female

**2. Age Analysis**

- Less than 20 years
- 21 than 30 years
- 31 than 40 years
- 41 than 50 years
- 51 and above

**3. Education**

- High School
- Diploma
- Graduate
- Master Degree
- Others

**4. Occupation**

- Students
- Housewife
- Retired
- Employees
- Own Business

**5. Could you please tell me your average monthly income?**

- Below 200k
- 200k-350k
- 350k-500k
- 500k-700k
- 700k-1M
- 1M and above

**The respondents need to circle the selected number (○) only.**

**1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree**

**A. Analysis of Customer perception on use of card payment system in Yangon**

**B. Public Transportation.**

<b>Cost of using Card System</b>						
1	The card payment system using in bus is not need to find small change for bus ride	1	2	3	4	5
2	The card payment system will get discount on bus fare for short distance trip	1	2	3	4	5
3	The card payment system able to pay exact bus ticket fare and commuters no need to worry for refund money	1	2	3	4	5
4	I am not worry about card selling price and able to pay more than 2000 kyats	1	2	3	4	5
5	I am willing to pay more bus fare for long-distance ride base on distance fare calculation by card payment system	1	2	3	4	5
<b>Secure in using Card System</b>						
6	I want secure card and would like to safe by using Card	1	2	3	4	5
7	I'm worry about bus fare deduction because of Card System error and want to trace back card usage records	1	2	3	4	5
8	I like to deposit money more than 30,000 kyats into my card	1	2	3	4	5
9	I'm worry about the stability of bus fare reader machines which are always working as normal	1	2	3	4	5
10	I want to get back my balance money if I lost the card	1	2	3	4	5
<b>Convenient of using Card System</b>						
11	The card payment system using in bus will more convenient	1	2	3	4	5
12	I want to get more access points to top-up/recharge cards and easy to recharge with receipt	1	2	3	4	5
13	I want to use card not only for bus ride but also other transportation modes easily	1	2	3	4	5
14	I want to use my bank card and QR code for bus ride with mobile phone	1	2	3	4	5
15	I also want to use card for micropayments consumption	1	2	3	4	5

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