THE INFLUENCE FACTORS OF E-LOGISTICS TOWARDS CUSTOMER SATISFACTION IN CHINA

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ABSTRACT

Since from last decade, the e-logistic industry of China facing different issues due to high volume worldwide. To address these issues, this study is quantity and use regression to test the hypotheses.It introduced a framework to mitigate various issues of e-logistic in China. Therefore, the prime objective of the current study is to examine factors influencing e-logistics in China. To achieve this objective, the current study examines the effect of distribution rate (DR), transit time(TT), E-payment(EP), E-traceability(ET), Information and Communication Technology (ICT) on E-logistics Customer Satisfaction(ELCS). This study, each items will be tested by survey. Moreover, there are 501 useful responds from e-logistics customers who live in Shaanxi province.Five hypotheses were formulated. Generally, the results were found to support the hypotheses. DR, TT, EP, ET, ICT have positive relationship with ELCS. Additionally, ICT was seen to partially mediate between EP/ET and ELCS.The findings of this study imply that the managers of e-logistics performance in China need to pay more attention on DR, TT, EP, ET and ICT, as they can be used to improve e-logistics activities. Especially, ICT, which is a key influence factor and can partially mediate between EP/ET and ELCS, this could attract more investment and improved.

Keywords: e-payment, e-traceability, information communication technology, e-logistics, customer satisfaction.

ABSTRAK

Semenjak sedekad yang lalu, industri e-logistik di negara China menghadapi pelbagai isu yang disebabkan oleh peningkatan yang tinggi di seluruh dunia. Bagi mengatasi isu-isu ini, kajian ini berbentuk kuantitatif dan menggunakan regresi bagi mengkaji hipotesis. Kajian ini memperkenalkan rangka bagi mengurangkan pelbagai isu e-logistik di China. Oleh itu, objektif utama kajian semasa adalah mengkaji faktor-faktor yang mempengaruhi e-logistik di China. Bagi mencapai objektif ini, kajian semasa menyelidik kesan terhadap kadar agihan (DR), tempoh transit (TT), E-pembayaran (EP), E-kebolehjejakan (ET), serta Teknologi Maklumat dan Komunikasi (ICT) terhadap E-logistik Kepuasan Pelanggan (ELCS). Dalam kajian ini, setiap item akan diuji menggunakan kajian tinjauan. Tambahan pula, terdapat 501 maklum balas berguna daripada pelanggan e-logistik yang menetap di kawasan Shaanxi. Lima hipotesis telah dibentuk. Secara umumnya, hasil kajian telah diperolehi bagi menyokong hipotesis-hipotesis tersebut. DR, TT, EP, ET, ICT memperlihatkan hubungkait yang positif dengan ELCS. Selain itu, ICT dilihat menjadi pengantaraan separa di antara EP/ET dan ELCS. Dapatan kajian membuktikan bahawa pengurus-pengurus prestasi e-logistik di China harus memberikan lebih perhatian terhadap DR, TT, EP, ET dan ICT kerana kesemuanya boleh digunakan bagi menambahbaik aktiviti e-logistik. ICT terutamanya, merupakan faktor pengaruh utama boleh menjadi pengantara separa di antara EP/ET dan ELCS, hal ini boleh menarik lebih banyak pelaburan dan boleh ditambahbaik.

Kata kerja: e-pembayaran, e-kebolehjejakan, teknologi maklumat dan komunikasi, e-logistik, kepuasan pelanggan

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LIST OF ABBREVIATIONS

DR:	Distribution Rate
SSQ:	Staff Service Quality
TT:	Transit Time
EP:	E-Payment
ET:	E-Traceability
ICT:	Information and Communication Technology
ELCS:	E-Logistics Customer Satisfaction
UK:	United Kingdom
GDP:	Gross Domestic Product
B2A:	Business to Administration
B2B:	Business to Business
B2C:	Business to Customer
C2A:	Customer to Administration
C2B:	Customer to Business
C2C:	Customer to Customer
WTO:	World Trade Organization
SME:	Small and Medium Enterprise
IT:	Information Technology
ISO:	International Standardization Organization
TM:	Transportation management
SCE:	Supply Chain Execution
FFA:	Field Force Automation
FFM:	Fleet and Freight management
RBV:	Resource-Based View
KMO:	Kaiser-Meyer-Olkin
VIF:	Variance Inflation Factor
MSA:	Measure of Sampling Adequacy

EFA:	Exploratory Factor Analysis
IV:	Independent Variable
DV:	Dependent Variable
MV:	Mediator Variable

CHAPTER ONE

INTRODUCTION

1.1 Introduction

In this chapter, the background of this research study is presented, followed by the problem statement, the research questions, the research objectives, scope of the study, significance and contribution of the research, and finally the chapter's summary.

1.2 Background of the Study

Logistics plays the central role in delivering products from manufacturers to consumers through the supply chain (Lee & Seo, 2017). The importance of the logistics industry has increased dramatically following the rapid digitization of the worldwide economy. In the midst of all this are simple logistics services that are converted into electronic commerce logistics or also known as e-logistics. E-logistics comprises of various tools that are accessible through the internet such as transactions systems, supply chains system, data warehouses, communication tools and numerous other systems used to manage the sale purchase of goods (Barcik & Jakubiec, 2012).

Today, e-logistics practices are available worldwide entailing the circulation of goods throughout the industry. Thus, it has a considerable effect on businesses (Lee & Seo, 2017) worldwide, particularly in developed nations such as the United Kingdom (UK), Germany and the Netherlands. From 1999 to 2005, a dramatic growth in Businesses was recorded in these countries with approximately 720% in the UK, 1060% in Germany and 1403% in the Netherlands (Weltevreden, 2007a). Therefore, it can be indicated that e-logistics activities are covering a wider scope.

However, in China, the development of the logistics industry took many years. The turnover of this industry experienced a rapid over-volume. Globally, the country's rail transportation volume and air

cargo volume are ranked as first and second respectively (Qu, Mao & Zhou, 2017). Therefore, the logistics industry of China is ranked top worldwide, rendering it to be highly important for the country's overall economy. Wide range logistics has the ability to encourage globalization development due to the positive correlation between logistics and economic growth (Hayaloğlu P., 2015). Recent developments of E-commerce have also contributed to the expansion of the logistics market, promoting the development of technologies related to logistics. Large numbers of practices have been carried out in E-commerce logistics (Bask, Lipponen et al. 2012, Masmoudi, Benaissa et al., 2014, Ramanathan, George et al., 2014).

Furthermore, the latest and newest type of logistics has significant factors that can promote the development of the economy (Xiao, Wang, Lenzer & Sun, 2017) namely electronic commerce logistics (e-logistics) which own dominant factors including e-payment, traceability, transit time, quality services and use of information communication technology (ICT).

With the increase in the Internet's penetration range and a wider application of computer networks in both daily and business life, the revenue of global e-commerce has witnessed a continual and steady growth from 1.34% in 2011 to 3.11% in 2015. The Asia-Pacific region owns the largest share of e-GDP (4.48%) worldwide with 23,564 billion dollars GDP at market prices. However, it has less than 39% Internet access per region, which is lower than the worldwide average rate of 45%. E-shopping has become a "trend" where in 2015, nearly 26% (1436 million) of the total world population had purchased goods via the Internet (Ecommerce Foundation, 2016).

China is the top leading country in e-commerce with a 7.05% share of e-commerce GDP in 2015 (Ecommerce Foundation, 2016). In 2016, the total amount of transaction for the e-tailing industry was 4.97 billion CNY whilst the B2C e-tailing market generated over 2.7 trillion CNY in revenue

with an increasing growth rate trend of 36.0% as compared to that of the previous year. In terms of transaction amount, the growth rate slightly decreased from 78.6% in 2013 to 36.0% in 2016; however, there is still a continual rising trend of the currency amount of transaction volume for the B2C e-tailing market. The full details are shown in Figure 1 below (Analysys, 2017).

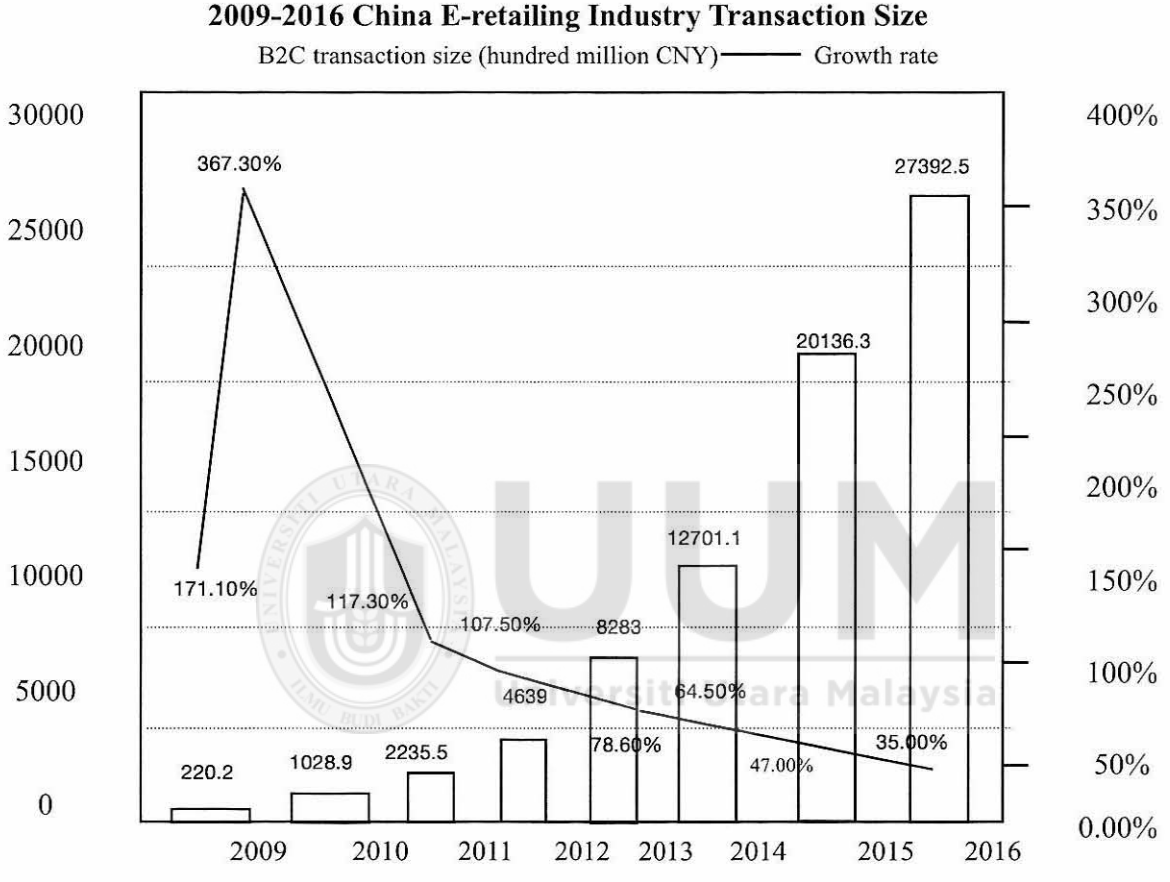


Figure 1.1 2009-2016 China B2C E-retailing Industry Transaction Size (Analysys 2017)

Despite the dramatic increase in the number of Internet users and the amount of online purchases in recent years (Amin, Rezaei, & Tavana, 2015; Daliri, Rezaei, & Ismail, 2014; Rezaei, 2015; Rezaei, Amin, & Ismail, 2014), online shopping is actually still in the developmental stage in China (Ling, Chai, & Piew, 2010).

In 2015, China's logistics industry was confronted with a complex environment both internationally and domestically. As far as the international environment was concerned, the world economic envi-

ronment was slow where prices of most commodities dropped and worldwide trade was in a slump. In the domestic environment, the overall growth rate of China was continuously slowing down (Jiao, Lee, Wang & Liu, 2017). The author further explained that, in 2015, the logistics industry in China showed certain characteristics which were against the growth of e-logistics. These characteristics include a slowdown in logistics growth, various weak points in China's infrastructure related to the logistics industry, and implications due to international competition and start mergers. All these challenges created numerous issues in the e-logistics industry of China causing customer retention to suffer and an automatic decrease in the overall e-logistics customer satisfaction level.

Other issues related to e-logistics are high distribution rate, low staff service quality, transit time, payment issue, traceability problems and various issues related to the delivery of goods. Numerous studies in China have found various weaknesses in the country's logistics system (Lin and Ho, 2009). Despite being the top in the e-logistics industry worldwide, the e-logistics industry in China is in fact suffering. Most of the country's e-logistics companies are struggling to reduce the said issues.

In the context of business-to-customer (B2C) e-commerce transaction, the final delivery presents even more complications, higher costs and inefficient segments to fulfill the whole logistics chain (Gevaers et al., 2014). The problem is rooted in the particularity of the e-commerce logistics system (Maruntelu, 2008). Delivery is one of the most expensive services in the e-logistics process where instances such as the non-availability of the customer cause the delivery to be returned and thus rendering additional costs. Increase in delivery piece increases the total price of the goods. This price of delivery is called distribution rate.

The logistics constraints to international operations in China include the absence of cargo tracing service facilities, the lack of delivery reliability for different local carriers, the complicated customs procedures, as well as the geographical disintegration of the transportation networks (Ta, Choo & Sum, 2000). Hence, the delivery of goods to the customer is one of the most crucial and expensive processes for Chinese logistics companies.

With the rapid development of China's economy and its agreement with the World Trade Organization (WTO), the demand for different activities like logistics services has been increasing significantly in China, and the country's logistics industry is set to take off. With the substantial increase in logistics services, the need to mitigate logistics issues has reached an all-time high. This spurred the tendency of using logistics service providers to satisfy the growing requirements for logistics services (Lieb & Miller, 2002).

To fully satisfy the diversifying requirements of customers, many logistics service providers improve their service efficiency by continuously adopting information or automation technologies (Corbitt, Thanasankit, & Yi, 2003; Standing, Tang-Taye, & Boyer, 2014; Tseng, Wu, Morrison, Zhang, & Chen, 2015).With the advances in emerging information technology, new problems have emerged in the credit card issuing industry. The most critical problem entails the protection from identity theft (Fan, Ji, Wei & Lambert, 2018). Most e-commerce customers are highly concerned about the aspect of e-payment trust where many of them hesitate to reveal their personal information while doing payment.

There are four other important issues for logistics companies in China (Jiao, Lee, Wang & Liu, 2017). The first one involves the promotion of the logistics system to calculate the logistics cost and clarify the supply chain cost. Secondly is the introduction of the latest system to cut down the total

distribution cost which defines the distribution rate that in turn defines the overall price of the e-logistics product charged to the customers. Thirdly is the promotion of efforts to fulfill the innovative logistics requirements and to introduce new techniques. And fourthly is the enhancement of employee skills through training in all segments of the e-logistics process as training increases the staff's service quality including their attitude, behavior and communication skills. Apart from all this, the tracking system of the goods and the website design are also crucial issues to be considered by the e-logistics industry.

E-logistics companies are facing problems in information communication technology (ICT). Technology has traditionally been viewed as the key to productivity in manufacturing; however, it has also assumed a greater significance in services in recent times (Bitner et al., 2000; Howells & Tether, 2004). Despite the indicated benefits of ICT in overcoming e-logistics issues, many of China's e-logistics companies still fail to invest in it as shown in literature (Wang & Lalwani, 2007).

In conclusion, despite being the top leader in the industry and displaying continuous rapid growth, the logistics system in China is mired with numerous issues entailing aspects of payment, staff service quality, delivery time, information communication technology and issues related to distribution rate, which are all significant challenges that need to be mitigated by China's e-logistics companies.

1.3 Problem Statement

In the current decade, with the increase in e-logistics services, the problem of e-logistics customer satisfaction is raised. E-commerce logistics services have spread so rapidly worldwide, overlooking the significant segment of customer satisfaction which is core to the success of many businesses (Srinath, 2017). Despite being one of the vital factors for e-commerce logistics success (Xueling,

2016), e-logistics customer satisfaction also proves to be one of the most problematic areas, particularly in the context of China, where there is a huge volume of e-logistics activities.

In recent years, with extensive use of internet technology, the aspect of customer satisfaction particularly in the logistics industry has drawn close attention from practitioners as well as academics (Xiaomin & Yi, 2017). Still, the e-logistics process is struggling to mitigate the problem of customer satisfaction. Various prior studies have shown that problems related to freight forwarding service quality have not been treated with the necessary attention (Kilibarda, Nikolicic & Andrejic, 2016), especially in the context of China, where various factors are responsible for the low-level e-logistics customer satisfaction.

Despite the growth of e-logistics in China, the problem of customer dissatisfaction is still prevalent due to the large transactions involved. As e-commerce business practices are increasing dramatically in recent years in China, several companies are facing crucial problems related to logistics services (Yu, Wang, Zhong & Huang, 2016) including distribution rate, payment, transit time, staff service quality and traceability.

The increasing acceptance of e-logistics has led to the rising number of distribution vehicles in different areas for delivering the required goods to customers. Morganti et al (2014) indicated that online shopping customers had experienced various logistics problems in Europe such as France and Germany. The issues are mainly related to the various aspects of delivery such as customers not being at home during delivery of goods, delay in delivery, high costs of delivery, lack of tracking delivery status, the need to collect goods from a distant collection point, and damaged goods.

Such problems result in an increase in the goods' overall cost. Distribution problems exist not only in foreign companies, but also in companies in China (Jiang & Prater, 2002). For instance, supply chain costs can reach up to 30% to 40% of the wholesale prices in China, which instead is considered quite reasonable in the United States (US) as the costs translate to only 5% to 20% (Tanzer, 2001). With an increase in the distribution cost, ultimately the overall price is also increased which in turn affects customer satisfaction level. This is because the price of delivery (distribution rate) has a significant influence on customer satisfaction (Xia & Tingting, 2016). Furthermore, personalized service and quick expansions in smaller cities lead to serious problems such as cost control (Yu, Wang, Zhong & Huang, 2016).

Payment for e-logistics goods is also one of the problematic areas that influence customer satisfaction. Even though several security measures and different mechanisms have been designed to enable better payment systems, several security problems still remain (Chou et al., 2004; Dai & Grundy 2007; Kousaridas et al., 2008). Approximately 95% of customers are worried about the aspect of privacy or security when using credit cards on the Internet, and six out of ten respondents worry about credit card theft (Kim, Tao, Shin & KAim, 2010). Lack of trust is another barrier in making online transactions, as consumers are reluctant to use the Internet for conducting transactions with SMEs (Kaynak et.al, 2005; NETCOACH, 2014; Wikibooks, 2014). Savrul, Incekara & Sener (2014) state that SMEs display problems related to logistics and payments. Many studies have also indicated the increasingly crucial issue of security with e-payments (Cotteleer, Cotteleer & Prochnow, 2007; Linck et al. 2006; Peha & Khamitov 2004; Stroborn et al. 2004; Tsiakis & Sthephanides, 2005; Savrul, Incekara,& Sener, 2014). Hence, there is a growing need to mitigate the risks linked to e-payment transaction processes (Tsiakis & Sthephanides, 2005).

Most of the e-logistics companies in China are facing transit time problems which render a negative perception in the mind of customers. Transit time is a vital logistics factor that has a high correlation to customer satisfaction (Lina, Guiling & Weiwei, 2014). An online market research in China found that logistics service coverage as well as delivery efficiency are the primary logistics-related problems (CNNIC, 2014). According to Benfang and Feng (2014), almost 80% of goods delivery is in-effect in China. The quality of delivery is also dependent on staff service quality whereby poor staff service quality creates dissatisfaction among e-logistics customers.

Apart from abovementioned problems, other general e-logistics problems are delay in information, inaccurate information, inefficient operations, incomplete services, delay in operations and high product damage rate (Gunasekaran & Ngai, 2003). All these problems affect e-logistics customer satisfaction negatively which in turn affects the overall performance of e-logistics activities. However, it is entirely possible to mitigate these problems by developing a comprehensive framework for e-logistics activities.

Such problems can be mitigated with excellent staff service quality, low distribution rate and quick delivery (transit time). Price of delivery (distribution rate) has a significant influence on customer satisfaction (Xia & Tingting, 2016). New channels of distribution can be introduced through e-logistics (Hu et al., 2016) to increase customer satisfaction. The problem of payment and traceability of e-logistics goods can be handled using information and communication technology (ICT) which has critical importance in the promotion of logistics services (Meuter, Ostrom, Roundtree & Bitner, 2000). This justifies the need for companies to invest in IT supported traceability (Manos & Manikas, 2010) as it helps in the easy tracking of goods, ensuring payment security as well as building customer trust.

Thus, the current study contributes to the body of knowledge by filling the gap in literature. Firstly, this study introduces two new indirect factors for customer satisfaction in e-logistics, namely payment and traceability. The importance of these factors was neglected in most studies. Secondly, the benefits of these factors are limited without the use of information and communication technology (ICT), which is thus highlighted in this study by renewing the concept of IT (information technology). Thirdly, based on prior studies, four direct factors namely distribution rate, transit time, staff service quality and ICT level are introduced to mitigate the existing problems in e-logistics. Fourthly, this study determines the combined effect of all these factors (distribution rate, transit time, staff service quality, payment, traceability, and ICT) on e-logistics customer satisfaction. Finally, e-commerce and logistics show different grounding paths across various regions with diversified built environments (Xiao, Wang, Lenzer & Sun, 2017); therefore, the current study also fills the contextual gap by highlighting a particular region in China. Hence, the present study is expected to determine the solution to e-logistics customer satisfaction problems by filling different gaps in the existing literatures.

1.4 Research Questions

The problem statement of the current study revealed several key issues on e-logistics customer satisfaction. Based on these issue below several questions are identified.

RQ1: What is the relationship between distribution rate and e-logistics customer satisfaction level?

RQ2: What is the relationship between transit time and e-logistics customer satisfaction level?

RQ3: What is the relationship between staff service quality and e-logistics customer satisfaction level?

RQ4: Does information communication technology (ICT) mediates the relationship between e-payment and e-logistics customer satisfaction level.

RQ5: Does information communication technology (ICT) mediates the relationship between e-traceability and e-logistics customer satisfaction level.

1.5 Research Objectives

The current research study has following objectives.

RO1: To examine the relationship between distribution rate and e-logistics customer satisfaction level.

RO2: To examine the relationship between transit time and e-logistics customer satisfaction level.

RO3: To examine the relationship between staff service quality and e-logistics customer satisfaction level.

RO4: To examine the mediating role of information communication technology (ICT) between e-payment and e-logistics customer satisfaction level.

RO5: To examine the mediating role of information communication technology (ICT) between e-traceability and e-logistics customer satisfaction level.

1.6 Scope of the Study

The Chinese e-logistics industry has spread dramatically worldwide. It has achieved the highest position in volume, turnover and in all other logistics services (Qu, Mao & Zhou, 2017). However, this industry is still facing various issues in China such as customer satisfaction. The current study focuses on China, but due to obvious difficulties in obtaining data from the entire country, data collection is narrowed down to the Shaanxi province which is China's second-tier province i.e. the most important northwestern province and a middle-income area. Further details of this will be explained in Chapter 3.

1.7 Significance of The Study

This study is significant in many aspects. It highlights the different essential services of e-logistics process, and provides helpful insights for e-logistics companies to resolve the problem of customer dissatisfaction. Therefore, by applying this model in the e-logistics process, companies in China can improve their performance by increasing the satisfaction level of e-logistics customers.

This study is also helpful for the government of China. With the rapid growth of the country's logistics industry, new problems are emerging as well. Due to the significant contribution of e-logistics to the economy of China, the government of China can improve their economy by deploying the e-logistics model introduced by the current study.

This study also highlights the importance of information communication technology (ICT) for e-logistics companies, which can be used to mitigate the various identified problems of e-logistics.

Apart from that, this study underlines the newly discovered mediating role of information communication technology (ICT) in the relationship between e-payment and e-traceability with e-logistics customer satisfaction, which was found missing from existing literature.

1.8 Contribution of The Study

First of all, the recent study had identified six significant factors that influence e-logistics customer satisfaction including three direct factors i.e. distribution rate, transit time, and staff service quality; two indirect factors i.e. e-payment and e-traceability; and one mediator variable i.e. information communication technology. These factors would contribute in helping e-logistics companies in China to increase customer satisfaction.

Secondly, the study contributes to the existing body of knowledge by filling up the gap in literature and introducing a new model to improve e-logistics customer satisfaction, which was never before mentioned in prior studies.

Last but not least, the study highlights the significance of ICT as a mediator in facilitating the e-payment and e-traceability systems. This will remind e-logistics managers and leaders in China to pay more attention on making proper investments in ICT so as to increase the level of customer satisfaction.

1.9 Chapter Summary

This chapter had presented the motivation of the study which is the identification of factors that influence e-logistics customer satisfaction. The basis of the study is that although the logistics industry in China is ranked top worldwide, the rapid developments in logistics had caused a heavy volume of turnover leading to e-logistics issues involving Distribution Rate, Transit Time, Staff Service Quality, E-payment, E-traceability and Information Communication Technology (ICT). All of these factors play a role in significantly reducing customer satisfaction levels. This chapter lays the foundation of the study that contributes directly to the building of the literature review.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In this chapter, some literature regarding e-commerce logistics practices is reviewed and discussed. This chapter explains the relationship between the identified variables with e-logistics customer satisfaction. A comprehensive systematic critical analysis of the topic is discussed to develop an understanding of the current research study. Other central concepts are also discussed to help the researchers in exploiting materials towards providing a solution for the issues being tackled in the study. In addition, this chapter also examines previous literature on distribution rate, transit time, service quality, payment, traceability, and information communication technology (ICT) as well as discusses the mediating role of ICT. Finally, this chapter discusses relevant literature related to the research questions and builds literature in support of the study hypothesis which helps in the development of the conceptual framework.

2.2 E-Commerce and Logistics

E-commerce denotes the use of different networked information and communication technologies, particularly internet technology, in various business activities (Rahayu & Day, 2017). It is one of the processes which comprise transferring, buying, selling, or exchanging different types of products, services, and information using computer networks, generally the internet as well as intranets (Turban, 2010).

E-commerce consists of website designs, search engines, online sales, e-catalogs and order entry as well as different types of business models such as business-to-business (B2B), consumer-to-consumer (C2C), business-to-consumer (B2C), consumer-to-business (C2B), consumer-to-administra-

tion (C2A) and business-to-administration (B2A). Business-to-business (B2B) e-commerce has a major contribution to the overall e-commerce process, which constitutes over 85% of the total e-commerce volume (Turban, Whiteside, King & Outland, 2017). It represents the transitions between different businesses. However, in the e-commerce LSCM, there are two major types of business models i.e. business-to-consumer (B2C) and business-to-business (B2B) (Bolumole, Closs et al. 2015). In the B2C model, the business website is the place where all the transactions take place directly between a business organization and the consumer (Mangiaracina, Marchet et al. 2015). In this model, a consumer visits the website and places an order to buy the products. The business organization, after receiving the orders, will dispatch the goods to the customer. Successful examples like Amazon.com and Priceline.com are B2C leaders (Ta, Esper et al. 2015). They are adept in using modern e-logistics to improve the efficiency of material flows and to reduce distribution rate in different enterprises (Yu, Wang, Zhong & Huang, 2017).

Meanwhile, logistics is defined as the part of the supply chain that efficiently and effectively plans, implements as well as controls the flow and storage of different services, goods and associated information from the point of origin to the point of consumption so as to fulfill customer requirements (Netro, Álvarez, Carrillo & Flores, 2016). It is one of the functions through which international and local sub-contractors manage the services and equipment i.e. by maintaining the quantity, quality, timeliness and different cost parameters (Makepeace et al., 2017). When the e-commerce becomes a part of the logistics system, it is called electronic logistics (e-logistics) which provides an easier system for customer as well as logistics companies.

2.3 E-Logistics

The process of logistics managed using computer networks, generally internet as well as intranets, to control the supply of services and goods to end users is called e-commerce logistics (e-logistics).

The appearance of e-logistics is an outcome of the wider range of electronic application on business. The advantages of the Internet are widely recognized by business players. The complex process between each connecting points among the business chains is simplified with the use of online technology. Therefore, better cost-effectiveness, shorter use of time, better safety and higher level of executive capacity and many other benefits could be achieved with electronic technology (Xu, 2017).

The typical feature of e-logistics is the application of Internet tools and electronic transaction method and system as a communicating bridge (Barcik & Jakubiec, 2012). E-logistics consists of different tools used by companies that are accessible through the Internet. According to Barcik & Jakubiec (2012), these tools consist of various electronic platforms, internet portals, electronic catalogs, transactions systems, data warehouses, communication tools, systems of offers as well as purchasing and other software for planning, supply chains, digital maps and e-learning systems.

However, the use of the Internet in logistics does not mean that it has become electronic (Skitsko, 2016). The author further explained that e-logistics is basically a complex system, which comprises manufacturers, logistics centers, customers, resellers, and carriers, among whom data exchange occurs based on the electronic process through the Internet with the aim to reduce time and errors and to improve effectiveness as well as efficiency. Therefore, e-logistics is processed with the use of the Internet to distribute services and goods from the point of origin to the the customers.

2.3.1 E-Logistics Worldwide

E-commerce logistics has grown rapidly in most developed nations. This indicates that business-to-business transactions are larger than that of business-to-consumer. This research further explained

that in 2012, retail online sales have increased by 10 percent and is expected to increase further over time.

However, with the increase in e-logistics services, issues with e-logistics customer satisfaction emerge. E-commerce logistics services have spread so rapidly worldwide, overlooking the important segment of customer satisfaction. The increasing acceptance of e-logistics has led to the rising number of distribution vehicles in different areas to deliver goods to end customers. In Germany for instance, the total volume of standard, express and courier deliveries has increased by 3.5% in volume and 3.7% in turnover from 2011 to 2012. In 2012, the sector's turnover was €15.5 billion (Esser and Kurte, 2013). In France, 300 million parcels have been delivered to end consumers as standard shipments (ARCEP, 2012). The United Kingdom, Germany and France hold Europe's largest online markets, which together accounted for 71% of the European e-commerce in 2011 (Kelkoo, 2012) and is still growing. The dissatisfaction among customers is mostly related to failed home deliveries (Weltevreden, 2008).

According to Weltevreden (2008), most home-delivered parcels require consignee signature at the time of delivery. Non-availability of the customer at time of delivery leads to higher cost and customer dissatisfaction. According to IMRG (2006), the direct costs of unsuccessful deliveries in 2006 within the United Kingdom (UK) had reached 682 million, resulting in high levels of customer dissatisfaction.

In recent years, information technology has been promoting online transactions (Wu, Li & Xu, 2014) and most companies have been trying to tackle the issue through new technology. New channels of distribution are introduced through e-logistics (Hu, Huang, Hou, Chen & Bulysheva, 2016) to increase the satisfaction level of e-logistics customers. However, the problem is still under debate

and there is a need to explore the issue further especially in the context of China, where there is a high offering of e-logistics services.

2.3.2 E-Logistics in China

In China, the logistics industry took 30 years to achieve development stage followed by the volume of logistics delivery goods, turnover from logistics, air cargo and road transportation to finally achieve the highest rank worldwide (Qu et, 2017). However, the overall logistics industry in China is still in an extensive stage which is not good for the social as well as economic development of the country (Tencent Institute, 2015). Therefore, the old logistics methods were not sufficient for China's continuous economic and social development. Hence, logistics was modified using the Internet and e-logistics was introduced.

In recent years, China's e-commerce industry developed with high speed, enhancing the e-logistics industry. Because of China's e-logistics, overall transactions increased in tremendous speed, creating history. According to Guo, Zhong & Zhang (2016), transactions in China's e-commerce market had reached 16.2 trillion which was 3.4 times that of 2010. Further, in 2015, the income of the National Express business had reached 276.96 billion yuan (State Post Bureau data, 2015) which is a substantial increase of almost 35.4%, whilst the total volume for the express business was 2.067 billion, an increase of 48% i.e. the highest in the world. Figure 2.1 shows the growth rate and total of China's logistics value from 2006 to 2015.

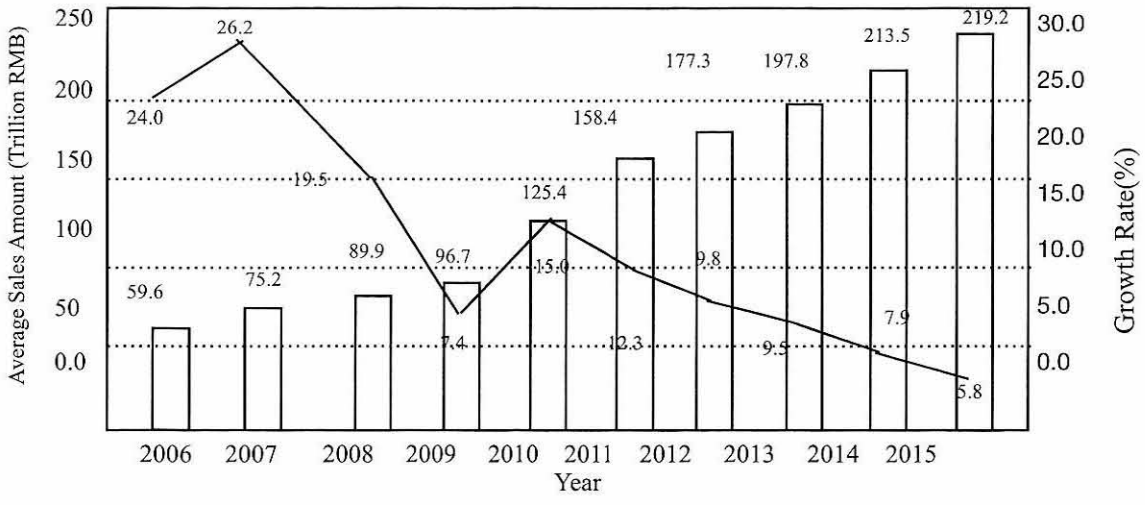


Figure 2.1
Growth Rate of China Logistics
Source: Jiao, Lee, Wang & Liu (2017)

However, according to Guo, Zhong & Zhang (2016), because of the inclusive development, logistics services have inhibited the growth of e-commerce, which has been one of the most crucial complaints made by online shopping customers. Logistics suppliers are challenged with the choice of self-distribution or outsourcing for distribution services. For instance, when the size of the business is low, based on cost-effectiveness, distribution services will tend to outsource. But when the volume of business increases to a good level, they may adopt self-distribution to ensure the overall quality of different services, so as to win subsequent orders. Having faced various challenges, China's e-logistics is now experiencing tremendous growth despite prevailing issues caused by huge amounts of transactions.

China is now the leading e-commerce market in the world. From online B2C sales, it has already surpassed the United States with a €566 billion turnover (Forrester, 2015; EMarketer, 2015). Players such as Alibaba, China's leading e-commerce market, completely changed the retail industry, introducing more and more Chinese consumers to online shopping (Winter, 2016). The recent de-

velopment of e-commerce also contributed to the expansion of the logistics market (Yu et al., 2016). As a result of this dramatic increase in the volume of transactions through e-commerce, which is often disordered, the number of exchanges and product returns is also suffering a great impact. China's logistics industry is facing many issues including high distribution rates, higher transit time, poor staff service quality, e-payment issues, e-traceability issues, and poor use of information communication technology (ICT).

Han and Wang (2017) state that there are several conditions and opportunities for the development of e-commerce; however, there are bottlenecks to the development of logistics. Such hindrances include complicated customer procedures, high delivery costs, delays in delivery, bad attitude of staff service, lack of personal data security, non-availability of a globally unique identifier, online theft and so on (Abrazhevich, 2004; Jie, Subramanian, Ning& Edwards, 2015;Kim, Tao, Shin & Kim, 2010; Carusotto, 2014). To mitigate all these issues, China's logistics services should improve their technology level to enable e-traceability of goods, e-payment, proper distribution rate and less delivery time.

2.4 E-Logistics Customer Satisfaction

Determining how best to deliver e-logistics services without sacrificing the quality is one of the ongoing challenges faced by e-logistics companies (Javalgi, Martin, & Todd, 2004) particularly those in China where e-logistics transactions are rampant. Companies that manage to meet the requirements of their customers through proper utilization of e-logistics services gain the most benefit. While it is possible to meet the expectations of e-logistics customers, the effort requires substantial deployment of cost, quality and value (Hameri & Hintsa, 2009).

The fast-growing online market is serving customers with more convenience (Hu, Iyer, Hesse & Ahlert, 2004), but it also creates competition among different online retailers (Szymanski & Hise, 2000). Therefore, in terms of customer retention, satisfying the needs of e-logistics customers is a critical issue for online retailers because dissatisfied customers will not return (Kim & Stoel, 2004). According to Oliver (1980), customer satisfaction is one of the vital factors that affect customers' post-purchase behaviors. Therefore, customers' satisfaction improvement level is a key goal (Evanschitzky et al., 2004) particularly in China where e-logistics services are spread worldwide. For online retailers, apart from providing products with outstanding quality and reasonable prices, they must also enhance online customer satisfaction level to ensure their survival in the market (Iqbal, Verma & Baran, 2003; Zeithaml, Parasuraman & Malhotra, 2002). Prior studies found that online customer satisfaction level is influenced by numerous factors such as the punctuality of deliveries (Teresa & Evangelos, 2015), easy and convenient methods of payment (Aggarwal & Rahul, 2018), website privacy and security (Li et al., 2017), flexible and smart services with the evolution of technology (Jie, Subramanian, Ning & Edwards, 2015), efficient and effective logistics (Cui, Mak et al., 2015), high service quality and lower price (Subramanian, Gunasekaran, Yu , Cheng & Ning, 2014), as well as good service reliability, speed, responsiveness and value (Yuen & Thai, 2015). All these factors improve customer intention and create more satisfaction; however, their attainment is not always clear cut. Poor quality in one of the factors can easily lead to customer dissatisfaction.

The concept of "best value supply chains" such as e-logistics for better performance and customer satisfaction is also consistent with the customer value theory (Christopher, 2005; Hult, Ketchen & Slater, 2004; Ketchen & Hult, 2007; Ketchen, Rebarick, Hult & Meyer, 2008). Similarly, e-logistics providers need to deliver excellent quality service to meet customer needs (Yuen & Thai, 2015; Cui, Mak et al., 2015). However, China carries out large e-commerce activities, covering the maximum

part of the world, rendering it to be quite problematic to develop a good e-logistics framework to satisfy e-logistics customers.

E-logistics customer satisfaction is one of the vital factors for e-commerce logistics success (Xueling, 2016). According to prior studies (e.g., Jie, Subramanian, Ning & Edwards, 2015; Carusotto, 2014; Li et al., 2017), to fulfill the needs of e-logistics customers, the efficiency of e-logistics systems need to be enhanced through the adoption of better automation technologies. Furthermore, according to Fan, Ji, Wei & Lambert (2018), logistics providers should also employ new information technologies. Thus, the logistics industry should focus on the adoption of innovations in logistics services through knowledge, information technology and relationship networks (Pan, Teoh, and Seow, 2014). Adoption of these technologies will enhance the capability of logistics services providers in China (Lin, 2007). Logistics technologies such as e-payment, e-traceability, and re-distribution can enhance service quality and lessen order time, leading to better e-customer satisfaction. Several researchers also supported the adoption of a technological process to extend the services in logistics (Yu, Wang, Zhong & Huang, 2016), especially in China's logistics industry.

However, e-logistics customer satisfaction cannot be improved by merely delivering goods on time; it also needs additional value-added services (Gunasekaran & Ngai, 2003) such as the traceability of product, easy payment methods and functioning quality of the product. For instance, Amazon.com has a good supporting infrastructure which allows it to deliver the required services within 24-hours complete with additional value-added services to gain the confidence of customers. Therefore, the e-service features of Amazon.com have been paramount to its continued success.

Hence, from the abovementioned review of prior studies, it is clear that customer satisfaction is one of the most problematic areas in e-logistics, particularly in the context of China. However, it is en-

tirely possible to solve the problem by developing a proper framework that has better e-payment services and e-traceability, higher quality, less delivery time and application of information communication technology (ICT).

2.4.1 Distribution Rate and E-Logistics Customer Satisfaction

Distribution of goods to the end customer is one of the important elements of the logistics process (Gunasekaran & Ngai, 2003). Logistics operations entail the input, storage, transportation as well as distribution of physical goods (Gunasekaran & Ngai, 2003). In short, distribution is the physical delivery of goods or any type of parcel as well as information to the actual customer.

Distribution rate is based on the distribution price, return service fee and any type of discount. The delivery and return of services render specific costs. It was estimated that e-commerce logistics could cost 40% of the price that customers pay for the goods (Bayles and Bhatia, 2000). In China, it contributed 18% to the GDP in 2014, almost double the average figure of developed economies (Gui, Wu et al., 2014). Both costs define the price, and the price consists of discounts given by the company, which in turn defines the distribution rate. The receiving price is one of the key factors influencing customer satisfaction (Xia & Tingting, 2016). According to Lina, Guiling, and Weiwei (2014), logistics cost related to the distribution rate is another one of the factors influencing customer satisfaction. Additionally, distribution rate also consists of the return service fee (Yuanxiao, 2014), which is an issue in e-logistics services (Jianghua, 2014).

Distribution is a crucial element of any e-logistics process and distribution rate is one of the most significant elements in e-logistics customer satisfaction. Price of delivery has a significant influence on customer satisfaction (Xia & Tingting, 2016) as it is one of the factors that determine the overall price of the product, which in turn defines purchase intention.

Price plays a significant role in the customer's selection of e-commerce channels to purchase products due to the low cost of delivery. According to Lina, Guiling and Weiwei (2014), the price is instrumental in creating satisfaction or dissatisfaction among customers. But some e-commerce items cost higher than those sold in physical stores due to the cost of logistics distribution.

Jianghua (2014) conducted a research study on two China-based companies namely You Zheng express and Shen Tong express and observed that customers were more satisfied with the price offered by Shen Tong express. The author found that the distribution rate of Shen Tong express is low, leading to the lower price than that of You Zheng express. Therefore, the distribution rate of e-logistics companies has a relationship with e-logistics customer satisfaction in China.

This notion is also supported by Hui (2011) who indicated that high distribution rates can cause dissatisfaction among customers due to the ultimate effect on the overall price of a product. A high distribution rate will lead to a high product price, and a low distribution rate leads to a low product price. Having said that, the distribution rate in e-logistics is lower than that of traditional logistics.

Online retail market permits logistics service providers to utilize the Internet as one of the new channels to distribute products as well as services, which generates tremendous business opportunity and revenue growth (Rohm & Swaminathan, 2004) where distribution rate is low. It also provides a new and better platform for customers to purchase goods and avail different types of services (Hu et al., 2016). All these elements contribute to defining the distribution rate which directly influences e-logistics customer satisfaction level.

Jing (2014) conducted a research study on logistics and found that distribution rate is one of the indexes which influence customer satisfaction of a product. Cost-effective delivery service helps to

enhance customer satisfaction by creating a positive experience in the whole logistics process (Lihong & Qiao, 2015).

The distribution rate of e-logistics goods also comprises return service fees (Yuanxiao, 2014). Both delivery price and return service fee influence customer satisfaction. Generally, customers compare these prices with that of other companies. If the customer finds that another company offers lower prices, then it could create customer dissatisfaction. Therefore, the proper setting of the distribution price is of high importance.

In summary, distribution rate is one of the vital elements of any e-logistics process. High distribution rate decreases customer satisfaction level whilst low distribution rate increases the satisfaction level.

2.4.2 Transit Time and E-Logistics Customer Satisfaction

Transit time mainly refers to the period that transpires between the time of product order and time of product delivery. It entails order response time, order handling time by the e-merchant, product delivery time and logistics reversal time (Lina, Guiling & Weiwei, 2014). Transit time was ranked as the second most important element in determining customer satisfaction with an attribute of transit time speed (Teresa & Evangelos, 2015).

Logistics companies, especially shippers, give high importance on transit time (Yuen & Thai, 2015). A broader range of products or services are becoming more time-sensitive following the proliferation of the latest supply chain within the manufacturing as well as retailing sectors (Saslavsky, & Shepherd, 2014).

Dissatisfaction among e-logistics customers transpires when the transit time develops into a longer waiting period. Customers put high importance on timeliness especially with B2C e-commerce services (Yuanxiao, 2014). Prolonged transit time creates frustration in the mind of the customer which develops into dissatisfaction.

According to Mengmeng (2014), the concept of transit time refers to time quality. Prolonged transit time denotes low time quality and less transit time denotes high time quality. The virtual nature of the whole process from order to delivery adds to customer insecurity. The longer the transit time, the higher the sense of insecurity; this in turn causes customer dissatisfaction. Hence, customer satisfaction can be attained with shorter transit time.

Allen, Mahmoud & McNeil (1985) found that transit time reliability is crucial for freight transport today due to its effect on the overall cost. Mengmeng (2014) indicated that the quality of transit time consists of three parts i.e. the time required for an order, the waiting time to receive the goods, and the required time for returning the cargo. All three parts influence the satisfaction of the customer.

Delivery speed was also found to indirectly influence customer satisfaction due to its role in either shortening or prolonging transit time as indicated by Benfang & Feng (2014).

Liu, He, Gao & Xie (2008) found that delivery as well as payment are unique features in the context of online shopping in China. The study also found that delayed delivery has a negative effect on the satisfaction level of customers. BITKOM (2013) stated that consumers have negative experiences involving delivery delay, which means that a good delivery time impacts customer satisfaction level positively.

The major advantage of e-commerce is ease of use. Customers always expect to receive their orders promptly (Morganti et al., 2014); hence, transit time highly matters.

Additionally, e-logistics is also pushing sellers to come up with innovative services that are free of charge as well as more desirable to online customers, such as same-day delivery services (Mintel, 2015b). Being able to select delivery services with minimum spend time and price is also becoming a common desire among online shoppers (Mintel, 2016).

In summary, transit time is one of the key elements of e-logistics services that influence customer satisfaction level. Minimum transit time enhances customer satisfaction level whereas prolonged transit time decreases it.

2.4.3 Staff Service Quality and E-Logistics Customer Satisfaction

The attitude of logistics service representatives, external image of employees, communication with the customer, personalized service as well as other related contents can have a substantial impact on the perception on e-commerce logistics services. A logistics company's staff service quality with respect to its customers, image, attitude, and communication helps to shape the overall quality (Yuanxiao, 2014). The guarantee to distribute logistics services refers to the ability of the company's staff to ensure quality services (Benfang & Feng, 2014).

Staff service quality is essential in determining the overall quality of a logistics company. It is the attitude provided by the organization to its customers which is an important variable that affects customer perceptions about the products being offered. According to Thai (2013), service quality primarily consists of an attribute. This attribute is connected to the attitude of the staff of the e-logistics company, the external image of the employees as well as communication. Staff service quali-

ty is determined by whether or not the staff instrument and staff attitude in terms of service and communication capabilities meet the required quality.

In 1982, Lehtinen & Lehtinen (1982) introduced a quality-related concept which indicates that quality depends on output and process, and in 1983, the concept of service quality based on physical and interactive qualities was introduced. Gummesson & Grönroos (1988) followed suit by introducing a model for device quality. Delivery quality and relationship quality are the elements of this model which are directly related to the staff of the logistics company.

According to Chaohe (2011), based on the investigation on third-party logistics enterprises and with respect to large customers, Tennessee University in America had determined nine service quality indicators related to logistics. These indicators include company staff communication quality, release order quality, quality of information, quality of ordering process, care of materials, delivery of goods in perfect condition, articles quality, quality in error handling as well as timing. All these indicators belong to the aspect of staff service quality and attitude, communication as well as skills which determine staff service quality. Xin & Bo (2004) subsequently examined and determined the significant influence of the various evaluation standard features on service quality.

It has been widely recognized that logistics service quality is one of the foundations of every logistics enterprise and the service quality provided by those logistics enterprises determines customer satisfaction (Thai, 2013). Employees' attitude and communication directly influence customer satisfaction level especially in the case of China, where e-logistics practices exist on a huge platform as compared to other countries.

Logistics companies are engaged to serve customers with professional and systematic services, as well as logistics activities (Thai, 2006). Services are generally the fundamental provision of all logistics enterprises; an excellent quality service is a key advantage in this era of modern competition; however, in China, logistics enterprises started relatively late as compared to other countries (Chaohe, 2011). The contribution of the staff is highly important in rendering quality services regardless of the nature of business.

The study by Mengmeng (2014) found that staff communication is important in enhancing logistics customer satisfaction level. Communication in personal service is all the more crucial because the employees communicate directly with the customers as in the case with delivery services where the employees communicate face-to-face with customers while delivering the goods. During such direct communication, customer perception regarding the e-logistics services of the company is established, which is vital in ensuring customer satisfaction.

The staff contributes significantly to the provision of information. The management of information on websites and the systematic way of providing information can increase the satisfaction level of e-logistics customers. With the Internet and electronic technology developments, the era of e-fulfillment is in the horizon. The biggest development is in information flow where information sharing has become quicker and less limited. With the support of information technology, material and financial flows also experience greater efficiency and accessibility in fulfilling customer demands (Sell, 2015).

Hui (2011) conducted a research study on a network of logistics services for shopping in the context of a customer satisfaction index evaluation system. The author found that logistics service attitude is the second most important element in the index with respect to e-logistics customer satisfaction.

This index has seven other aspects namely: taking the initiative to contact customers, delivering the goods on time, communicating with customers in a very polite way, being friendly with customers, not throwing the goods from the gate, not throwing the goods while unloading, and asking customers to check the goods before signing. According to the author, these aspects are highly important in the effort to improve the satisfaction level of customers.

Xiaoxu (2016) also emphasized on the quality of personal delivery in ensuring customer satisfaction. A good image representation can win the heart of the customer.

Yuen & Thai (2015) argued that service quality has a relationship with customer satisfaction i.e. the better the staff service quality, the higher the customer satisfaction level. According to Benfang and Feng (2014), almost 80% of goods delivery is in-effect in China, and most of the e-logistics employees leave the goods at the company gate or community gate without sending to the actual address, especially homes. This practice decreases the satisfaction level of customers.

According to Liu & Liu (2014), in the first half of 2013, China's online retailing market scale had achieved 7542 billion RMB, with the number of online shoppers reaching 2.77 billion. Existing national express service companies had achieved a size volume totaling 38.4 billion, which is an increase of 60.6%. However, the overall satisfaction level for the 2012 online express service only reached 39.8%. These companies consequently tried to satisfy the demand of customers by enhancing their staff service quality. Therefore, staff service quality has a significant role in China's e-logistics industry.

In summary, staff service quality is one of the key determinants of e-logistics customer satisfaction level. A decrease in staff service quality will reduce the customer satisfaction level. Staff service

quality is determined by the attitude of the staff, the behavior of the staff, staff communication with customers especially while delivering goods, and the information generated by the staff. Thus, staff services quality has a relationship with e-logistics customer satisfaction.

2.4.4 E-Payment and E-Logistics Customer Satisfaction

Electronic commerce is built upon electronic payment systems. Electronic payment has become the main element of business operations for most companies; however, it has also become one of the most critical problems for businesses and financial services (Savrul, Incekara & Sener, 2014).

As compared to other traditional payment procedures, e-payment methods have numerous promising characteristics such as security, reliability, privacy, scalability, acceptability, convenience as well as efficiency (Yuen & Thai, 2015; Aggarwal & Rahul, 2018; Savrul, Incekara & Sener, 2014). The electronic payment system is recognised and implemented in most parts of the world. Developed countries like France, the United States (US) and the United Kingdom (UK) have established e-payment systems in logistics. However, other regions like Asian countries are only beginning to encourage their industries to deploy the e-payment system.

A good e-payment system is free of security breaches which makes it more advantageous than traditional payment systems (Lee & Turban, 2001, Linck et al., 2006). According to the European Central Bank, different instruments are used for e-payment including credit cards, cash, checks and different types of debit cards. Generally, e-payment is classified into five categories (Abrazhevich, 2004; Dai & Grundy, 2007; Guan & Hua, 2003; Lawrence, 2002; Schneider, 2007) namely:

1. Electronic-cash: Transactions are handled through the exchange of electronic currency.

2. Pre-paid card: Online customers pay a certain amount by making an entry using a card number on the company website.

3. A card linked with a bank where the customer enters a number or swipes the card and a specific amount is posted against the customer's account; the customer later receives a bill and pays this amount to the bank.

4. Debit cards: This card is linked to the customer's bank account. Money is deducted from the customer's bank account whenever a debit transaction is carried out.

5. Electronic checks: Electronic checks are generally managed by an institution electronically between the bank of seller and bank of the buyer in the form of an electronic check.

Despite the numerous e-payment methods available, credit cards, electronic-cash, debit cards and pre-paid cards are extensively used in many business-to-business, business-to-consumer and consumer-to-consumer transactions (Theodosios & George, 2005). The various e-payment methods are shown in Figure 2.2.

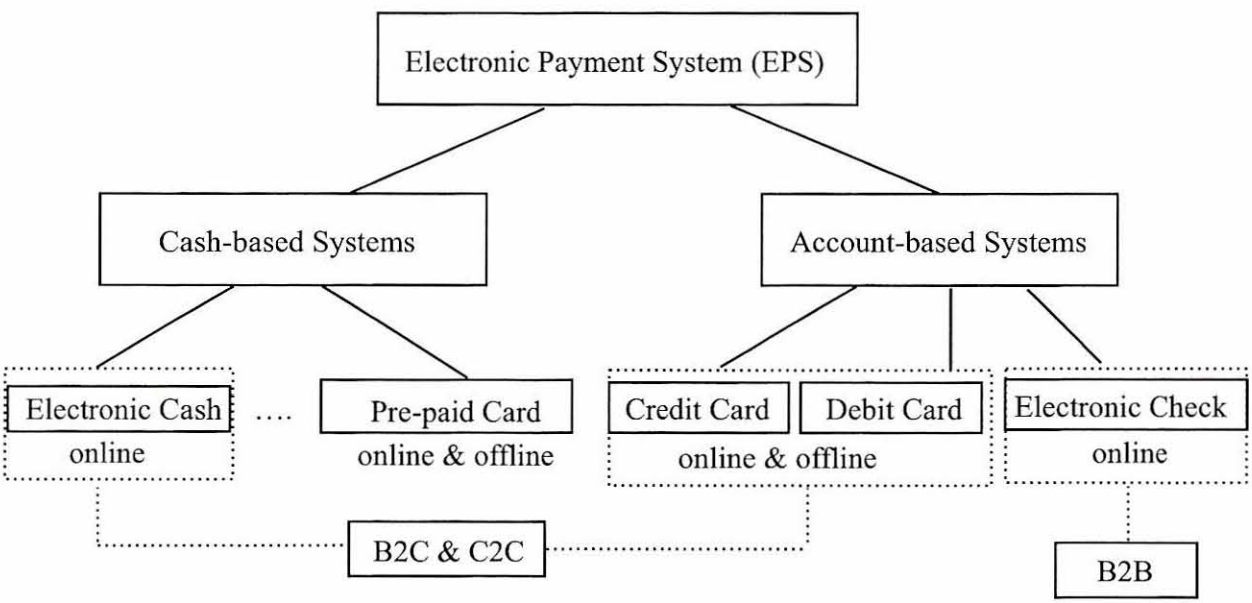


Figure. 2.2 *Classification of electronic payment systems.*
Source: Kim, Tao, Shin & Kim (2010)

It is generally believed that better security improves trust level. Perceptions of good security and trust level ultimately enhance the use of e-commerce. As e-payment provides high security (Kousaridas et al., 2008), satisfaction among e-logistics customers is easily created. In fact, the perception of customers regarding e-payment security systems has become a key factor in the development of e-commerce markets (Kim, Tao, Shin & Kim, 2010). To attract and retain e-logistics customers, it is mandatory to increase their satisfaction level which can be achieved through the creation of perceptions of security and trust during e-payment transactions (Aggarwal & Rahul, 2018).

An electronic payment system enhances the confidence of e-logistics customers and also improves the transparent integration of several collaborating companies. A unique platform for communication comprising the ease of placing orders, knowledge regarding the status of goods, and facility to make online payments improves customer confidence in the system (Gunasekaran & Ngai, 2004).

According to Xue, Pengfei & Chen (2016), payment is a secondary index that influences logistics service satisfaction among customers. Benfang & Feng (2014) focused on dissatisfied e-logistics customers and revealed that they have various objections related to e-payment. Some of the customers argued that payment should be made after the delivery of goods. Some of the customers explained that payment should be made after the inception of goods by the customer.

Overall, the satisfaction level of e-logistics customers can be enhanced with the deployment of e-payments services which are more secure and trustworthy than other traditional payment services, and of which are more convenient with the use of credit cards, debit cards, electronic cheques, etc.

2.4.5 Traceability and E-Logistics Customer Satisfaction

Traceability is the ability to authenticate the history, location, or application of an item with documented record identification. According to ISO (9001:2000) traceability can be defined as the ability to trace history, tracking both the status of the product as well as the location data records. As the e-logistics process is mostly exclusive of face-to-face interaction, it is important to have proper traceability of the customer's goods which can be achieved with the use of ICT.

Proper maintenance of the tracking system for all e-logistics goods is highly crucial especially in China where e-logistics activities are substantial. Prior studies had examined traceability-based quality control, focusing mainly on the functions as well as structure of the information tracing systems (Oliveira, Cardoso, Barbosa, Costa & Prado, 2015; Azar & Vaidyanathan, 2015; Zou, Chen, Uysal, & Zheng, 2014;Wood, Reiners & Pahl, 2015).

According to Xiaoxu (2016), the quality of the tracking information is an important factor in determining logistics customer satisfaction. E-logistics processes are mainly carried out via the Internet rather than through physical interactions with the employees; hence, a proper traceability system can facilitate the customer in determining the delivery status of their goods.

Xue, Pengfei, Chen, and Yixuan (2016) indicated that availability of tracking information such as logistics information security, timeliness, and query of logistics order ranks second in the logistics customer satisfaction index. The index indicates that traceability has a significant influence on customer perception of the logistics company.

However, according to Benfang and Feng (2014), tracking of order ranks fourth in the customer satisfaction index, behind the attitude of logistics service. E-logistics services can better trace deliveries using the Internet, as it can capture more customers than the traditional logistics system.

In conclusion, the additional feature of traceability in e-logistics has a positive influence on customer satisfaction level. A good quality traceability system creates positive perception in the mind of the customers, which automatically increases their satisfaction level.

2.5 Information and Communication Technology (ICT)

The adoption of information and communication technology (ICT) is a critical area of innovation. ICT is seen as one of the most perfect instruments to achieve service differentiation as well as to improve collaboration through effective connectivity with different supply chain partners. Nonetheless, many logistics service companies failed to properly utilize ICT in gaining a competitive advantage as the implementation of technology innovation is rather risky and challenging. In small businesses, technology implementation is critical, and ICT investments need to be carefully planned (Evangelista, McKinnon & Sweeny, 2013). It is necessary for a typical e-commerce company to have an online system or platform as numerous trading systems have been employed in recent times (Yu, Wang, Zhong & Huang, 2017).

Many empirical studies on logistics service providers in China (e.g., Lai, Zhao & Wang, 2006; Lai, Wang & Zhao, 2008; Lin & Ho, 2009) have revealed weaknesses in the companies' information integration capability. This issue is a major hindrance to the progress of logistics services. Such weaknesses include poor information infrastructure and low investment in ICT which affect customized logistics provision (Luisa dos Santos Vieira, Sérgio Coelho & Mendes Luna, 2013; Zhang & Zhao, 2016; Nowicka, 2014; Hofmann & Osterwalder, 2017).

The application of ICTin large logistics service enterprises has been extensively examined (Schliwa, Armitage, R., Aziz, Evans & Rhoades, 2015; Evangelista, 2014; Tacken J., Sanchez Rodrigues & Mason, 2014). ICT was also found to have significant influence on business growth and productivity improvement in other service sectors such as transportation, wholesale, communications, retail business, and finance (Pilat, 2003).

ICT creates a bridge between merchant and customer. It combines merchant information and customer information on a single website which facilitates both parties in transmitting accurate and timely information (Yuanxiao, 2014) i.e. an aspect that is critical for e-logistics services.

According to Marchet et al. (2009), there are several types of ICT applications in logistics as given below:

- **Transportation management (TM) applications**: Mason et al. (2003) mentioned different elements of TM such as tools to support decision-making in transportation planning and execution using various functionalities including carrier load tendering, scheduling and routing, traceability, and payment as well as auditing (Gilmore and Tompkins, 2000; Tyan et al., 2003).

- **Supply chain execution (SCE) applications**: SCE was designed to manage information exchange and execute real-time management of different processes such as distribution schedule (Giaglis et al., 2004).

- **Field force automation (FFA) applications**: FFA is controlled through mobile applications and helps provide a link between remote workforce and various business processes (Rodina et al., 2003).

- **Fleet and freight management (FFM) applications**: These applications are generally used as a reporting tool by logistics managers to ascertain vehicle travel times, delivery points visited, service and other related parameters.

2.5.1 E-Payment and Information Communication Technology (ICT)

The advances in ICT have had a large impact on the development and application of electronic businesses (e-business) in the credit card industry (Carusotto, 2014). For example, the development in contactless technology has improved methods of payments whereby cardholders can simply wave their cards instead of swiping to make payments (Carusotto, 2014). Such enhancement minimizes the cardholder's transaction processing time and thus simplifying the overall transaction processes. Another form of contactless technology is where cardholders only need to download a payment app on their mobile devices (such as a mobile phone) so that they do not have to carry their credit cards all the time (Carusotto, 2014; Ghasemi, Mohamad, Karami, Bajuri, and Asgharizade, 2016; Pan, Teoh, and Seow, 2014). Such e-payment convenience can therefore increase customer satisfaction.

As the aspect of payment has become the most critical problem for businesses and all other financial services (Ma, Banerjee, & Shroff, 2015), ICT is seen to play a vital role in solving the predicament as it creates a bridge between companies as well as between companies and customers in establishing convenient and secure payment methods.

The e-payment system, being directly linked to ICT, is developed in such a way to be free of security breaches during transactions (Linck et al., 2006), which in turn affects e-logistics customer satisfaction in a positive way.

2.5.2 Traceability and Information Communication Technology (ICT)

The level of ICT application is still undeveloped and needs to be improved, especially in the case of payment and traceability. Traceability is an important facility made possible by ICT and is one of the most crucial elements in logistics. According to Marchet et al. (2009), transportation management (TM) is one of the ICT applications used in logistics. TM consists of several functions including payment and traceability (Gilmore and Tompkins, 2000; Tyan et al., 2003).

According to Manos and Manikas (2010), most companies invest in IT supported traceability systems in order to comply with customer requirements, rather than to improve traceability efficiency.

ICT is also used to identify problems in a company's logistics system by communicating and collaborating with the various departments of the company. Such problems include wrong delivery, damaged goods, and late delivery which have a direct influence on customer satisfaction. ICT helps to mitigate these problems through proper traceability. That is why most e-logistics companies, particularly those in China, rely on information technology to increase their traceability capability (Manos & Manikas, 2010).

2.6 Information Communication Technology (ICT) and E-Logistics Customer Satisfaction

ICT plays a critical role in the promotion of logistics services. According to Luisa dos Santos Vieira, Sérgio Coelho and Mendes Luna (2013), ICT has become essential to the management of flows among supply chain partners by allowing integration, synchronization, visibility, and responsiveness. ICT offers a wide range of applications (Gono, Harindranath, & Özcan, 2014; Deng & Fang, 2014) to support different activities for customer satisfaction. Quality ICT services render e-logistics systems to be more effective and efficient, which automatically enhance customer satisfaction.

E-logistics customer satisfaction improves with the increase in ICT level as indicated by prior studies discussed above. For instance, quality e-payment methods made possible by ICT increase the trust and confidence level among customers which in turn enhance customer satisfaction (Gunasekaran & Ngai, 2004; Xue, Pengfei & Chen, 2016).

Another element facilitated by ICT is traceability which enables customers to trace the delivery status of their goods leading to better customer satisfaction (Xiaoxu, 2016). Transportation management (TM) is another ICT-facilitated application (Marchet et al., 2009) that consists of payment as well as traceability (Gilmore and Tompkins, 2000; Tyan et al., 2003).

In conclusion, ICT investments are an essential part (Evangelista et al., 2013) of any e-logistics activity due to their direct and indirect impact on customer satisfaction.

2.7 Underpinning Theory

2.7.1 Resource-Based View

The Resource-Based View (RBV) of the firm had been used by several authors to develop e-logistics performances, and some examples of this include Hitt, Carnes & Xu (2016); Kellermanns, Walter, Crook, Kemmerer & Narayanan (2016); Pee & Kankanhalli (2016), and Backman, Verbeke & Schulz (2017). With RBV applied as the underpinning theory, specific firm resources and their link to enhanced performance are described. Barney (1991) explained firm resources as "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc. controlled by a firm that enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness". Therefore, RBV is a suitable choice to support this research as the underpinning theory.

Several researchers have engaged in multifaceted work on resource classification (Barney, 1991; Spender, Grant, 1996; Miller & Shamsie, 1996; Mills, Platts, & Bourne, 2003). The identification and classification of firm resources is important because the effective utilization of resources develops competitive capability. Mills, Platts, and Bourne (2003) expanded the classification of resources to six categories namely: (1) tangible resources, (2) knowledge resources, skills and experience, (3) system and procedural resources, (4) cultural resources and values, (5) network resources, and (6) resources with potential dynamic capability.

According to the RBV, a company's success is largely dependent on its resources which consist of assets as well as capabilities (Asani, Umrani & Paknikar, 2016). Assets are either tangible or intangible (Collis, 1994).

Meanwhile, capabilities are mainly intangible in the form of skills and knowledge of the employees (Teece, Pisano & Shuen, 1997). Additionally, knowledge, skills of employees, and other capital equipment are the key resources of any firm (Barney, 1991). Resources also include technology, assets, staff skills etc. In the context of this study, if e-logistics companies have good resources like enhanced ICT, good staff service quality, good staff skills/capabilities, good traceability and high-quality e-payment system with ICT technology, then these companies can potentially satisfy customer needs and gain success. Otherwise, other resource-based strengths can be gained through low distribution rate and transit time. Therefore, the Resource-Based View is applicable in this study.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

Based on the problem statement of the current study, the objectives, and prior research studies, the methodology of the study is presented in this chapter. This chapter consists of subsections of the research framework, the research design, the hypothesis of the study, the techniques of data analysis and finally the data analysis steps. It provides detailed discussions on framework development of the study. It is also discussing research design, study population, data, and sampling. This chapter is also discussing data collection method. The data collection procedures are also discussed in detail in this section along with the instrumentations used for data measurement. Finally, this section discusses the data analysis techniques applied.

3.2 The Research Framework

E-logistics is known as internet-enabled logistics (Gunasekaran, Ngai & Cheng, 2007) which is spreading worldwide, particularly in China where overall transactions increased in an incredible speed, which touched the maximum level (Guo, Zhong & Zhang, 2016). However, e-logistics customer satisfaction is important. The rapid growth of different online market helping customers with more secure ways to make their transactions (Hu, Iyer, Hesse & Ahlert, 2004). Various e-logistics services influence positively on customer satisfaction. These services are including distribution rate, transmit time, staff service quality, e-payment, and traceability.

Distribution rate such as the delivery price of the product has a significant impact on customer satisfaction (Xia & Tingting, 2016). Because it is one of the factors which determines the overall prices and overall price of the product has a significant impact on the purchase intention of customers. It is

a major factor of the e-logistics system which has an effect on the satisfaction level of customers (Lina, Guiling & Weiwei, 2014).

Moreover, time in order to the actual delivery is also an essential logistics factor which has more impact on the satisfaction level of customer (Lina, Guiling & Weiwei, 2014). More speed of delivery means less transmit time which has a positive influence on customer satisfaction. As mentioned by Benfang and Feng (2014) that speed of delivery has an effect on customer satisfaction. Therefore, transmit time has a significant influence on e-logistics customer satisfaction.

Furthermore, guarantee to distribute logistics service refers to the enterprise staff's ability to ensure quality services (Benfang & Feng, 2014). Provision of quality services from e-logistics employees determines the customer satisfaction level (Thai, 2013). Moreover, staff service quality has significant positive influence on customer satisfaction (Hua & Jing, 2015). Hence, staff service quality has a significant relationship with customer satisfaction.

Nevertheless, electronic payment has an important role in customer satisfaction level. Electronic payment is more secure, reliable and convenient way of making payment of e-logistics goods (Kousaridas, Parissis & Apostolopoulos, 2008). That is the reason it has a significant influence on customer satisfaction. As, the security system of electronic payment is one of the vital factor in growth as well as the development of electronic commerce market (Kim, Tao, Shin & Kim, 2010).

Nonetheless, customer satisfaction level is also influenced by the tracking system of the e-logistics system (Xiaoxu, 2016). A well-managed traceability system has significant positive impact on customer satisfaction to purchase the products. A good system regarding an inquiry about logistics or-

der and timeline of product delivery with the security of information has an effect on customer satisfaction (Xue, Pengfei, Chen & Yixuan, 2016).

Additionally, e-commerce consists of different information communication technologies (ICT) to run various business activities (Rahayu & Day, 2017) and it has a significant influence on customer satisfaction. It consists of different processes which facilitate buying and selling using computer network (Turban, 2010) which is more convenient. ICT also facilitates payment and traceability of goods which is necessary for customer satisfaction. Therefore, ICT has a significant relationship with e-logistics customer satisfaction level. Because ICT facilitates the e-payment and traceability procedure, that is the reason ICT has a mediating role between e-payment and traceability with e-logistics customer satisfaction.

Various studies on third-party logistics service providers in China (e.g., Lai et al., 2006; Lai et al., 2008; Lin & Ho, 2009) find out weaknesses in information integration capability, especially among different Chinese companies, which is one of the main limitation in the progress of logistics services. Logistics users in China should have a good system of information and communication technology (ICT) to get access to global connectivity and web-enabled communications (Lai et al., 2008), as mentioned by Ding, Kam, and Lalwani (2012). In the climate of increasing dynamics, poor information infrastructure and little investment found in ICT which effect on customized logistics provision (Evangelista & Sweeney, 2006; Wang & Lalwani, 2007). Furthermore, according to Han et al., (2009), integrated information communication technology (ICT) and integrated logistics management have an indirect impact on the performance of firms. Additionally, as discussed in Chapter two, e-payment and e-traceability have a significant relationship with ICT and ICT has a significant relationship with e-logistics customer satisfaction, therefore, according to Baron and

Kenny (1986), ICT can be used as a mediator between e-payment and e-logistics customer satisfaction, e-traceability and e-logistics customer satisfaction.

Hence, from the above discussion, the research framework of the current study is developed as shown in Figure 3.1;

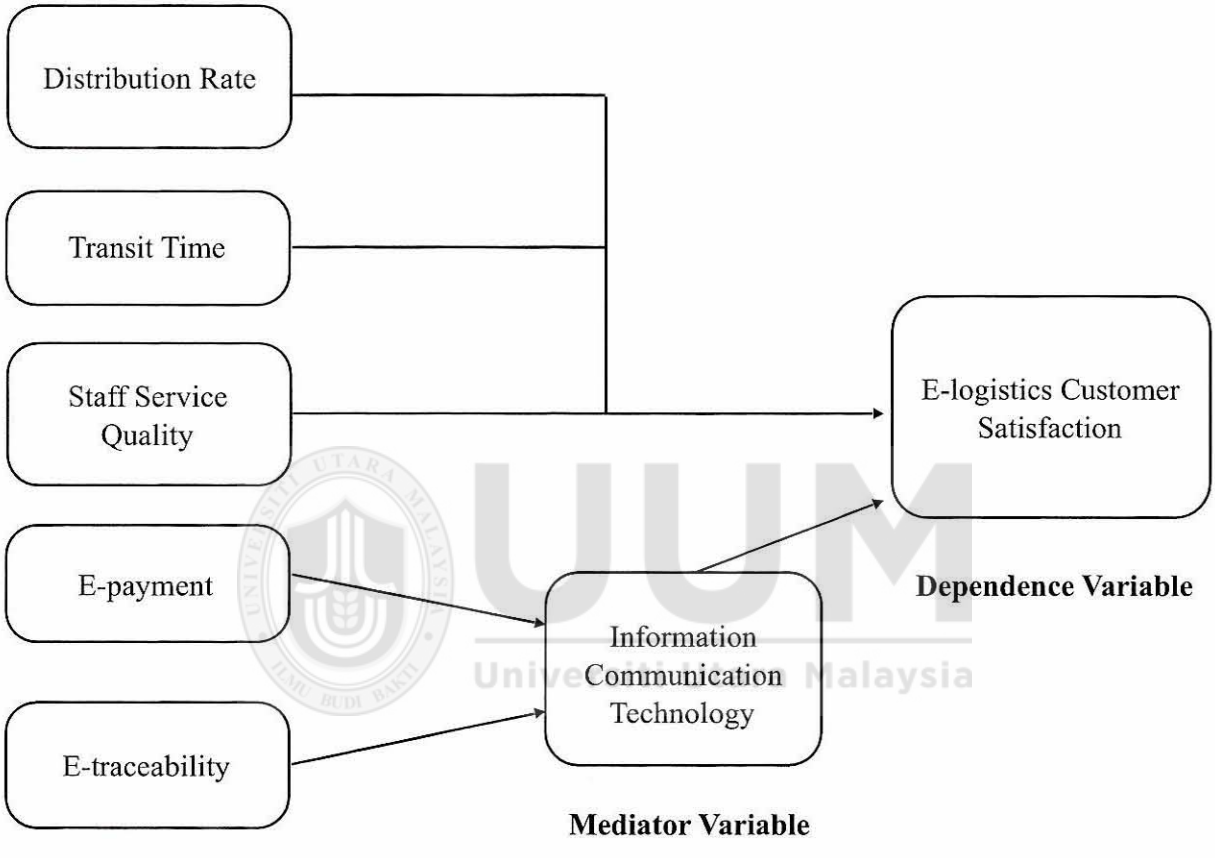


Figure 3.1 *Research Framework*
Source: Developed by Author

3.3 The Study Hypothesis

The focus of this research study is the effect of e-logistics services on e-logistics customer satisfaction level. Additionally, this study is also focusing on the mediating role of information communica-

tion technology (ICT). Hence, from the above discussion on framework development section, the study comes up below hypothesis.

H1: There is a significant relationship between distribution rate and E-Logistics customer satisfaction.

H2: There is a significant relationship between transit time and E-Logistics customer satisfaction.

H3: There is a significant relationship between staff service quality and E-Logistics customer satisfaction.

H4: Information communication technology (ICT) mediates the relationship between E-payment and E-Logistics customer satisfaction.

H5: Information communication technology (ICT) mediates the relationship between E-traceability and E-Logistics customer satisfaction.

3.4 Research Design

The current research study is based on the quantitative approach in which survey is conducted. As the quantitative approach is one of the best approaches to accept or reject the hypothesis (Shuttleworth, 2008). The questionnaire will be used to collect the data from Shaanxi province of China. This study will collect the data by using the cluster sampling. As the focal point of the study is e-logistics customers. Thus, data will be collected from the e-logistics customers in the Shaanxi province of China. However, the current study will focus on one-time data collection. Therefore, this study is a cross-sectional study.

3.4.1 Population of the Study

Polit and Hungler (1999:43, 232) define a population as "the totality of all subjects that conform to a set of specifications, comprising the entire group of persons that is of interest to the researcher and to whom the research results can be generalized." As the current study is focusing on the effect of different services of e-logistics on the satisfaction level of e-logistics customers. That is the reason, the population of the current study is all customers of e-logistics based on Shaanxi province of China.It means that data will be collected from the customers of e-logistics in the Shaanxi province to examine the satisfaction level of customers regarding e-logistics.

3.4.2 Unit of Analysis

The current study is focusing on the satisfaction level of e-logistics customers. That is why the data will be collected from the customers of e-logistics. Therefore, the unit of analysis of this study is individual.

3.4.3 Sampling Size

According to Krejcie and Morgan (1970), if the population is more than 100,000 then sample size should be 384. In the current study, number of e-logistics customers are more than 100,000 in China. Hence, the sample size is 384.

Table 3.1: The Table of Krejcie and Morgan (1970)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
20	19	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	100000	384

3.4.4 Design and Procedure

LoBiondo-Wood and Haber (1998:250) explain a sample as "a portion or a subset of the research population selected to participate in a study, representing the research population". The population of the study is spread over a wide area. According to Sekaran & Bougie (2013), when the population is spread on wide area and study want to cover the whole area, cluster sampling technique is one of the suitable technique to collect the data from respondents. Additionally, the sampling frame is not available. Thus, cluster sampling is appropriate to collect the data.

This study divide China into four clusters—-Northern China, Southern China, Eastern China,Western China. Due to the probability of each cluster is same, it selected Western Chinese randomly. Shaanxi province is considered as the leader in the Western China, because its economic ranks the top in the whole of Western China.In addition, because Shaanxi is a second-tired and middle-income province, in large extent, which can represent the middle-economic areas and the living standards of citizens as well. Hence,Shaanxi province is the most suitable province as a sample in this study. Then this is study will collect the data by using the cluster sampling. Total population will be divided into different clusters. After that few clusters will be selected randomly. Finally, data will be collected from each randomly selected cluster.

3.4.5 Sample Location

The current research study will take the sample from e-logistics customers from Shaanxi province, which is the second-tired province and middle-income areas.

3.5 Operational Definitions

An operational definition provides the brief description of different variables that how the study intends to measure the related variables (Creswell, 2012). The current study variables are based on previous studies. Different variables used in this study are adopted from various studies. These variables include e-logistics customer satisfaction, distribution rate, transit time, staff service quality, e-payment, e-traceability, and information communication technology (ICT). The variables measured were adopted from previous studies.

3.5.1 E-logistics Customer Satisfaction

In reality, there is a problem that logistics service quality, delivery, reputation and customer shopping experience do not match. These elements are necessary for the satisfaction of customers.

Therefore, in this study, customer satisfaction is highlighted in the sense of e-logistics quality, price, services, delivery, reputation, and experience.

Hence, customer satisfaction in the context of e-logistics is defined as, "electronic system of sale and purchase of goods having good quality, satisfactory price, good delivery services, a good reputation which satisfy the customer experience."

3.5.2 Distribution Rate

Distribution rate depends upon the cost incurred while distributing the goods to the actual customer. This distribution cost defines the distribution fee which usually charged from customers. In this study, distribution rate consists of various elements such as distribution fee, discount rate, stability in price and fee in the case to return the goods.

Hence, in the context of the current study, distribution rate is defined as "it is the process of distribution of goods having a reasonable fee, discount rate, minimum return fee, stability in price and better rules regarding distribution rate of products."

3.5.3 Transit Time

Transit time comprised of the time taken by the company from customer order to the actual delivery. This is the time between customer order of particular goods to the actual delivery to that customer. According to the current study, transit time based on different elements such as picking up time, return goods time and delay due to the holiday.

Hence, in the context of the current study, transit time is defined as, "goods delivery time comprised of the picking up time, return goods time and reasonable delay due to a holiday which satisfies the e-logistics customers."

3.5.4 Staff Service Quality

Staff service quality based on the communication, attitude, and extent of services by the staff of e-logistics companies. It mainly includes: the proposed problem can be the quickly professional answer to customers, logistics personnel service attitude, logistics staff are willing to help customers, physical appearance and responsibility of e-logistics staff.

Hence, in the context of the current study, staff service quality is defined as, "process of providing better quality services with the help of good communication skills of staff, the attitude of e-logistics staff, physical appearance and professional way to solve all customer problems."

3.5.5 E-Payment

E-payment is one of the electronic processes through which customers make the payments of e-logistics goods. This system consists of specific features such as easy to use, perceived trust and security which increase the satisfaction level of e-logistics customers.

Hence, in the context of the current study, e-payment is defined as "electronic process of payment which comprised of trust, security of information and easy to use."

3.5.6 E-Traceability

Traceability is one of the significant element of the e-logistics system which provides the facility of tracking the logistics goods. In this study, traceability is highlighted by the help of timely tracking information, feedback of error and logistics transportation information.

Hence, in the context of the current study, traceability is defined as, "is the ability to verify the time tracking information, feedback of error and logistics transportation information regarding e-logistics goods."

3.5.7 Information Communication Technology (ICT)

Information communication technology (ICT), one of the perfect instrument, to achieve service differentiation as well as improving the collaboration through effective connectivity with different supply chain partner and customers.

In the context of the current study, information communication technology is defined as, "process which adopts the customer needs by ensuring the security of transactions and provide the information accuracy, completeness and fulfill the timelines."

3.6 Instrumentations

The current research study using the questionnaire to collect the primary data from the province of Shaanxi in China. As the measurement scale is one of the suitable tools to examine the relationship between different variables (Sekaran, 2003). However, the current study using a Likert scale to collect the data. Generally, the 5-point Likert scale is used from strongly disagree to strongly agree (Jamieson, 2004). Therefore, the scale has 5 categories such as 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. Below the measures for all variables are given.

3.6.1 E-logistics Customer Satisfaction

E-logistics customer satisfaction will be measured with the help of quality, price, services, delivery, the reputation of companies and customer experience. The scale items are adapted from the previous study which was conducted by Pei (2013).

3.6.2 Distribution Rate

Distribution rate will be measured by distribution fee, discount rate, stability in price and fee in the case to return the goods. These scale items are adopted from prior studies conducted by Jiaqi (2015), Yuanxiao (2014) and Lina, Guiling & Weiwei (2014).

3.6.3 Transit Time

In the context of the current study, transit time is measured based on picking up time, return goods time and delay due to the holiday. Scale items for these measures are adopted from Mengmeng (2014) and Yuanxiao (2014).

3.6.4 Staff Service Quality

Staff service quality is measured based on the attitude of staff, image, delivery and communication with customers. Scale items are adopted form Mengmeng (2014) and Yuanxiao (2014).

3.6.5 E-Payment

In the context of the current study, e-payment is measured on the basis of ease to use, perceived trust and security. Scale items for these measured are adopted from Kim, Tao, Shin & Kim (2010).

3.6.6 E-Traceability

E-traceability is measured through timely tracking information, feedback of error and logistics transportation information. Scale items are adopted from the previous study which is conducted by Yuanxiao (2014).

3.6.7 Information Communication Technology (ICT)

Information communication technology (ICT) is measured based on the rapid adoption of needs, security for the business transaction, communication with customers and supplier, completeness, accuracy and timeliness. Scale items are adopted form Huixing (2016) and Ding, Kam & Lalwani (2012).

3.6.8 Questionnaire Descriptions

To check the effect of different e-logistics services on customer satisfaction level, the questionnaire is divided into two sections. The first section of the study related to the descriptive statistics. It consists of personal information of respondents such as gender, material status, age, education, and income.

The second section of the questionnaire is comprised of major variables of the study. These variables are including distribution rate, transit time, staff service quality, e-payment, e-traceability, information communication technology and e-logistics customer satisfaction.

3.7 Procedure of data collection

The pilot study was conducted by questionnaire around Chinese students in UUM and who have e-logistics experience in China before.And in April, 2018, this study started to collect the real data by e-survey, such as sending e-questionnaire to WeChat friends , WeChat group and asked them to share to others who live in Shaanxi province and have e-shopping experience.After few weeks, finally, there are 612 data responds. Ultimately, the study use 501 valid data to conduct the following analysis.The specific details about real data will be discussed in Chapter 4.

3.8 Pilot Study

In the current study, the questionnaire is adapted and translated into Chinese. Therefore, there was a need to conduct a pilot study. It is very important because it improves the questionnaire (Neuman, 1997). Generally, it highlights weaknesses in design as well as instrumentation (Cooper & Schindler, 2001).

According to the instructions of Emory and Cooper (1991), adequate sample size for pilot study is 25 to 100. Thus, in the current study, 90 questionnaires were distributed among the customers of e-logistics and 81 questionnaires were returned. However, 9 questionnaires were incomplete and not included to conduct pilot study. Hence, total 72 questionnaires were used to conduct pilot study.

3.8.1 Reliability

To examine the reliability Cronbach's Alpha was used. According to Sekaran (2000) reliability less than 0.6 is considered to be poor, in the range of 0.7 is considered to be acceptable, however 0.8 is considered to be good. In below Table 3.1, Cronbach's Alpha is given for all variables.

Table 3.1.1 Distribute Rate (DR) Reliability Results

DR-Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.877	0.878	5

DR-Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
Clear fee	11.67	16.958	0.702	0.530	0.853
Return fee	11.94	16.645	0.677	0.521	0.859
Discounts	11.88	16.618	0.773	0.613	0.836
Distribution rate	11.97	17.070	0.682	0.586	0.857
Price rules	11.76	16.943	0.711	0.610	0.850

From table 3.1.1 shows that Cronbach's Alpha related to DR is 0.877, which is more than 0.8 acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good.

Table 3.1.2 Transit Time (TT) Reliability Results

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.918	0.920	5

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
Ordering to receiving parcel	12.15	18.328	0.713	0.570	0.915
Mailing the return goods to receiving the new goods	12.17	18.141	0.826	0.694	0.895
The delay time	12.19	17.032	0.775	0.655	0.904
Picking up parcel	12.04	17.139	0.828	0.696	0.892
Different choice about the delivery time	11.89	16.607	0.822	0.683	0.894

From table 3.1.2 shows that Cronbach's Alpha related to TT is 0.918, which is more than 0.9 quite acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good, above 0.9 is quite good.

Table 3.1.3 Staff Service Quality(SSQ)

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.954	0.954	6

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
Answer the questions quickly and professionally	15.15	30.920	0.782	0.698	0.953
Service attitude is good	14.82	29.587	0.896	0.819	0.940
Willing to help customers	15.00	29.887	0.903	0.833	0.940
Familiar with the whole delivery process	15.03	29.464	0.888	0.812	0.941
Communication with customers	14.94	29.800	0.924	0.862	0.937
Wear uniform dress	15.13	31.519	0.747	0.638	0.957

From table 3.1.3 shows that Cronbach's Alpha related to SSQ is 0.954, which is more than 0.9 quite acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good, above 0.9 is quite good.

Table 3.1.4 E-payment (EP) Reliability Results

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.941	0.942	7

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
E-payment is secure online transaction	15.93	37.615	0.691	0.520	0.942
Hacker invasions	16.42	36.246	0.674	0.561	0.944
The information I provided in the previous e-payment is helpful for transactions	16.08	34.556	0.805	0.676	0.932
The information relating to user is safety	16.18	33.530	0.915	0.870	0.922
Trust participant , such as seller and buyer, involved in e-payment	16.21	35.491	0.857	0.800	0.928
Trust the security mechanisms of e-payment	16.18	34.742	0.867	0.805	0.927
Trust the information provided during the e-payment process.	16.17	35.239	0.849	0.823	0.928

From table 3.1.4 shows that Cronbach's Alpha related to EP is 0.941, which is more than 0.9 quite acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good, above 0.9 is quite good.

Table 3.1.5 E-traceability(ET) Reliability Results

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.951	0.951	5

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
LSP real-time tracking information	12.07	23.164	0.895	0.829	0.934
LSP accurate logistics transportation information	11.99	23.141	0.906	0.889	0.932
LSP fast respond	12.08	22.444	0.915	0.900	0.931
Provided to track the location at anytime	11.94	23.603	0.867	0.758	0.939
LSP provide the worldwide location information	11.97	24.394	0.747	0.604	0.960

From table 3.1.5 shows that Cronbach's Alpha related to ET is 0.951, which is more than 0.9 quite acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good, above 0.9 is quite good.

Table 3.1.6 Information Communication Technology

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.956	0.956	5

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
Information system adapted to my needs	12.57	17.206	0.863	0.746	0.948
Information system is secure	12.63	17.364	0.848	0.733	0.951
Information system can integrate operations	12.61	16.945	0.899	0.814	0.942
ICT equipment to deal with some emergency	12.60	17.061	0.878	0.789	0.946
ICT equipment to give customers feedback timely	12.54	17.266	0.900	0.824	0.942

From table 3.1.6 shows that Cronbach's Alpha related to ICT is 0.956, which is more than 0.9 quite acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good, above 0.9 is quite good.

Table 3.1.7 E-logistics Customer Satisfaction Reliability Results

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based On Standardized Items	N of Items
0.969	0.969	7

Item-Total Statistics					
	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if item Deleted
Satisfy with e-logistics quality	19.58	39.232	0.858	0.785	0.966
Satisfy with price of e-logistics products	19.56	38.645	0.875	0.798	0.965
Satisfy with the services of e-logistics	19.46	37.238	0.924	0.882	0.962
Satisfy with the home delivery services	19.42	38.162	0.924	0.885	0.962
Satisfy with reputation of e-logistics	19.53	37.943	0.915	0.875	0.962
Satisfy with after sale service of e-logistics	19.56	39.095	0.816	0.723	0.970
Satisfy with the shopping experience by using e-logistics	19.40	39.033	0.912	0.863	0.963

From table 3.1.7 shows that Cronbach's Alpha related to ELCS is 0.969, which is more than 0.9 quite acceptable range. As according to Sekaran (2000), 0.8 reliability value is considered to be good, above 0.9 is quite good.

Table 3.1 Reliability Test Summary

Constuct	Factor	Alpha(inter item correlation)	Items	Cronbach's Alpha if item deleted
Distribute Rate(DR)	Distribute Rate(DR)	0.877	Clear fee	0.853
			Return fee	0.859
			Discounts	0.836
			Distribution rate	0.857
			Price rules	0.850

Construct	Factor	Alpha(inter item correlation)	Items	Cronbach's Alpha if item deleted
Transit Time(TT)	Transit Time(TT)	0.918	The time from ordering to receiving parcel	0.915
			The time from mailing the return goods to receiving the new goods	0.895
			The delay time	0.904
			The time for picking up the parcel	0.892
			Different choices about the delivery time	0.894
Staff Service Quality(SSQ)	Staff Service Quality(SSQ)	0.954	The staff can answer the questions quickly and professionally	0.953
			The staff service attitude is good	0.940
			The staff is willing to help customers	0.940
			The staff is familiar with the whole delivery processes	0.941
			The staff can communication with customers	0.937
			The staff wear uniform dress	0.957
E-Payment(EP)	E-Payment(EP)	0.941	E-payment is secure online transaction	0.942
			Hacker invasions	0.944
			The previous information is helpful for secure e-payment transactions.	0.932
			The information relating to user is safety.	0.922
			Trust participant, such as seller and buyer, involved in e-payment.	0.928
			Trust the security mechanisms of e-payment	0.927
			Trust the information provided during the e-payment process.	0.928

Construct	Factor	Alpha(inter item correlation)	Items	Cronbach's Alpha if item deleted
E-Traceability(ET)	E-Traceability(ET)	0.951	LSP real-time tracking information	0.934
			LSP accurate logistics transportation information	0.932
			LSP fast respond	0.931
			Provided to track the location at anything	0.939
			LSP provide the worldwide location information	0.960
Information Communication Technology(ICT)	Information Communication Technology(ICT)	0.956	Information system adapted to my needs	0.948
			Information system is secure	0.951
			Information system can integrate operations	0.942
			ICT equipment to deal with some emergency	0.946
			ICT equipment to give customers feedback timely.	0.942
E-Logistics Customer Satisfaction(ELCS)	E-Logistics Customer Satisfaction(ELCS)	0.969	Satisfy with e-logistics quality	0.966
			Satisfy with price of e-logistics products	0.965
			Satisfy with the services of e-logistics	0.962
			Satisfy with the home delivery serveces	0.962
			Satisfy with reputation of e-logistics	0.962
			Satisfy with after sale service of e-logistics	0.970
			Satisfy with the shopping experience by using e-logistics	0.963

Table 3.1 shows that all constructs reliability is more than acceptable range. All the constructs have reliability value more than 0.8 which good. As according to Sekaran (2000), 0.8 reliability value is considered to be good.

3.8.2 Validity

Factor analysis identifies clusters of closely related Validity. Hence, a factor analysis of the frequency table was conducted with IBM SPSS 24 Version. KMO and Bartlett's test of sphericity were used to measure the sampling adequacy for factor analysis. The calculated KMO value was above 0.5 and Bartlett's test of sphericity revealed statistically significant results ($p<0.001$); then the factor analysis was thus appropriate (Hair et al., 2006).

Table 3.2.1 Distribute Rate (DR) Validity Result

Component Matrix	Component 1	KMO and Bartlett's Test		
Clear fee	0.814	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.823
Return fee	0.797			
Discounts	0.865	Barlett's Test of Sphericity	Approx.Chi-Square	186.065
Distribution rate	0.801		df	10
Price rules	0.822		Sig.	0.000

Form table 3.2.1 shows for DR, KMO value is 0.823($a>0.5$), and Bartlett's test of sphericity revealed statistically significant results($p<0.001$).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2.2 Transit Time (TT) Validity Result

Component Matrix	Component 1
Ordering to receiving parcel	0.814
Mailing the return goods to receiving the new goods	0.893
The delay time	0.858
Picking up parcel	0.894
Different choices about the delivery time	0.891

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.872
Barlett's Test of Sphericity	Approx.Chi-Square	251.815
	df	10
	Sig.	0.000

Form table 3.2.2 shows for TT, KMO value is 0.872 (a>0.5), and Bartlett's test of sphericity revealed statistically significant results(p<0.001).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2.3 Staff Service Quality (SSQ) Validity Result

Component Matrix	Component 1
Answer the questions quickly and professionally	0.848
Service attitude is good	0.931
Willing to help customers	0.936
Familiar with the whole delivery process	0.925
Communication with customers	0.950
Wear uniform dress	0.818

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.911
Barlett's Test of Sphericity	Approx.Chi-Square	459.003
	df	15
	Sig.	0.000

Form table 3.2.3 shows for SSQ, KMO value is 0.911 (a>0.5), and Bartlett's test of sphericity revealed statistically significant results(p<0.001).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2.4 E-payment (EP) Validity Result

Component Matrix	Component 1
E-payment is secure online transaction	0.762
hacker invasions	0.748
The information I provided in the previous e-payment is helpful for secure e-payment transactions	0.859
The information relating to user is safety	0.943
Trust participant, such as seller and buyer, involved in e-payment	0.903
Trust the security mechanisms of e-payment	0.910
Trust the information provided during the e-payment process.	0.900

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.897
Barlett's Test of Sphericity	Approx.Chi-Square	466.235
	df	21
	Sig.	0.000

Form table 3.2.4 shows for EP, KMO value is 0.897 (a>0.5), and Bartlett's test of sphericity revealed statistically significant results($p<0.001$).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2.5 E-traceability (ET) Validity Result

Component Matrix	Component 1
LSP real-time tracking information	0.937
LSP accurate logistics transportation information	0.945
LSP fast respond	0.951
provided to track the location at anytime	0.915
LSP provide the worldwide location infomation	0.828

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.880
Barlett's Test of Sphericity	Approx.Chi-Square	404.822
	df	10
	Sig.	0.000

Form table 3.2.5 shows for ET, KMO value is 0.880 (a>0.5), and Bartlett's test of sphericity revealed statistically significant results($p<0.001$).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2.6 Information Communication Technology (ICT) Validity Result

Component Matrix	Component 1
Information system adapted to my needs	0.913
Information system is secure	0.902
Information system can integrate operations	0.937
ICT equipment to deal with some emergency	0.924
ICT equipment to give customers feedback timely	0.938

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.907
Barlett's Test of Sphericity	Approx.Chi-Square	372.427
	df	10
	Sig.	0.000

Form table 3.2.6 shows for ICT, KMO value is 0.907 (a>0.5), and Bartlett's test of sphericity revealed statistically significant results(p<0.001).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2.7 E-logistics Customer Satisfaction Validity Result

Component Matrix	Component 1
Satisfy with e-logistics quality	0.896
Satisfy with the price of e-logistics products	0.908
Satisfy with the services of e-logistics	0.947
Satisfy with the home delivery services	0.945
Satisfy with reputation of e-logsitics	0.940
Satisfy with after sale service of e-logistics	0.862
Satisfy with the shopping experience by using e-logistics	0.937

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.905
Barlett's Test of Sphericity	Approx.Chi-Square	638.354
	df	21
	Sig.	0.000

Form table 3.2.7 shows for ELCS, KMO value is 0.905 (a>0.5), and Bartlett's test of sphericity revealed statistically significant results(p<0.001).The factor analysis is thus appropriate.All of the items in component matrix are above 0.4 quite strongly and there only one component extracted.

Table 3.2 Validity Result Summary

Construct	KMO	Bartlett's Test of Sphericity(Sig.)	Items	Component analysis
Distribute Rate(DR)	0.823	0.000	Clear fee	0.814
			return fee	0.797
			discounts	0.865
			distribution rate	0.801
			price rules	0.822
Transit Time(TT)	0.872	0.000	The time from ordering to receiving parcel	0.814
			The time from mailing the return goods to receiving the new goods	0.893
			The delay time	0.858
			The time for picking up the parcel	0.894
			Different choices about the delivery time	0.891
Staff Service Quality(SSQ)	0.911	0.000	The staff can answer the questions quickly and professionally	0.848
			The staff service attitude is good	0.931
			The staff is willing to help customers	0.936
			The staff is familiar with the whole delivery processes	0.925
			The staff can communication with customers	0.950
			The staff wear uniform dress	0.818

Construct	KMO	Bartlett's Test of Sphericity(Sig.)	Items	Component analysis
E-Payment(EP)	0.897	0.000	E-payment is secure online transaction	0.762
			Hacker invasions	0.748
			The previous information is helpful for secure e-payment transactions.	0.859
			The information relating to user is safety.	0.943
			Trust participant, such as seller and buyer, involved in e-payment.	0.903
			Trust the security mechanisms of e-payment	0.910
			Trust the information provided during the e-payment process.	0.900
E-Traceability(ET)	0.880	0.000	LSP real-time tracking information	0.937
			LSP accurate logistics transportation information	0.945
			LSP fast respond	0.951
			provided to track the location at anything	0.915
			LSP provide the worldwide location information	0.828
Information Communication Technology(ICT)	0.907	0.000	Information system adapted to my needs	0.913
			Information system is secure	0.902
			Information system can integrate operations	0.937
			ICT equipment to deal with some emergency	0.924
			ICT equipment to give customers feedback timely.	0.938

E-Logistics Customer Satisfaction(ELCS)	0.905	0.000	Satisfy with e-logistics quality	0.896
			Satisfy with price of e-logistics products	0.908
			Satisfy with the services of e-logistics	0.947
			Satisfy with the home delivery serveces	0.945
			Satisfy with reputation of e-logistics	0.940
			Satisfy with after sale service of e-logistics	0.862
			Satisfy with the shopping experience by using e-logistics	0.937

In summary, form table 3.2 shows all the items of each factors, KMO and Bartlett's test of sphericity are in acceptable range. Moreover, the calculated KMO value was above 0.8 and Bartlett's test of sphericity revealed statistically significant results are 0.0000 ($p<0.001$); then the validity analysis is thus appropriate (Hair et al., 2006).

3.9 Data Analysis Techniques

SPSS version 24 will be used to analyze the data. The descriptive data analysis technique will be utilized in analyzing the respondent's non-quantified data which are descriptive in nature. This analysis technique will cover the mean, frequency, and standard deviation.

Furthermore, reliability and validity test will be used to check the reliability and validity of all items. To mitigate the effect of missing value, missing value analysis will also be performed. Moreover, to test the normality of data, normality test will be conducted, and skewness and kurtosis value will be considered. To examine the strength of variables correlation analysis will be used.

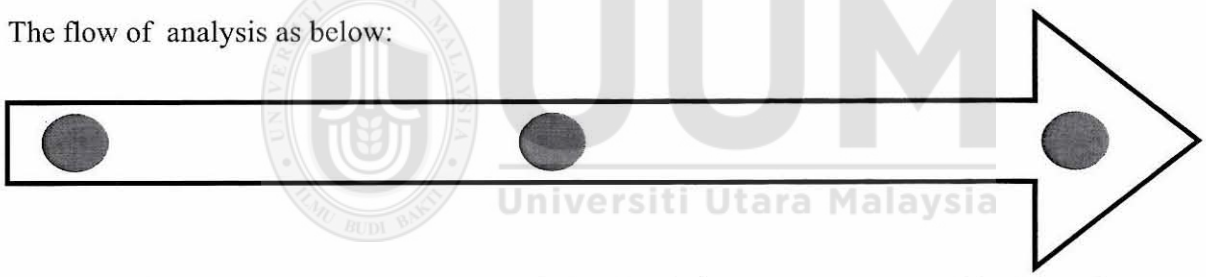
Finally, to test the hypothesis, regression analysis will be performed in which significance (p-value), and beta value will be considered.

CHAPTER FOUR

DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter discusses about the findings of the collected data from the responds of the questionnaires in order to answer the research questions.Generally, this chapter is separated into two major sections which are descriptive data analysis and empirical data analysis.In the section of descriptive data analysis, the demographic of respondent's profile will be described, for example the Gender, Marital Status, Age, Highest Education Level, Income Rate, Location and Occupation in Shaanxi province.Besides, the section of empirical analysis will discuss about the analysis tests that conducted such as frequency analysis,Pearson correlation analysis and Multiple Regression Analysis. The flow of analysis as below:



Descriptive Data Analysis and Findings | Correlation Analysis | Test Hypotheses

4.2 Descriptive Data Analysis and Findings

The questionnaire was made into e-survey using Tencent Questionnaire, which are the most popular and basic online survey tool in China. The whole process of collecting data were conducted online for one week.The e-survey were sent to those persons who have online shopping experience or have the e-logistics experience in Shaanxi province.Besides, the questionnaires were sent into WeChat group, by email and other online websites.However, there are some respondents who are not living Shaanxi province, this responds are directly removed from analysis.On the other hand, all the responds have been checked and vetted for inconsistency.

4.2.1 Survey Response Rate

Table 4.1: Survey responses

Description	Total	Percentage(%)
Total Received Questionnaires	612	100
Other Province Questionnaires	34	5.6
Invalid Questionnaires	77	12.6
Accepted Questionnaires	501	81.8

The survey response rate is presented in this section of the study.There are 612 responses from e-survey in Shaanxi province. However, there are 34 responses from other provinces, and 77 invalid responds.Totally, there are 501 useful responses from Shaanxi province, and will be analysis in this study.Hence, the response rate of this study is 81.8%.According to Hair et al.(1984), when the responses rates above 50% are generally considered acceptable, but if the response rate is 80% and above are far more desirable.In this study, 81.8% is acceptable and can be used in this research.

4.2.2 Demographic Profile of Respondents

The demographic profile of respondents is separated into 7 different types which are Gender, Marital Status, Age, Highest Education Level, Income Rate, Occupation and Location.Because of the location, it already removes other province responses.Therefore, no need to test the location.

Table 4.2 Demographic Profile of Respondents

Item		Frequency	Percentage(%)
Gender	Male	187	37.3
	Female	314	62.7
	Total	501	100
Marital Status	Single	141	28.1
	Married	360	71.9
	Total	501	100
Age	0-19	10	2.0
	20-24	82	16.4
	25-29	66	13.2
	30-34	96	19.2
	35-40	65	13.0
	40+	182	36.3
	Total	501	100
Education Level	Hight School	69	13.8
	Junior College	175	34.9
	Undergraduate	225	44.9
	Master	26	5.2
	PHD	6	1.2
	Total	501	100
Occupation	The Employed	390	77.8
	The Retired	46	9.2
	The Self-Employed	20	4.0
	Others	45	9.0
	Total	501	100
Income(CNY)	0-1999	46	9.2
	2000-3999	228	45.5
	4000-5999	138	27.5
	6000-9999	59	11.8
	10000+	30	6.0
	Total	501	100

From the table showed above, it shows that there are 187 or 37.3 % of male involved and there are 314 or 62.7% female involved in this study.141 or 28.1% of respondents are single, 360 or 71.9% already married.For the ages, there are 6 different categories for range of ages which are below 19 years old, between 20-24 years old, between 25-29 years old, between 30-34 years old, between 35-40 years old and above 40 years old.The number of respondents are 10 (2.0%), 82 (16.4%), 66 (13.2%), 96 (19.2%), 65 (13.0%) and 182 (36.3%) respectively. Besides, there are 5 different categories for Highest Education Level which are High School, Junior College, Undergraduate, Master, PHD.The number of respondents are 69 (13.8%), 175 (34.9%), 225 (44.9%), 26 (5.2%), 6(1.2%) respectively.For the occupation, there are 390 respondents have their own job which is 77.8% of the total number and 46 respondents already retired (9.2%), 20 (4.0%) respondents do their own business while 45 (9.0%) respondents belongs to other situation, including house-wife, house-husband, students, the unemployed and so on. In additionally, there are 5 different ranges for the income which are below 1999 yuan/month, between 2000-3999 yuan/month, between 4000-5999 yuan/month, between 6000-9999 yuan/month, above 10000 yuan/month.The number of respondents are 46 (9.2%), 228 (45.5%), 138 (27.5%), 59 (11.8%), 30 (6.0%) respectively.

4.3 Reliability and Validity

Generally, in empirical research, the measurement instruments must have an acceptable level of validity and reliability for two main reasons.Firstly, reliable scales ensure that the measures produce identical results if used repeatedly in different countries, different fields and for longitudinal studies.

Secondly, valid scales can increase the confidence that the empirical research findings accurately reflect the proposed construct.

i. **Normality**

In statistics, normality tests are used to determine if a data set is well-modeled by a normal distribution and to compute how likely it is for a random variable underlying the data set to be normally distributed.It is an significant assumption in multivariate analysis and statistical tests (Hair et al., 2010; Pallant, 2007), such as data may useless results once the assumption is obviously violated.There are various methods to test the data distribution wether it deviates from the normal.But the most prevalent indicates are skewness and kurtosis, which are tested in prior studies.

Skewness is a measure of symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point.Kurtosis is a measure of whether the data are heavy-tailed or light-tailed relative to a normal distribution. Field(2001) and Bulmer (1979) states that the result of skewness and Kurtosis between -1.96 to +1.96 is acceptable.In this study, the skewness and kurtosis values were conducted and all the variables were tested to be within the -1.96 to +1.96.As Table 4.3 shows, the skewness and kurtosis ratios are within the normal distribution ±1.96.Therefore, the assumption of normality is completely accepted.

Table 4.3 The result of Normality Tests

	Valid	Missing	Skewness	Std.Error of Skewness	Kurtosis	Std.Error of Kurtosis
Distribution rate	501	0	0.025	0.109	-0.850	0.218
Transit Time	501	0	0.124	0.109	-0.788	0.218
Staff Service Quality	501	0	-0.010	0.109	-0.937	0.218
E-payment	501	0	0.149	0.109	-0.684	0.218
E-tracebility	501	0	-0.076	0.109	-1.279	0.218
ICT	501	0	0.015	0.109	-0.678	0.218
E-logistics Customer Satisfaction	501	0	-0.077	0.109	-0.752	0.218

The histogram and a normal probability plot of the distribution of the residuals are the other methods to test the normality of the regression model as well.For the result of histogram, it should look like a bell-shaped curve as a normal distribution and it is not extremely skewed (asymmetric).The normal probability plot describes a straight line with points that represent the observed residuals, which will lie along the line test, if the data was normally distributed.It means that the dots in the plot are very close to the line. According to an inspection of these diagrams, the data did not violate the assumption of normality, which in Appendix 2.

ii. The Linearity of the Phenomena

Regression analysis is the fundamental concept of linearity, which shows there is a straight relationship between variables; therefore, it is important to test this assumption.The evaluation of partial plot(scatter plot) is the popular method to inspect linearity in regression analysis.In this study, in addition to the probability plots, all relevant scatter plots were produced. The result of examine the linearity through scatter plot diagrams for the models is shown in Appendix 2.

iii. Multicollinearity

Multicollinearity means the regression coefficient may be unable (Bryman & Cramer, 2009).This is related to the strong relationship between two or more independent variables, the situation where independent variables are highly correlated (r>0.80).

Generally, such as tolerance value, variance inflation factors(VIF),and Pearson correlations.Pearson correlations shows the relationship between two or more than two in dependent variables, which the figures is significant at the 0.01 level.

In this study, Pearson correlation, tolerance value, and VIF, as shown in Table above.The results shows that there is no multicollinearity between independent variables because the Pearson correlation values for all the independent variables were less than 0.80.Furthermore, as discussed in the prior studies, when the tolerance value is less than 0.10 and the VIF value is above 10(Field, 2009; Pallant, 2007) multicollinearity exists.Table 4.4 shows the results of the tolerance and VIF values for the in dependent variables.

Table 4.4 Tolerance Value and the Variance Inflation Factor (VIF)

	Collinearity statistics	
Independent variables	Tolerance	VIF
Distribution rate	0.391	2.556
Transit time	0.290	3.449
Staff service quality	0.255	3.925
E-payment	0.373	2.679
E-traceability	0.266	3.753
Information Communication Technology	0.246	4.065

From the above table, it shows that there is no multicollinearity among all the independent variables because the tolerance values are more than 0.10 and the VIF values are less than 10.Therefore, this study does not have any problem with multicollinearity.

In summary, the whole examination of the data proves that there is no contravention of the essential assumptions (normality, linearity and multicollinearity).Therefore, regression analysis for the following test is appropriate.The standardized coefficient beta (β) and R^2 explain whether the formu-

lated hypotheses are supported to not, and whether the predictor variable is significantly predict the outcome variable if the p value is less than 0.05 (Field, 2009).

iv. Reliability

Reliability is the degree of consistency between two measures of the similar thing.The purpose of reliability test is to define the consistency of the items in each part of questionnaires.The questionnaire is reliable if there is any same repeated result with consistent score.The stronger the relation between items, the scale of reliability will be higher(Sekaran, 2003).

According to Sekaran(2003), the closer the reliability coefficient gets to 1.0, the better it is, and all value over 0.80 are considered as good.Those values in the 0.70 are considered as acceptable and the reliability less than 0.60 are considered to be poor.

From the reliability analysis made, a table as shown below will be obtained.The table show the values of Cronbach's Alpha of the variable been analyzed. Cronbach's alpha determine the internal consistency or average correlation of items in a survey instrument to gauge its reliability (Cronbach, 1951).In this case, distribution rate, transit time, staff service quality, information communication technology (ICT), e-payment, e-traceability and e-logistics customer satisfaction.

Table 4.5 The Cronbach's Alpha to Determine the Internal Consistency of the Data

Variables	Cronbach's Alpha	Cronbach's Alpha Based Standardized	N of Items
Distribution rate	0.886	0.886	5
Transit Time	0.905	0.907	5
Staff Service Quality	0.953	0.954	6
E-payment	0.941	0.942	7
E-traceability	0.958	0.958	5
Information Communication Technology (ICT)	0.937	0.937	5
E-logistics Customer Satisfaction	0.959	0.959	7

The table above shows a Reliability Analysis for an actual study, the reliability test of Distribution Rate has been made.The number of items for Distribution Rate is 5.It was found that the Cronbach's Alpha is 0.886.As the Cronbach's Alpha obtained is strongly accepted, then no deletion of item is necessary.Thus, the Cronbach's Alpha for Transit Time is high, which is above 0.9, thus it is strongly acceptable.As the Cronbach's Alpha obtained is considered high, then no deletion of item is necessary.For the Cronbach's Alpha of Staff service quality is also high, which is 0.953, therefore, it is strongly acceptableAs the Cronbach's Alpha obtained is considered high, then no deletion of item is necessary.

Next, the reliability analysis to determine the internal consistency of the items of E-payment will be performed.The number of items to be tested is 7.From the result, the Cronbach's Alpha for E-payment is high which 0.941, E-traceability is 0.958, Information Communication Technology (ICT) is 0.937 and E-logistics customer satisfaction is 0959.The result is strong and acceptable.Hence, no deletion of items is necessary.

However, the reliability analysis alone is not enough to determine the absolute reliability and validity of the items of the variables.Another analysis known as Factor analysis is also important to be carried out in order to determine the reliability and validity of the items being tested.One of the objectives of the Factor analysis is to increase the internal consistency of the items by reducing the number of items or detecting structure in the relationship between items and classifying them.The procedure of Factor Analysis will be discussed next.

V. Validity

The section discusses the results of factor analysis for actual study conducted on all items that measured distribution rate, transit time, staff service quality, e-payment, e-traceability, information communication technology (ICT) and e-logistics customer satisfaction variables to determine whether each construct variable could be treated as single measure.Factor analysis can be viewed as a statistical procedure for grouping variable into subsets such that the variable with each set are mutually high correlated, whereas at the same time variables in different subsets are relatively uncorrelated.

Generally, construct validity can be tested by using factor analysis(Hair et al.2010; Sekaran & Bougie, 2010),which provides an accurate means of conceptualizing unobservable constructs(construct validity), and is capable of grouping items or factors that are highly correlated(convergent validity)as well as separate factors that differ from each other(discriminant validity)(Rashid, 2007). Based on previous arguments, factor analysis can be utilized to examine both types of construct validity(convergent and discriminant).

According to the pilot study in Chapter 3, there are 72 valid data were used to analysis.The result of all construct reliability value are more than 0.8.According to Sekaran(2000), 0.8 reliability value is

considered to be good.In addition, the KMO value were above 0.8 and Bartlett's test of sphericity revealed statistically significant result are 0.000(P<0.001),therefore the validity analysis are appropriate.(Hair et al.,2006).

Vi. Factor Analysis

According to Bryman and Cramer(2009), factor analysis involves a number of related statistical methods that assist researchers to determine the characteristics that go together to constitute a factor.They provided three main reasons why researchers use factor analysis.First, the researcher can evaluate the degree to which items are tapping the same concept.Second, if the researcher has a large number of variables, factor analysis can decide the degree to which they can be decreased to a smaller set.Third, the goal of factor analysis is to try to make sense of the complexity of social behavior by decreasing it to a more fixed number of factors.

The literature suggests that factor analysis has two main forms:exploratory factor analysis and confirmatory factor analysis, depending on the purpose of the research (Hair et al., 2010; Pallant 2007).In cases when the number of variable extracted is not set or is less certain, the researcher can adopt the exploratory approach.On the other hand, the confirmatory approach is used in situations where the researcher has a predetermined structure of variables based on theoretical support.This means it can be used to assess the extent to which the variable meets the expected structure.

For this research, the items used in the questionnaire were gathered from prior research.In cases where the variable are adapted from previous studies, it is suggested that different the research constructs(Pizam & Ellis,1999).Therefore, there is a tendency for the items used to measure the differences in the context and area of study.In line with this thinking, Gunasekaran(1999) indicated that when items have been borrowed from the literature to measure variables, it is deemed necessary to

re-examine the validity of the measures because they will be examine in a different context.Since there is a need to be context specific, exploratory factor analysis(EFA) was deemed appropriate.This helps to identify the structure of a set of variables that are utilized to describe the constructs in this model.

In other words, in order to ascertain whether the measurement used in this study has construct validity, EFA was used on all items measuring the constructs of distribution rate, transit time, staff service quality, e-payment, e-traceability, inform and communication (ICT), e-logistics customer satisfaction.Subsequently, the underlying factors from this analysis can be used for further analysis in terms of estimating the research model and testing the hypotheses.Based on these points, it was felt that exploratory factor analysis would be beneficial.

A number of requirements should be met before factor analysis can be performed.First, the minimum sample size must be at least ten times as large as the number of variables to be analyzed (Hair et al., 2010).To justify the use of factor analysis, the data matrix must have adequate correlations.A matrix correlation in excess of 0.3 should be found, otherwise the use of component factor analysis should be reconsidered(Pallant, 2007; Coakes & Steed, 2003).The anti-image correlation should also be more than 0.5 to reveal that all the measures of sampling adequacy are acceptable.In addition, according to Hair et al.(2010),the Bartlett Test of Sphericity and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy(MSA) are two familiar tests utilized to test the correlations among the variables.

According to Kaiser (1974) and Field (2009) the KMO is the index used to compare the magnitude of the observed correlation coefficient to that of the partial correlation coefficient.The smaller the sum of the partial correlation between all pairs of variables, the closer the KMO will be to 1.0 and,

hence, the more appropriate factor analysis will be.Moreover, Kaiser (1974) describe the KMO measure based on its closeness to one as marvelous if it is around 0.90; meritorious if it is around 0.80; middling if it is around 0.70; mediocre if it is around 0.60; miserable if it is around 0.50; and unacceptable if it is below 0.50.Thus, factor analysis can be performed if the Bartlett Test of Sphericity is significant and the KMO measure of sampling adequacy is greater than 0.60.

Table 4.6 The result of KMO and Bartlett's Test of Sphericity

Construct	KMO	Bartlett's Test of Sphericity(Sig.)	Items	Component analysis
Distribution Rate(DR)	0.865	0.000	Clear fee	0.815
			Return fee	0.778
			Discounts	0.832
			Distribution rate	0.850
			Price rules	0.869
Transit Time(TT)	0.876	0.000	The time from ordering to receiving parcel	0.875
			The time from mailing the return goods to receiving the new goods	0.869
			The delay time	0.826
			The time for picking up the parcel	0.886
			Different choices about the delivery time	0.810

Construct	KMO	Bartlett's Test of Sphericity(Sig.)	Items	Component analysis
Staff Service Quality(SSQ)	0.931	0.000	The staff can answer the questions quickly and professionally	0.873
			The staff service attitude is good	0.917
			The staff is willing to help customers	0.920
			The staff is familiar with the whole delivery processes	0.915
			The staff can communication with customers	0.929
			The staff wear uniform dress	0.852
E-Payment(EP)	0.928	0.000	E-payment is secure online transaction	0.804
			Hacker invasions	0.810
			The previous information is helpful for secure e-payment transactions.	0.877
			The information relating to user is safety.	0.882
			Trust participant, such as seller and buyer, involved in e-payment.	0.852
			Trust the security mechanisms of e-payment	0.910
			Trust the information provided during the e-payment process.	0.887
E-Traceability(ET)	0.888	0.000	LSP real-time tracking information	0.906
			LSP accurate logistics transportation information	0.947
			LSP fast respond	0.943
			provided to track the location at anything	0.930
			LSP provide the worldwide location information	0.899

Construct	KMO	Bartlett's Test of Sphericity(Sig.)	Items	Component analysis
Information Communication Technology(ICT)	0.884	0.000	Information system adapted to my needs	0.864
			Information system is secure	0.907
			Information system can integrate operations	0.902
			ICT equipment to deal with some emergency	0.893
			ICT equipment to give customers feedback timely.	0.902
E-Logistics Customer Satisfaction(ELCS)	0.941	0.000	Satisfy with e-logistics quality	0.879
			Satisfy with price of e-logistics products	0.880
			Satisfy with the services of e-logistics	0.911
			Satisfy with the home delivery serveces	0.895
			Satisfy with reputation of e-logistics	0.912
			Satisfy with after sale service of e-logistics	0.878
			Satisfy with the shopping experience by using e-logistics	0.911

The table above shows a Viability Analysis for this study, the Viability test of Distribution Rate, Transit time, Staff Service Quality,E-payment, E-traceability, Information and Communication Technology (ICT) and E-logistics Customer Satisfaction(ELCS) has been made.The KMO number of items for Distribution Rate,Transit time, Staff Service Quality,E-payment, E-traceability, Information and Communication Technology (ICT) and E-logistics Customer Satisfaction(ELCS) are 0.865, 0.876, 0.931, 0.928, 0.888, 0.884, 0.941, respectively. According to Kaiser (1974), all the items are strongly accepted.In additional, the result of Bartlett's Test of Sphericity(Sig.) are 0.00, which means all the items are significant ($P<0.05$).

Vii. Correlation Analysis

Correlation analysis was performed to decide if there were any relationships among the independent variables, mediators and dependent variable.It is a statistical method employed to explain the strength and direction of the linear relationship between two variable(Tolmie, Muijs & McAteer, 2011; Hair et al., 2010;Pallant 2007).

The degree of correlation between variables refers to the strength and importance of the relationship.To examine this, the current study bivariate correlation, which involves the use of Pearson's correlation coefficient.

Pearson correlation analysis produces coefficient values ranging from -1 to +1.The perfect correlation of 1 or -1 indicates that the value of one variable can be determined exactly by knowing the value of another variable.The correlation value 0 indicates no relationship between the two specified variables. Tolmie et a.(2011) provide some rules of thumb to explain the strength of the relationship between two variables(r), as shown in Table 4.7.

Table 4.7 Pearson Correlation Coefficient

Value of Coefficient(r)	Strength of relationship
$r \geq 0.8$	Very strong positive relationship
$0.5 < r < 0.8$	Strong positive relationship
$0.3 < r \leq 0.5$	Modest positive relationship
$0.1 < r \leq 0.3$	Modest positive relationship
$0 < r \leq 0.1$	Weak positive relationship
$r = 0$	No correlation
$0 > r > -0.1$	Very weak negative relationship
$-0.1 \geq r > -0.3$	Modest negative relationship
$-0.3 \geq r > -0.5$	Modest negative relationship
$-0.5 > r > -0.8$	Strong negative relationship
$r \leq -0.8$	Very strong negative relationship

(Source:Tolmie *et al.*, 2011)

Hence, the method of Pearson Correlation analysis will provide the value of coefficient and the significant level in order to define whether the independent variable are statistically significantly correlated to the dependent variable.

In this study, Pearson Correlation was used to test the relationship between distribution rate, transit time, staff service quality, e-payment, e-traceability, information communication technology (ICT) and e-logistics customer satisfaction.Pearson Correlation is used to test the strength and the direction of a relationship between two constructs(Pallant, 2011).Table 4.8 presents the findings of the Pearson correlation of this study.

Table 4.8 The result of Pearson Correlations Analysis

	1	2	3	4	5	6	7
(1) Distribution Rate	1						
(2) Transit Time	0.721	1					
(3) Staff Service Quality	0.726	0.803	1				
(4) E-payment	0.636	0.694	0.675	1			
(5) E-traceability	0.673	0.696	0.749	0.722	1		
(6) Information Communication Technology (ICT)	0.675	0.710	0.766	0.739	0.825	1	
(7) E-logistics Customer Satisfaction	0.676	0.709	0.737	0.726	0.793	0.831	1

According to Tolmie *et al.*'s(2011) guidelines for correlation strength,Table 4.8 reveals that the association is strong positive relationship between distribution rate and transit time, staff service quality, e-payment, e-traceability, information communication technology(ICT), e-logistics customer satisfaction with r=0.721, 0.726, 0.636, 0.673, 0.675 and 0.676, respectively, at p=0.000.

The table also reveals that the very strong positive relationship between transit time and staff service quality, which r=0.803,p=0.000.The correlations between transit time and e-payment, e-traceability, information communication technology and e-logistics customer satisfaction, respectively, are strong positive relationship, r= 0.694, 0.696, 0.710, 0.709, p=0.000.

Staff service quality has a strong positive relationship with e-payment, e-traceability, information communication technology and e-logistics customer satisfaction, with r=0.675, 0.749, 0.766, 0.737, respectively, at p=0.000. E-payment also has a strong positive relationship with e-traceability, in-

formation communication technology and e-logistics customer satisfaction, with r=0.722, 0.739, 0.726, respectively, at p=0.000.

However, e-traceability has a very strong positive relationship with information communication technology(ICT), r=0.825,p=0.000. And it has strong positive relationship with e-logistics customer satisfaction, with r= 0.793, p=0.000.Then information communication technology (ICT) also has a very strong positive relationship with e-logistics customer satisfaction with r=0.831, p=0.000.The results of Pearson Correlations analysis for all variables are provided in Appendix.

Even though correlation is reliable, statistical significance can not imply causation.In additional, the result of correlation coefficient (r) does not explain the variance in the dependent variable e-logistics customer satisfaction, when several independent variables, distribution rate, transit time, staff service quality, e-payment, e-traceability, information communication technology (ICT) are utilized simultaneously.Accordingly, analysis was conducted using multivariate analysis, such as multiple regression.

4.4 Testing of Hypotheses

In light of the result of the factor analysis, the framework and hypotheses of the study were formulated.

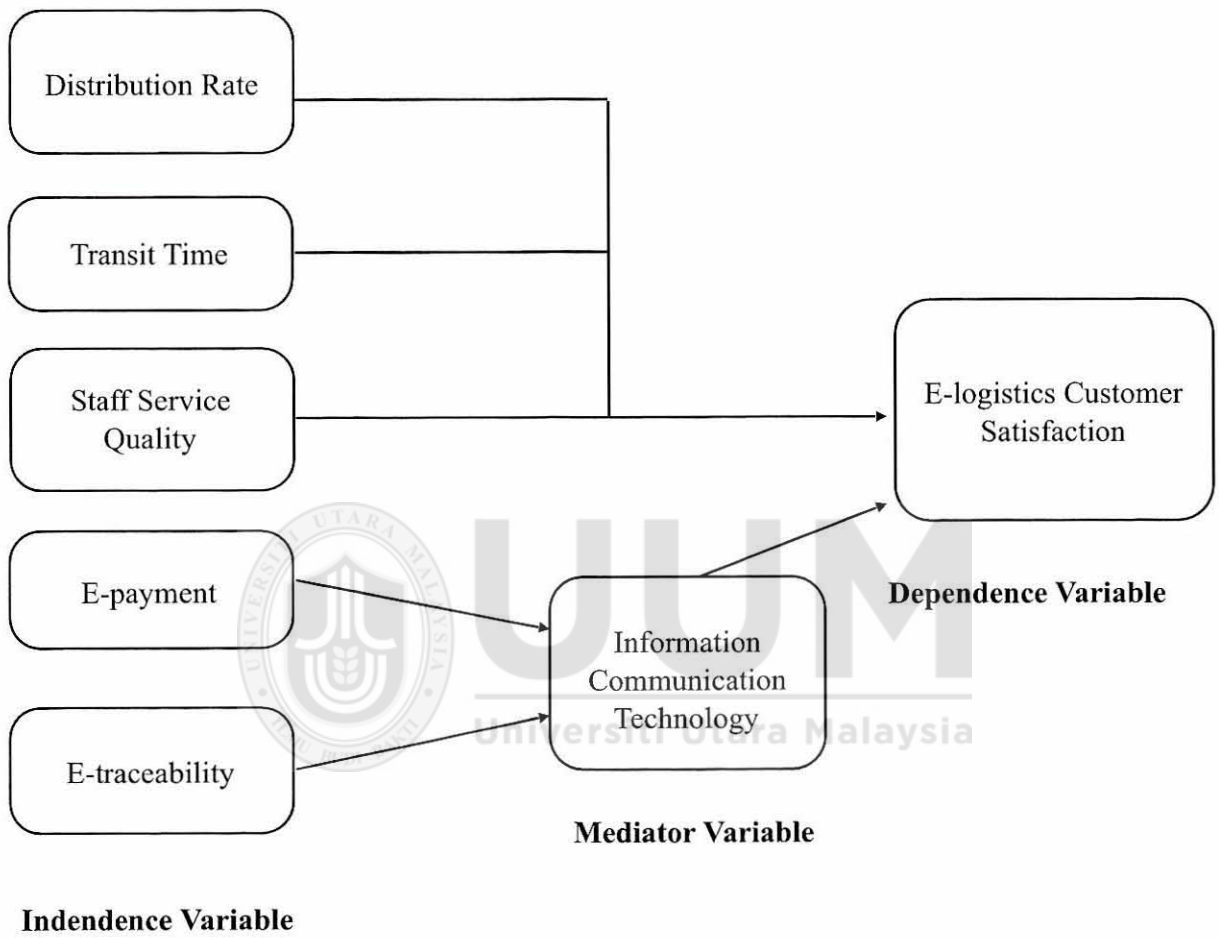


Figure 4.1 Research Framework after Factor Analysis

Based on the model in Figure 4.1, the hypotheses tested in this study are as follows:

H1: There is a significant relationship between distribution rate and e-logistics customer satisfaction.

H2: There is a significant relationship between transit time and e-logistics customer satisfaction.

H3: There is a significant relationship between staff service quality and e-logistics customer satisfaction.

H4:Information communication technology (ICT) mediates the relationship between e-payment and e-logistics customer satisfaction.

H5: Information communication technology (ICT) mediates the relationship between e-traceability and e-logistics customer satisfaction.

4.5 Testing the Assumptions of Regression Analysis

4.5.1 Regression Analysis concerning the Influence of DR on ELCS

Table 4.9 Summary of Multiple Regression Analysis for DR Influencing ELCS

Variables	B	SE B	β	Sig.
Distribution rate	0.658	0.032	0.676	0.000

Note: R= 0.676; R^2 = 0.456;F=418.857; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

The F-statistics (F=418.857, p=0.000) indicate that the relationship between Distribution rate and E-logistics customer satisfaction is significant.The R^2 also indicates that the 0.456 variation in e-logistics customer satisfaction is explained by the distribution rate.In the regression equation, all distribution rate dimensions emerged as significant predictors of e-logistics customer satisfaction.-Consistent with the hypotheses, distribution rate are proved to have a positive influence on e-logistics customer satisfaction.Based on the results, the study failed to reject H1.To investigate which of the dimensions has the most influence, we referred to the beta values.Based on the size of the beta, the predictor variables exercising the most influence on e-logistics customer satisfaction(β=0.676).

4.5.2 Regression Analysis concerning the Influence of TT on ELCS

Table 4.10 Summary of Multiple Regression Analysis for TT Influencing ELCS

Variables	B	SE B	β	Sig.
Transit Time	0.708	0.032	0.709	0.000

Note: R= 0.709; R^2 = 0.502;F=502.984; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

The F-statistics (F=502.984, p=0.000) indicate that the relationship between Transit Time and E-logistics customer satisfaction is significant. The R^2 also indicates that the 0.502 variation in e-logistics customer satisfaction is explained by the distribution rate.In the regression equation, all transit time dimensions emerged as significant predictors of e-logistics customer satisfaction.Consistent with the hypotheses, transit time are proved to have a positive influence on e-logistics customer satisfaction.Based on the results, the study failed to reject H2.To investigate which of the dimensions has the most influence, we referred to the beta values.Based on the size of the beta, the predictor variables exercising the most influence on e-logistics customer satisfaction(β=0.709).

4.5.3 Regression Analysis concerning the Influence of SSQ on ELCS

Table 4.11 Summary of Multiple Regression Analysis for SSQ Influencing ELCS

Variables	B	SE B	β	Sig.
Staff service quality	0.687	0.028	0.737	0.000

Note: R= 0.737; R^2 = 0.543;F=593.225; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

The F-statistics (F=593.225, p=0.000) indicate that the relationship between staff service quality and E-logistics customer satisfaction.The R^2 also indicates that the 0.543 variation in e-logistics customer satisfaction is explained by the staff service quality.In the regression equation, all staff

service quality dimensions emerged as significant predictors of e-logistics customer satisfaction.-Consistent with the hypotheses, staff service quality are proved to have a positive influence on e-logistics customer satisfaction.Based on the results, the study failed to reject. H3 To investigate which of the dimensions has the most influence, we referred to the beta values.Based on the size of the beta, the predictor variables exercising the most influence on e-logistics customer satisfaction(β=0.737).

4.6 The Mediating Effect of Information Communication Technology (ICT)

There are several articles about how to test the mediator. Compare to other methods, this study used Regression Analyst which is a suitable method to test mediator and more stronger than other methods. An ANOVA provides a limited test of a meditational hypothesis as extensively discussed in Fiske, Kenny, and Taylor (1982). Rather, as recommended by Judd and Kenny (1981b), a series of regression models should be estimated.According to Baron, R. M., & Kenny, D. A. (1986). There are some articles, which cited Baron & Kenny(1986) and used the Regression to test mediation role and get strong results successfully, such as Sekaran, U., & Bougie, R. (2016); John Wiley & Sons. Neuendorf, K. A. (2016); P., West, S. G., & Aiken, L. S. (2014); Brown, T. A. (2014); Hayes, Andrew F.(2013).Therefore, current research choose Regression Analyst as the method to test the mediation impact of ICT.

According to Baron and Kenny(1986), there are four steps to test the mediating impact of IV and DV. The four steps are above:

1.It must be significant when the independent variable (IV) influence the dependent variable (DV),which means β1 must be significant.

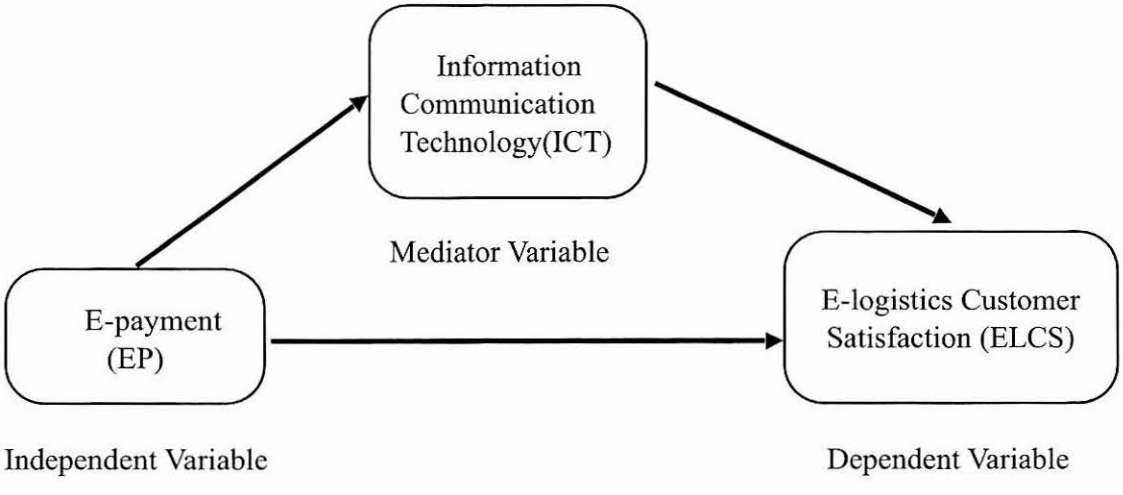
2.It must be significant when the IV influence the Mediator variable (MV),which means β2 must be significant.

3.It must be significant when the MV influence the DV, which means β3 must be significant.

4. Observe that, if MV completely meditates the relationship of IV and DV, then the effect of IV on DV controlling for the impact of the MV should be zero.It means β4 no significant and it is full mediation. However, if β4 still be significant but reduced compare with β1, MV is a partial mediation.

As mentioned above, there are four steps to test each mediating impact.In this framework, there are two mediating impacts in the whole framework: one is ICT mediating the relationship between E-payment and E-logistics customer satisfaction; another is ICT mediating the relationship between E-traceability and E-logistics customer satisfaction.They are tested as below by the four steps.

4.6.1 Testing the mediating impact of ICT between E-payment and E-logistics customer satisfaction



Step 1: E-payment (EP) ⟶ E-logistics Customer Satisfaction(ELCS)

Step 2: E-payment (EP) ⟶ Information Communication Technology(ICT)

Step 3:ICT ⟶ E-logistics Customer Satisfaction(ELCS)

Step 4: EP|ICT ⟶ E-logistics Customer Satisfaction(ELCS)

Table 4.12 Summary of Multiple Regression Analysis for EP Influencing ELCS

Variables	B	SE B	β1	Sign
E-payment	0.762	0.032	0.726	0.000

Note: R= 0.726; R^2 = 0.528;F=557.086; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of EP on ELCS.It indicates that there is a relationship between E-payment and E-logistics customer satisfaction.Therefore, it is significant when e-payment influences e-logistics customer satisfaction, due to β1=0.726 and p=0.000.

Table 4.13 Summary of Multiple Regression Analysis for EP Influencing ICT

Variables	B	SE B	β2	Sig.
E-payment	0.764	0.031	0.739	0.000

Note: R= 0.739; R^2 = 0.546;F=599.906; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of EP on ICT.It indicates that there is a relationship between E-payment and E-logistics customer satisfaction.Therefore, it is significant when e-payment influence Information Communication Technology(ICT), due to β2=0.739 and p=0.000

Table 4.14 Summary of Multiple Regression Analysis for ICT Influencing ELCS

Variables	B	SE B	β3	Sign
ICT	0.843	0.025	0.831	0.000

Note: R= 0.831; R^2 = 0.690;F=1112.388; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of ICT on ELCS.It indicates that there is a relationship between Information Communication Technology(ICT) and E-logistics customer satisfaction.Therefore, it is significant when ICT influence e-logistics customer satisfaction, due to β3=0.831 and p=0.000.

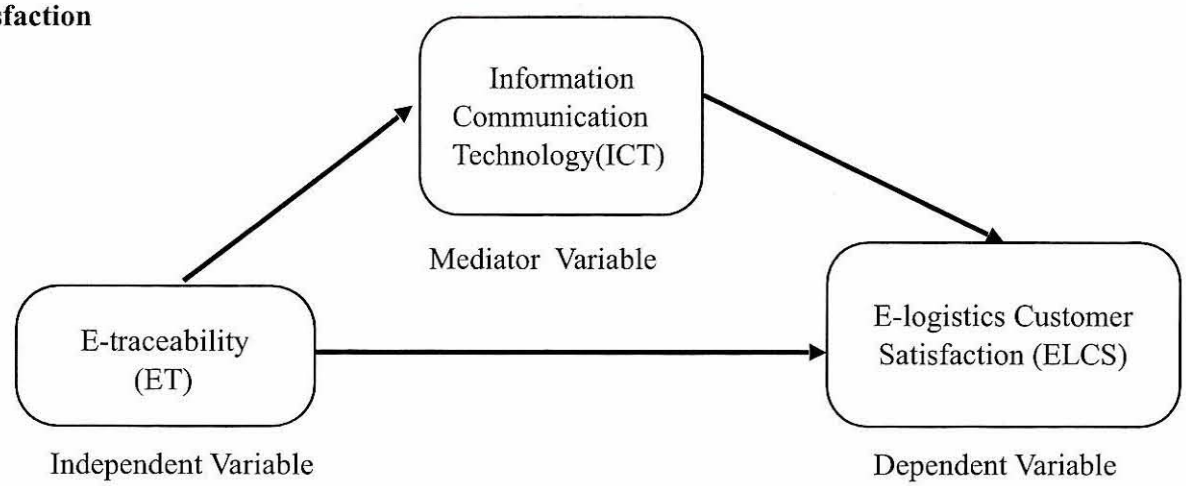
Table 4.15 Summary of Multiple Regression Analysis for EP|ICT Influencing ELCS

Variables	B	SE B	β4	Sign
E-payment	0.260	0.037	0.248	0.000
ICT	0.657	0.036	0.648	0.000

Note: R= 0.847; R^2 = 0.718;F=634.459; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of EP on ELCS when ICT is mediating.It indicates that there is a significant relationship between E-payment and E-logistics customer satisfaction when ICT as a mediator. Because the p=0.000 and β4=0.248 < β1=0.726, according to Baron and Kenny(1986), ICT is partial mediator between EP and ELCS.Hence,H4 fail to be rejected.

4.6.2 Testing the mediating impact of ICT between E-traceability and E-logistics customer satisfaction



Step 1: E-payment (ET) ⟶ E-logistics Customer Satisfaction(ELCS)

Step 2: E-payment (ET) ⟶ Information Communication Technology(ICT)

Step 3: ICT ⟶ E-logistics Customer Satisfaction(ELCS)

Step 4: ET|ICT ⟶ E-logistics Customer Satisfaction(ELCS)

Table 4.16 Summary of Multiple Regression Analysis for ET Influencing ELCS

Variables	B	SE B	β1	Sig.
E-traceability	0.640	0.022	0.793	0.000

Note: R= 0.793; R^2 = 0.628;F=843.756; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of ET on ELCS.It indicates that there is a relationship between E-traceability and E-logistics customer satisfaction.Therefore, it is significant when ET influence e-logistics customer satisfaction, due to β1=0.793 and p=0.000.

Table 4.17 Summary of Multiple Regression Analysis for ET Influencing ICT

Variables	B	SE B	β2	Sig.
E-traceability	0.656	0.020	0.825	0.000

Note: R= 0.825; R^2 = 0.680;F=1060.364; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of ET on ICT.It indicates that there is a relationship E-traceability and between Information Communication Technology(ICT).Therefore, it is significant when E-traceability influence ICT, due to β2=0.825 and p=0.000.

From Table 4.5.17 Summary of Multiple Regression Analysis for ICT Influencing ELCS.It indicates that there is a relationship between Information Communication Technology(ICT) and E-logistics customer satisfaction.Therefore, it is significant when ICT influence e-logistics customer satisfaction, due to β3=0.831 and p=0.000.

Table 4.5.18 Summary of Multiple Regression Analysis for ET|ICT Influencing ELCS

Variables	B	SE B	β4	Sign
E-traceability	0.271	0.033	0.336	0.000
ICT	0.562	0.042	0.554	0.000

Note: R= 0.852; R^2 = 0.726;F=661.357; Significant level: *p<0.05,**p<0.01 B=Unstandardized coefficient; SE B= Standard error of coefficient; β=Beta coefficient.

This regression analysis concerns the Influence of ET on ELCS when ICT is mediating.It indicates that there is a significant relationship between E-traceability and E-logistics customer satisfaction when ICT as a mediator. Because the p=0.000 and ICT β4=0.336 < β1=0.739, according to Baron and Kenny(1986), ICT is partial mediator between ET and ELCS.Hence,H5 fail to be rejected.

4.7 SUMMARY

There are 501 valid data from e-logistics customers in Shaanxi Province of China, representing a 81.8% response rate.The results of factor analysis shows that the data is variable because all the items of each variables are higher than 0.5, almost of them are above 0.8, which is highly acceptable. Cronbach's Alpha for all the items of each variables are greatly acceptable as well, which are higher than 0.80, almost 0.9, indicating that all factors are reliable. To test the relationship between direct factors (distribution rate, transit time, staff service quality and e-logistics customer satisfaction),and the mediating effects of ICT on the relationship between E-payment and E-logistics customer satisfaction, on the relationship between E-traceability and E-logistics customer satisfaction, the regression analysis was conducted.The summary of the findings from the hypotheses testing are as below:

Table 4.19 Summary of All Tested Relationships

Hypothesis	Description	Results
H1	Distribution rate has and effect on E-logistics Customer Satisfaction	Failed to reject H1
H2	Transit Time has and effect on E-logistics Customer Satisfaction	Failed to reject H2
H3	Staff Service Quality has and effect on E-logistics Customer Satisfaction	Failed to reject H3
H4	Information Communication Technology (ICT) mediates the relationship between E-payment and E-logistics Customer Satisfaction	Partially mediate H4
H5	Information Communication Technology (ICT) mediates the relationship between E-traceability and E-logistics Customer Satisfaction	Partially mediate H5

The results in Table 4.19 indicate that all the hypotheses are failed to reject, which direct factors (Distribution rate, Transit Time, Staff Service Quality) have an influence on E-logistics Customer Satisfaction.In additional, ICT also have an effect on E-logistics Customer Satisfaction as well as

play a mediating role in the relationships between E-payment/E-traceability and E-logistics Customer Satisfaction.

These findings are in line with the main premise of RBV theory, which assert that the success of a company is largely depending upon the resources and these resources are consists of assets (Asani, Umrani & Paknikar, 2016) as well as capabilities which includes intangible such as the skills and the knowledge of employees(Teece, Pisano & Shuen, 1997).In this study, resources like ICT, good staff service quality, good staff skills/capabilities, good traceability and high-quality e-payment system with ICT technology, are helpful to the success of a company. Based on the results of the data analysis.The subsequent chapter will proclaim the discussion of findings, and the theoretical and practical implications of this study.Furthermore, the limitations, conclusion and recommendations for the further study.

CHAPTER FIVE

DISCUSSION, CONCLUSION AND SUGGESTIONS

5.1 Introduction

This chapter discusses the findings on the relationship between the direct factors (distribution rate, transit time, staff service quality) as well as the mediating effect of information communication technology (ICT) on the relationships between e-payment/e-traceability and e-logistics customer satisfaction. The first section presents the summary of the study's findings whilst the second section illustrates the theoretical and practical contributions of this study. Finally, the limitations, suggestions for future study and conclusion are presented.

5.2 Summarization of the Study's Findings

The purpose of the research is to comprehend the relationship between the direct factors (distribution rate, transit time, staff service quality) and the mediating role of information communication technology (ICT) on the relationships between e-payment/e-traceability and e-logistics customer satisfaction in China. The main research question inquires how the direct, indirect factors and mediator variables are related to e-logistics customer satisfaction. By studying this model, the performance of e-logistics may be improved.

This recent framework was supported by the Resource-Based View (RBV) theory, which suggests that organizational performance is influenced by organizational resources and capabilities. According to Teece, Pisano & Shuen (1997), capabilities consist of intangible elements such as the skills and knowledge of employees. Additionally, knowledge, skills of employees, and other capital equipment are the key resources for any firm (Barney, 1991). In this study, distribution rate, transit

time and staff service quality are cited as organizational resources, whilst information communication technology (ICT), e-payment and e-traceability are cited as capabilities.

Generally, the objectives of this study were appraised based on the research questions below:

RQ1: What is the relationship between distribution rate and e-logistics customer satisfaction level?

RQ2: What is the relationship between transit time and e-logistics customer satisfaction level?

RQ3: What is the relationship between staff service quality and e-logistics customer satisfaction level?

RQ4: Does information communication technology (ICT) mediate the relationship between e-payment and e-logistics customer satisfaction level?

RQ5: Does information communication technology (ICT) mediate the relationship between e-traceability and e-logistics customer satisfaction level?

This study adopted statistical analysis—descriptive statistics, exploratory factor analysis, reliability analysis, correlation analysis, as well as simple and multiple regression—to answer the research questions. The results presented in Table 5.2 shows failure of rejection for all the hypotheses.

Table 5.1 Summary of All Tested Relationships

Hypothesis	Description	Results
H1	Distribution rate has an effect on E-logistics Customer Satisfaction	Failed to reject H1
H2	Transit Time has an effect on E-logistics Customer Satisfaction	Failed to reject H2
H3	Staff Service Quality has an effect on E-logistics Customer Satisfaction	Failed to reject H3
H4	Information Communication Technology (ICT) mediates the relationship between E-payment and E-logistics Customer Satisfaction	Failed to reject H4
H5	Information Communication Technology (ICT) mediates the relationship between E-traceability and E-logistics Customer Satisfaction	Failed to reject H5

In the subsequent sections, each of these hypotheses will be explained in further detail based on previous knowledge and the contribution of the new findings in the area.

5.3 Discussion of Findings

This section discusses the findings related to the direct factors (distribution rate, transit time, staff service quality) and e-logistics customer satisfaction; and the mediation role of information communication technology (ICT) in the relationships between e-payment/e-traceability and e-logistics customer satisfaction.

5.3.1 Effect of Distribution Rate on E-logistics Customer Satisfaction

There is an abundance of literature on the effect of distribution rate on logistics customer satisfaction, or e-commerce total price (which includes product price and e-logistics price) on e-commerce customer satisfaction. However, there is very limited research on the e-logistics sector. This study focuses on the lack of attention given to distribution rate issues in the e-logistics industry. According to Lina, Guiling and Weiwei (2014), price is one of the most important elements that create customer satisfaction and dissatisfaction. Certain e-commerce items will cost higher than those sold in physical stores due to the cost of logistics distribution. Price of delivery too has a significant effect on customer satisfaction (Xia & Tingting, 2016) as it is one of the factors that determine the overall price of the product, which in turn determines customer purchase intention. This study pays more attention to the significance of the relationship between distribution rate and customer satisfaction in the e-logistics industry in China.

The main findings based on the data analysis are outlined below:

In evaluating the hypothesis regarding the relationship between distribution rate and e-logistics customer satisfaction, it was found that distribution rate has a positive and significant relationship with e-logistics customer satisfaction ($R^2 = 0.456$).

This means that 0.456 of the e-logistics customer satisfaction variance can be illustrated by the distribution rate. Therefore, the finding in this study is in accordance with the long-recognized belief that distribution rate plays a significant role in logistics customer satisfaction (Hu et al., 2016; Xia & Tingting, 2016; Jianghua, 2014; Lina, Guiling and Weiwei, 2014; Yuanxiao, 2014; Lihong & Qiao, 2015; Hui, 2011; Rohm & Swaminathan, 2004; Bayles and Bhatia, 2000).

In terms of the effect of the distribution rate, the results show that it has a positive and significant impact on e-logistics customer satisfaction (β=0.676;p<0.001). This result is in accordance with prior studies which indicate that distribution rate plays a crucial role in determining logistics customer satisfaction (Hu et al., 2016; Xia & Tingting, 2016; Lihong & Qiao, 2015; Jianghua, 2014; Lina, Guiling and Weiwei, 2014; Yuanxiao, 2014; Hui, 2011; Rohm & Swaminathan, 2004; Bayles and Bhatia, 2000).

According to Bring (1994), standardized regression coefficients can be used to measure the importance of a variable by the magnitude of its regression coefficient. Therefore, by comparing the results of β (standardized coefficients beta), the order of importance of each variable is revealed "**"as shown below in Appendix 3.

Table 5.2 The regression analysis of each items of DR on ELCS

Model	Unstandardized B	Coefficients Std.Error	Standardized Coefficients Beta	Sig.
Clear Fee**	0.111	0.035	0.145	0.002
Return Fee**	0.075	0.035	0.094	0.031
Discounts**	-0.002	0.039	-0.003	0.954
Distribution Rate**	0.210	0.043	0.252	0.000
Price Rules**	0.259	0.044	0.316	0.000

Based on the results of the regression analysis, the correlation of each item of distribution rate with e-logistics customer satisfaction is shown in Table 5.2. Based on Table 5.2, the "discounts" (which represents "The company has different discounts according to the different logistics service") does not have a significant relationship with e-logistics customer satisfaction. If this item is deleted, the coefficients are as shown in the table below:

Table 5.3 The regression analysis of each items of DR on ELCS-1

Model	Unstandardized B	Coefficients Std.Error	Standardized Coefficients Beta	Sig.
Clear Fee**	0.110	0.034	0.144	0.001
Return Fee**	0.074	0.033	0.093	0.027
Distribution Rate**	0.209	0.042	0.252	0.000
Price Rules**	0.259	0.043	0.315	0.000

Based on Table 5.3, all of the items are shown to be significant ($p<0.005$). Additionally, the order of impact from strong to weak is "price rules", "distribution rate", "clear fee", "return fee" (β=0.315, 0.252, 0.144, 0.093).

5.3.2 Effect of Transit Time on E-logistics Customer Satisfaction

In assessing the hypotheses regarding the relationship between transit time and e-logistics customer satisfaction, it was found that there is a positive and significant relationship between transit time and e-logistics customer satisfaction. The results show that transit time illustrates 0.502 of the variance in e-logistics customer satisfaction. Therefore, the findings support H2, which indicates that transit time has an effect on e-logistics customer satisfaction.

Further results show that staff service quality has a significant and positive impact on e-logistics customer satisfaction (β=0.737;P<0.005). The result supports previous studies which state that transit time is a vital logistics factor which impacts customer satisfaction (Lina, Guiling, and Weiwei, 2014). It is one of the key elements of the logistics process apart from product delivery time and logistics reversal time (Lina, Guiling & Weiwei, 2014). As shown in Table 5.3, "Ordering to receiving parcel" represents "I am satisfied with the time from ordering to receiving parcel" (p=0.000), and "Mailing the returned goods to receiving the new goods" represent the reasonable time from mailing the returned goods to receiving the new goods (P<0.005).

Table 5.4 The regression analysis of each items of TT on ELCS

Model	Unstandardized B	Coefficients Std.Error	Standardized Coefficients Beta	Sig.
Ordering to receiving parcel**	0.182	0.047	0.206	0.000
Mailing the return goods to receiving the new goods**	0.115	0.047	0.128	0.016
The delay time**	0.175	0.041	0.199	0.000
Picking up parcel**	0.171	0.046	0.201	0.000
Different choices about the delivery time**	0.072	0.035	0.094	0.042

The results in Table 5.4 show that the delay time has a significant relationship with e-logistics customer satisfaction, which was already argued in prior studies. For example, BITKOM (2013) stated that consumers have negative experiences involving delivery delay, which means that a good delivery time always has a positive impact on customer satisfaction level.

According to the results of the regression analysis, Table 5.4 shows the correlation of each item of transit time with e-logistics customer satisfaction. From Table 5.4, all the items about transit time have a significant correlation with e-logistics customer satisfaction (P<0.005). The strength of TT on ELCS from strong to weak is "Ordering to receiving parcel", "Picking up parcel", "The delay time", "Mailing the returned goods to receiving the new goods", and "Different choices about the delivery time" with Standardized Coefficients Beta of β=0.206, 0.201, 0.199, 0.128, and 0.094, respectively.

5.3.3 Effect of Staff Service Quality on E-logistics Customer Satisfaction

In assessing the hypotheses regarding the relationship between Staff Service Quality and e-logistics customer satisfaction, it was found that there is a positive and significant relationship between staff service quality and e-logistics customer satisfaction. The results show that transit time illustrates 0.543 of the variance in e-logistics customer satisfaction. Therefore, the findings support H3, which suggests that staff service quality has an effect on e-logistics customer satisfaction.

Table 5.5 The regression analysis of each items of SSQ on ELCS

Model	Unstandardized B	Coefficients Std.Error	Standardized Coefficients Beta	Sig.
Answer the questions quickly and professionally**	-0.011	0.046	-0.013	0.811
Service and attitude is good**	0.210	0.056	0.244	0.000
Willing to help customers**	0.128	0.054	0.152	0.019
Familiar with the whole delivery process**	0.143	0.055	0.166	0.010
Communication with customers**	0.102	0.058	0.121	0.080
Wear uniform dress**	0.112	0.040	0.142	0.005

Further results show that staff service quality has a significant and positive impact on e-logistics customer satisfaction (β=0.737; P<0.005).The results support previous studies which state that service quality is one of the foundations of every logistics enterprise and the service quality provided by those logistics enterprises determines customer satisfaction (Thai, 2013).

According to Yuanxiao (2014), the staff service quality of a logistics company i.e. with respect to its customers, image, attitude, and communication helps to shape the company's overall service quality (Yuanxiao, 2014). The results in Tables 5.5 and 5.6 show that attitude is the most important item out of all the other items.

Based on the results of the regression analysis, Table 5.5 shows the correlation of each item of transit time with e-logistics customer satisfaction. Table 5.5 shows that there are two items that are not significant which are (P=0.811>0.005) and (P=0.080>0.005). After deleting the two items, the new results are shown in Table 5.6 below:

Table 5.6 The regression analysis of each items of SSQ on ELCS-1

Model	Unstandardized B	Coefficients Std.Error	Standardized Coefficients Beta	Sig.
Service and attitude is good**	0.225	0.052	0.261	0.000
Willing to help customers**	0.151	0.052	0.180	0.004
Familiar with the whole delivery process**	0.181	0.050	0.210	0.000
Wear uniform dress**	0.127	0.039	0.160	0.001

Table 5.6 shows that the correlations between all the items of staff service quality with e-logistics customer satisfaction are significant due to P<0.0.5. Additionally, the strength order of the relationship from strong to weak is "service attitude is good", "familiar with the whole delivery process",

"willing to help customers", and "wearing uniforms" due to β=0.261, 0.210, 0.180, and 0.160 respectively.

5.3.4 Information Communication Technology(ICT) Mediating the relationship between E-payment and E-logistics Customer Satisfaction

The fourth research hypothesis is related to the mediating impact of ICT on the relationship between E-payment and E-logistics Customer Satisfaction. These results are in accordance with the views in previous studies (Hofmann & Osterwalder, 2017; Zhang, Y., & Zhao, 2016; Nowicka, 2014; Luisa dos Santos Vieira, Sérgio Coelho & Mendes Luna, 2013) which argue that ICT has a positive influence on e-logistics customer satisfaction. This is because ICT may help e-logistics managers in handling the e-payment system, so that customer value can be increased through the customization and personalization of their offerings, leading to improved customer satisfaction and retention and, consequently, increased profits.

The findings of this study further confirm the view that ICT mediates the relationship between e-payment and e-logistics customer satisfaction. Hence, ICT may play a crucial role in the relationship between e-payment and e-logistics customer satisfaction. Based on the findings in prior studies, the influence of e-payment on e-logistics customer satisfaction increased after incorporating the use of ICT.

These results are in accordance with that of prior studies which found that e-payment must be integrated with other capabilities in an organization, such as e-traceability, to become more effective and to improve organizational performance (Ma, Banerjee, & Shroff, 2015; Yuanxiao, 2014; Linck et al. 2006; Tyan et al., 2003; Gilmore and Tompkins, 2000).

5.3.5 Information Communication Technology (ICT) Mediating the Relationship between E-traceability and E-logistics Customer Satisfaction

Tests for the mediating impact of ICT on the relationship between e-traceability and e-logistics customer satisfaction showed that ICT partially mediates the relationship between e-traceability and e-logistics customer satisfaction, which means that to a certain extent, the effect of e-traceability on e-logistics customer satisfaction is due to the adoption of ICT managers. At the same time, e-traceability has a direct impact on e-logistics customer satisfaction. This means that e-traceability is vital for the performance of e-logistics.

In summary, this recent study empirically argues that the achievement of information communication technology (ICT) on e-logistics customer satisfaction significantly depends on the effective implementation of e-payment (EP|ICT ⟶ ELCS, R^2 =0.726) and e-traceability (ET|ICT ⟶ ELCS, R^2=0.718). In short, the e-logistics industry must improve its e-payment and e-traceability system so as to provide better safety and more accurate information, to effectively integrate their resources, to fully meet customers' needs, and to create competitive advantage. As a result, ICT can improve their e-payment and e-traceability system. Based on the results, H4 and H5 which suggest the mediating effect of ICT on the relationship between e-payment/e-traceability and e-logistics customer satisfaction are failed to reject.

The results of the multiple regression analysis related to each variable as presented in Tables 5.2 to 5.6 reveal that the strength order between the independent variables, mediator variable and dependent variable (e-logistics customer satisfaction) is: ICT (β=0.831,P<0.005), ET (β=0.793,P<0.005), SSQ (β= 0.737,P<0.005), EP (β= 0.726,P<0.005), TT (β= 0.709,P<0.005), DR (β= 0.676,P<0.005). Therefore, ICT is the most important factor which influences the dependent variable, whilst distribution rate is the weakest factor for the same.

Having discussed the empirical findings, the following section will proceed to discuss the theoretical and practical contributions of this research.

5.4 Research Contributions

The contributions of this study are discussed in terms of their theoretical and practical implications.

5.4.1 Theoretical Conclusions

Viewing the result from the academic perspective of distribution rate in customer satisfaction literature, this study illustrates the findings below:

First of all, the study provides empirical evidence to support the resource-based view theory, which allocates a particular role to internal resource and organizational aspects that can be used as determinants of the firm's future success and profit. As a result, according to this theory, efficiency, effectiveness and the companies' success will be a function of their abilities, competences and skills in improving management of the resources that help them build a sustainable competitive advantage (Barney, 1991; Grant, 1991).

Numerous empirical studies on logistics service providers in China (e.g., Abdulrahman, Gunasekaran, & Subramanian, 2014; Aguezzoul, 2014; MellatParast & Spillan, 2014) have found weaknesses in the information integration capability of these companies. However, in a recent study, the results indicated that when e-payment and e-traceability are integrated with and internalized by ICT, an inimitable organizational capability in e-logistics performance is generated hence being a source of sustainable competitive advantage.

Secondly, this study incorporates Information Technology (IT) into Information Communication Technology (ICT). There are many literatures related to IT, which is a key factor in influencing logistics performance. But there are very few literatures that discuss about ICT. This study demonstrates that ICT has a more efficient and stronger impact on logistics than IT, especially in e-logistics. The adoption of information and communication technology (ICT) is a critical area of innovation. ICT is seen as one of the most perfect instruments to achieve service differentiation as well as to improve collaboration through effective connectivity with different supply chain partners (Pilat, 2003).

Thirdly, Information Communication Technology (ICT) was tested as a mediator in this new model, something that was never done before in previous studies. The result showed that ICT partially mediates, but due to the special function of ICT as a mediator, the direct impact of e-payment/e-traceability on e-logistics customer satisfaction is reduced. Empirically, this means that insufficient ICT knowledge will only hinder the development of e-payment/e-traceability. ICT is the basic technology in e-payment/e-traceability. In turn, e-payment/e-traceability is one of the elements of ICT in logistics (Marchet et al., 2009; Tyan et al., 2003; Gilmore and Tompkins, 2000). This indicates that ICT can be used as a potential variable in future research.

5.4.2 Practical Contributions

Firstly, this study enriches managerial understanding related to distribution rate, transit time, staff service quality, e-payment, e-traceability, and Information Communication Technology (ICT) for the model development and results of the hypotheses testing. It provides an insight into e-logistics customer satisfaction in China from the perspective of distribution rate, transit time, staff service quality, e-payment, e-traceability and Information Communication Technology (ICT). In order to help e-logistics companies to keep surviving in this fierce business environment, more attention

should be given on the integration of e-payments in practice. Two suggestions are hence put forward: firstly, to improve the standards, models and architectures of the e-payment system, and secondly, to innovate policy implications and possible future standards.

The second practical contribution of this study is that it provides the e-logistics industry in China with practical recommendations on how to carry out e-logistics business successfully i.e. by focusing on the integration of distribution rate, transit time, staff service quality, especially in e-payment, e-traceability and Information Communication Technology (ICT). E-logistics managers will have to pay more attention on investing in new technologies such as ICT, which is a mediator between e-payment/e-traceability and e-logistics customer satisfaction, in order to improve the e-payment/e-traceability system. With improved customer data privacy and security, better payment methods, and more accurate and timely information of product delivery tracking, customer satisfaction and retention will also be elevated.

Moreover, the findings have shown that ICT (β=0.831, P<0.005) has the greatest influence on e-logistics customer satisfaction, which should prompt e-logistics managers to make the best use of ICT in order to improve e-logistics performance. Distribution rate has been shown to be the least influential in decreasing e-logistics customer satisfaction. Therefore, it is only rational to increase the investment in ICT such as by integrating data from Sales and Fulfillment Systems and using intelligent analytics to predict product demand.

Traceability is also a very important technology in the e-logistics industry, indicated to have a strong relationship with e-logistics customer satisfaction, being the second most important factor found in this study. Therefore, due attention should also be paid on investments to improve traceability in e-logistics. It is very important to choose a proper selection of traceability technology and

to have effective communication with consumers regarding product information. Traceability using RFID technology also permits the creation of new services which will enable the integration of industrial and logistics traceability.

5.5 Limitations and Suggestions for Future Studies

Even though a comprehensive review of the whole body of literature had been conducted, this study still had several limitations as with other empirical studies.

The first limitation is that the study had focused only on the Shaanxi province rather than the whole of China, due to obvious difficulties in pursuing the latter. Had the study managed to gather data from the whole of China, it could have obtained a more valuable response and a better scenario of the influence of each variable on e-logistics customer satisfaction. Future studies could investigate the relationship put forward in this study by focusing on other countries and other sectors.

Secondly, this study is cross-sectional in nature, which means that changes that occur over time in the process of carrying out the ICT initiatives are not captured. Furthermore, the study used a quantitative approach to fulfill the target of study. Hence, to understand the changes that occur when the ICT initiatives are being carried out, longitudinal studies might be conducted by future studies to survey the extent of the actual ICT benefits experienced by customers in the e-logistics industry. Other methods such as qualitative techniques can be used to provide in-depth knowledge of the issues at hand. This would help in understanding how e-logistics can implement ICT successfully.

Thirdly, this research only focused on assessing the association between distribution rate, transit time, staff service quality, ICT, e-payment, e-traceability and e-logistics customer satisfaction. Future studies should survey other factors which might influence the relationship between the ICT di-

mensions and e-logistics performance such as transportation management applications (Mason et al. 2003; Tyan et al., 2003; Gilmore and Tompkins, 2000), supply chain execution applications (Giaglis et al., 2004), field force automation applications (Rodina et al., 2003), fleet and freight management applications, or some other main supporting techniques for e-logistics including e-commerce system, warehouse management system, and transportation management system (Takacs, Zuban and Kovacs, 2015).

5.6 Conclusion

The current study had examined the association between several direct factors (distribution rate, transit time, staff service quality) and e-logistics customer satisfaction in China. It also tested the mediating impact of information communication technology (ICT) on the relationship between e-payment/e-traceability and e-logistics customer satisfaction. It has made a significant contribution by providing an enriched understanding of the influence of the direct factors on organizational performance and of the mediating role of ICT on the prevailing relationships in the e-logistics sector, which had received very little attention in previous literatures. The framework of this research is drawn from the resource-based perspective of the firm, which theorized that a firm can utilize its resources to improve its performance.

The research used regression analysis to assess the research hypotheses in terms of the associations between the direct factors (distribution rate, transit time, staff service quality) and the mediating effect of ICT in the relationships between e-payment/e-traceability and e-logistics customer satisfaction.

The findings fulfilled the objective of the study, indicating that the direct factors (distribution rate, transit time, staff service quality) have a significant and positive impact on e-logistics customer sat-

isfaction. Moreover, ICT was found to have a positive and significant influence on e-logistics customer satisfaction. The study also indicates the mediating role of ICT in the relationship between e-payment/e-traceability and e-logistics customer satisfaction. Hence, in an e-logistics industry that is fiercely competitive, the direct factors (distribution rate, transit time, staff service quality), ICT, and e-payment/e-traceability are crucial for the survival in the marketplace and for making a profit.

To sum up, the findings recommend that the major factor that influences e-logistics customer satisfaction in the context of China is information communication technology (ICT). Although the results generally support the hypotheses that distribution rate, transit time, and staff service quality could influence e-logistics customer satisfaction, and that ICT could mediate the relationship between e-payment/e-traceability and e-logistics customer satisfaction, more research needs to be conducted to investigate other factors that might influence ICT and their impact on e-logistics customer satisfaction, so that our conception of the issue of ICT in the e-logistics sector can be further improved.

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APPENDICES A Sample of Questionnaire

INFLUENCE FACTORS OF E-Logistics AND CUSTOMER SATISFACTION IN CHINA

关于中国电子物流与客户满意度的影响因素

Questionnaire

调查问卷

A Master Research Survey

研究生论文调查

This questionnaire consists of two sections. There is no right or wrong question. Answer of every question is essential.

Section 1: **Demographic Information**

第一部分：背景调查

Below questions belong to the personal data. Please tick the box which is best applicable to you.

以下的问题属于个人资料，请您在符合您情况的方框内打勾。

Gender ☐ Male ☐ Female

性 别： 男 女

Marital Status ☐ Single ☐ Married

婚姻状况： 单身 已 婚

Age (Years old) ☐ 0-19 ☐ 20-24 ☐ 24-29

年龄（几岁）： ☐ 30-34 ☐ 35-40 ☐ 40+

Highest Education Level ☐ High School ☐ Junior College

最高学历： 高 中 大 专

☐ Undergraduate ☐ Master ☐ PHD

本 科 硕 士 博 士

Income Rate (Yuan) ☐ 0-1999 ☐ 2000-3999 ☐ 4000-5999

月收入（元）： ☐ 6000-9999 ☐ 10000+

Occupation: ☐ Employed ☐ The Retired

职 业： 上班族 已退休

☐ The Self-Employed ☐ Others

个体经营 其他（学生、失业等无收入人群）

Location: ☐ Shaanxi ☐ Others

所在地: 陕西省 其他

Section 2: **E-Logistics Services**

第二部分：物流服务

This section is related to the e-logistics services. Please read the following statement and mark accordingly: 1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree

这个部分是关于电子物流服务。请阅读以下的陈述并且打分：非常不同意 1分，不同意1分，中立3分，同意4分，非常同意5分。

Distribution Rate (DR)

物流运费

1	The company has a clear fee lists 公司是否有明确的费用清单	1	2	3	4	5
2	There is no additional return fee 没有额外的返回运费	1	2	3	4	5
3	The company has different discounts according to the different logistics service 公司针对不同情况的物流服务有不同的折扣	1	2	3	4	5
4	The distribution rate is satisfactory 物流运费比较满意	1	2	3	4	5

5	The price rules are adequate and price relatively stable 拥有完善的价格体制并且价格相对稳定	1	2	3	4	5

Transit Time (TT)

物流时间

6	I am satisfied with the time from ordering to receiving parcel 从下单到接收到包裹的时间我很满意	1	2	3	4	5
7	The time from mailing the return goods to receiving the new goods is reasonable 从邮寄返回货物到收到新货物，这个时间相对是合理的。	1	2	3	4	5
8	The delay time in holidays is normal 假期的延长时间是合理的	1	2	3	4	5
9	The time about picking up parcel is sufficient 取货时间是充足的	1	2	3	4	5
10	There have different choices about the delivery time which can be free to choose by the buyer. 提供不同的配送时间可以由买家自由选择	1	2	3	4	5

Staff Service Quality (SSQ)

物流服务质量

11	The logistics personnel could answer the questions of customer quickly and professionally 物流人员可以迅速并且专业地回答客户问题	1	2	3	4	5
12	The logistics personnel service attitude is good 物流人员服务态度是良好的	1	2	3	4	5
13	The logistics staff are willing to help customers 物流员工乐于帮助客户	1	2	3	4	5
14	Staff are familiar with the whole delivery process 员工熟悉整个物流运输过程	1	2	3	4	5
15	The logistics personnel have a good communication with customers 物流人员可以有效地与客户沟通	1	2	3	4	5

16	The e-logistics staff always wear uniform dress which shows good image 电子物流员工经常穿制服来表现出良好的形象	1	2	3	4	5

E-Payment (EP)

电子支付

17	I perceive e-payment as a secure online transaction 我认为电子支付是一种安全的网络交易	1	2	3	4	5
18	I do not fear hacker invasions into e-payment system 我不担心黑客会入侵电子支付系统	1	2	3	4	5
19	The information I provided in the previous e-payment is helpful for secure e-payment transactions 在之前的交易中我提供的信息有助于安全交易	1	2	3	4	5
20	I perceive the information relating to user and e-payment transactions as secure 我认为相关用户信息和网上交易的信息是安全的	1	2	3	4	5
21	I trust each participant, such as seller and buyer, involved in e-payment 我信任每一个电子支付相关者，例如卖方和买方	1	2	3	4	5
22	I trust the security mechanisms of e-payment 我信任电子支付的安全机制	1	2	3	4	5
23	I trust the information provided during the e-payment process 我信任在电子支付过程中提供的信息	1	2	3	4	5

E-Traceability (ET)

电子追踪技术

24	The LSPs provide real-time tracking information about goods 分层服务提供商可以提供及时的物流跟踪信息	1	2	3	4	5

25	The LSPs provide accurate logistics transportation information 分层服务提供商可以给予准确的物流运输信息	1	2	3	4	5
26	The LSPs provide fast respond on any distribution in regards to goods. 分层服务提供商可以提供快速地关于货物的反馈在任何的分发过程中	1	2	3	4	5
27	The buyer is provided to track the location of his/her products at anytime. 买方可以随时查询自己货物的定位信息	1	2	3	4	5
28	The LSPs can provide the worldwide location information include domestic and oversea China. 分层服务提供商可以提供全球的地位信息包括中国境内和境外	1	2	3	4	5

Information Communication Technology (ICT)

通信工程

29	Information system could be readily adapted to my needs 信息系统易于迎合我的需求	1	2	3	4	5
30	Information system is sufficiently secure to conduct business transactions 信息系统可以足够安全地进行商业交易	1	2	3	4	5
31	Information system can integrate operations with supplier 信息系统能够整合所有的供应商一起工作	1	2	3	4	5
32	The logistics companies have relatively mature ICT equipment to deal with some emergency 物流公司拥有相对成熟的通信工程设备去处理一些紧急事件	1	2	3	4	5
33	The logistics companies use ICT equipment to give customers feedback timely 物流公司使用通信工程设备提供客户及时的反馈	1	2	3	4	5

E-Logistics Customer Satisfaction (ELCS)

电子物流服务满意度

Note: E-Logistics cover e-payment, e-traceability, e-distribution, e-return, e-service.

提示：电子物流包括电子支付，电子追踪，电子运输，电子退换货运输，电子服务。

34	I am satisfied with e-logistics quality 我对于电子物流质量是满意	1	2	3	4	5
35	I am satisfied with price of e-logistics products 我针对电子物流货物的价格是满意的	1	2	3	4	5
36	I am satisfied with the services of e-logistics 我针对电子物流服务是满意的	1	2	3	4	5
37	I am satisfied with the home delivery services of e-logistics 我针对上门的电子物流服务是满意的	1	2	3	4	5
38	I am satisfied with reputation of e-logistics 我针对电子物流的声誉是满意的	1	2	3	4	5
39	I am satisfied with after sale services of e-logistics 对于电子物流的售后服务我是满意的	1	2	3	4	5
40	In general, I am satisfied with the shopping experience by using e-logistics 总地来说，我对于网上购物使用电子物流的经历是满意的	1	2	3	4	5

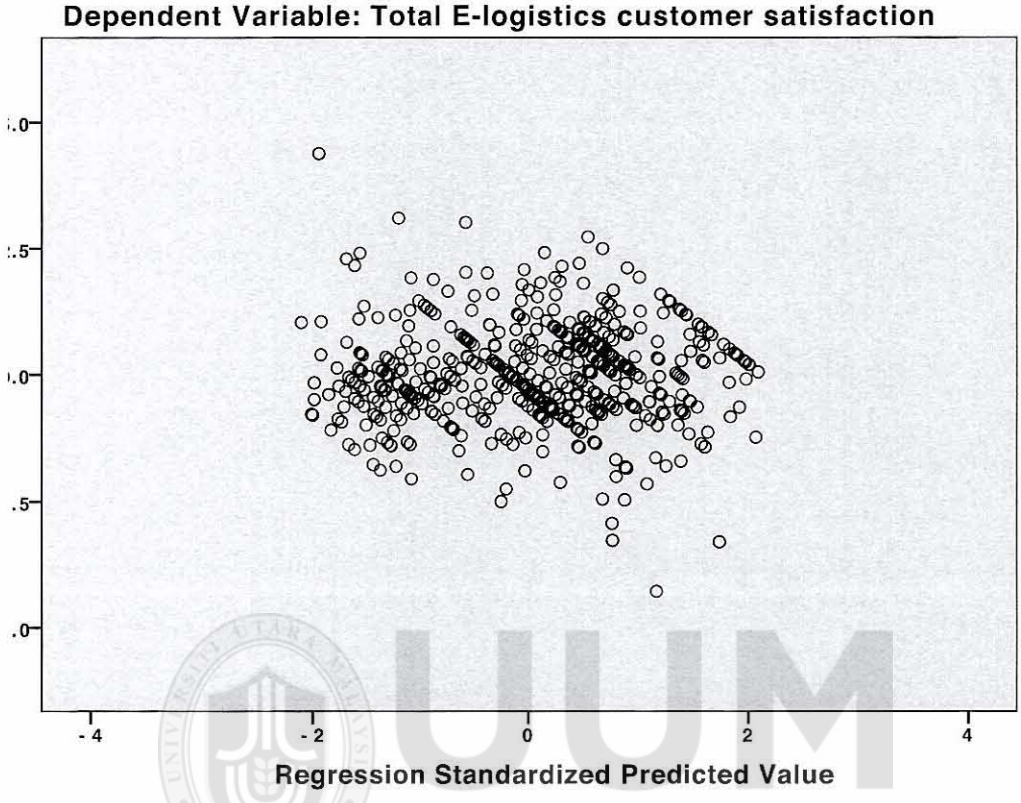
APPENDICES B Statistics Analysis

Statistics

		Total Distribute Rate	Total Transit Time	Total Staff Service Quality	Total E-payment
N	Valid	501	501	501	501
	Missing	0	0	0	0
Skewness		.025	.124	-.010	.149
Std. Error of Skewness		.109	.109	.109	.109
Kurtosis		-.850	-.788	-.937	-.684
Std. Error of Kurtosis		.218	.218	.218	.218

Statistics

		Total E-traceability	Total ICT	Total E-logistics customer satisfaction
N	Valid	501	501	501
	Missing	0	0	0
Skewness		-.076	.015	-.077
Std. Error of Skewness		.109	.109	.109
Kurtosis		-1.279	-.678	-.752
Std. Error of Kurtosis		.218	.218	.218



APPENDICES C Note

"**" represent details meaning as below:

Table 5.2-5.3

1. "Clear fee":The company has a clear fee lists.
2. "return fee":There is no additional return fee.
3. "discounts": The company has different discounts according to the different logistics service.
4. "distribution rate":The distribution rate is satisfaction.
5. "price rules":The price rules are adequate and price relatively.

Table 5.4

1. "Ordering to receiving parcel":I am satisfied with the time from ordering to receiving parcel.
2. "Mailing the return goods to receiving the new goods":The time from mailing the return goods to receiving the new goods is reasonable.
3. "The delay time":The delay time in holidays is normal.
4. "Picking up parcel":The time about picking up parcel is sufficient.
5. "different choices about the delivery time":There have different choices about the delivery time which can be free to choose by the buyer.

Table 5.5-5.6

1. "answer the questions quickly and professionally":The logistics personnel could answer the questions of customer quickly and professionally.
2. "service attitude is good": The logistics personnel service attitude is good.
3. "willing to help customers":The logistics staff are willing to help customers.
4. "familiar with the whole delivery process":Staff are familiar with the whole delivery process.
5. "communication with customers":The logistics personnel have a good communication with customers.
6. "wear uniform dress":The e-logistics staff always wear uniform dress which shows good image.