

**IDENTIFYING THE KEY DRIVERS OF B2B CUSTOMERS' ADOPTION OF
ONLINE-BASED FREIGHT FORWARDING SERVICES IN THAILAND**

NATTAKORN PINYANITIKORN

**MASTER OF SCIENCE
IN TECHNOLOGY AND INTERDISCIPLINARY MANAGEMENT**

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CHIANG MAI UNIVERSITY

JUNE 2024

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**A THESIS SUBMITTED TO CHIANG MAI UNIVERSITY IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN TECHNOLOGY AND INTERDISCIPLINARY MANAGEMENT**

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THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN TECHNOLOGY AND INTERDISCIPLINARY MANAGEMENT


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21 June 2024

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ACKNOWLEDGEMENT

I would like to express my appreciation to my supervisors, Asst. Prof. Dr. Wirachchaya Chanpuypetch, for their valuable aid and support throughout the completion of this study, as well as for their helpful feedback on my research efforts. Their guidance and advice have played a crucial role not only in shaping my research methodologies but also in enhancing my comprehension of the study. The successful completion of this thesis and my advancement thus far would have been unattainable without the continuous support that I have consistently received from them.

Furthermore, I would like to extend my gratitude to the members of the examination committee, Assoc. Prof. Dr. Walailak Atthirawong and Asst. Prof. Dr. Weerapan Chanhom for their constructive suggestions and generous support.

I am grateful to all participants who devoted their time to provide the required data, and I also wish to acknowledge the dedicated personnel of the European International University for their assistance in providing me with the necessary resources for conducting this research.

Finally, I am profoundly grateful to my family for their unwavering support and encouragement throughout this research endeavor.

Nattakorn Pinyanitikorn

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หัวข้อปริญญานิพนธ์	การระบุปัจจัยสำคัญที่มีผลต่อการยอมรับบริการรับจ้างขนส่งสินค้าระหว่างประเทศแบบออนไลน์ของลูกค้าแบบธุรกิจในประเทศไทย
ผู้เขียน	นายณัฏฐ์กรณ์ ภิญญาธิกร
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บทคัดย่อ

การพัฒนาการใช้บริการขนส่งสินค้าผ่านระบบออนไลน์ประกอบด้วยคุณสมบัติที่เป็นนวัตกรรมใหม่ที่จะช่วยให้ลูกค้าสามารถรับใบเสนอราคาค่าบริการขนส่งได้ทุกวันตลอด 24 ชั่วโมง จองบริการ ดาวน์โหลด กรอกข้อมูล และอัปเดตเอกสารออนไลน์ ตลอดจนการติดตามการจัดส่งและชำระค่าบริการออนไลน์ อย่างไรก็ตามแนวคิดของการใช้บริการขนส่งสินค้าผ่านระบบออนไลน์ยังถือเป็นเรื่องใหม่ในสังคมไทย ในการศึกษาวิจัยนี้มีวัตถุประสงค์เพื่อระบุปัจจัยที่มีอิทธิพลที่ส่งผลต่อความตั้งใจใช้บริการขนส่งสินค้าผ่านช่องทางออนไลน์ในหมู่ลูกค้ากลุ่มธุรกิจ และเสนอแนะกลยุทธ์ในการส่งเสริมให้เกิดการใช้บริการขนส่งสินค้าผ่านระบบออนไลน์มากยิ่งขึ้น งานวิจัยนี้ใช้ระเบียบวิธีการวิจัยเชิงปริมาณเพื่อให้บรรลุวัตถุประสงค์ของการศึกษานี้ ใช้แบบสอบถามออนไลน์ที่จัดทำขึ้นเพื่อรวบรวมข้อมูลจากบุคลากรระดับผู้จัดการขึ้นไป ที่รับผิดชอบการจองและประสานงานกับบริการขนส่งสินค้าในองค์กรของตน จำนวน 400 คน จาก 400 บริษัทในประเทศไทย ผลการวิจัยยืนยันว่า ความคาดหวังด้านประสิทธิภาพ (PE), ความคาดหวังของความพยายาม (EE), อิทธิพลจากสังคม (SI), การรับรู้ความเสี่ยง (PR) และ ปัจจัยที่เกี่ยวกับสภาพแวดล้อมในองค์กร (FC) ส่งผลอย่างมีนัยสำคัญต่อความตั้งใจที่จะใช้แพลตฟอร์มการส่งต่อการขนส่งสินค้าทางออนไลน์ ซึ่งความตั้งใจดังกล่าวส่งผลต่อการใช้งานจริงอย่างมีนัยสำคัญ ผลลัพธ์ยังชี้ให้เห็นว่า PE ส่งผลต่อความตั้งใจที่จะใช้บริการมากที่สุด ตามด้วย FC, SI, PR และ EE ตามลำดับ ผลการวิจัยพบว่าขนาดองค์กรมีผลกระทบต่อความสัมพันธ์ระหว่าง SI และ ความตั้งใจใช้บริการ ในลักษณะที่บริษัทขนาดใหญ่ได้รับอิทธิพลทางสังคมต่อความตั้งใจที่จะใช้บริการที่มากกว่าเมื่อเปรียบเทียบกับบริษัทขนาดเล็ก

Thesis Title Identifying the Key Drivers of B2B Customers' Adoption of Online-Based Freight Forwarding Services in Thailand

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Degree Master of Science (Technology and Interdisciplinary Management)

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ABSTRACT

The development of online-based freight forwarding service include the innovative features that allow the customers for 24/7 freight quote, online booking, filling, uploading and downloading of documents, tracking the shipment, and online payment for the service. As the concept of online-based freight forwarding service is still new in the Thai market, the researcher aims to explore the level of adoption intention to use online-based freight forwarding service among business customers in the market, to identify the influential factors affecting the adoption of services, and to recommend strategies for encouraging the adoption of online-based freight forwarding services.

Quantitative methodological approach was applied to meet the objective of this study. Online questionnaire survey was conducted to collect the data from 400 managers from 400 companies in Thailand who was in charge with booking and coordinating with freight forwarding services in their organizations.

The results confirmed that Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Perceived Risk (PR), and Facilitating Conditions (FC) significantly affected the intention to use online-based freight forwarding platform, in which intention to use further affected the actually use significantly. The results also suggested that PE affects the adoption intention with the strongest effect, followed by FC, SI, PR, and EE, respectively. The results indicated that there was a moderating effect of organization size on the relationship between SI and intention to use in the way that large-size firms seemed to have stronger effect of social influence on the adoption intention.

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CHAPTER 1

INTRODUCTION

Chapter 1 is to provide an essential overview of the context and broader field within which this study is situated. It traces the historical developments, current trends, and the significance of the research topic, setting the stage for understanding the importance and necessity of the study. Within this context, the research problems are identified, detailing specific issues or challenges that the study aims to address, thereby research questions and objectives are formulated. Furthermore, the research scope defines the boundaries and limitations of the study to ensure that the research is manageable and feasible within the given constraints. The benefits of the study are also discussed, highlighting its potential contributions and implications.

1.1 Research Background

According to the market report of ReportLinker (2023), Thailand's logistics market is relatively large, fragmented and populated with a number of differing firms, ranging from multinational corporations providing a full range of logistics services, to small-sized local transportation firms providing simple logistics services. There has been a shift in customer demand, which in turn has driven the consolidation over the few decades, that customers are likely to prefer fewer but larger logistics providers who are able to handle complicated supply chain efficiently and effectively in a global scale. Sathapongpakdee (2023), as cited in Krungsri Research (2023), stated that sea freight plays a vital role in facilitating global trade by transporting raw materials to production sites worldwide, thus sustaining the efficiency of global supply chains. It also ensures the continuous fulfillment of producers' and consumers' needs in global markets. The sea freight industry is interconnected with various domestic and international activities, such as warehousing, transportation, and end-point distribution. Consequently, a diverse range of sea freight services is offered based on vessel types.

Utilizing maritime channels for goods transportation offers several advantages, notably the ability to ship large quantities of heavy or bulky goods together, resulting in cost-effectiveness compared to alternative modes of transportation. On average, sea transport incurs lower freight charges (approximately THB 0.65/tonne/kilometer) compared to rail (THB 0.95), road (THB 2.12), and air (THB 10.0) alternatives. Moreover, modernization efforts in transportation systems and fuel usage, along with containerization, enhance safety and flexibility in maritime freight. However, sea freight's relatively slower speed necessitates the use of other transport modes for final delivery. Despite this drawback, sea freight remains dominant in global trade, accounting for over 80% of volume and 70% of value in the global merchant fleet as of the latest data available in 2021 (Krungsri Research, 2023).

Sea freight companies operate on a global scale, facilitating the movement of goods from one port to another. Due to a number of advantages provide in terms of cost-effectiveness and time efficiency, these operators typically depend on other companies or components within their commercial network for various services. These services may include port entry and exit procedures, customs clearance, and unloading goods during transit towards their ultimate destination (Krungsri Research, 2023). According to the statistics of UNCTAD (2022), Asia has witnessed consistent growth in its import-export sector due to the rapid economic expansion and its status as a hub for agricultural and manufacturing industries. In 2024, the region stands as the world's busiest in terms of sea freight services, responsible for over half of all goods transported by sea and 62.5% of circulating containers. Among the ASEAN countries, Singapore holds the largest portion of the maritime shipping market, as evidenced by import and export volumes at major ports. Following Singapore, Thailand and Malaysia also play significant roles in the maritime shipping market within the ASEAN region (UNCTAD, 2022).

Along with the positive growth, however, there has been growing price competition in the freight forwarding markets where business customers consider transportation cost as a key point contributing to the lower cost but with no compromise for the service level and reliability. As of 2021, Krungsri Research (2023) revealed that a total of 230 companies, either Thai or Thai-overseas joint ventures registered with the Ministry of Commerce, were providing coastal or open water freight services. Among these, 16 companies, constituting 6% of the total, met the criteria for being classified as

large operations, with a majority falling under the category of Vessel Operation Common Carriers (VOCCs). The remaining 214 companies were identified as SMEs and micro-operations, accounting for 94% of the total entities involved in this sector. Some of these are in fact subsidiaries of companies that expanded their commercial networks and then hived off these subsidiaries as regional offices. Some of large-scale international freight forwarders have tried to introduce IT technology thus would allow freight forwarding companies to offer their customers with competitive costs, better experiences with their new products or services, and internal service processes or systems for high performance, but the success is not yet evidence (Deloitte, 2019). The development of online-based freight forwarding service is still innovative service in Thailand, which will include the features that allow the customers for 24/7 freight quote, online booking, filling, uploading and downloading of documents, tracking the shipment, and online payment for the service.

1.2 Research Problems

Digital platforms have been observed to disrupt entire industries, where digital platform-driven companies become digital disruptors in many industries. According to Wurst (2021), freight forwarders are likely to become obsolete as intermediaries, with a platform-only model enabling direct interaction between carriers and shippers. Basic intermediary function of freight forwarding services between carriers and shippers is likely to become extinct in the future, and that digital connectors have the potential to reduce the need for intermediaries to manually organize shipments for multiple parties. Yet, the digital disruption is not evidence in the freight market, in which major reasons for the failure of online platforms in relation to freight forwarding service include shipper customization requirements, guaranteed pricing and load capacity, consolidated billing, robust and rigid reliability requirements between different parties involved in transportation, the need to include many different types of parties in shipments, a traditionally analog mindset and short-term investment culture among incumbents, and a lack of two-way capabilities and digital talent among freight forwarders (Deloitte, 2019). In other words, this means that freight forwarders who are able to develop niche freight forwarding platforms with regional ecosystems by bringing together a critical mass of

players in their field may still face a traditionally analog mindset and short-term investment culture among incumbents.

In B2B market, business customers of freight forwarding service vary from the large multi-national corporations (MNCs) to small-and-medium sized enterprise (SMEs). The concept of online-based freight forwarding service is relatively new in Thailand. Freight forwarders that intend to shift the customer behaviors from traditional booking through salespersons thus are required to understand the expectations and wants of them and are able to develop the online platform of freight forwarding service that is better than that of traditional ones. In other words, freight forwarding companies need to create satisfactory freight forwarding experiences at lower cost. It is believed that freight forwarding firms that early adopt digital technology to improve the service experience and to reduce the dependence on manpower are more likely to further enhance the firm's competitiveness in highly competitive marketplace, as suggested by Zhang et al. (2011). However, digital platforms for freight forwarding services have failed to generate game-changing effects, in which customization needs of shippers and traditionally analog mindset are the major market-specific prohibitors (Deloitte, 2019). This means that freight forwarders who able to develop niche platforms for freight forwarding with regional ecosystems through bringing together a critical mass of players in its realm still might face traditionally analog mindset and a short-term investment culture at incumbents. This is considered important to know about the expectation and concern of customers to adopt the online-based freight forwarding services in the context of Thai culture.

1.3 Research Questions

In this research, the researcher intends to investigate the factors influencing the B2B customers' intention to use online-based freight forwarding services for better customer insights. Therefore, the research questions are determined as follows

1. What are the levels of adoption intention toward the use of online freight forwarding services among business customers in the Thai freight forwarding market?
2. What are the influential factors affecting the adoption of online-based freight forwarding services among Thai shippers?

3. What are the areas of improvement for encouraging the adoption of online-based freight forwarding service by Thai shippers?

1.4 Research Objectives

As the concept of online-based freight forwarding service is still new in the Thai market, the customers who firstly adopt the service is considered as early adopters. Some consumers might display reluctance to embrace an innovation during its initial phases of introduction, opting instead to observe and eventually become late adopters as they witness the successful adoption and utilization of the innovation by others. In this study, the researcher hypothesizes that customer innovativeness influences the perceived desirability, perceived risk, performance expectancy, and effort expectancy, which in turn further affects the intention to use innovative service of online-based freight forwarding service. There are three objectives of this study as follows:

1. To explore the level of adoption intention to use online-based freight forwarding service among business customers in the Thai freight forwarding market
2. To identify the influential factors affecting the adoption of online-based freight forwarding services among customers.
3. To recommend strategies for encouraging the adoption of online-based freight forwarding services for the benefits of shippers and freight forwarders.

1.5 Research Scope

Quantitative methodological approach was applied to meet the objective of this research. The study was characterized by a deductive approach, where research hypotheses were formulated based on both the theoretical framework and empirical studies conducted previously. This was done in order to validate the theories and further enrich the existing knowledge base.

The survey was methodically designed and developed as a crucial research instrument in quantitative research aimed at collecting data from specific samples. The questions and variables' structures were derived from previous studies carried out in the same field.

The research population was defined as business customers of freight forwarding services in Thailand who has used the service for importing or exporting cargoes. They can be manufacturing companies, exporters, and distributors in the Thai market. The purposive sampling method will be applied in this research to gather the data from the customer base of a selected freight forwarding company including those of its existing customers and potential customers. Contacted persons of these business customers for the supervisor level or upper in their organizations will be invited to participate in this study.

1.6 Benefits of the Study

This study will provide the useful information for freight forwarding companies regarding the B2B customers' intention to accept and adopt online-based freight forwarding service, which is the innovative service in Thailand that has not been offered by any freight forwarders in the market. The results will help to better understanding the customers and factors affecting their acceptance and use of this innovative service. In addition, this study will also benefit academics in the fields of innovation to support the Thai government's efforts to transform the country into a developed one and prepare for the challenges of the 21st century, in which the environment is changing rapidly. The plan was developed and proposed under the "Thailand 4.0 Digital Economy" program, in which people and innovation are key to a new economic development aimed at a value-based economy. In regard to the importance of innovation, this research seeks the way to provide customer insights, which in turn will enhance the chance of innovation to be successful in the marketplace. By leveraging the fundamental features of digital innovations, Thai freight forwarder should be able to compete in innovative ways and to digitally transform through taking advantage of the opportunities presented by digital technologies in order to enhance their digital capabilities and resources.

CHAPTER 2

LITERATURE REVIEW

Chapter 2 delves into the literature review, providing a comprehensive examination of existing research and theories related to the study. This chapter begins with an overview of the theoretical framework, presenting key theories and concepts that underpin the research. It explores various perspectives and interpretations within the field, highlighting seminal works and influential studies. Through a critical analysis of the literature, this chapter identifies the conceptual model and hypothesises that the current study aims to examine.

2.1 Freight Forwarding Services

Freight forwarders are intermediaries between customers or shippers and the providers of transportation services such as ships, trucks, trains, planes that engage in carrying the goods, and by offering access to premium pricing and expert knowledge on export/import prerequisites such as documentation, regulations, and insurance (Rau, 2017).

In the context of the Thai market, the role of a freight forwarder in exporting can be summarized as 1) to select and propose the most suitable and best transportation route, transportation mode, and vehicle to the customer or exporter. The best format is one that ensures the safe and timely delivery of goods while minimizing costs; 2) to book cargo with the carrier for the customer; 3) to receive goods from the customer and package them. During this process, documents must be prepared for customs procedures, including other documents such as certificates of origin for the goods; 4) to transport the goods to the port and carry out customs procedures for export and deliver the goods to the carrier; 5) to pay all related fees, including freight charges, on behalf of the exporter first; 7) to receive the signed and stamped delivery receipt from the carrier and deliver it to the customer; 8) to track the journey of the goods until they reach the destination recipient. Meanwhile, the role of a freight forwarder in importing can be summarized as 1) to track the shipment of goods on behalf of the customer and notify the customer; 2) to receive

and verify documents related to transportation; 3) to receive goods from the carrier and pay the freight charges on behalf of the customer first; 4) to carry out customs procedures for importation, pay taxes, and other expenses; 5) to deliver the goods to the customer. During transportation, there may be cases where goods are damaged or lost. Therefore, it is the responsibility of the freight forwarder to claim damages from the carrier for the customer. If such a case occurs, it will take time to investigate the matter thoroughly because it involves legal processes (Wise Logistics, 2023). However, it has been observed that freight forwarding markets are resistant to change as carriers have operated their supply chains in the same way for 30 years, meaning that paperwork, phone calls, and emails continue to be used (Morley & Greg, 2016). This creates a number of problems for customers, such as delays in obtaining quotes, lack of flexibility in changing routes during transportation, and lack of transparency in pricing, location tracking, and problem resolution (Byrnes, 2017). Problems in traditional freight forwarding service processes can be illustrated in the Figure 2.1 below.

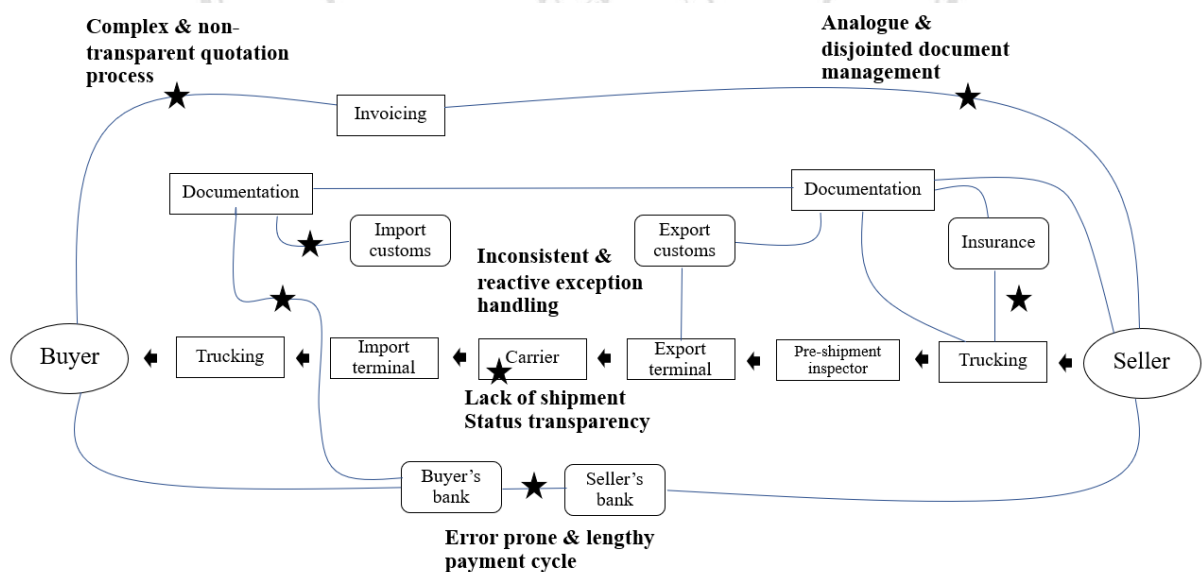


Figure 2.1 Processes of freight forwarding service

Source: Maersk (2022)

To handle with the problem of delays in obtaining quotes, lack of transparency in pricing, location tracking, and analogue and disjointed documentation processes, online-based freight forwarding service has been proposed in the Western world, which can be

further adopted in the Thai market in the near future for the better experiences of customers and cost efficiency.

2.2 Digital Technology and Freight Forwarding Service

2.2.1 Online Platform of Freight Forwarding Services

Given numerous customers' pain-points along with the market's attractiveness in terms of size and high profitability, Herold et al. (2023) describe that freight forwarding markets are ripe for digital disruption. Damco, a freight forwarding subsidiary of Maersk, has turned to digitalization because the aforementioned customer pain points are easily solved with software. The company launched its online platform called Twill to provide instant price quotes and bookings, transparency and tracking services, simplified paperwork, and proactive customer support (Maersk, 2022). Among the many venture capital-funded technology startups that have entered the freight forwarding market, Flexport offers a digital freight forwarding platform that indexes all carriers in one database and provides shippers with a digital solution to easily understand, purchase, manage, and track services, with the company's revenue growing an impressive 16-fold in 2016 to more than \$1 billion (Constine, 2017)

Further, previous research conducted by Transport Intelligence, as cited in Alumni (2017), indicated that there is significant demand from shippers for online interfaces for carriers. Deloitte's (2019) report argues that digital platforms for freight forwarding services have failed to make a breakthrough impact, and that despite numerous efforts, the market remains as fragmented as ever. The report showed that none of the digital players have yet made traditional freight forwarding obsolete, with reasons for the failure of platforms in relation to freight forwarding including shippers' adaptation needs, guaranteed pricing and load capacity, consolidated invoicing, robust and rigid reliability requirements between the various parties involved in transportation, the need to involve many different types of parties in shipments, traditionally analog mindset and short-term investment culture among incumbents, and a lack of two-way capabilities and digital forwarder talent (Deloitte, 2019). From a technology perspective, Deloitte (2019) stated that in the industry where services boil down to moving physical goods from A to B, there is no culture of technology embrace and therefore digital technologies can only ever have a limited impact.

2.2.2 Key Features of Online Freight Forwarding

Online solutions have the capability to enhance the efficiency of a majority of the tasks carried out by freight forwarders on a daily basis, thereby simplifying the entire procedure - starting from providing a quotation to issuing an invoice. The most advantageous aspects of these solutions involve the creation of documents, the facilitation of data exchange, and the improvement of communication with both shippers and carriers. Moreover, by consolidating all relevant information within one system, freight forwarders are able to obtain a comprehensive overview of their operations. Generally, these platforms consist of various essential modules that address logistics activities, customer interactions, and financial transactions.

1) Rate quote generation

The pricing mechanism within the domain of freight forwarding is typically not easily determinable. The quotation of rates is contingent upon numerous variables, including the nature of the goods, quantity to be transported, carrier preference, destination country, and the spectrum of requisite services. Manual computation of quotations for individual scenarios may be time-consuming; however, the utilization of software streamlines this process, enabling freight forwarders to formulate a quotation upon acquiring a comprehensive understanding of customer specifications. Customized operational protocols encompassing the company's fees, tariffs, and profit margins can be established by freight forwarders. Furthermore, contemporary platforms seamlessly integrate with various carriers to access their prevailing rates. Consequently, when consignors seek information on freight charges, they can promptly obtain a quotation for any mode of transportation (including multimodal shipping) and review a comprehensive breakdown of associated expenses.

2) Order management

Upon the shipper's agreement with the quotation provided by the freight forwarder, the process of fulfillment commences, initiating the creation of an order based on the accepted quotation. Through the utilization of freight forwarding software dashboards, shippers find it to be advantageous to oversee the status of various shipment orders, establish recurring orders, identify errors, and more. Additionally, freight forwarders have the capability to configure notifications for crucial updates on statuses.

A further benefit of inclusive platforms is the streamlined exchange of data, facilitating the seamless sharing of order specifics with different modules such as warehousing, invoicing, and reporting.

3) Warehouse management

Some freight forwarders may not provide storage and associated services; however, those that do stand to gain advantages from incorporating the warehouse management (WMS) module. This tool enables shippers to enhance their storage space planning and optimization, monitor inventory levels, oversee picking and packing operations, manage personnel coordination, and attain improved insight into various warehouse functions.

4) Load planning and consolidation

Shippers who prioritize the consolidation of partial shipments will find this section particularly relevant. The practice of reserving space for a container and dispatching it with unused capacity is deemed ineffective. In such cases, the utilization of a load planning or consolidation module can assist shippers in overseeing Less than Container Load (LCL) shipments and merging them to maximize cost efficiency. By inputting all pertinent freight particulars into their system, shippers can devise loading strategies, conduct cost comparisons, generate loading directives, among other functionalities.

5) Documentation management

Freight forwarding entails the management of numerous documents. A key aspect of freight forwarding software is its ability to automatically generate BOLs, AWBs, customs paperwork, and similar documents. This not only enhances efficiency but also minimizes errors and diminishes the necessity for manual record-keeping. In cases where freight forwarders are inundated with physical copies of quotes, sales orders, BOLs, warehouse records, invoices, and other paperwork, the online platform enables them to maintain systematic organization. Consequently, shippers can conveniently locate, retrieve, monitor, and distribute crucial documentation pertaining to all their shipments. Through the utilization of digital document exchange features, shippers and freight forwarders can swiftly transmit contracts and various documents in multiple file formats.

6) *Shipment tracking*

Tracking plays a pivotal role in the transportation process as it is imperative for all stakeholders to remain informed about the whereabouts of the shipment. The utilization of Internet of Things (IoT) and telematics technologies enables carriers to furnish real-time tracking updates and estimated time of arrival (ETA) projections. Integration of major transportation services providers with most freight forwarding software platforms facilitates accessibility to this crucial information. Subsequent to the collection of tracking data, freight forwarders have various alternatives for updating their clientele, including the dissemination of regular notifications via email or text, provision of data access through a series of Application Programming Interfaces (APIs) for shippers desiring to track delivery status through their internal systems, or enabling self-monitoring via the company's website or customer portal.

7) *Customer portal*

The rising trend of self-service utilization among shippers reflects a desire for autonomy in managing operations and accessing information. Therefore, providing a customer portal becomes essential, enabling users to solicit quotations, retrieve documentation, monitor cargo movements, seek assistance from a support center, and execute payment transactions through an incorporated payment gateway.

8) *Customs and regulatory compliance*

Businesses engaged in international shipping are obligated to adhere to various regulations imposed by different nations. The utilization of online platforms can assist both shippers and freight forwarders in effectively handling these compliance obligations, primarily through the automation of filing procedures, electronic submission of customs paperwork, conducting denied party screenings from various databases, as well as keeping freight forwarders informed about any changes in regulations.

9) *Customer Relationship Management (CRM)*

Freight forwarding operates within the realm of service industry, emphasizing the crucial significance of effectively managing customer relationships to bolster loyalty and boost sales. A proficient Customer Relationship Management system not only archives all customer-related information but also enables freight forwarders to scrutinize and evaluate leads, oversee sales, execute and supervise marketing campaigns, and streamline communication with current, former, and potential clientele. Noteworthy features

encompass automated email responses and alerts, dashboards exhibiting lead status, automated follow-up tasks, logs of interactions and history of orders/shipments, sales Key Performance Indicator analysis, and various other capabilities.

10) Invoicing

Financial implications necessitate precision, and the utilization of an invoicing module facilitates the efficient management of all financial transactions within the realm of accounting. Through the utilization of this tool, freight forwarders are able to automatically produce invoices, transmit them to their clientele, and monitor their progress. Consequently, shippers are empowered to adeptly oversee the reception of invoices from the freight forwarder.

2.3 Related Theories of Technology Acceptance and Use

Before the development of online-platform for freight forwarding service, it is important to assess the acceptance of users. There are a number of models which previously used in the context of information system to evaluate users' acceptance and use of technology, all of which had their origins in sociology, psychology and communications. These models are Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Model of Personal Computer Utilization (MPCU), Diffusion of Innovation (DOI), Motivational Model and Social Cognitive Theory. In regard to models that are applicable to the context of organization's technology adoption and digital innovation, only TAM, UTAUT, and DOI are reviewed in this part.

2.3.1 Theory of Technology Acceptance Model (TAM)

Davis (1989) introduced the Technology Acceptance Model (TAM) to explain computer acceptance across different technologies and user groups, emphasizing simplicity and theoretical grounding. TAM aims to track how external factors influence internal beliefs, attitudes, and intentions to improve system acceptance. It suggests that technology acceptance is determined by user intention, influenced by perceived usefulness and ease of use. TAM is widely used in various fields to assess technology adoption decisions, consisting of perceived usefulness and ease of use. TAM2 was later

developed to incorporate subjective norms and cognitive processes in explaining technology acceptance. Studies have applied TAM to understand technology adoption in organizations, such as Electronic Data Interchange (EDI). User readiness to accept technology is crucial for reaping organizational benefits. Understanding user acceptance of new technology is vital for enhancing company performance and gaining a competitive edge in the industry.

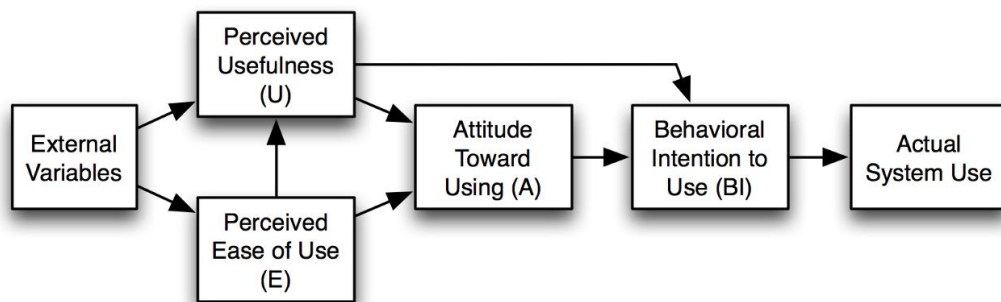


Figure 2.2 Theory of Technology Acceptance Model (TAM)

Source: Davis (1989).

Behavioral intention (BI) refers to the degree to which a student consciously intends to utilize or abstain from utilizing online learning activities (Mooya & Phiri, 2021; Lui et al., 2020). BI demonstrates a close connection to an individual's actual conduct; in essence, if there is an intention to partake in a specific behavior, the likelihood of doing so is heightened. The Technology Acceptance Model (TAM) posits that users harbor favorable attitudes towards technology when they perceive it as beneficial and user-friendly (Ikhsan, 2020). According to TAM, elevated levels of Perceived Usefulness (PU) and Perceived Ease of Use (PEU) are indicative of positive attitudes, subsequently leading to intentions to utilize (Amiruddin et al., 2021). The effective utilization of a technological system is either directly or indirectly impacted by behavioral intentions, attitudes, perceived usefulness, and perceived ease of use of the system (Verma et al., 2018).

2.3.2 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model was developed to modify the TAM model by Venkatesh et al. (2003), identifying four core determinants of technology adoption. It explains about 70% of the variance (Venkatesh et al., 2012). UTAUT is a valuable tool for assessing technology success in e-business communities (Venkatesh et al., 2012). The main determinants are Performance Expectancy, Effort Expectancy, Social Influences, and Facilitating Conditions. These variables interact and influence technology adoption (Venkatesh et al., 2012). The UTAUT model is the basis for frameworks in developed countries studying technology success drivers. Moderating variables like Gender and Age influence the key variables on intention to use and behavior. The model is derived from eight previous models and used in various technology acceptance studies (Alrawashdeh & Al-Mahadeen, 2013; Khechine et al., 2014; Oh & Yoon, 2014; Septiani et al., 2017).

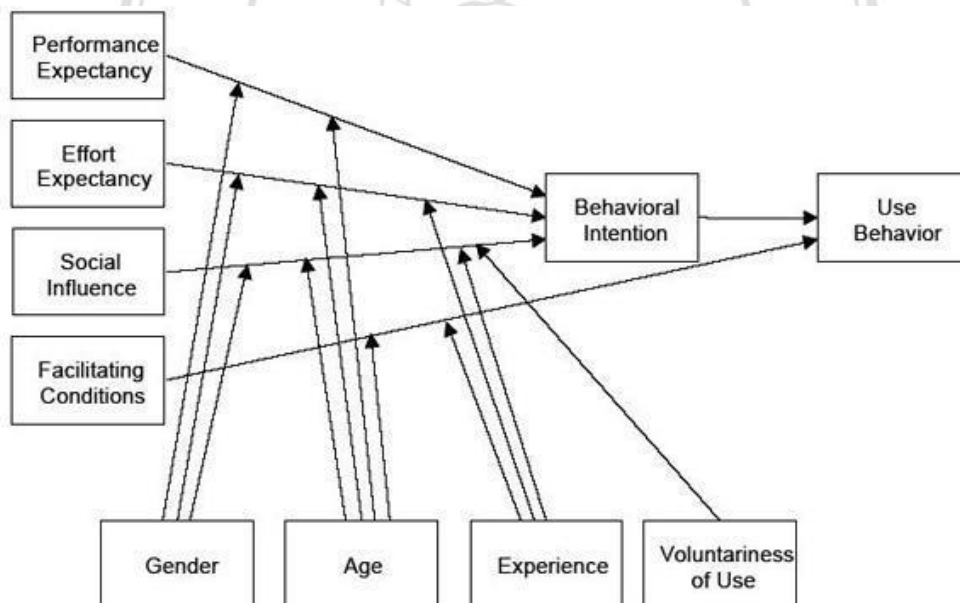


Figure 2.3 UTAUT Model

Source: Venkatesh et al. (2012)

Performance expectancy reflects the perceived benefits associated with using the technology (Venkatesh et al., 2012). According to expectancy confirmation theory, users are satisfied when their expectations are confirmed (Alrawashdeh & Al-Mahadeen, 2013, 2013). Previous research has also found the effect of perceived usefulness (similar to

performance expectancy) on satisfaction Alrawashdeh & Al-Mahadeen, 2013; Khechine et al., 2014). In addition, performance expectancy also affects continuance intention (Venkatesh et al., 2012). Effort expectancy reflects the perceived difficulty in using the technology. If users have to exert great effort to learn or master its use, they may not feel satisfied (Venkatesh et al., 2012). Thus, users may discontinue their use if the technology does not provide them with an easy-to-use interface. Previous research has shown that perceived ease of use (similar to effort expectancy) affects user satisfaction (Khechine et al., 2014) and continued use (Oh & Yoon, 2014). Social influence reflects the effect of referent opinion on individual user behavior (Septiani et al., 2017). According to social influence theory, users tend to follow the opinions of other key reviewers (Oh & Yoon, 2014). Thus, if others who are important to a user recommend that he or she use a technology, the user will follow their suggestions (Venkatesh et al., 2012). Hong et al. (2008) also found that social influence has a significant impact on intention to continue using services. Facilitating conditions mean that users have the resources and knowledge necessary to use the technology (Venkatesh et al., 2012). If users do not have these resources and knowledge, they may not continue to use the technology (Septiani et al., 2017).

2.3.3 Diffusion of Innovations Theory (DOI)

Rogers (2003) explained the process of innovation decision-making as "a cognitive endeavor focused on acquiring and processing information, driven by the individual's desire to mitigate uncertainty regarding the merits and drawbacks of an innovation" (p. 172). According to Rogers (2003), the progression of the innovation decision process comprises five distinct phases: (1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation. These phases typically unfold sequentially over time. A visual representation of this process can be observed in Figure 2.4.

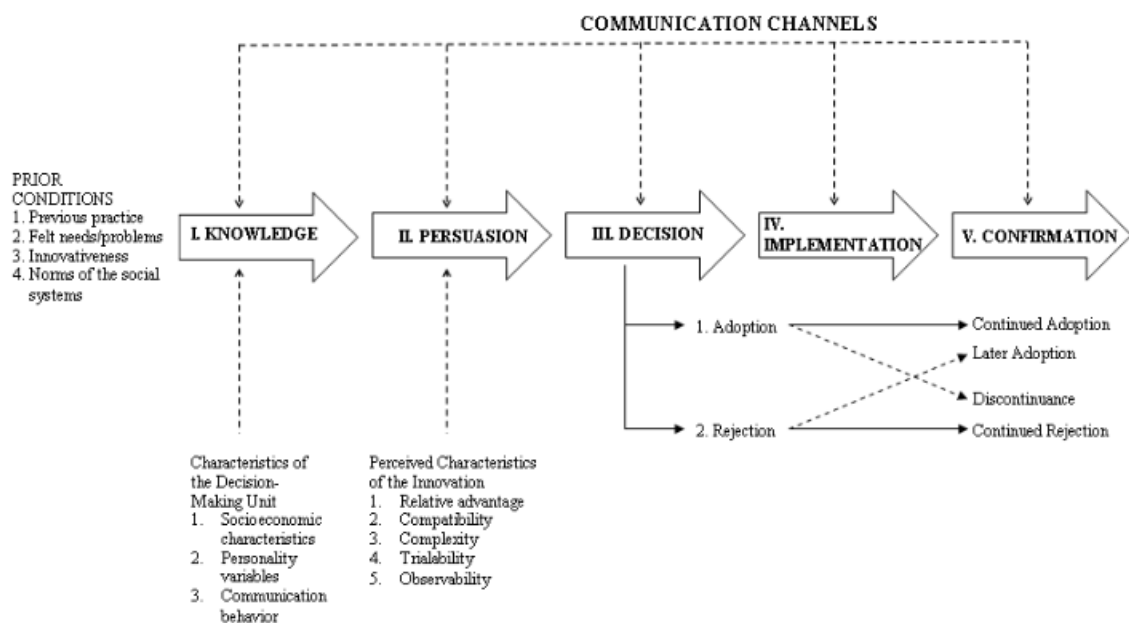


Figure 2.4 DOI Model

Source: Roger (2003)

The innovation decision process starts with the knowledge phase where an individual learns about an innovation and seeks information. Three types of knowledge are identified by Rogers (2003) as awareness, how-knowledge, and principles knowledge. Awareness-knowledge motivates individuals to learn more and potentially adopt the innovation. How-knowledge is crucial for proper usage of the innovation. Principle knowledge explains the operating principles of an innovation. Having knowledge does not guarantee adoption, as attitude also plays a role in the decision-making process.

In the persuasion phase, individuals develop attitudes towards innovation, but attitude formation does not always lead to adoption or rejection. According to Rogers (2003), attitudes are formed after learning about the innovation, following the knowledge phase. Rogers distinguishes the cognitive knowledge phase from the affective persuasion phase. During persuasion, individuals are emotionally connected to the innovation. Uncertainty and social support influence opinions about innovation. Evaluations from close colleagues reduce uncertainty and are more credible. Individuals seek evaluation information and news during decision-making (Chang & Zhu, 2012).

During the innovation decision phase, individuals decide to accept or reject the innovation. Adoption involves fully utilizing an innovation, while rejection means not adopting it (Roger, 2003). Innovations that can be partially tried are adopted more quickly

as individuals prefer to try it first. Vicarious trial speeds up the decision process, but rejection can happen at any stage. Rogers distinguishes between active rejection, where someone tries and then rejects an innovation, and passive rejection, where the person does not consider adopting it (Kim & Ko, 2019). The order of knowledge-persuasion-decision phases may change, especially in collectivist cultures like Eastern countries. The group influence can turn a personal decision into a collective decision. However, implementation always follows the decision phase (Rogers, 2003).

During implementation phase, innovations are put into practice. Innovations bring uncertainty about diffusion. Uncertainty may persist, necessitating technical assistance to reduce uncertainty. The decision process ends as innovation loses distinctiveness (Rogers, 2003). Reinvention is important during implementation, involving changes by users. Rogers differentiates between invention and innovation. Adoption of innovation is using existing ideas. More reinvention leads to faster adoption. Computers as innovations offer various possibilities and are open to reinvention (Rogers, 2003).

In the confirmation phase, the individual seeks support for their decision after it has been made. Conflicting messages can reverse the decision, leading individuals to seek supportive messages instead (Rogers, 2003). Attitude plays a significant role in this stage. Depending on support and attitude, adoption or abandonment of the innovation occurs. Abandonment can happen through replacement exit or discontinuation due to disappointment, as explained in Dibra (2015). Discontinuation may occur if the innovation does not meet the individual's needs or provide perceived advantages.

2.4 Theories Related to Technology Avoidance

2.4.1 Technology Threat Avoidance Theory (TTAT)

TTAT, as proposed by Liang and Xue (2009), suggests that how users perceive a threat influences their motivation to invoke a protective mechanism against that threat. Liang and Xue (2010) reviewed their theory by confirming the theoretical foundations and presenting their model to explain technological threat avoidance behavior. The original model includes perceptions of vulnerability, severity, threat, protective effectiveness, protective cost, self-efficacy, avoidance motivation, and avoidance behavior.

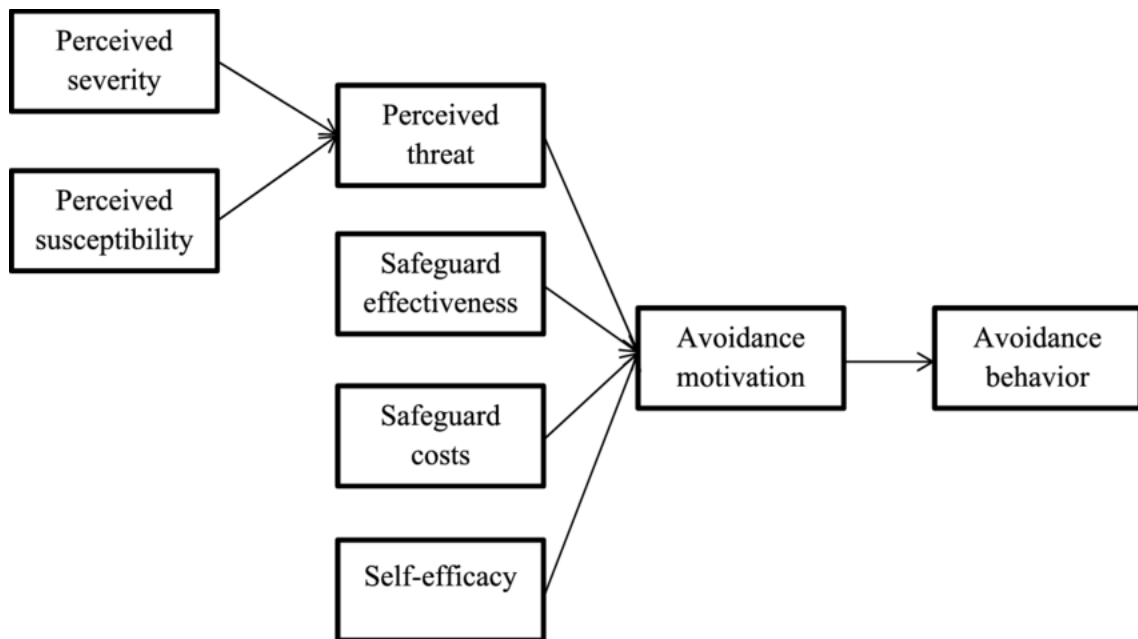


Figure 2.5 Technology Threat Avoidance Theory (TTAT)

Source: Liang and Xue (2010)

The theory of TTAT suggests that users will actively avoid a threat by using a protective measure if they believe it can work, otherwise they will use emotion-focused coping. Liang and Xue (2010) found significant associations in original TTAT testing, except for severity and vulnerability interaction. Perceived vulnerability and severity influence threat assessment, along with beliefs about protective measure effectiveness and cost, affecting motivation and avoidance behavior. The cost of protection includes physical and cognitive effort, time, money, and inconvenience. Self-efficacy in information security is the perceived ability to protect against IT threats (Ling & Xue, 2009).

2.4.2 Perceived Risk on Technology Adoption

Laroche et al. (2003) defined perceived risk as the sensation of uncertainty and its adverse repercussions, which subsequently exert an influence on the act of purchasing. Bielen and Sempels (2004) elucidated that risk embodies the extent of alteration and peril. Dowling (1986) postulated a multidimensional framework of risk encompassing physical, psychological, functional, financial, social, and temporal dimensions. Bielen and Sempels (2004) contended that the nature of the purchasing scenario significantly impacts

perceived risk. Furthermore, Bunn and Shaw-Ching Liu (1996) categorized purchasing contexts into varying risk levels, such as "purchasing support, low importance and uncertainty; frustrating situation, low importance and high uncertainty; efficiency optimization, high importance and low uncertainty; and strategic challenge, high importance and uncertainty." Laroche et al. (2003) added that the transaction of goods and services influences perceived risk, wherein intangibility and generality exhibit a positive correlation with perceived risk. Anderson et al. (2009) affirmed that vendors must effectively communicate their offerings, services, and principles, particularly in pivotal and intricate circumstances, to mitigate the risk associated with purchasing.

The concept of perceived risk has been correlated with potential financial risk in digital transactions (Im, Kim, & Han, 2008). The perceptions individuals hold regarding risk associated with a specific technology are closely linked to the adoption of said technology (Laforet & Li, 2005; Yang, 2009). The assessment of perceived risk has been identified as a crucial factor in the utilization of electronic services due to the escalating threats to financial stability with the rise in e-service usage. Various research works have highlighted the significant role of users' risk perception in the utilization of specific e-services (Alsheikh & Bojei, 2014; Chitungo & Munongo, 2013; Gu, Lee, & Suh, 2009; Hanafizadeh et al., 2014; Hassan et al., 2014; Luo et al., 2010; Venkatesh & Morris, 2003). These investigations have indicated that perceived risk has a deterring impact on users' intentions to engage with e-services. In the realm of online transactions, certain categories of risks hold significance. Risks associated with product functionality, financial uncertainties, time constraints, mental well-being, and other forms of risks are prevalent among both Internet users and online shoppers (Forsythe & Shi, 2003).

Reepu's (2022) study investigated the influence of perceived risk in e-services, with perceived risk as one of the main barriers to using e-services. The result showed that risk constructs, including privacy risk, security risk, social risk, time risk, and financial performance risk, have a negative influence on the desire to use online banking. In this study, four constructs of perceived risk are applied, namely performance risk, time risk, financial risk, and security risk. First, in the absence of individual contacts, the customer may not adequately evaluate the item's characteristics and may degrade safety in the form of asymmetry in e-service data, the probability of failure and execution not as expected and advertised, and thus the desired benefits. Second, inconvenience and time loss can

occur due to payment delays or steering efforts (finding appropriate services and hyperlinks). The time that may be involved in learning about e-service websites and the time wasted when consumers make a poor decision by spending time exploring and completing their purchases and learning to use the service only to replace it when expectations are not met (Reepu & Arora, 2022). Third, risk also includes monetary risk, which is the probability of economic loss in online purchasing. Customers sometimes pay money to correct difficult things, and therefore failure of services can result in large financial losses (Reepu & Arora, 2022). Fourth, various studies have shown that security risks related to security issues in the e-service landscape are fascinating for customers. Security ensures the confidentiality, integrity, and availability of critical information assets stored, processed, and transmitted within and between e-government domains (Karakola et al., 2009). Improving security services will promote secure services and consequently build trust among e-services users, leading to the success of e-services initiatives (West, 2004).

2.5 Related Researches

Alwahaishi and Snášel (2012) investigated a variety of theories employed in the comprehension of user adoption of novel technologies. Numerous frameworks have been devised, notably the Technology Acceptance Model, the Theory of Reasoned Action, the Theory of Planned Behavior, and most recently the Unified Theory of Acceptance and Use of Technology. Each of these frameworks has endeavored to pinpoint the determinants influencing individuals' inclination or actual utilization of information technology. Drawing upon the UTAUT and flow theory, this research introduces a novel amalgamated theoretical structure to ascertain the determinants impacting the acceptance and utilization of mobile Internet as an ICT application in a consumer setting. The suggested model encompasses eight elements, comprising of performance expectancy, effort expectancy, facilitating conditions, social influences, perceived value, perceived playfulness, attentional focus, and behavioral intention. The findings indicate that the proposed model is predominantly corroborated by the empirical evidence.

Sarfaraz (2017) conducted an investigation on the determinants of mobile banking adoption within the UTAUT framework in order to forecast the behavioral inclination

towards embracing mobile banking. The findings indicated that the performance expectancy, effort expectancy, and risk perception notably impact the users' willingness to utilize mobile banking services. Nevertheless, there were no significant associations identified for social influence and trust. The scholar proposed that the adoption of technology is also shaped by various factors that fall beyond the scope of this particular study.

Moghavvemi et al. (2013) conducted an analysis on the individual inclinations towards the adoption and utilization of information technology. Within this sphere, the UTAUT model emerges as a prominent theory, albeit with specific constraints, notably in terms of the discrepancies between intention and action. In order to confront this disparity within the UTAUT model and enhance its efficacy, a comprehensive evaluation was undertaken, juxtaposing it with the Entrepreneurial Potential Model (EPM). This comparison aimed to formulate a fresh framework amalgamating components from both theories to encompass the diverse facets of IT adoption conduct. The findings indicate that this novel model alleviates the restrictions stemming from the UTAUT, particularly in its capacity for prediction, while concurrently diminishing the 'distal nature' existing between intent and utilization behavior.

Lee and Song (2013) conducted a study on the impact of trust and perceived risk on the adoption of a novel technological service by users. The scholars employed the UTAUT model within the novel context of the Certified e-Document Authority (CeDA) service implemented in the Republic of Korea. The outcomes of the structural equation modeling predominantly upheld the propositions posited, indicating that trust and perceived risk directly influence the intention to utilize the service, with trust also playing an indirect role. Moreover, it was revealed that performance expectancy and social influence have a positive effect on behavioral intention, and that effort expectancy impacts performance expectancy. The amalgamation of trust, perceived risk, performance expectancy, effort expectancy, and social influence accounted for 55.3% of the variability observed in users' intention to use CeDA services.

Abrahão et al. (2016) conducted a study on the intention of current Brazilian cell phone consumers to embrace a forthcoming mobile payment service within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT). Through the application of structural equation modeling, the study revealed that 76% of

the variance in behavioral intentions could be accounted for by factors such as performance expectancy, effort expectancy, social influence, and perceived risk. Interestingly, perceived cost was determined to lack statistical significance at the conventional 5% significance level. This outcome offers valuable insights for stakeholders in the payment market, suggesting the importance of developing a robust, user-friendly, and secure mobile payment platform that not only stimulates social engagement among individuals but also does so at a reasonable cost, thereby aligning with the demands and anticipations of contemporary cell phone users.

Monilakshmane and Rajeswari (2018) conducted an investigation into the impact of perceived risk on the acceptance of a mobile application designed for financial service utilization. The research utilized the established Unified Theory of Acceptance and Use of Technology (UTAUT) model as its framework. The inclusion of perceived risk (PR) as an additional construct in the UTAUT model was a key aspect of this study. Results indicated that performance expectancy (PE), social influence (SI), and facilitating conditions (FC) exhibited a strong positive and significant effect on the behavioral intention to utilize mobile applications for financial transactions. Conversely, effort expectancy (EE) and perceived risk (PR) were found to have an insignificant impact on behavioral intention. The proposed model successfully accounted for 62.7 percent of the variability in behavioral intentions concerning the adoption of mobile applications for financial services.

Boonsiritomachai and Pitchayadejanant (2017) conducted a study on the factors influencing the behavioral intention of Generation Y individuals to embrace mobile banking. By integrating the UTAUT and TAM frameworks into their theoretical model, the researchers proposed an enhanced model to enhance the comprehension of mobile banking adoption. The findings of the analysis indicated a strong alignment between the revised model and the uptake of mobile banking among Generation Y users. This revised model was employed to elucidate the patterns of mobile banking adoption. Furthermore, the researchers identified hedonic motivation as the primary driver inspiring customers to adopt mobile banking, while the perceived security of the mobile banking platform exhibited an inverse association with hedonic motivation.

Gbongli et al. (2019) examined mobile-based money services in developing countries like Togo. They modified the technology acceptance model (TAM) by adding

self-efficacy, technology anxiety, and personal innovativeness. The study revealed that perceived ease of use is a key factor affecting consumers' views on mobile money. Consumer attitudes and intentions were closely linked to TAM, but self-efficacy and technology anxiety had varied outcomes.



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Table 2.1 Review of Factors Affecting the Acceptance of Online-Based Freight Forwarding Service

Authors	Objective	Tool	PE / PU	EE/ PEU	FC	SI	PP / HM	PV	AF	IF / OF	PR/ TA	TR	PF / SE	PD	PA	PC	SR	PI
Alwahaishi and Snášel (2012)	To identify the factors affecting the acceptance and use of an ICT application	Modified UTAT	X	X	X	X	X	X	X	X								
Sarfaraz (2017)	To examine the drivers of mobile banking adoption within the framework of UTAUT model.	Modified UTAT	X	X		X					X	X						
Moghavve mi et al. (2013)	To explore technology adoption and use behavior of innovations by entrepreneurs by empirically validating the new model (TADU) in a technology acceptance context.	Modified UTAT	X	X	X	X							X	X	X			
Lee and Song (2013)	To explore the precise impacts of trust and perceived risk on the core constructs of the UTAUT.	Modified UTAT	X	X		X					X	X						
Abrahão et al. (2016)	To evaluate the intention of adopting a future mobile payment service based on UTAUT.	UTAUT	X	X		X					X					x		

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Authors	Objective	Tool	PE / PU	EE/ PEU	FC	SI	PP / HM	PV	AF	IF / OF	PR/ TA	TR	PF / SE	PD	PA	PC	SR	PI
Monilaksh mane and Rajeswari (2018)	To examine the influence of perceived risk on the adoption of a mobile application with the use of UTAUT.	UTAUT	X	X	X	X					X							
Boonsirito machai and Pitchayadej anant (2017)	To explore the determinants of behavioral intention to adopt mobile banking based on the UTAUT and TAM in this study.	UTAUT TAM	X	X	X	X	X						X				X	
Gbongli et al. (2019)	To investigate the adoption of mobile-based services	TAM	X	X							X		X					X
Trigo et al. (2015)	To investigate influence of firm size on the adoption of the main enterprise information systems (EIS) types.	User characteristics								X								

List of independent variables in Table 2.1

PE = Performance Expectancy

PU = Perceived usefulness

EE = Effort Expectancy

PEU = Perceived ease of use

FC = Facilitating Condition

SI = Social Influence

PP = Perceived Playfulness

HM = Hedonic motivation

PV = Perceived Value

AF = Attention Focus

IF = Individual factors (Gender, Age)

OF = Organizational factors (firm size, industry)

PR = Perceived Risk

TA = Technology Anxiety

TR = Trust

PF = Perceived Feasibility

SE = Self efficacy

PD = Perceived Desirability

PA = Propensity to Act

PC = Perceived cost

SR = Security Risk

PI = Personal innovativeness



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2.6 Conceptual Framework

This research extended UTAUT model through integrated DOI and perceived risk to investigate the factors influencing the intention to use online-based freight forwarding service. The conceptual model determined the important pathways of factors affecting the adoption intention and actual use of online-based freight forwarding platform with direct and indirect effects based on theoretical justifications as described in this section. This research focuses on estimating causal effects through the study of path relations in order to understand direct and indirect pathways, in which all pathways are linear, positive or negative relations, and one-way directions between exogenous variables and endogenous variables.

2.6.1 Relationship Between Performance Expectancy and Adoption Intention

Performance expectancy reflects the perceived benefits associated with using the technology (Venkatesh et al., 2003). According to expectancy confirmation theory, users are satisfied when their expectations are confirmed (Bhattacharjee, 2001). Previous researches have found the effect of perceived usefulness (similar to performance expectancy) on the intention to use technological systems (Alalwan, 2020; Alam et al., 2020; Al-Saedi et al., 2020; Raza et al., 2021; Tam et al., 2020). Alwahaishi and Snášel (2012) investigated the factors that influence the acceptance and use of the mobile Internet as an ICT application in a consumer context. The results suggest that performance expectancy is largely supported by the empirical data. Sarfaraz (2017) examined the drivers of mobile banking adoption within the UTAUT model to predict the behavioral intention to adopt mobile banking. The results showed that performance expectancy, effort expectancy, and risk perception significantly influence users' intention to use mobile banking services.

2.6.2 Relationship Between Effort Expectancy and Adoption Intention

Effort expectancy reflects the perceived difficulty in using the technology. If users have to exert great effort to learn or master its use, they may not feel satisfied (Venkatesh et al., 2003). Thus, users may discontinue their use if the technology does not provide them with an easy-to-use interface. Previous researches have shown that perceived ease of use (similar to effort expectancy) affects the intention to use technological systems

(Abbad, 2021; Beh et al., 2021; Queiroz et al., 2021). The study of Alwahaishi and Snášel (2012) and Sarfaraz (2017) also confirmed that effort expectancy significantly influences users' intention to use ICT technologies.

2.6.3 Relationship Between Social Influence and Adoption Intention

Social influence reflects the effect of referent opinion on individual user behavior (Zhou, 2011). According to social influence theory, users tend to follow the opinions of other key reviewers (Bagozzi and Lee, 2002). Thus, if others who are important to a user recommend that he or she use a technology, the user will follow their suggestions (Venkatesh et al., 2003). The significance of social influence on the intention to use technological services or new technologies has been from in a number of previous researches (Kamal et al., 2020; Patil et al., 2020; Raza et al., 2021; Zhao and Bacao, 2020).

2.6.4 Relationship Between Perceived risk and Adoption Intention

Laroche et al. (2003) defined perceived risk as uncertainty causing negative impact on purchase. Bielen and Sempels (2004) linked risk to change and danger. Several studies support perceived risk influencing adoption of new technologies (Alalwan et al., 2018; Giovanis et al., 2019; Kaur, & Arora, 2020). Lee and Song (2013) examined trust and perceived risk effects on new technology adoption. UTAUT model was applied to the CeDA service in Korea, finding trust and perceived risk directly affecting intention to use. Abrahão et al. (2016) explored mobile payment adoption intention in Brazil using UTAUT, showing behavioral intentions explained by various factors including perceived risk.

2.6.5 Relationship Between Organizational size and Technology Adoption

Previous research indicates a link between IT/IS adoption and firm size. Firm size correlates positively with IT/IS implementation, especially seen in ERP adoption by medium and large firms. Large companies invest more in technology for competitive advantage, while smaller firms innovate quickly. Trigo et al. (2015) studied how firm size affects adoption of enterprise information systems (EIS). The study found that firm size

impacts adoption of EIS types like business intelligence and workflow management systems.

2.6.6 Relationship Between User generation and Technology Adoption

Moderating variables such as age, experience, and voluntariness of use are posited to exert an influence on the determinants of both intention to use and behavior (Venkatesh et al., 2003). The influence of age or user generation in moderating the relationships between performance expectancy (PE), effort expectancy (EE), social influence (SI), and the ensuing construct of behavioral intention has been demonstrated in studies by Lu, Yu, & Liu (2009) and Venkatesh et al. (2003). Specifically, it was found that the impact of performance expectancy on intentions was more pronounced among younger individuals, while the effects of effort expectancy and social influence were more prominent among older individuals (Venkatesh et al., 2003). Research conducted by Khechine et al. (2015) delved into the factors elucidating the acceptance of a webinar system and revealed that age as a variable played a moderating role in shaping the intention to adopt technology.

2.6.7 Relationship Between Facilitating condition and Adoption Intention

Facilitating conditions mean that users have the resources and knowledge necessary to use the technology (Venkatesh et al., 2003). If users do not have these resources and knowledge, they may not continue to use the technology (Zhou, 2011). Alwahaishi and Snášel (2012) investigated the factors that influence the acceptance and use of the mobile Internet as an ICT application in a consumer context. The results suggest that facilitating condition is largely supported by the empirical data. Monilakshmane and Rajeswari (2018) studied the influence of the perceived risk factor on the acceptance of a mobile application for the use of financial services. This study found that facilitating conditions together with performance expectancy, and social influence had a strong positive and significant influence on behavioral intention to use mobile apps for financial transactions.

2.6.8 Relationship Between Facilitating Conditions and Actual Use of Technology

Facilitating conditions are defined as one's belief that an organizational and technical infrastructure exists to support the system (Al-Gahtani 2007). Alalwan et al. (2018) found similar results to Venkatesh et al. (2003), maintaining that there is a statistically significant relationship between facilitating conditions and actual use of Internet banking. This is similar to some of the facilities needed to adopt e-services (Miladinovic & Xiang, 2016). Alawadhi and Morris (2009) found a significant effect of facilitating conditions on the actual use of e-gov service.

2.6.9 Relationship Between Adoption Intention and Actual Use of Technology

Due to its substantial correlation with behavior, numerous research endeavors incorporating intentions into their theoretical framework opt to assess behavioral intentions instead of the more intricate task of measuring behavior. The discourse posits that intentions present a more reliable forecast of behavior compared to alternative cognitive elements (e.g., perceived usefulness, perceived ease of use) and affective elements (e.g., attitudes, norms, self-efficacy, risk perceptions, severity perceptions, and personality). This assertion finds reinforcement in various other scholarly works (Chiaburu et al., 2011; McEachan et al., 2011).

After reviewing the theoretical justification of factors affecting the adoption intention of technology, the conceptual model and research hypotheses were developed based on the ground theories, as seen in the Figure 2.6 below.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
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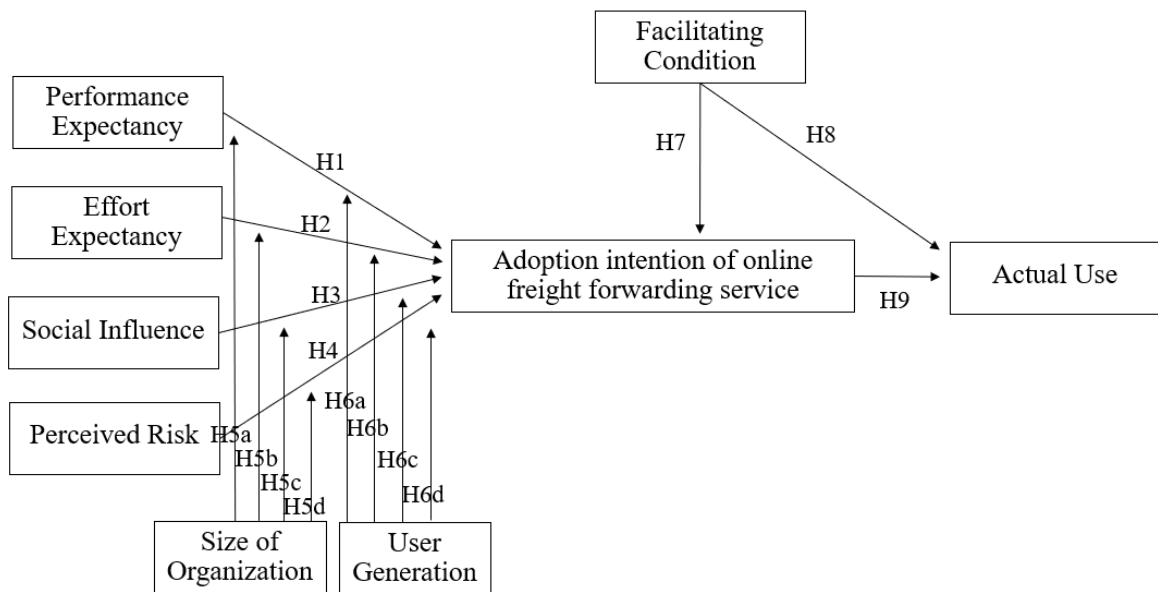


Figure 2.6 Conceptual Model

Source: Modified from UTAUT Model

H1: Performance expectancy has a significant effect on the adoption intention of online freight forwarding service

H2: Effort expectancy has a significant effect on the adoption intention of online freight forwarding service

H3: Social influence has a significant effect on the adoption intention of online freight forwarding service

H4: Perceived risk has a significant effect on the adoption intention of online freight forwarding service

H5a: The effect of performance expectancy on the adoption intention is moderated by size of organization.

H5b: The effect of effort expectancy on the adoption intention is moderated by size of organization.

H5c: The effect of social influence on the adoption intention is moderated by size of organization.

H5d: The effect of perceived risk on the adoption intention is moderated by size of organization.

H6a: The effect of performance expectancy on the adoption intention is moderated by user generation.

H6b: The effect of effort expectancy on the adoption intention is moderated by user generation.

H6c: The effect of social influence on the adoption intention is moderated by user generation.

H6d: The effect of perceived risk on the adoption intention is moderated by user generation.

H7: Facilitating condition has a significant effect on the adoption intention of online freight forwarding service

H8: Facilitating condition has a significant effect on the actual use of online freight forwarding service

H9: The adoption intention of online freight forwarding service has a significant effect on the actual use of the service

CHAPTER 3

RESEARCH METHODOLOGY

To achieve the objective of this study, a quantitative methodological approach is used. The study is deductive in nature, that is, the research hypothesis is established based on the theoretical framework and previous empirical studies in order to prove the theories and extend the existing ones

The questionnaire is designed and developed as a research instrument in quantitative research to collect the data from purposive samples in which the questions and constructs of variables from those used in the previous researches in the related field were applied

The research population consists of business customers of freight forwarding services in Thailand that have used the service to import or export goods. These may be manufacturing companies, exporters, and distributors in the Thai market. The purposive sampling method is used in this research to collect data from the customer base of a selected freight forwarding company, including existing customers and potential customers. The contacted individuals of these business customers at the level of supervisors or higher in their organizations are invited to participate in this study

The data will be further processed in SPSS statistical analysis software version 26. Descriptive statistics, Structural Equation Modeling (SEM) analysis was conducted for hypothesis testing on AMOS with two-step approach analysis guided by Henseler et al., (2009) comprising of Measurement Model Assessment and Structural Model Assessment.

3.1 Sampling and Data Collection Methods

Quantitative research is applied to collect data from existing customers and potential customers of freight forwarding companies among freight forwarding associations in Thailand. The survey method is chosen as the research technique because it allows to reach a large number of respondents

The freight forwarding companies are invited to participate in this research by distributing the online questionnaire and sharing the link with their customers and potential customers. Therefore, this research adopts the purposive sampling method to collect the data from the customer base of these trucking companies, including the existing and potential customers. The contacted individuals of these business customers will be invited to participate in this study. The data will be collected using an online questionnaire on Google Forms to account for convenience.

Using the stratified sampling procedure for the first phase was helpful to divide business customers of freight forwarder companies into the stratification of the already existing sectors, which were manufacturing, transportation, warehousing, cold storage, and trading. This procedure was to ensure a uniform representativeness of all sectors of business customers using freight forwarding services, as well as to avoid potential biases in selecting samples. The respondents were person in charge in these organizations. From each sector of business customers, respondents were conveniently selected based on the accessibility of researcher and their willingness to participate in this study.

Statistical accuracy is a function of the sample size. The larger the sample size, the greater the statistical accuracy of the results. However, a sample size of 400 has been widely recognized and applied across fields of research given its statistical accuracy of $\pm 5\%$ and is often thought of as the most cost-effective sample size (Creswell, 2003). Kline (2011) suggested a minimum of 200 samples in the application of structural equation modeling within research. Moreover, a relationship exists between the sample size and the parameters, as indicated by Hair et al. (2011) proposing a ratio of 5 to 10 respondents per parameter. With this study involving 26 parameters, the suggested sample size ranges from approximately 130 to 260 individuals. Further, the selection of the sample size was influenced by the inferential statistical principles outlined by Comrey and Lee (1992). Their guidelines specify that a sample size below 50 respondents is considered inadequate, while 100 is still insufficient, 200 is satisfactory, 300 is commendable, 500 is highly commendable, and 1000 is outstanding. Hence, a sample size of 400 respondents was deemed appropriate to ensure a high degree of accuracy in the research findings.

3.2 Measurement Instrument Development

The online questionnaire on Google Forms is developed by the researcher as a research tool for data collection, which was considered suitable to reach large geographical areas, and as a cost-effective method. In this study, the questionnaire consists of two main parts: Part I: Demographic information and usage experience; and Part II: Attitude assessment of variables. There are two main types of questions, namely multiple-choice questions and five-point Likert scale questions. In this research, the multiple-choice questions allow respondents to choose the answer that most closely matches their opinion or reality. Meanwhile, the five-point Likert scale is used to measure the variables, where each respondent was asked to rate their level of agreement with the constructs of the variables under study from 1 "strongly disagree" to 5 "strongly agree", with the questions of the scale adopted from previous studies

Table 2.2 Scale of Measurement

Factor	Measurement	Sources
Performance Expectancy (PE)	PE1 Using an online platform of freight forwarding service will improve our performance in the logistics than paper-based processes.	Venkatesh et al., 2003; Bhattacharjee, 2001;
	PE2 Using an online platform of freight forwarding service enables us to accomplish our logistics activities more quickly.	Lee et al., 2007
	PE3 Using an online platform of freight forwarding service improves the quality of logistics activities.	
	PE4 Using an online platform of freight forwarding service makes our logistics activities easier.	
	PE5 Using an online platform of freight forwarding service enhances our effectiveness in our logistics activities.	

Table 2.2 (Continued)

Factor	Measurement	Sources
Effort Expectancy (EE)	<p>EE1: The interaction with an online platform of freight forwarding service would be clear and understandable.</p> <p>EE2: It would be easy for us to become skillful at using an online platform of freight forwarding service in our business.</p> <p>EE3: Learning to operate an online platform of freight forwarding service is easy for our staffs.</p> <p>EE4: An online platform of freight forwarding service is compatible with our company.</p>	<p>Venkatesh et al., 2003;</p> <p>Bhattacharjee, 2001;</p> <p>Lee et al., 2007</p>
Social Influence (SI)	<p>SI1: Top management of our company believe that we should use an online platform of freight forwarding service for digital transformation.</p> <p>SI2: Involved staffs in freight booking believe that we should use an online platform of freight forwarding service through relying more on digitized documents instead</p> <p>SI3: Using an online platform of freight forwarding service is commercially satisfaction-enhancing for supply chain partners/customers.</p>	<p>Venkatesh et al., 2003;</p> <p>Bhattacharjee, 2001;</p> <p>Lee et al., 2007</p>
Perceived Risk (PR)	<p>PR1: Using digital or paperless documents through an online platform of freight forwarding service causes a possible loss of important information of our company.</p> <p>PR2: Using an online platform of freight forwarding service causes a possible loss of time for our staffs than traditional process.</p> <p>PR3: Using an online platform of freight forwarding service causes the possible loss of performance accuracy.</p> <p>PR4: Using an online platform of freight forwarding service causes the possible loss of money to train staffs.</p>	<p>Laforet & Li, 2005;</p> <p>Yang, 2009</p>

Table 2.2 (Continued)

Factor	Measurement	Sources
	PR5: Using an online platform of freight forwarding service causes the possible loss of cooperation between our company and the freight forwarder.	
Facilitating Conditions (FC)	FC1: Our company has IT facilities necessary to use an online platform of freight forwarding service. FC2: Our company has knowledge necessary to use an online platform of freight forwarding service. FC3 A technical person is available online for assistance with difficulties in using an online platform of freight forwarding service.	Venkatesh et al., 2003; Bhattacharjee, 2001; Lee et al., 2007
Intention to Use (IU)	IU1: I predict our company would use an online platform of freight forwarding service, if it is available in the market. IU2: Our company will have very seriously thought of using an online platform of freight forwarding service in the near future. IU3: Our company have a plan to use an online platform of freight forwarding service for digital transformation.	Hameed & Counsell, 2014
Actual Use (AU)	AU1: Our company is ready to use an online platform of freight forwarding service as important step toward digital transformation in our company. AU2: Our company use an online platform of freight forwarding service to partially or fully substitute traditional freight forwarding service. AU3: Our company use an online platform of freight forwarding service to manage logistics.	Goodhue & Thompson, 1995

3.3 Validity and Reliability of Research Instrument

To ensure that the research instrument (survey questionnaire) uses for data collection is accurate and reliable, the content validity and reliability testing will be performed as follows;

3.3.1 Content Validity Testing

To determine the accuracy of the content validity in this research, three experts (comprised of one academic staff and two managerial staffs from a selected freight forwarding company) were invited to review the developed questionnaire. Each of the experts provides his/her evaluation score regarding the congruence of questions toward research objectives, appropriation of content, the understanding of questions and languages used in the developed questionnaire. The scores are collected and used to calculate index objective congruence (IOC) by applied following formula.

$$IOC = \frac{\sum r}{N}$$

Where IOC is index of item objective congruence

r = evaluation score from each of experts

n = the number of experts

The content validity scores criteria are depicted in Table 3.1

Table 3.1 The content validity scores criteria

CV scores	Criterion
+1	The question is in line with the research objectives.
-1	The question does not correspond to the objectives of the research.
0	Not sure if the question is in line with the research objectives whether or not.

The interpretation of IOC values from a group of experts are shown in Table 3.2 below.

Table 3.2 The interpretation of IOC values

IOC value	Criterion
$IOC \geq 0.5$	The question is in line with the research objectives.
$IOC < 0.5$	The question does not correspond to the objectives of the research then it needs to be improved.

The questions used in the questionnaire were required to have IOC scores of more than 0.5 for the further use in the pilot testing.

Experts participated in examining the questions used were the President of Thai International Freight Forwarders Association (TIFFA), the Chairman of Thai National Shippers' Council (TNSC), and the President of Thai Authorized Customs Brokers Association (TACBA) during February 22-24, 2024. The results of experts' opinion are demonstrated in Table 3.3 below.

Table 3.3 Results of IOC Testing

	Expert 1	Expert 2	Expert 3	IOC Score
Q 1	1	1	1	1.00
Q 2	0	1	1	0.67
Q 3	1	1	1	1.00
Q 4	1	1	1	1.00
Q 5	1	1	1	1.00
Q 6	1	1	1	1.00
Q 7	1	1	1	1.00
Q 8	1	1	1	1.00
Q 9	0	1	1	0.67
Q 10	1	1	1	1.00
Q 11	1	1	1	1.00
Q 12	1	1	1	1.00
Q 13	1	1	1	1.00
Q 14	1	1	1	1.00
Q 15	1	1	1	1.00
Q 16	1	1	1	1.00
Q 17	1	1	1	1.00
Q 18	1	1	1	1.00
Q 19	1	1	1	1.00
Q 20	1	1	1	1.00
Q 21	1	1	1	1.00
Q 22	1	1	1	1.00
Q 23	0	1	1	0.67
Q 24	0	1	1	0.67
Q 25	1	1	1	1.00
Q 26	0	1	1	0.67
				0.94

From Table 3.3, the results showed the IOC values of greater than 0.5 for all questions, indicating that all questions were in line with the research objectives and thus all of them were used in the questionnaire.

3.3.2 Reliability Testing

To measure the consistency of questions in developed questionnaire, the reliability testing is conducted. The convenience sampling of questionnaire was chosen to be used for pre-test with 30 samples. The statistical method by using Cronbach's alpha coefficient (α) is used to measure the questionnaire reliability. The Cronbach's alpha coefficient is computed as following equation.

$$(\alpha) = \frac{n}{n-1} \left[1 - \frac{\sum S_i^2}{S_x^2} \right]$$

Where:

α = the reliability value of questionnaire

n = the number of questions

S_i^2 = the variance of score for each question

S_x^2 = the total variance of scores

If the α coefficient value is greater than 0.7 is interpreted that the questionnaire is reliable.

However, Bagozzi and Yi (2012) recommended that Cronbach's alpha is considered either less accurate or inappropriate decision aiding in the structural equation context, in which Confirmatory Factor Analysis (CFA) has been widely recognized and recommended for examining construct validity. According to Hair et al. (2011), the utilization of CFA to examine the construct validity of research instruments adds a level of statistical accuracy as well as the development of abbreviated forms of a research instrument or confirmation of their possible sub-domains. The standardized factor loadings is recommended for the cut-off value of 0.50. In addition, Average Variance Extracted (AVE) has been recommended as a criterion to investigate a measurement model, representing the average amount of variance in observed variables that a latent construct is capable to explain" (Bove et al., 2009). It is usually recommended that all latent factors should have an AVE of at least 0.5 where the value of less than 0.5 is

considered questionable because of more than 50% error remains in the observed variables (Bove et al., 2009). Similarly, the composite reliability, which is basically the variance due to the factor divided by the composite's total variance, is recommended for the cut-off value of 0.7 (Hair et al., 2011).

3.4 Data Analysis

3.4.1 Descriptive Statistics

Firstly, descriptive analysis was used to summarize and present the data in terms of frequency, percentage, mean, and standard deviation. The descriptive results of sample profiles were presented to understand the characteristics of respondents. To demonstrate the results of the five-point Likert Scale questions, the number of classes for interval score were predetermined to 5 classes. Then, the range of score can be computed as follows.

$$\begin{aligned} \text{Range} &= (\text{Maximum Score} - \text{Minimum Score}) / \text{Number of classes} \\ &= (5-1) / 5 \\ &= 0.8 \end{aligned}$$

The evaluation criteria for rating scores are interpreted and presented in Table 3.4.

Table 3.4 The interpretation of the evaluation criteria for rating scores

Interval of score	Interpretation of rating score level
$4.21 \leq \bar{x} \leq 5.00$	Respondents strongly agree/highly satisfied
$3.41 \leq \bar{x} \leq 4.20$	Respondents agree/satisfied
$2.61 \leq \bar{x} \leq 3.40$	Respondents judge Neutral
$1.80 \leq \bar{x} \leq 2.60$	Respondents disagree/dissatisfied
$1.00 \leq \bar{x} \leq 1.80$	Respondents strongly disagree/highly dissatisfied

3.4.2 Hypothesis Testing

This research conducted the statistical analysis to estimate causal effects through examining path relations in order to understand direct and indirect pathways, in which all pathways are linear, positive or negative relations, and one-way directions between exogenous variables and endogenous variables. Inferential Statistical Analysis is used for statistical hypothesis testing in accordance with the proposed conceptual framework

with the use of structural equation modeling (SEM). SEM is a statistical method estimating parameters for simultaneous equations. It includes regression, pathway analysis, factor analysis, econometric equations, and growth curve models. It is used in research to test fit of a causal model by estimating linear equations system. First step involves visualizing hypothesized model with a path diagram. Rectangles in path diagrams represent observed variables, while circles/ovals represent unobserved constructs defined by variables.

In this research, SEM is used to estimate a system of linear equations to test the fit of a hypothesized “causal” model with 2 steps approach consisting of accessing model fitness and path coefficient analysis with the use of IBM SPSS + AMOS version 26. The research adopted the statistics of model fitness for accessing model fitness through using the value of Relative chi-square (CMIN/degree of freedom), Root mean square error of approximation (RMSEA), Standardized root mean square residual (SRMR), Non-normed fit index (NNFI) or Tucker-Lewis index (TLI), and Comparative fit index (CFI). The cut-off value and interpretation are demonstrated in Table 3.5 below.

Table 3.5 Interpretation of Model Fit

Fit Statistics	Cut-off	Reference
Relative chi-square (CMIN/degree of freedom)	the value is ≤ 5 indicates a reasonable fit	Marsh & Hocevar (1985)
Root mean square error of approximation (RMSEA)	< 0.05 good fit 0.05-0.08 fair fit 0.08-0.10 mediocre fit >0.10 poor fit	MacCullum et al. (1996); Hu & Bentler (1999)
Standardized root mean square residual (SRMR)	< 0.05	Hu & Bentler (1999)
Non-normed fit index (NNFI) or Tucker-Lewis index (TLI)	0 = poor fit; close to 1 = very good fit	Byrne (1994)
Comparative fit index (CFI)	0 = poor fit; close to 1 = very good fit	Hu & Bentler (1999)

CHAPTER 4

RESEARCH ANALYSIS AND RESULTS

This chapter is to demonstrate the research analysis and results. The descriptive results of sample profiles were presented to understand the characteristics of respondents. The descriptive statistics were also used to present the respondents' level of agreement toward constructs and variables. Further, the results from SEM analysis were shown to answer the research questions about the influence of factors affecting the adoption intention and actual use of online-based freight forwarding platform.

4.1 Background of Respondents and Demographic Profiles

The data was collected from 400 respondents from 400 companies. Of 400, all these companies had recently used freight forwarding service over the past three months (100%). On average, the majority of them shipped about 5 – 20 containers per month, which accounted for 35% of them. There were 100 companies (25%) who shipped less than 5 containers a month; 84 companies (21%) shipped about 21 - 50 containers a month; and another 76 companies (19%) shipped over 50 containers a month.

Table 4.1 Company's Freight Use

	Frequency (n)	Percent (%)
Current Use of freight forwarding service		
Yes	400	100.0
Average shipment		
Less than 5 containers a month	100	25.0
5 –20 containers a month	140	35.0
21 –50 containers a month	84	21.0
More than 50 containers a month	76	19.0

Classified by the size of business operation based on average revenue per annum, the majority of them for 181 companies or 45.3% were classified as Small-sized business

with the total revenue of less than THB 50 million per year; followed by 35.5% Medium-sized business (THB 51 - 300 million / year), and 19.3% Large-sized business (more than THB 300 million / year).

Table 4.2 Size of Company

	Frequency (n)	Percent (%)
Business size by revenue		
Small (less than THB 50 million / year)	181	45.3
Medium (THB 51 - 300 million / year)	142	35.5
Large (more than THB 300 million / year)	77	19.3

All respondents were a person in charge of selecting a freight forwarder for their companies' importing and exporting. There were 173 persons (43.3%) who were Import / Export manager; 142 persons (35.5%) were Logistics manger; 26 persons (7.3%) were Chief Operating Officer or Managing Director; and another 56 persons (14%) were in the management level or equivalent.

Table 4.3 Respondents' Position

	Frequency (n)	Percent (%)
Position		
Chief/Managing Director	29	7.3
Import / Export manager	173	43.3
Logistics Manager	142	35.5
Other management level or equivalent)	56	14.0

Age of respondents ranged from 27 to 57 years old; which were categorized into three different age groups, comprising of 61 persons (15.3%) who were considered in the age group of Generation X (over 43 years old); 262 persons (65.5%) who were considered in the age group of Generation Y (between 30 - 43 years old); and another 77 persons (19.3%) who were considered in the age group of Generation Z (29 years old or less).

Table 4.4 Respondents' Age Group

	Frequency (n)	Percent (%)
Age Group		
Gen X (over 43 years old)	61	15.3
Gen Y or Millennials (30 – 43 years old)	262	65.5
Gen Z (29 years old or less)	77	19.3

4.2 Descriptive Statistics of Variables

There were seven variables in this study. The interpretation of mean scores for each item were divided by 5 classes of Likert scales equal to 0.8 for each level, as suggested in Salkind (2006).

Table 4.5 Descriptive Results of Variables

	Mean	Std. Deviation	Mean Interpretation	Skewness	Kurtosis
PE1	3.96	0.678	Agree	-.291	.115
PE2	3.97	0.705	Agree	-.299	-.061
PE3	3.96	0.778	Agree	-.477	-.037
PE4	3.95	0.810	Agree	-.452	-.256
PE5	3.99	0.771	Agree	-.317	-.461
Performance Expectancy (PE)	3.97	0.603	High	-.947	.165
EE1	4.06	0.786	Agree	-.697	.328
EE2	4.09	0.701	Agree	-.298	-.362
EE3	4.08	0.762	Agree	-.742	.607
EE4	4.03	0.665	Agree	-.088	-.565
Effort Expectancy (EE)	4.06	0.568	High	-1.077	1.008
SI1	4.04	0.650	Agree	-.477	.852
SI2	3.99	0.761	Agree	-.357	-.109
SI3	4.03	0.791	Agree	-.746	.482
Social Influence (SI)	4.02	0.591	High	-1.162	1.205
PR1*	3.61	0.851	Agree	-.727	1.004
PR2*	3.74	0.819	Agree	-.080	-.616
PR3*	3.99	0.883	Agree	-.415	-.739

Table 4.5 (Continued)

	Mean	Std. Deviation	Mean Interpretation	Skewness	Kurtosis
PR4*	3.70	0.716	Agree	-.379	.076
PR5*	3.64	0.733	Agree	-.273	-.124
Reverse of Perceived Risk (PR) → Perceived Risk Free	3.73	0.658	High	-.661	.262
FC1	3.99	0.629	Agree	-.296	.496
FC2	4.06	0.669	Agree	-.366	.251
FC3	3.96	0.747	Agree	-.629	.526
Facilitating Conditions (FC)	4.00	0.544	High Favourableness	-.971	.998
IU1	4.04	0.582	Agree	-.156	.529
IU2	4.05	0.694	Agree	-.297	-.184
IU3	4.10	0.623	Agree	-.198	.037
Intention to Use Online-based Freight Forwarding (IU)	4.07	0.537	High	-.711	.202
AU1	3.75	0.589	Agree	-.691	.927
AU2	3.75	0.588	Agree	-.914	1.257
AU3	3.73	0.633	Agree	-1.013	1.217
Actual Use (AU)	3.74	0.510	High	-1.393	1.392

Note: * Recode from 5 to 1; 4 to 2; 2 to 4; and 1 to 5

For PE, the statement with the highest level of agreement was “PE5; Using an online platform of freight forwarding service enhances our effectiveness in our logistics activities. (mean = 3.99, SD = 0.771), and the item with the lowest level of agreement was “PE4: Using an online platform of freight forwarding service makes our logistics activities easier” (mean = 3.95, SD = 0.810). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Overall, Performance Expectancy (PE) showed a mean score of 3.97 and a standard deviation of 0.603. PE shows the normal distribution of data sets as indicated by the skewness of -.946 which is lower than the absolute value of 2 for acceptable symmetry; and the kurtosis of .165 which is lower than the recommended absolute value of 4 for a lack of outliers.

For EE, the statement with the highest level of agreement was “EE2: It would be easy for us to become skillful at using an online platform of freight forwarding service in our business.” (mean = 4.09, SD = 0.701), and the item with the lowest level of agreement was “EE4: An online platform of freight forwarding service is compatible with our company.” (mean = 4.03, SD = 0.665). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Overall, Effort Expectancy (EE) showed a mean score of 4.06 and a standard deviation of 0.568. EE shows the normal distribution of data sets as indicated by the skewness of -1.077 which is lower than the absolute value of 2 for the acceptable symmetry; and the kurtosis of 1.008 which is lower than the recommended absolute value of 4 for a lack of outliers.

For SI, the statement with the highest level of agreement was “Top management of our company believe that we should use an online platform of freight forwarding service for digital transformation” (mean = 4.04, SD = 0.650), and the item with the lowest level of agreement was “Involved staffs in freight booking believe that we should use an online platform of freight forwarding service through relying more on digitized documents instead” (mean = 3.99, SD = 0.761). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Social Influence (SI) showed a mean score of 4.02 and a standard deviation of 0.591. SI shows the normal distribution of data sets as indicated by the skewness of -1.162 which is lower than the absolute value of 2 for the acceptable symmetry; and the kurtosis of 1.205 which is lower than the recommended absolute value of 4 for a lack of outliers.

For PR, the research reversed the coding from 5 to 1, 4 to 4, 2 to 4, and 1 to 5. The statement with highest level of agreement was “PR3: Using an online platform of freight forwarding service (does not) causes the possible loss of performance accuracy” (mean = 3.99, SD = 0.883), and the item with the lowest level of agreement was “PR1: Using digital or paperless documents through an online platform of freight forwarding service (does not) causes a possible loss of important information of our company.” (mean = 3.61, SD = 0.851). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Perceived Risk (PR) showed a mean score of 3.73 and a standard deviation of 0.658. PR shows the normal

distribution of data sets as indicated by the skewness of -0.661 which is lower than the absolute value of 2 for acceptable symmetry; and the kurtosis of 0.262 which is lower than the recommended absolute value of 4 for a lack of outliers.

For FC, the statement with the highest level of agreement was “FC2: Our company has the knowledge necessary to use an online platform of freight forwarding service.” (mean = 4.06, SD = 0.669), and the item with the lowest level of agreement was “FC3 A technical person is available online for assistance with difficulties in using an online platform of freight forwarding service.” (mean = 3.96, SD = 0.747). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Overall, Facilitating Conditions (FC) showed a mean score of 4.0 and a standard deviation of 0.544. FC shows the normal distribution of data sets as indicated by the skewness of -0.971 which is lower than the absolute value of 2 for acceptable symmetry; and the kurtosis of 0.998 which is lower than the recommended absolute value of 4 for a lack of outliers.

For IU, the statement with the highest level of agreement was “IU3: Our company have a plan to use an online platform of freight forwarding service for digital transformation” (mean = 4.1, SD = 0.623), and the item with the lowest level of agreement was “IU1: I predict our company would use an online platform of freight forwarding service, if it is available in the market.” (mean = 4.04, SD = 0.582). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Intention to Use (IU) showed a mean score of 4.07 and a standard deviation of 0.537. IU shows the normal distribution of data sets as indicated by the skewness of -0.711 which is lower than the absolute value of 2 for acceptable symmetry; and the kurtosis of 0.202 which is lower than the recommended absolute value of 4 for a lack of outliers.

For AU, the statement with the highest level of agreement was “AU1: Our company is ready to use an online platform of freight forwarding service as an important step toward digital transformation in our company.” (mean = 3.75, SD = 0.589), and the item with the lowest level of agreement was “AU3: Our company use an online platform of freight forwarding service to manage logistics.” (mean = 3.73, SD = 0.633). All constructs showed a standard deviation of less than 1, indicating that the values in the datasets were considered relatively consistent. Actual Use (AU) showed a mean score of

3.74 and a standard deviation of 0.510. AU shows the normal distribution of data sets as indicated by the skewness of -1.393 which is lower than the absolute value of 2 for acceptable symmetry; and the kurtosis of 1.392 which is lower than the recommended absolute value of 4 for a lack of outliers.

4.3 Structural Equation Modelling (SEM) Analysis

In this research, SEM is used to estimate a system of linear equations to test the fit of a hypothesized “causal” model with 2 steps approach consisting of accessing model fitness and path coefficient analysis with the use of IBM SPSS + AMOS version 26.

Table 4.6 Results of the Validity and Reliability Testing (n = 400)

Variable	Construct	Loadings	CR	AVE	α
Performance Expectancy (PE)	PE1	.789	0.903	0.651	0.863
	PE2	.836			
	PE3	.850			
	PE4	.785			
	PE5	.771			
Effort Expectancy (EE)	EE1	.867	0.859	0.608	0.782
	EE2	.790			
	EE3	.844			
	EE4	.585			
Social Influence (SI)	SI1	.792	0.845	0.647	0.723
	SI2	.749			
	SI3	.867			
Perceived Risk (PR)	PR1	.851	0.914	0.679	0.877
	PR2	.770			
	PR3	.779			
	PR4	.875			
	PR5	.841			

Table 4.6 (Continued)

Variable	Construct	Loadings	CR	AVE	α
Facilitating Condition (FC)	FC1	.785	0.841	0.639	0.711
	FC2	.855			
	FC3	.754			
Intention to Use (IU)	IU1	.810	0.886	0.721	0.801
	IU2	.819			
	IU3	.915			
Actual Use (AU)	AU1	.789	0.882	0.714	0.799
	AU2	.866			
	AU3	.877			

From Table 4.6, the results revealed factor loadings between 0.585 – 0.915, which is more than the acceptable value of 0.5 representing evidences of the quality of measurement scales used in the research (Hair et al., 2010). Composite reliability (CR) is required to be ≥ 0.7 (Hair et al., 2011), and the value showed the acceptable range of 0.841 to 0.914. The cut-off value of average variance extracted (AVE) is 0.5, in which the values of AVE were in the acceptable range of 0.608 to 0.721. The values of Cronbach's alpha were also in the acceptable range of 0.711 – 0.877, given the Cronbach's alpha's cut-off value of 0.6 (Hair et al., 2011). These implied that the measurement scales for the model were considered valid and reliable.

4.3.1 Model Fit

SEM was employed to test research hypotheses with maximum-likelihood estimation. The results revealed the statistics of model fitness with the value of Relative chi-square (CMIN/degree of freedom), Root mean square error of approximation (RMSEA), Standardized root mean square residual (SRMR), Non-normed fit index (NNFI) or Tucker-Lewis index (TLI), and Comparative fit index (CFI). The results and the cut-off are demonstrated in Table 4.7 below.

Table 4.7 Results of Model Fit

Fit Statistics	Model value	Cut-off	Reference
Relative chi-square (CMIN/degree of freedom)	3.306	the value is ≤ 5 indicates reasonable fit	Marsh & Hocevar (1985)
Root mean square error of approximation (RMSEA)	0.044	< 0.05 good fit 0.05-0.08 fair fit 0.08-0.10 mediocre fit >0.10 poor fit	MacCullum et al. (1996); Hu & Bentler (1999)
Standardized root mean square residual (SRMR)	0.032	< 0.05	Hu & Bentler (1999)
Non-normed fit index (NNFI) or Tucker-Lewis index (TLI)	0.779	0 = poor fit; close to 1 = very good fit	Byrne (1994)
Comparative fit index (CFI)	0.833	0 = poor fit; close to 1 = very good fit	Hu & Bentler (1999)

From the Table 4.7, the results showed the ratio of relative chi-square of 3.306, which is lower than the maximum recommended value of 5 (Marsh & Hocevar, 1985) and thus this model was considered a reasonable fit. The RMSEA of the model in this study is 0.044, in which the value of the RMSEA indicates a good fit of the model (MacCullum et al., 1996; Hu & Bentler, 1999). The TLI is 0.779 which this value is close to 1 indicating a good model fit (Byrne, 1994). The CFI of the model 0.833 which is suggested that value that is close to 1 indicating a good model fit (Hu & Bentler, 1999). In conclusion, all measurements indicated that the model has an acceptable fit for the further SEM analysis.

4.3.2 Coefficient Path Analysis

This study assessed the effect of Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Perceived Risk (PR), and Facilitating Condition (FC) on the adoption intention (IU) and actual use (AU) of online freight forwarding

service platform. In addition, this study investigated the moderating effect of firm's size and user's generations.

Table 4.8 Results of Coefficient Path Analysis

Hypothesis	Relationship	β	S.E.	C.R.	p	Decision
H1	PE \rightarrow IU	.503	.081	3.970	.000*	Accepted
H2	EE \rightarrow IU	.172	.035	2.468	.014**	Accepted
H3	SI \rightarrow IU	.264	.065	3.326	.000*	Accepted
H4	PR \rightarrow IU	.208	.022	4.395	.000*	Accepted
H7	FC \rightarrow IU	.428	.094	3.275	.000*	Accepted
H8	FC \rightarrow AU	.447	.073	4.630	.000*	Accepted
H9	IU \rightarrow AU	.657	.104	6.751	.000*	Accepted

* A statistically significant test result for the relationship ($p \leq 0.01$)

** A statistically significant test result for the relationship ($p \leq 0.05$)

From Table 4.8, the effect of PE on IU was positive and significant ($\beta = .503, p < .01$), supporting H1 with the confidence level of 99%.

The effect of EE on IU was positive and significant ($\beta = .172, p < .05$) and thus H2 was also supported with the confidence level of 95%.

The effect of SI on IU was positive and significant ($\beta = .264, p < .01$), supporting H3 with the confidence level of 99%.

The effect of PR on IU was negative and significant ($\beta = .208, p < .01$) and thus H4 was supported with the confidence level of 99%.

The effect of FC on IU was positive and significant ($\beta = .428, p < .01$) and thus H7 was also supported with the confidence level of 99%.

The effect of FC on AU was positive and significant ($\beta = .447, p < .01$) and thus H8 was also supported with the confidence level of 99%.

The effect of IU on AU was positive and significant ($\beta = .657, p < .01$) and thus H9 was also supported with the confidence level of 99%.

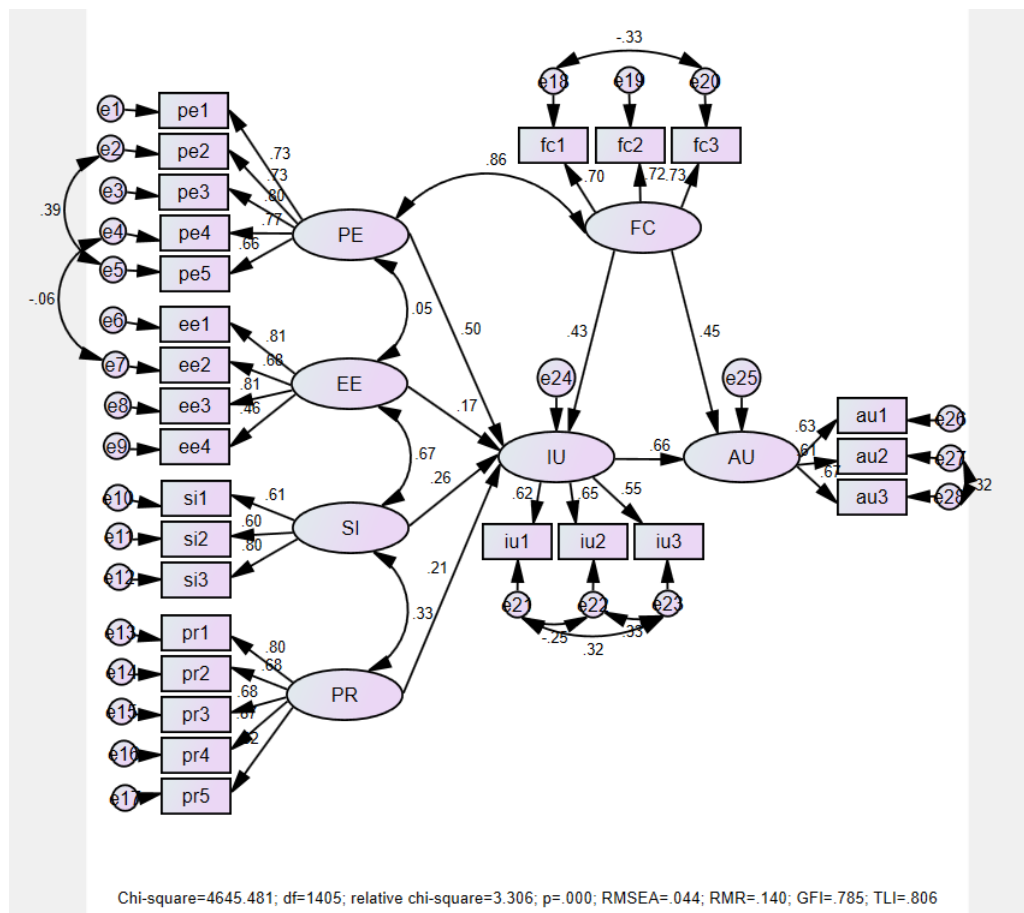


Figure 4.1 Results of Model's Path Analysis

4.3.3 Testing the Moderating Effect

4.3.3.1 Firm Size

There were 3 types of organization's size comprising of Small, Medium, and Large-sized organization. For testing the moderating effect of firm's size, the researcher divided organization size into two groups, which were Small and Medium sized firms and Large-sized firms. The results of testing moderating effect of firm size are demonstrated in the Table 4.9 below.

Table 4.9 Moderating Effect of Organization Size (OS)

	Relationship	Small & Medium		Large		z -score	Decision
		β	<i>p</i>	β	<i>p</i>		
H5a	OS x PE → IU	.572	***	.179	0.399	-1.412	Rejected
H5b	OS x EE → IU	.154	0.033	.242	0.199	0.314	Rejected
H5c	OS x SI → IU	.201	0.012	.785	***	2.187**	Accepted
H5d	OS x PR → IU	-.234	***	-.053	0.566	1.623	Rejected

From the Table 4.9, the results indicated that there was no moderating effect of organization size on the relationship between PE → IU, EE → IU, and PR → IU, given the Z-score of less than 1.96. It indicated that the effect of performance expectancy on the adoption intention is not moderated by size of organization. The effect of effort expectancy on the adoption intention is not moderated by size of organization. The effect of perceived risk on the adoption intention is not moderated by size of organization. However, the effect of social influence on the adoption intention is moderated by size of organization, given the z-score of more than 1.96. The results suggested that social influence significantly affects the adoption intention of online freight forwarding platform, in which large-size firms seemed to have stronger effect of social influence on the adoption intention.

4.3.3.2 User Generations

User generations were classified into Gen X, Gen Y, and Gen Z. For testing the moderating effect between different groups, Gen Y and Gen Z were regrouped into the same group as they seemed to have similar IT skills and knowledge as compared to their previous generations. The results of testing moderating effect of user generations between the group of Gen X and Gen Y&Z are demonstrated in the Table 4.10 below.

Table 4.10 Moderating Effect of User Generations (UG)

	Relationship	Gen X		Gen Y&Z		z-score	Decision
		β	<i>p</i>	β	<i>p</i>		
H6a	UG x PE \rightarrow IU	0.810	0.144	0.364	0.008	-0.617	Rejected
H6b	UG x EE \rightarrow IU	-0.777	0.663	0.198	0.004	0.522	Rejected
H6c	UG x SI \rightarrow IU	1.701	0.411	0.177	0.019	-0.732	Rejected
H6d	UG x PR \rightarrow IU	0.518	0.581	-0.252	0.000	-0.805	Rejected

From the Table 4.10, the results indicated that there was no moderating effect of user generation on the relationship between PE \rightarrow IU, EE \rightarrow IU, SI \rightarrow IU, and PR \rightarrow IU, given the z-score of less than 1.96. Hence, H6 is not accepted in all aspects. In other words, the effect of performance expectancy on the adoption intention is not moderated by user generation. The effect of effort expectancy on the adoption intention is not moderated by user generation. The effect of social influence on the adoption intention is not moderated by user generation. The effect of perceived risk on the adoption intention is not moderated by user generation.

CHAPTER 5

DISCUSSIONS AND RECOMMENDATION

Chapter 5 provides conclusions and set of recommendations derived from the research. The chapter begins with conclusions of key findings of the study. It revisits the research questions and objectives, summarizing how they have been addressed and achieved. This section offers a cohesive narrative that highlights the significance of the results, contextualizing them within the broader academic field and practical applications.

5.1 Discussions of Results

The results confirmed that Performance Expectancy (PE) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of performance expectance as perceived by users will lead to higher level of adoption intention toward the technology. While PE reflects the perceived benefits associated with using the technology, the results of this study is consistent with the suggestion of Venkatesh et al. (2003), which indicated that performance expectancy affects continuance intention (Venkatesh et al., 2003). The study of Alwahaishi and Snášel (2012) and Sarfaraz (2017) which suggested that performance expectancy, effort expectancy, and risk perception significantly influence users' intention to use ICT services was also proved from the findings.

The results confirmed that Effort Expectancy (EE) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of effort expectance as perceived by users will lead to higher level of adoption intention toward the technology. As explained by Venkatesh et al (2003), EE reflects the perceived difficulty in using the technology. If users have to exert great effort to learn or master its use, they may not feel satisfied. The results of this study is align with the finding of previous researches showing that perceived ease of use (similar to effort expectancy) affects user satisfaction (Lee et al., 2007a) and continued use (Shin et al., 2010), and intention to use (Alwahaishi & Snášel, 2012; Sarfaraz, 2017).

The results confirmed that Social Influence (SI) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of social influence as perceived by users will lead to higher level of adoption intention toward the technology. Social influence reflects the effect of referent opinion on individual user behavior (Zhou, 2011). The results supported the study of Hong et al. (2008) which found that social influence has a significant impact on intention to continue using services. The study of Lee and Song (2013) revealed that performance expectancy and social influence were found to positively influence behavioral intention, which was confirmed from the finding of this study. Further, this study suggested that there was a moderating effect of organization size on the relationship between SI and IU in the way that large-size firms seemed to have stronger effect of social influence on the adoption intention.

The results confirmed that Perceived Risk Free (PR) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of risk free as perceived by users will lead to higher level of adoption intention toward the technology. Bielen and Sempels (2004) explained that risk represents the degree of change and danger. Lee and Song (2013) studied the effects of trust and perceived risk on user adoption of a new technology service and found that trust and perceived risk are direct antecedents of intention to use, which is consistent with the result of this study. Abrahão et al. (2016) investigated the intention to adopt ICT service based on the Unified Theory of and found that 76% of behavioral intentions were explained by performance expectancy, effort expectancy, social influence, and perceived risk, which is also supported from the finding of this study.

The results confirmed that Facilitating Conditions (FC) significantly affected the intention to use and actual use of online-based freight forwarding platform with the positive impact. It means that higher favorableness of facilitating conditions as perceived by users will lead to higher level of adoption intention toward the technology. Facilitating conditions mean that users have the resources and knowledge necessary to use the technology, as explained in Venkatesh et al. (2003). In an organizational context, facilitating conditions are defined as one's belief that an organizational and technical infrastructure exists to support the system (Al-Gahtani 2007). Alwahaishi and Snášel (2012) investigated the factors that influence the acceptance and use of ICT application

and suggested that facilitating condition is largely supported by the empirical data. Monilakshmane and Rajeswari (2018) studied the influence of the perceived risk factor on the acceptance of a mobile application for the use of financial services. This study found that facilitating conditions (FC) together with performance expectancy (PE), and social influence (SI) had a strong positive and significant influence on behavioral intention to use mobile apps for financial transactions, which is consistent with the findings of this study. Alalwan et al. (2018) found similar results supporting that there is a statistically significant relationship between facilitating conditions and actual use of online financial service, which is also similar to some of the facilities needed to adopt e-services (Miladinovic & Xiang, 2016). Alawadhi and Morris (2009) found a significant effect of facilitating conditions on the actual use of e-gov, which is supported by this study.

The results confirmed that intention to use further affected the actually use significantly in the case of online-based freight forwarding platform. This result is consistent with several other studies (Rhodes & Smith, 2006; Poropat, 2009; Chiaburu et al., 2011; McEachan et al., 2011).

5.2 Research Implications

5.2.1 Managerial Implications for Freight Forwarders

The results revealed that Performance Expectancy, Effort Expectancy, Social Influence, Perceived Risk, and Facilitating Conditions significantly affected the intention to use online-based freight forwarding platform, in which intention to use further affected the actually use significantly. The results also suggested that Performance Expectancy affects the adoption intention with the strongest effect, followed by Facilitating Conditions, Social Influence, Perceived Risk, and Effort Expectancy, respectively. There are five recommendations based on the findings as follows

1. The results suggested that Performance Expectancy (PE) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of performance expectancy as perceived by users will lead to higher level of adoption intention toward the technology. To enhance the adoption intention of freight customers, it is suggested that freight customers should be educated about the key benefits of

using online-based freight forwarding platform, how it will help to improve and fasten their logistics performance with less or no paper-based process.

2. The results revealed that Facilitating Conditions (FC) significantly affected the intention to use and actual use of online-based freight forwarding platform with the positive impact. It means that higher favorableness of facilitating conditions as perceived by users will lead to higher level of adoption intention toward the technology. In an organizational context, facilitating conditions are defined as one's belief that an organizational and technical infrastructure exists to support the system. It is believed that freight customers normally have IT facilities necessary to use an online platform of freight forwarding service, which include Personal Computer (PC), or Laptop and the Internet in order to access to the online service. However, some of them may not have IT personnels in their office, particularly for SMEs. Freight customers may try the service if they are assured that they will get the IT supports instantly with any difficulties in using an online platform of freight forwarding service. AI should be very useful for providing this kind of support to freight customers when needed. AI and robotic conversational interfaces have revolutionized the field of customer service through the enhancement of operational efficiency, customization, and availability. They deliver uniform, precise, and immediate replies, manage standard queries, provide tailored interactions, and amass crucial client information. Businesses thus can boost customer satisfaction, decrease operational costs, and attain a competitive edge in the market. As AI technology continues to progress, its significance in customer service is projected to expand, providing increasingly complex and effective resolutions.
3. The results confirmed that Social Influence (SI) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of social influence as perceived by users will lead to higher level of adoption intention toward the technology. In addition, the results suggested that social influence significantly affects the adoption intention of online freight forwarding platform, in which large-size firms seemed to have stronger effect of social influence on the adoption

intention than small and medium-sized firms. Top management and associated employees of freight customers should be convinced why they should transform this process into e-service. The large number of users should also create the impact for the change for other freight customers. Learning and training should be provided for freight customers, particularly at the introduction stage of the new service.

4. The results indicated that Perceived Risk Free (PR) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of risk free as perceived by users will lead to higher level of adoption intention toward the technology. Freight customers' fear about using online-based freight forwarding platform such as a possible loss of important information, time, performance accuracy, money, and cooperation between freight customers and the freight forwarder should be eliminated. Protective measures should be well designed and implemented in order to enhance their confidence. In addition, positive reviews from peers in the industry should be helpful for them to make a decision easier.
5. The results confirmed that Effort Expectancy (EE) significantly affected the intention to use online-based freight forwarding platform with the positive impact. It means that higher degree of effort expectance as perceived by users will lead to higher level of adoption intention toward the technology. Technically, it is important that user interface on the platform should be clear and understandable. New users should be able to use the platform with small amount of time for learning about it. AI should be very useful for providing instant and 24/7 support to freight customers when needed.

5.2.2 Managerial Implications for Shippers

1. The finding suggested that the effect of social influence on the adoption intention is moderated by size of organization, in which large-size firms seemed to have stronger effect of social influence on the adoption intention. SMEs seemed to have higher speed to adapt new technology than large enterprises in this study. Larger businesses may face distinct challenges when it comes to integrating new technologies; nonetheless, these obstacles can be

effectively overcome through the implementation of strategic planning, strong leadership, and a commitment to cultivating an innovative environment. By identifying and resolving specific obstacles to technology adoption, large corporations can accelerate their digital transformation efforts and maintain their competitive advantage in an increasingly volatile market.

2. The workforce is typically comprised of multiple generations, each possessing unique experiences and attitudes towards technology. The generational gap within organizations can significantly affect the adoption of technology. The differences in technological attitudes, familiarity, and comfort within diverse age groups could influence the efficiency and speed of integrating new technologies into organizational procedures. Despite the lack of a generation gap in the use of online-freight forwarding services, organizations can create inclusive methods that aid in a more seamless and efficient incorporation of technology. To bridge this gap is not only to fast-track the implementation of technology but also to enhance collaboration, innovation, and overall organizational resilience.

5.3 Conclusions of Major Findings

The development of online-based freight forwarding service is still innovative service in Thailand, which will include the features that allow the customers for 24/7 freight quote, online booking, filling, uploading and downloading of documents, tracking the shipment, and online payment for the service. As the concept of online-based freight forwarding service is still new in the Thai market, the customers who firstly adopt the service is considered as early adopters. Some customers may reject to adopt in the early introduction stages of an innovation or can wait and become a late adopter after seeing others adopt the innovation and use it successfully. In this study, the researcher aims to explore the level of adoption intention to use online-based freight forwarding service among business customers in the Thai freight forwarding market, to identify the influential factors affecting the adoption of online-based freight forwarding services among customers, and to recommend strategies for encouraging the adoption of online-based freight forwarding services. Quantitative methodological approach was applied to meet the objective of this study. Online questionnaire survey was conducted to collect

the data from 400 managers from 400 companies in Thailand who was in charge with booking and coordinating with freight forwarding services in their organizations.

The results confirmed that Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Perceived Risk (PR), and Facilitating Conditions (FC) significantly affected the intention to use online-based freight forwarding platform, in which intention to use further affected the actually use significantly. The results indicated that there was a moderating effect of organization size on the relationship between SI and IU in the way that large-size firms seemed to have stronger effect of social influence on the adoption intention.

5.4 Suggestions for Future Research

This study was to study influential factors affecting the adoption intention and actual use of online-based freight forwarding platform, which is innovative service in the Thai market. The results, nonetheless, may not be applicable to corporations outside Thailand due to different context. The future research is recommended to study corporations in other markets for further comparison. Also, the results were based only on the management' perspective, in which there are other factors that may affect the adoption intention and actual use of online-based freight forwarding platform such as attitude of associated employees toward the use of technology. The influence of these factors should be examined in the future research. Additionally, the limitations of quantitative research cannot be avoided in this study, which leads to a lack of a full and detailed understanding about the context of phenomenon. Therefore, future research should consider using qualitative research, mixed methods, or a combination of quantitative and qualitative approaches to overcome limitations of quantitative research. This will help to provide the useful information why people may reject the use of online-based freight forwarding platform.

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Appendix

Questionnaire (English Version)

Part 1 General Information and Usage Experience

1. Have your business ever used freight forwarding service over the past 3 months?

- Yes, please continue.
- No. End of survey & Thank you for your time.

2. Please indicate the average shipment of your organization for both import and export.

- Less than 5 containers a month
- 5 –20 containers a month
- 21 –50 containers a month
- More than 50 containers a month

3. Size of your company (by average annual revenue)

- Small (less than 50 million THB / year)
- Medium (51 - 300 million THB / year)
- Large (more than 300 million THB / year)

4. Position

- Chief/Managing Director
- Import / Export manager
- Freight Allocation Manager
- Others_____

5. Age group

- Gen X (over 43 years old)
- Gen Y or Millennials (30 – 43 years old)
- Gen Z (30 years old or less)

Part II:

Please excerpt your opinion to the following statements on a scale of 1 to 5 as:

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5	4	3	2	1

Strongly Disagree <---> Strongly Agree

Performance Expectancy	1	2	3	4	5
PE1 Using an online platform of freight forwarding service will improve our performance in the logistics than paper-based processes.					
PE2 Using an online platform of freight forwarding service enables us to accomplish our logistics activities more quickly.					
PE3 Using an online platform of freight forwarding service improves the quality of logistics activities.					
PE4 Using an online platform of freight forwarding service makes our logistics activities easier.					
PE5 Using an online platform of freight forwarding service enhances our effectiveness in our logistics activities.					

Strongly Disagree <---> Strongly Agree

Effort Expectancy	1	2	3	4	5
EE1: The interaction with an online platform of freight forwarding service would be clear and understandable.					
EE2: It would be easy for us to become skillful at using an online platform of freight forwarding service in our business.					
EE3: Learning to operate an online platform of freight forwarding service is easy for our staffs.					
EE4: An online platform of freight forwarding service is compatible with our company.					

Strongly Disagree <---> Strongly Agree

Social Influence	1	2	3	4	5
SI1: Top management of our company believe that we should use an online platform of freight forwarding service for digital transformation.					
SI2: Involved staffs in freight booking believe that we should use an online platform of freight forwarding service through relying more on digitized documents instead					
SI3: Using an online platform of freight forwarding service is commercially satisfaction-enhancing for supply chain partners/customers.					

Strongly Disagree <---> Strongly Agree

Perceived Risk	1	2	3	4	5
PR1: Using digital or paperless documents through an online platform of freight forwarding service causes a possible loss of important information of our company.					
PR2: Using an online platform of freight forwarding service causes a possible loss of time for our staffs than traditional process.					
PR3: Using an online platform of freight forwarding service causes the possible loss of performance accuracy.					
PR4: Using an online platform of freight forwarding service causes the possible loss of money to train staffs.					
PR5: Using an online platform of freight forwarding service causes the possible loss of cooperation between our company and the freight forwarder.					

Strongly Disagree <---> Strongly Agree

Facilitating Conditions	1	2	3	4	5
FC1: Our company has IT facilities necessary to use an online platform of freight forwarding service.					
FC2: Our company has knowledge necessary to use an online platform of freight forwarding service.					
FC3 A technical person is available online for assistance with difficulties in using an online platform of freight forwarding service.					

Strongly Disagree <---> Strongly Agree

Intention to use online-based service	1	2	3	4	5
IU1: I predict our company would use an online platform of freight forwarding service, if it is available in the market.					
IU2: Our company will have very seriously thought of using an online platform of freight forwarding service in the near future.					
IU3: Our company have a plan to use an online platform of freight forwarding service for digital transformation.					

Strongly Disagree <---> Strongly Agree

Actual Use	1	2	3	4	5
AU1: Our company is ready to use an online platform of freight forwarding service as important step toward digital transformation in our company.					
AU2: Our company use an online platform of freight forwarding service to partially or fully substitute traditional freight forwarding service.					
AU3: Our company use an online platform of freight forwarding service to manage logistics.					

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