A COMPARATIVE STUDY ON THE ACCEPTANCE OF TECHNOLOGY FOR 3RD PARTY LOGISTIC SERVICE PROVIDERS IN THAILAND

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ABSTRACT

The objectives of this study are to: Evaluate the two constructs in the Technology Acceptance Model (TAM) which are, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), for Inventory Management Technologies (IMTs) to 3rd party logistics service providers in Thailand; Discover what are the leading factors within the Technology Acceptance Model (TAM) that contribute primarily to the adoption of Inventory Management Technologies (IMTs) technologies for 3rd party logistic service providers; Propose recommendations for IT Research and Development (R&D) in the logistics industry in Thailand.

The research conducted in-depth interviews with three separate 3rd Party Logistic Service Providers within Bangkok, Thailand and analyzed the comparison of the three companies from the collected data. The researcher has found in this study that The Technology Acceptance Model has a significant impact on the acceptance to the 3rd party logistic service providers in this study. Another conclusion that can be drawn from this research is that Perceived Usefulness (PU) weighs more in the decision-making process than Perceived Ease of Use (PEOU). The research found the perceived increase of productivity, overall usefulness of technology, and overall ease of use to be the most significant factors for making decisions on adopting the new technology for all three companies.

Keywords: 3rd Party Logistic Service Providers, Inventory Management Technologies (IMTs), Technology Acceptance Model (TAM)

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I would like to express my deep gratitude to Dr. Apitep Saekow for his patient guidance, enthusiastic encouragement and useful critiques of this research work, while also for his advice and assistance in keeping my progress on schedule.

Finally, I wish to thank my parents for their support and encouragement throughout my study.

Linse William Hauser

Researcher

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CHAPTER 1
INTRODUCTION

1.1 Background of the Study

A large portion of incurred costs to many firms in Thailand stem directly from managing and distributing inventory. To alleviate these issues, some companies are outsourcing these operations to 3rd Party Logistic Service Providers. (Lieb and Bentz, 2004), conducted a survey in which 83 percent of the Fortune 500 companies that were surveyed reported of having at least one contract with a third party logistic service provider.

The model that this study is primarily based on is the (TAM) Technology Acceptance Model (Davis, 1986), which originates from the (TRA) Theory of Reasoned Actions (Fishbein and Ajzen, 1975). This study focuses on two theoretical constructs, perceived usefulness (PU) and perceived ease of use (PEOU), which are theorized to be fundamental determinants of system use.

1.2 Objectives of the Study

- Evaluate the two constructs in the Technology Acceptance Model (TAM), which are, Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), for Inventory Management Technologies (IMTs) to 3rd party logistics service providers in Thailand
- Discover what are the leading factors within the Technology Acceptance Model (TAM) that contribute primarily to the adoption of Inventory Management Technologies (IMTs) technologies for 3rd party logistic service providers.
- Propose recommendations for IT Research and Development (R&D) in the logistics industry in Thailand.

1.3 Scope of the Research

This study took place in Bangkok, Thailand. Bangkok is an ideal choice for this study to take place because of its strategic location in terms of logistics and the variety of business that are located within the city. Since the ASEAN community will be taking form in next couple of years, this study will be directly relevant and hold value for not only companies already based in Southeast Asia, but also companies looking to conduct business within this region. Bangkok, Thailand is an ideal location due to the level of direct involvement that it will have with the ASEAN community.

1.4 Research Question

The purpose of this both qualitative and qualitative comparative study is to discover "How the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs)".

1.5 Significance of the Research

The researcher has interest in this study because not only did he previously major in this field during his Undergraduate career, but also he has an interest in pursuing a professional career in which this study will be significant. The researcher also believes that due to the uniting of the global marketplace, he believes that research into any form of logistics is relevant.

This study has a level of importance to the companies participating in this research because this study allows them to more clearly understand how the market leaders around them value factors that influence adoption of inventory management technologies. The researcher has provided the finished study to the participating companies as a way to analyze what their current position is and discover what some other companies are doing in terms of technology adoption.

1.6 Implications in Academia

Since this study does give some valuable insight in how to understand not only how technology is adopted in inventory management, but also how much importance inventory management technologies have in Thailand, which can prove to be a valuable resource to academics that are studying different aspects of logistics and inventory management. Although this study can be valuable to academics, technology and the way we currently perform our logistics operations are changing at a consistently rapid pace so that this study could possibly be obsolete in the somewhat near future.

1.7 Implications in Practice

This study does give some valuable insight in how to understand not only the adoption of technology in inventory management, but also the importance that inventory management technologies have in Thailand. More research is needed to continue to accurately analyze how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

1.8 Limitations of the Research

One of the limitations in this study is the size of the sample in which the study was conducted. Although the companies that participated in this study are among the market share leaders, more research is needed to confirm the results of this study. Another limitation of this study is that it is only conducted in Thailand. This limitation exists due to the reason that the researcher resides in Thailand and therefore conducted the study within Thailand. More research is needed to continue to accurately analyze how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

1.9 Terms of Definition

The Technology Acceptance Model (TAM) focuses on two theoretical constructs,

perceived usefulness (PU) and perceived ease of use (PEOU), which are theorized to be fundamental determinants of system use. Perceived Usefulness (PU) is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1986). Perceived Ease of Use (PEOU) is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1986).

CHAPTER 2
REVIEWING THE LITERATURE

2.1 Relevant Literatures

The model that this study is primarily based on is the (TAM) Technology Acceptance Model (Davis, 1986), which originates from the (TRA) Theory of Reasoned Actions (Fishbein and Ajzen, 1975). This study focuses on two theoretical constructs, perceived usefulness (PU) and perceived ease of use (PEOU), which are theorized to be fundamental determinants of system use.

The Theory of Reasoned Action (TRA) is a model that finds its origins in the field of social psychology. This model developed by (Fishbein and Ajzen, 1975), defines the links between beliefs, attitudes, norms, intentions, and behaviors of individuals. According to this model, a person's behavior is determined by its behavioral intention to perform it. (Fishbein and Ajzen, 1975) define the subjective norms as "the person's perception that most people who are important to him think he should or should not perform the behavior in question".

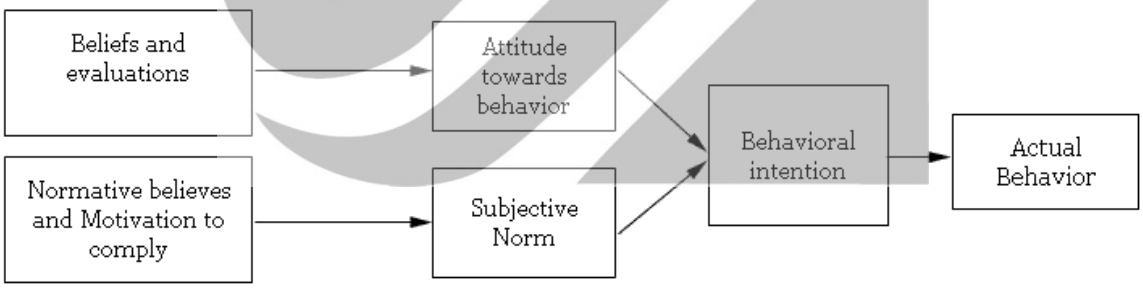

Figure 1. Theory of Reasoned Action
Source: Davis, Bagozzi et Warshaw (1989)

$$BI=(AB)W_1 + (SN)W_2$$

Behavioral Intention = Attitude + Subjective norms

Based on the Theory of Reasoned Action (Fishbein and Ajzen, 1975), Davis (1986) developed the Technology Acceptance Model, which deals more specifically with

the prediction of the acceptability of an information system. The purpose of this model is to predict the acceptability of a tool and to identify the modifications in which must be brought to the system in order to make it acceptable to users. This model suggests that the acceptability of an information system is determined by two main constructs: perceived usefulness and perceived ease of use (Davis, 1986). TAM replaces many of TRA's attitude measures with the two technology acceptance measures— ease of use, and usefulness. TRA and TAM, both of which have strong behavioral elements, assume that when someone forms an intention to act, that they will be free to act without limitation. In the real world there will be many constraints, such as limited freedom to act (Bagozzi, Davis & Warshaw 1992).

> *"Because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision makers with respect to the successful adoption of them, people form attitudes and intentions toward trying to learn to use the new technology prior to initiating efforts directed at using. Attitudes towards usage and intentions to use may be ill-formed or lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitudes and intentions." (Bagozzi, Davis & Warshaw 1992)*

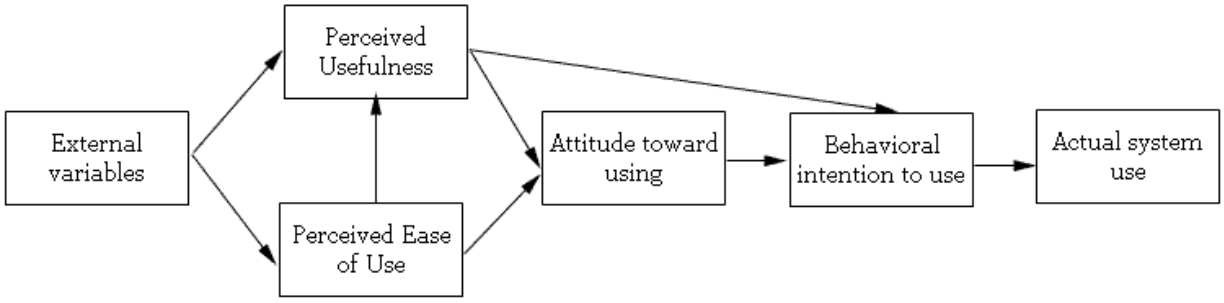

Figure 2. Technology Acceptance Model
Source: Davis, Bagozzi et Warshaw (1989)

Behavioral intention is determined by two belief constructs, namely, perceived usefulness (PU) and perceived ease of use (PEOU). By manipulating these two constructs, system developers can have better control over users' beliefs about the system, and subsequently, their behavioral intention and usage of the system (Shroff, Deneen and Ng, 2011). Perceived Usefulness (PU) is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1986). Perceived Ease of Use (PEOU) is defined as “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1986).

Response Time is basically how quickly a system responds to a change in input is an important measure of its' performance or the time a system or functional unit takes to react to a given input. To create a shorter response time, the length of time that a system responds to a change in input is shortened.

Improved Communication for this study is an increase in how well or how efficient the communication channels operate within and/or between different departments.

Increased Productivity for this study is an increase in the ratio of output to inputs in production. Basically Increased Productivity is an increase in the average measure of the efficiency of production.

Easier Overall Task for this study is basically the predetermined conclusion that using the new technology would make the overall task easier than otherwise using the previous technology.

Overall Useful Technology for this study is the predetermined conclusion that the new technology would meet the needs of the organization more than the previous technology that was being used.

Easy to Learn for this study is the predetermined conclusion that the new technology would be easy to learn for the employees as well as easy to teach for instruction and implementation.

Clear and Easy to Understand for this study is the predetermined conclusion that the new technology would be easy to understand by the employees and managers that are

operating it. This basically means that the employees and managers do not have a difficult time understanding how to operate the new technology.

Overall Easy to Use for this study is the predetermined conclusion that the new technology would be overall easy to use for the employees and managers that are using it. Basically this means that there are not many obstacles that the employees and managers have to overcome in order to accomplish their task while using the new technology.

Although the fundamental aspects of the Technology Acceptance Model are valuable, the researcher did criticize some parts of the theory. The main criticism that the researcher had was that there were some aspects that the technology acceptance model didn't take into consideration, such as price and time of conversion.

The Theory of Technological Innovation Acceptance (TTIA) from (Russell and Hoag, 2003), which originates from the Technology Acceptance Model (TAM) (Davis, 1986), explains that relative advantage and compatibility are two attributes of the innovation that are positively related to adoption and complexity is an attribute that is negatively related to adoption.

Relative advantage is based upon the technological innovation being more effective, efficient, and economical than the system that is replaces. (Rogers, 1995) characterized relative advantage as the degree to which the perception of innovation is better than the idea that it replaces.

Compatibility is the perceived degree to which the innovation is consistent with the organization's existing needs and values (Rogers, 1995). In other words, the technological innovation that is being replaced is likely to be better accepted if that technology is aligned with the current needs and values of that organization.

Complexity is the only attribute that is negatively related to technological innovation acceptance in this model. (Rogers, 1995), explains that complexity is the degree to which a technological innovation is perceived of as difficult to understand and use. This attribute plays an important role in this model in that typically the higher the complexity the more difficult the technological innovation will accepted within that organization.

The goal of RFID technology is to create an environment where every object can be automatically recognized, identified, tracked, and traced from the factory, through shipping and warehousing, and into the retail environment (Lai and Hutchinson, 2005). RFID technology, which uniquely identifies every product and tracks its movements in a value chain, offers an unprecedented real-time view of assets and inventories throughout the global supply chain (Lai and Hutchinson, 2005). It has been claimed that RFID offers the potential to greatly improve supply chain efficiency and effectiveness because it enables companies to track product information and allows greater control and flexibility in managing goods as they move through the supply chain (Jabjiniak and Gilbert, 2004). Major benefits of RFID are that it uniquely recognizes each item accurately, tracks items as they move through the supply chain, and shares information with business partners, allowing collaboration on inventory management, planning, forecasting and replenishment (Trailblazer Systems, 2004). Wal-Mart has already proven tangible value with their limited RFID pilot, which currently receives goods from 300 companies at 500 locations mostly in the southwestern USA (Ferguson, 2006). One of the barriers to adopting RFID at the forefront of managerial concern is the difficulty in quantifying the cost-benefit ROI (return on investment) in acquiring this technology (Reyes, 2007). Ngai and Gunasekaran (2009) argued that following are among the issues and challenges in the adoption of RFID within a SC: the lack of global standards for RFID adoption; the necessity for data privacy, identity and non-refutability; the requirement of RFID data management; the lack of RFID expertise for deployment; the management commitment, the RFID cost-benefit analysis, the selection of RFID hardware and software both at firm and the supply chain levels and the difficulty for firms to evaluate their own needs and determine which processes can benefit from automation with the use of RFID and associated technologies.

Bar code technology has been institutionalized across most industries and around the globe, accounting for billions of bar code scans daily (Wyld, 2006). Still, while the bar code and the Universal Product Code (UPC) have become omnipresent and enabled a host of applications and efficiencies (Brown, 1997). UPC coding has paid off with

improved product tracking over multiple retailers, reduced labor costs, and faster product replenishment (Attaran, 2007). For a successful deployment of RFID, it is important to have a set of widely accepted standards and regulations, similar to the path of the progression of barcode standards (Michael and McCathie, 2005). To read a bar code its lines had to stay in sight of the scanner to identify product correctly (Mehrjerdi, 2011). Barcode systems can provide an inexpensive solution for centrally managing IT assets and can be easily integrated with existing management systems to provide a single control solution (Coyle-Camp, 1994). The use of barcode and data matrix systems provides convenience in warehouse management systems (Kaya, 2012). The current cost of an RIFD tag in China is about US$0.25 to US$0.30 (RMB¥2.0), compared to the barcode cost of about US$0.0024 (RMB¥0.02) (China High-Tech Industry Herald, 2004). Conceptually, bar codes and RFID are indeed quite similar, as both auto-ID technologies, which are intended to provide rapid, and reliable item identification and tracking capabilities (Wyld, 2006). The bar code has become a part of every product we buy, having become ‘‘the ubiquitous standard for identifying and tracking products’’ (Douglas, 2005).

CSCO *insights* conducted a survey in 2011 in the United States inventory management technology for supply chain networks. They collected 225 surveys in which they asked a variety of questions including overall size of their company, supply chain network complexity, how well the technology manages their current supply chain network, and technological advantage for managing their supply chain network. This study uses the Technology Acceptance Model (Davis, 1986) and different attributes of the Theory of Technology Innovation Acceptance (TTIA) (Russell and Hoag, 2003). Using the (TTIA), more than 65% of the participants surveyed responded that relative advantage was a somewhat important to very important factor in adopting technology in their supply chain network. More than 69% of the participants surveyed responded that compatibility, in terms of if the technology met the organizations existing needs and values, was a somewhat important to very important factor in adopting the technology in their supply chain network. Also, more than 65% of the participants surveyed responded that their current technology was either somewhat complex or very complex and that

complexity was a somewhat important to very important factor for adopting technologies in their supply chain network. Using the Theory of Technology Innovation Acceptance, the participants responded positively to technology acceptance as long as the new technology met the relative advantage and compatibility requirements. Although the high complexity of the new technology, a large portion of the participants accepted the adoption of the technology due to the Perceived Usefulness (PU) as shown by its relative advantage and compatibility, even though the Perceived Ease of Use was low due to complexity.

Table 1. Inventory Management Technology For Supply Chain Networks,
Source: CSCO insights (2011)

Overall Size of Company (Revenue)		**Technology Advantage for Managing Their Supply Chain Network (PU)**	
Over $10 Billion	23.40%	Very Important	25.10%
$1-$10 Billion	28.90%	Important	24.10%
$500-$999 Million	10.10%	Somewhat Important	34.80%
Under $500 Million	37.50%	Not Very Important	20.80%
		Not Important	8.00%
Supply Chain Network Complexity (PEOU)			
Very Complex	24.10%		
Somewhat Complex	41.70%	**How Well The Technology Manages Their Current Supply Chain Network**	
Average	20.40%		
Fairly Simple	9.90%	Very Important	8.50%
Very Simple	1.90%	Important	27.50%
Not Sure	1.90%	Somewhat Important	34.10%
		Not Very Important	24.10%

Not Important	3.30%

Goh and Pinaikul (1998), did a study on 80 commercial and industrial firms in Thailand. Surveys were designed to be distributed to employees directly involved in logistics management. This study focused on the fundamental attributes of the Technology Acceptance Model, which are the Perceived Ease of Use (PEOU) and the Perceived Usefulness (PU). The Perceived Usefulness (PU) as shown by improved work quality was consistently high. The Perceived Ease of Use (PEOU) was relatively low as shown by the perceived barriers, which shows that both PU and PEOU both factor in the decision process of the adoption of new technologies in the logistics industry.

Table 2. Perceptions of Implementing Logistic Information Systems (PU),
Source: Goh and Pinaikul (1998)

Perceptions of Implementing Logistic Information Systems (PU)		
	Improved Quality	**Not Improved Quality**
Response Time	92.70%	0.00%
Order Cycle Time	78.10%	7.30%
Order Convenience	70.70%	2.40%
Communication	63.40%	12.20%
Stock Turnover	56.10%	12.20%
Economies Of Scale Of Supply Chain	48.80%	12.20%
Projected Business Image	41.50%	22.00%
Employ Fewer Employees	26.80%	26.80%

Table 3. Perceived Barriers/Problems (PEOU),

Source: Goh and Pinaikul (1998)

Perceived Barriers/Problems (PEOU)		
	Very Serious	**Not Serious**
Lack of logistics Management expertise	75.00%	18.80%
Inefficient logistics information systems	50.00%	16.30%
High cost of acquiring and installing automated logistics equipment	43.80%	18.80%
Low usage of UPC (universal product code)	23.80%	35.00%
Inadequate existing rules and regulations	41.30%	18.80%
Employee resistance to new management methods	13.80%	66.30%

Ndubisi and Jantan (2003), conducted a study on 295 medium sized firms in Malaysia. A total of 177 firms responded to the survey and the results show that usage is influenced directly by usefulness and indirectly (via usefulness) by ease of use (Ndubisi and Jantan, 2003). It was found that not only do computing skill and technical backing serve as strong anchors to users perceptions of the usefulness and ease of use of information systems, they also wield direct influence on systems usage. Since users seem to anchor their perceptions of usefulness and ease of use to computing skill and technical backing, when users come in contact with systems that are too difficult to handle with available computing skill and technical support, the user is more likely to reject such a system (Ndubisi and Jantan, 2003).

Yanchao and Diew (2009), conducted a study on 28 different companies who were registered in the Singapore Logistics Association. The main objective of this study

was to report on the state of use of IT in the shipping logistics industry, evaluate the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) of main IT applications, and analyze the facilitators and barriers to IT applications adoption. A questionnaire was sent to be completed by a manager or personnel whose scope and work experiences are related to logistics and transportation. It was found that overall PU and PEOU for the three categories of IT applications were considerably high. It can also be concluded that companies did not view IT implementation as a major technical challenge, since the PEOU for all three categories were considerably and consistently high.

Chuan (2005) evaluated the PU of a wide range of adopted and yet-to-be-implemented technologies, and revealed that implementation of technology in the logistics industry was slow, but companies were positive in implementing new technologies. A narrower approach to the shipping logistics industry to recalibrate attributes similar to Chuan's study could be useful in reporting on the current state of IT adoption in Singapore's shipping logistics industry.

Tilokavichai, Sophatsathit and Chandrachai (2012), conducted a study on 99 logistics management firms in Thailand. They designed a set of survey questionnaires covering the usefulness of LIS. They found all items of perceived usefulness of LIS having positive association with logistics performance management and perceived ease of LIS usage item having positively association with logistics performance management at the significant value of 0.05. In addition, all items of perceived usefulness had positive association with ease of LIS usage and almost all the items of perceived support had positive association with logistics performance management except after-sale service items.

2.2 Theoretical Framework

The purpose of this both qualitative and qualitative comparative study is to discover "How the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs)."

The model that this study is primarily based on is the (TAM) Technology Acceptance Model (Davis, 1986), which originates from the (TRA) Theory of Reasoned

Actions (Fishbein and Ajzen, 1975). This study focuses on two theoretical constructs, perceived usefulness (PU) and perceived ease of use (PEOU), which are theorized to be fundamental determinants of system use.

The problem that this study is trying to address is that since older Inventory Management Technologies (IMTs) are constantly becoming outdated and obsolete, 3rd party logistic service providers are confronted with the problem of whether or not to adopt to new technology. This study focuses on the factors, using the Technology Acceptance Model, that influences adoption.

The Researcher used a questionnaire to conduct three separate in-depth interviews with three separate 3rd Party Logistic Service Providers within Bangkok, Thailand. The researcher collected the qualitative and quantitative data and conducted a comparative analysis on the data collected from the interviews. The researcher then analyzed the data from the interviews and concluded how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider new Inventory Management Technologies (IMTs).

2.3 Conceptual Framework

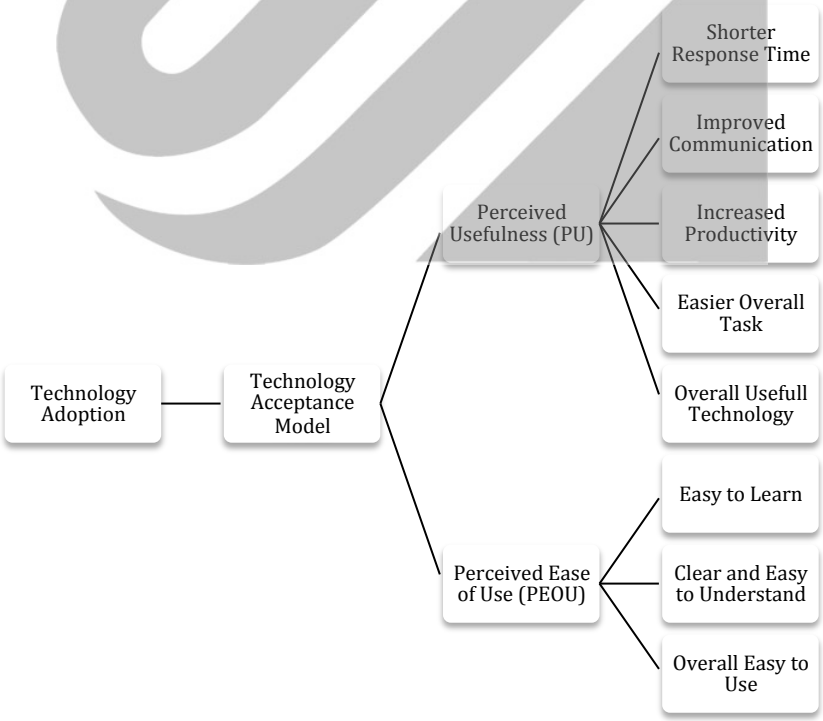

Figure 3. Conceptual Framework for Technology Adoption

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Research Design

The researcher conducted this study in a both qualitative and qualitative comparative research style in which he used questionnaires, based on the technology acceptance model, to conduct three separate in-depth interviews with three 3rd Party Logistic Service Providers within Bangkok, Thailand. Next, the researcher collected the qualitative and quantitative data and conducted a comparative analysis on the data collected from the interviews.

The model that this study is primarily based on is the (TAM) Technology Acceptance Model (Davis, 1986), which originates from the (TRA) Theory of Reasoned Actions (Fishbein and Ajzen, 1975). This study focuses on two theoretical constructs, perceived usefulness (PU) and perceived ease of use (PEOU), which are theorized to be fundamental determinants of system use.

3.2 Participants

Study Sample

All three companies used in this study represent a 24% global market share, and with an expected .05%-4% increase, a possible 30%+ global market share in the transportation and logistics industry within 2013. A.P. Møller - Maersk A/S (Company A) in 2012 had revenue of $59 billion and with a global market share of 15% (A.P. Møller - Maersk A/S Annual Report, 2012). Kuehne + Nagel (Company B) in 2012 had revenue of $20.75 Billion and a global market share of 5% (Kuehne + Nagel Annual Report, 2012). Nippon Express (Company C) in 2012 had revenue of $16.4 Billion and a global market share of 4% (Nippon Express Annual Report, 2012). All three of the participants operate in Thailand and are global market share leaders. Each of the three different 3rd Party Logistic Service Providers have been given the same questionnaire on three separate dates that was designated by the researcher.

Researcher's Details

The researcher is an MBA student at Stamford International University. The researcher has resided in Thailand for 4 years previous to the study. He obtained his undergraduate degree in International Business Management at Stamford International University.

3.3 Data Collection Methods

Sources of Data

One of the sources of data that was used in this study, was the data that was collected by the researcher from the in-depth interviews. Another source of data the researcher used was similar previous studies. All previous cases have been sited in the references page.

Collection of Data

The researcher conducted this study in a comparative research style. The researcher conducted background research on the research question and compiled a list of forty questions, which he prepared to issue to the participants. The researcher used the Technology Acceptance Model (TAM) and Dreyer and Laitenberger (1998) and Bienstock and Royne (2010) as a guide in which he formulated the questions. Next, the researcher complied a list of eight companies that represent the majority of market share, by analyzing their own annual reports, within the logistics industry in Thailand. Out of the eight companies, three companies agreed to take part in this study. The researcher than organized a time to conduct the interview with the three companies at separate times. During the interviews, the researcher wrote down key points during each of the questions. After the researcher was satisfied with the data collected, he offered the interviewee the option of having access to the research upon completion. All three of the interviewees welcomed the offer of access to the finished research. The interviewees also asked the researcher questions about the purpose of the research and where the research

was going to be published. The researched than thanked the interviewees for their time and then concluded the interview.

Analysis of Data

As for the qualitative and quantitative data collected from the interviews, the researcher analyzed the data collected from the interviews and concluded how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

3.4 Ethical Considerations

Each of the companies involved in this study were given the option by the researcher to remain anonymous. All three companies showed interest in remaining anonymous. The researcher also offered the opportunity to the companies that upon completion of the research, that they could have access to the finished study. All three companies also showed interest in having access to the finished study.

CHAPTER 4
RESEARCH FINDINGS

4.1 Introduction and Overview of the Research

A large portion of incurred costs to many firms in Thailand stem directly from managing and distributing inventory. To alleviate these issues, some companies are outsourcing these operations to 3rd Party Logistic Service Providers. In 2004, Lieb and Bentz, conducted a survey in which 83 percent of the Fortune 500 companies that were surveyed reported of having at least one contract with a third party logistic service provider. The purpose of this comparative study is to discover "How the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs)."

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4.2 Profile of Participants

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The researcher is an MBA student at Stamford International University. The researcher has resided in Thailand for 4 years previous to the study. He obtained his undergraduate degree in International Business Management at Stamford International University.

4.3 Findings

For the question regarding to perceived improvement to response time, Company A, B, and C found the perceived improvement to response time an important factor to adoption of the new inventory management technology.

For the question regarding the perceived improvement in communication, Company A, found the perceived improvement in communication somewhat of an important factor to adoption. Company B, found the perceived improvement in communication important factor to adoption. Company C found the perceived improvement in communication not very important to adoption of the inventory management technology.

For the question regarding to the perceived increase in productivity, Company A, B, and C found the perceived increase in productivity, a very important factor to adoption of the new inventory management technology.

For the question regarding to the perceived improvement of making the task easier, Company A and B found the perceived improvement of making the task easier somewhat of an important factor to adoption, while Company C found the perceived improvement of making the task easier not a very important factor to adoption of the inventory management technology.

For the question regarding to the perceived conclusion that the Inventory Management Technology would be useful, Company A, B, and C found the perceived conclusion that the Inventory Management Technology would be useful, a very important factor to adoption of the new inventory management technology.

For the question regarding to the perceived conclusion that the Inventory Management Technology would be easy to learn, Company A, B, and C found the perceived conclusion that the Inventory Management Technology would be easy to learn somewhat of an important factor to adoption of the new inventory management technology.

For the question regarding the perceived conclusion that the Inventory Management Technology would be clear and easy to understand, Company A and B, found the perceived conclusion that the Inventory Management Technology would be clear and easy to understand to be somewhat of an important factor, while Company C found the perceived conclusion that the Inventory Management Technology would be clear and easy to understand an important factor in the adoption of the inventory management technology.

For the question regarding the perceived conclusion that the Inventory Management Technology would be easy to use, Company A and Company C found the perceived conclusion that the Inventory Management Technology would be easy to use an important factor to adoption, while Company B found the perceived conclusion that the Inventory Management Technology would be easy to use a very important factor to the adoption of the inventory management technology.

For the question regarding to other factors did they consider before adopting the inventory management technology, Company A and Company C, responded that they also considered the cost of adoption as well as the time it would take to implement the

new technology. Company B responded that they also considered the cost and the compatibility with their current processes.

For the question regarding to the type of inventory management system that they use, Company A, B, and C all use a similar type of RFID inventory management system.

For the question regarding to if they actually adopted the inventory management technology they were looking to adopt, Company A, B, and C all responded that they adopted the inventory management technology that they were looking to adopt.

For the question regarding to if their expectations were met with the previous assumptions before the adoption of the inventory management technology, For Company A, B, and C, they all said that there previous assumptions proved to be accurate regarding to the perceived usefulness and ease of use for the technologies in which they were considering adopting.

For the question regarding to how important was the Perceived Usefulness and Perceived Ease of Use overall in factoring in the adoption of the technology, For Company A, The Interviewee said, "Overall the Perceived Usefulness carried heavier weight in the decision process due to the actually practicality of the technology, but both were very vital in the decision to adopt the technology." For Company B, The Interviewee said, " Regarding to your questions you asked about Perceived Usefulness and Perceived Ease of Use, both had a significant impact on our adoption of the new system. For Company C, the Interviewee said, "Our Perceived Usefulness and our Perceived Ease of Use of the technology we were looking to adopt, along with some other factors that we mentioned earlier, were very important in our final decision.

For the question regarding to if they would have still adopted the technology in the absence of the perceived factors, Company A, B, and C, all said that although there were a few other factors that they took into consideration such as cost, compatibility, and time spent in transition, but they all would not have adopted the technology without the Perceived Usefulness and Perceived Ease of Use factors.

For the question regarding to what were the most important perceived factors, Company A, B, and C, all said they found the perceived increase in productivity, overall usefulness, and overall ease of use to be the most significant factors in deciding to adopt the new technology.

4.4 Description of Qualitative Findings

Perceived Usefulness

For Company A, the Interviewee replied that the perceived improvement in response time was definitely an important factor in implementing the technology. The Interviewee said, “Being able to expedite the ordering process and getting the customer’s shipment out as soon as possible is important to us.” For Company B, the Interviewee replied that the perceived improvement in response time was an important factor in whether or not they adopted the technology. The Interviewee said, “In the past we have had issues with inconsistent response times, so being able to utilize a technology that could possibly help us in this area held a great deal of weight in our decision.” For Company C, the Interviewee replied that the perceived improvement in response time was important in the decision to adopt the new inventory management technology. The Interviewee said, “We wanted to make sure we were able to offer the highest quality service to our customers, while still being as efficient as possible.”

For Company A, the Interviewee replied that the perceived improvement in communication was somewhat of an important factor in deciding to implement the newer technology. The Interviewee said, “Although some aspects of our processes involve communication throughout our departments, as well with the customers, the technology we had was effective in accomplishing this task.” For Company B, the Interviewee replied that the perceived improvement in communication was an important factor in deciding to implement the newer technology. The Interviewee said, “ Being able to communicate with our customers effectively, as well as consolidate other communication channels throughout different departments was definitely a contributing factor.” For Company C, the Interviewee replied that the perceived improvement in communication was not a very important factor in deciding to implement the newer technology. The Interviewee said, “Although effective communication is vital to our company, the needs for effective communication were currently being met with a separate technology.”

For Company A, the Interviewee replied that the perceived increase in productivity was a very important factor in adopting the new technology. The Interviewee said, “To remain competitive on a global scale, constantly adapting to the current technological environment, especially when it can increase our productivity, is vital to our success and future growth.” For Company B, the Interviewee replied that the perceived increase in productivity was also a very important factor in adopting the new technology. The Interviewee said, “Having the opportunity to update our technology to increase our productivity while giving us a greater competitive advantage was one of our deciding factors.” For Company C, the Interviewee replied that the perceived increase in productivity was also a very important factor in adopting the new technology. The Interviewee said, “Being able to possibly increase our productivity through the implementation of new technology was possibly one of our most contributing factors, and a possibility we could not ignore.”

For Company A, the Interviewee replied that the perceived improvement of making the task easier was somewhat important in adoption of the new technology. The Interviewee said, “ Giving our employees the option of presenting them a task with fewer obstacles due to the adoption of the technology while also being able to assist them in accomplishing their task more efficiently and effectively factored in to our decision to adopt the technology.” For Company B, the Interviewee replied that the perceived improvement of making the task easier was also somewhat important in adoption of the new technology. The Interviewee said, “Making the task easier for our employees is important to us when considering to adopt a new technology.” For Company C, the Interviewee replied that the perceived improvement of making the task easier was not very important in adoption of the new technology. The interviewee said, “Making the task easier for our employees was not among the top factors that we considered before adopting the technology.”

For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, “Along with the other factors such as

increased productivity and shorter response time, we ultimately concluded that the technology would be useful." For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, "We decided that the technology we were looking to adopt met the needs of our company and would become very useful." For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, "We found that the technology would be useful to handle out company's operations."

Perceived Ease of Use

For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to learn was somewhat an important factor in adopting the technology. The Interviewee said, " Our employees were trained extensively on the previous technology and there was not much of a learning curve in order to implement the new technology." For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to learn was also somewhat an important factor in adopting the technology. The Interviewee said, "In the past we have had some difficulty adjusting to technology that was substantially different than a previous one. This was one factor we had to consider before implementation." For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to learn was also somewhat an important factor in adopting the technology. The Interviewee said, "Before adopting a new technology that manages out logistic operations, we always take into consideration how easy it is for the technology to be learned for out employees."

For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be clear and easy to understand was somewhat an important factor before adopting the technology. The Interviewee said, "It was important to us that the technology that we were adopting was easily understood by

our employees." For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be clear and easy to understand was also somewhat an important factor before adopting the technology. The Interviewee said, "Department Managers go through extensive training and dry runs of the technology to make sure that they understand how to use and also to instruct other employees." For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be clear and easy to understand was an important factor before adopting the technology. The Interviewee said, "In order for out employees to do their task effectively, understanding the technology that manages our logistical operations is important to us."

For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to use was an important factor in adopting the technology. The Interviewee said, "Along with the previous factors of if we thought that the technology that was to be adopted was easy to learn and understand, we found that whether or not the new technology was easy to use, was an important factor in determining if we decided to adopt the technology." For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to use was a very important factor in adopting the technology. The Interviewee said, "We determined that the ease of use of a technology was a very important factor to our adoption of the system." For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to use was an important factor in adopting the technology. The Interviewee said, "Being able to easily use the technology was a factor we considered before adoption and implementation."

Current Technology

For Company A, the Interviewee replied that they also considered cost of adoption as well as how long it would take you fully integrate the new system. For Company B, the Interviewee replied that they considered also the cost and compatibility with their current processes. Company C the Interviewee replied that they considered the cost of adopting the technology and the time it would take to complete the transition.

For Company A, B, and C, the Interviewees replied that they all use a similar type of RFID inventory management system.

For Company A, B, and C, the Interviewees replied that they all adopted and implemented the technology in which they were previously questioned about.

For Company A, B, and C, the Interviewees replied that they all said that there previous assumptions proved to be accurate regarding to the perceived usefulness and ease of use for the technologies in which they were considering adopting.

For Company A, The Interviewee said, "Overall the Perceived Usefulness carried heavier weight in the decision process due to the actually practicality of the technology, but both were very vital in the decision to adopt the technology." For Company B, The Interviewee said, " Regarding to your questions you asked about Perceived Usefulness and Perceived Ease of Use, both had a significant impact on our adoption of the new system. For Company C, the Interviewee said, "Our Perceived Usefulness and our Perceived Ease of Use of the technology we were looking to adopt, along with some other factors that we mentioned earlier, were very important in our final decision.

For Company A, B, and C, the Interviewees replied that they all said that although there were a few other factors that they took into consideration such as cost, compatibility, and time spent in transition, but they all would not have adopted the technology without the Perceived Usefulness and Perceived Ease of Use factors.

For Company A, B, and C, the Interviewees replied that they all found the perceived increase in productivity, overall usefulness, and overall ease of use to be the most significant factors in deciding to adopt the new technology.

4.5 Summary

The Researcher used a questionnaire to conduct three separate in-depth interviews with three separate 3rd Party Logistic Service Providers within Bangkok, Thailand. The researcher collected the qualitative and quantitative data and conducted a comparative analysis on the data collected from the interviews. The researcher then analyzed the data from the interviews and concluded how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 Overview of Significant Findings

Table 4. *Significant Findings A*

	SIGNIFICANT FINDINGS	Company A		Company B		Company C		Total	Mean	Standard Deviation
	Perceived Usefulness									
1	Shorter Response Time	Important	4	Important	4	Important	4	12	4.00	0.0000
		Expedited Order		Consistent Response Times		Order Efficiency				
2	Improved Communication	Somewhat Important	3	Important	4	Not So Important	2	9	3.00	1.0000
		Communication Integration		Effective Communication		Needs Currently Met				
3	Increased Productivity	Very Important	5	Very Important	5	Very Important	5	15	5.00	0.0000
		Remain Competively Globally		Maintain Competitive Advantage		Ease of Implemention				
4	Easier Overall Task	Somewhat Important	3	Somewhat Important	3	Not So Important	2	8	2.67	0.5774
		Fewer Obstacles		Ease for Employees		Benefits Employees				
5	Overall Usefull Technolgy	Very Important	5	Very Important	5	Very Important	5	15	5.00	0.0000
		Productivity and Response Time		Met Company's Needs		Efficient Integration in Operations				
	Total		20		21		18			
	Mean		4.00		4.20		3.60			
	Standard Deviation		1.0000		0.8367		1.5166			

Table 5. *Significant Findings B*

	Perceived Ease of Use							Total	Mean	Standard Deviation
1	Easy to Learn	Somewhat Important	3	Somewhat Important	3	Somewhat Important	3	9	3.00	0.0000
		Low Learning Curve		Similar as Previous Technology		Ease for Employees				
2	Clear and Easy to Understand	Somewhat Important	3	Somewhat Important	3	Important	4	10	3.33	0.5774
		Correct Operational Learning		Extensive Training		Ease of Understanding				
3	Overall Easy to Use	Important	4	Very Important	5	Important	4	13	4.33	0.5774
		Ease of Learning and Understanding		Clear Understanding		Ease of Instruction				
	Total		10		11		11			
	Mean		3.3333		3.6667		3.6667			
	Standard Deviation		0.5774		1.1547		0.5774			

	Perceived Usefulness and Perceived Ease of Use			
	Total	55	58.037	52.117
	Mean	5.00	5.28	4.74
	Standard Deviation	5.0990	5.3585	4.5534

1 = Not Important
2 = Not So Important
3 = Somewhat Important
4 = Important
5 = Very Important

Table 6. *Significant Findings C*

	MOST SIGNIFICANT FINDINGS	Company A		Company B		Company C			Total	Mean	Standard Deviation
	Perceived Usefulness										
3	Increased Productivity	Very Important	5	Very Important	5	Very Important	5		15	5.00	0.0000
		Remain Competively Globally		Maintain Competitive Advantage		Ease of Implemention					
5	Overall Usefull Technolgy	Very Important	5	Very Important	5	Very Important	5		15	5.00	0.0000
		Productivity and Response Time		Met Company's Needs		Efficient Integration in Operations					
	Perceived Ease of Use										
3	Overall Easy to Use	Important	4	Very Important	5	Important	4		13	4.33	0.5774
		Ease of Learning and Understanding		Clear Understanding		Ease of Instruction					

Total	14	15	14	
Mean	4.67	5.00	4.67	
Standard Deviation	0.5774	0.0000	0.5774	

5.2 Analysis and Interpretation of Findings

The purpose of this comparative study is to discover "How the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts or upgrades to new Inventory Management Technologies (IMTs)." The researcher has found in this study that The Technology Acceptance Model has a significant impact on the acceptance of technology to the 3rd party logistic service providers in this study. The following analysis uses data from Table A.

Perceived Usefulness

Company A answered 3 out of the 5 questions regarding Perceived Usefulness either important or very important while the 2 other responses were answered as somewhat important. For Perceived Usefulness, Company A had an average score of 4.00 and a standard deviation of 1.0000. With an average score of 4.00, the researcher can conclude that Company A found the Perceived Usefulness to have an important impact on whether or not these companies adopted the technology.

Company B answered 4 out of the 5 questions regarding Perceived Usefulness either important or very important while the 1 other response was answered as somewhat important. For Perceived Usefulness, Company B had an average score of 4.20 and a standard deviation of 0.8367. With an average score of 4.20, the researcher can conclude that Company B found the Perceived Usefulness to have an important to very important impact on whether or not these companies adopted the technology.

Company C answered 3 out of the 5 questions regarding Perceived Usefulness either important or very important while the 2 other responses were answered as not very

important. For Perceived Usefulness, Company C had an average score of 3.60 and a standard deviation of 1.5166. With an average score of 3.60, the researcher can conclude that Company C found the Perceived Usefulness to have an somewhat important to important impact on whether or not these companies adopted the technology.

Perceived Ease of Use

Company A answered 1 out of the 3 questions regarding Perceived Ease of Use either important or very important while the 2 other responses were answered as somewhat important. For Perceived Ease of Use, Company A had an average score of 3.33 and a standard deviation of 0.5774. With an average score of 3.33, the researcher can conclude that Company A found the Perceived Ease of Use to have an somewhat important to important impact on whether or not these companies adopted the technology.

Company B answered 1 out of the 3 questions regarding Perceived Ease of Use either important or very important while the 2 other responses were answered as somewhat important. For Perceived Ease of Use, Company B had an average score of 3.66 and a standard deviation of 1.1547. With an average score of 3.66, the researcher can conclude that Company B found the Perceived Ease of Use to have an somewhat important to important impact on whether or not these companies adopted the technology.

Company C answered 2 out of the 3 questions regarding Perceived Ease of Use either important or very important while the 1 other response was answered as somewhat important. For Perceived Ease of Use, Company C had an average score of 3.66 and a standard deviation of 0.5774. With an average score of 3.66, the researcher can conclude that Company C found the Perceived Ease of Use to have an somewhat important to important impact on whether or not these companies adopted the technology.

Perceived Usefulness and Perceived Ease of Use

Company A answered 4 out of the 8 questions regarding Perceived Usefulness and Perceived Ease of Use either important or very important while the 4 other responses were answered as somewhat important. Company A had an average score of 3.75 and a

standard deviation of 0.8864. With an average score of 3.75, the researcher can conclude that Company A found the Perceived Usefulness and Perceived Ease of Use to have a significant impact on whether or not these companies adopted the technology.

Company B answered 5 out of the 8 questions regarding Perceived Usefulness and Perceived Ease of Use either important or very important while the 3 other responses were answered as somewhat important. Company B had an average score of 4.00 and a standard deviation of 0.9258. With an average score of 4.00, the researcher can conclude that Company B found the Perceived Usefulness and Perceived Ease of Use both to have a significant impact on whether or not these companies adopted the technology.

Company C answered 5 out of the 8 questions regarding Perceived Usefulness and Perceived Ease of Use either important or very important while the 2 other responses were answered as not very important and one response was somewhat important. Company C had an average score of 3.75 and a standard deviation of 0.8864. With an average score of 3.75, the researcher can conclude that Company C found the Perceived Usefulness and Perceived Ease of Use both have a significant impact on whether or not these companies adopted the technology.

The researcher can conclude that from the results from all of the participants, Perceived Usefulness (PU) was consistently high with an average mean of 4.02 while Perceived Ease of Use (PEOU) was considerably lower with an average mean of 3.55, which proved similar in studies such as CSCO *insights (*2011) and Goh and Pinaikul (1998). What can be drawn from this conclusion is that Perceived Usefulness (PU) weighs more in the decision-making process than Perceived Ease of Use (PEOU) which is also substantiated in Tilokavichai, Sophatsathit and Chandrachai (2012) and Goh and Pinaikul (1998).

When asked how important was the Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) in factoring in the adoption of the technology, Company a responded "Overall the Perceived Usefulness carried heavier weight in the decision process due to the actually practicality of the technology, but both were very vital in the decision to adopt the technology." For Company B, The Interviewee said, " Regarding to your questions you asked about Perceived Usefulness and Perceived Ease of Use, both had a significant impact on our adoption of the new system. For Company C, the Interviewee

said, “Our Perceived Usefulness and our Perceived Ease of Use of the technology we were looking to adopt, along with some other factors that we mentioned earlier, were very important in our final decision.

Most Influential Factors

When discovering what are the leading factors within the Technology Acceptance Model (TAM) that contribute primarily to the adoption of Inventory Management Technologies (IMTs) technologies for 3rd party logistic service providers, the researcher found that the perceived increase in productivity, overall usefulness, and overall ease of use to be the most significant factors in deciding to adopt the new technology for all three companies which can be seen in Table B.

For Company A, the perceived increase in productivity was a very important factor in adopting the new technology. The Interviewee said, “To remain competitive on a global scale, constantly adapting to the current technological environment, especially when it can increase our productivity, is vital to our success and future growth.” Company A responded that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, “Along with the other factors such as increased productivity and shorter response time, we ultimately concluded that the technology would be useful.” Company A also responded that the perceived conclusion that the Inventory Management Technology would be easy to use was an important factor in adopting the technology. The Interviewee said, “Along with the previous factors of if we thought that the technology that was to be adopted was easy to learn and understand, we found that whether or not the new technology was easy to use, was an important factor in determining if we decided to adopt the technology.”

For Company B, the perceived increase in productivity was a very important factor in adopting the new technology. The Interviewee said, “Having the opportunity to update our technology to increase our productivity while giving us a greater competitive advantage was one of our deciding factors.” Company B responded that the perceived conclusion that the Inventory Management Technology would be useful was a very important in the decision to adopt the technology. The Interviewee said, “We decided that

the technology we were looking to adopt met the needs of our company and would become very useful." Company B also responded that the perceived conclusion that the Inventory Management Technology would be easy to use was a very important factor in adopting the technology. The Interviewee said, "We determined that the ease of use of a technology was a very important factor to our adoption of the system."

For Company C, the perceived increase in productivity was a very important factor in adopting the new technology. The Interviewee said, "Being able to possibly increase our productivity through the implementation of new technology was possibly one of our most contributing factors, and a possibility we could not ignore." Company C responded that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, "We found that the technology would be useful to handle out company's operations." For Company C, the perceived conclusion that the Inventory Management Technology would be easy to use was an important factor in adopting the technology. The Interviewee said, "Being able to easily use the technology was a factor we considered before adoption and implementation."

Recommendations For IT Research And Development (R&D)

From the conclusion of the analysis of the data collected from the interviews, the researcher has some recommendations for the IT Research and Development. First, as evident from the analysis conducted, IT Developers in the logistics technology industry need to focus their technology around Technology Acceptance Model. Designing their product around a company's perceived usefulness and perceived ease of use is important in the acceptance the newer technology. Second, it is recommended that IT developers set the cost of their technology to make it affordable for a company to accept and implement.

5.3 Conclusion

The purpose of this comparative study was to discover "How the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs)?"

The researcher has found in this study that The Technology Acceptance Model has a significant impact on the acceptance to the 3rd party logistic service providers in this study. Another conclusion that can be drawn from this research is that Perceived Usefulness (PU) weighs more in the decision-making process than Perceived Ease of Use (PEOU), which is also substantiated in Tilokavichai, Sophatsathit and Chandrachai (2012) and Goh and Pinaikul (1998). When discovering what are the leading factors within the Technology Acceptance Model (TAM) that contribute primarily to the adoption of Inventory Management Technologies (IMTs) technologies for 3rd party logistic service providers, the researcher found that the perceived increase in productivity, overall usefulness, and overall ease of use to be the most significant factors in deciding to adopt the new technology for all three companies.

This research direct contribution to this field of study is that it has shown the validity of the Technology Acceptance Model for 3rd party logistics service providers in Thailand. Although similar research has been conducted on the technology acceptance model in the logistics industry, this study primarily focused on the validity of the model within Thailand.

5.4 Significance of the Research

Significance to the Researcher

The researcher has interest in this study because not only did he previously major in this field during his Undergraduate career, but also he has an interest in pursuing a professional career in which this study will be significant. The researcher also believes that due to the uniting of the global marketplace, he believes that research into any form of logistics is relevant.

Significance to the Companies

This study has a level of importance to the companies participating in this research because this study allows them to more clearly understand how the market

leaders around them value factors that influence adoption of inventory management technologies. The researcher has provided the finished study to the participating companies as a way to analyze what their current position is and discover what some other companies are doing in terms of technology adoption.

5.5 Implications in Academia

Since this study does give some valuable insight in how to understand not only how technology is used in inventory management, but also the importance inventory management technologies have in Thailand, which can prove to be a valuable resource to academics that are studying different aspects of logistics and inventory management. Although this study can be valuable to academics, technology and the way we currently perform our logistics operations, are changing at a consistently rapid pace so that this study could possibly be obsolete in the somewhat near future.

5.6 Implications in Practice

This study does give some valuable insight in how to understand not only how technology is adopted in inventory management, but also the importance that inventory management technologies have in Thailand. More research is needed to continue to accurately analyze how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

5.7 Limitations of the Research

One of the limitations in this study is the size of the sample in which the study was conducted. Although the companies that participated in this study are among the market share leaders, more research is needed to confirm the results of this study.

Another limitation of this study is that it is only conducted in Thailand. This limitation exists due to the reason that the researcher resides in Thailand and therefore conducted the study within Thailand. More research is needed to continue to accurately analyze how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

5.8 Recommendations of Further Research

One recommendation for further research is to increase the size of the study sample. Increasing the number of companies in this study can more accurately conclude and confirm the results of this study. One way the researcher could increase the sample size is by including companies that are not headquartered only in Bangkok but also in other surrounding areas. Another recommendation is to increase the scope of the research to include other countries outside of Thailand to more accurately validate the results of this study. The researcher can accomplish this by including companies that are not only operating in Thailand, but that are operating on an international scale. As will all research, more research is needed to conclude how the Technology Acceptance Model (TAM) contributes to whether or not a 3rd party logistic service provider adopts new Inventory Management Technologies (IMTs).

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APPENDIX A

Interview Questionnaire

Perceived Usefulness

Before adopting new Inventory Management Technologies,

- Do you find the perceived improvement in response time to be an important factor in implementing the technology? (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

- Do you find the perceived improvement in communication to be an important factor in implementing the technology? Choose: (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

- Do you find the perceived increase in productivity to be an important factor in implementing the technology? Choose: (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

- Do you find the perceived improvement of making the task easier to be an important factor in implementing the technology? (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

- Do you find the perceived conclusion that the Inventory Management Technology would be useful to be an important factor in implementing the technology? Choose: (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

Perceived Ease of Use

Before adopting new Inventory Management Technologies,

- Do you find the perceived conclusion that the Inventory Management Technology would be easy to learn to be an important factor in implementing the technology? Choose: (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

- Do you find the perceived conclusion that the Inventory Management Technology would be clear and easy to understand to be an important factor in implementing the technology? Choose: (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

- Do you find the perceived conclusion that the Inventory Management Technology would be easy to use to be an important factor in implementing the technology? (5 - Very Important , 4 - Important , 3 - Somewhat Important, 2 - Not Very Important, 1 - Not Important) and Explain.

Current Technology

- What other factors did you consider before adopting the new technology?

- What type of Inventory management system do you use?

- Did you adopt and implement the technology previously mentioned?

- Were your expectations met with the previous assumptions before the adoption of the new technology?

- How important was the Perceived Usefulness and Perceived Ease of Use over all in factoring in the adoption of the technology?

- Would you have still adopted the technology in the absence of the perceived factors?

- What do consider the most important out of the following perceived factors: improvement in response time; improvement in communication; increase in productivity; making the task easier; overall usefulness; easy to learn; clear and easy to understand; overall ease to use.

- Who is using your existing IT systems, and what are they doing?

- How efficient are your current operations?

- Are there any bottlenecks which cause problems?

- Are employees getting stuck on less important tasks?

- Are you duplicating effort between different departments?

- Are there ways of working faster or tasks that could be automated?

- Is your current technology going out of date or causing compatibility issues?

- Are your business needs or processes likely to change in the near future?

- What percentage of your employees that you currently employ, are directly involved with the technology that manages your inventory?

- What is the average education level of the employees directly involved with the technology that manages your inventory?

- Do you provide training to new or inexperienced employees?

- Typically, how long does this training period last?

- Do you consider any of your employees Experts in their Field?

- Do you consider the majority of your employees that are directly involved with the technology that manages your inventory, Unskilled, Semi-skilled, or Skilled?

- Do you find in your employees a lack of knowledge to operate the technology a serious or not serious problem.

- On a Scale of 1-5, how important is the skill level of your employees that are directly involved with the technology that manages your inventory?

- What type/types of technology do you use to manage you inventory and/or which one do you use the most?

- On a scale of 1-5, how complex do you consider the technology that you use to manage your inventory to be?

- What is the minimum amount of employees does it take to operate that technology efficiently?

- Would you considering upgrading your Inventory Management Technology?

- On a Scale of 1-5, How important do you think Technology is in Inventory Management?

- Approximately, what percent of your total assets are allocated directly towards maintaining and updating your inventory management technology?

- Approximately, what percent of the allocated assets are used to maintain your inventory management technology?

- Approximately, what percent of the allocated assets are used to update your inventory management technology?

- Do you consider the cost of adopting and installing inventory technologies a serious or not a serious barrier to upgrading to a more complex inventory management technology?

- On a scale of 1-5, How important are investments toward Inventory Management Technologies?

APPENDIX B

QUESTIONARIE RESPONSES

TECHNOLOGY ACCEPTANCE MODEL

Perceived Usefulness

Before adopting new Inventory Management Technologies, did you find the perceived improvement in response time to be an important factor in implementing the technology?

For Company A, the Interviewee replied that the perceived improvement in response time was definitely an important factor in implementing the technology. The Interviewee said, “Being able to expedite the ordering process and getting the customer’s shipment out as soon as possible is important to us.” For Company B, the Interviewee replied that the perceived improvement in response time was an important factor in whether or not they adopted the technology. The Interviewee said, “In the past we have had issues with inconsistent response times, so being able to utilize a technology that could possibly help us in this area held a great deal of weight in our decision.” For Company C, the Interviewee replied that the perceived improvement in response time was important in the decision to adopt the new inventory management technology. The Interviewee said, “We wanted to make sure we were able to offer the highest quality service to our customers, while still being as efficient as possible.”

- Before adopting new Inventory Management Technologies, did you find the perceived improvement in communication to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived improvement in communication was somewhat of an important factor in deciding to implement the newer technology. The Interviewee said, “Although some aspects of our processes involve communication throughout our departments, as well with the customers, the technology we had was effective in accomplishing this task.” For Company B, the Interviewee replied that the perceived improvement in communication was an important factor in deciding to implement the newer technology. The Interviewee said, “ Being able to communicate with our customers effectively, as well as consolidate other communication channels throughout different departments was definitely a contributing factor.” For Company C, the Interviewee replied that the perceived improvement in communication was not a very important factor in deciding to implement the

newer technology. The Interviewee said, “Although effective communication is vital to our company, the needs for effective communication were currently being met with a separate technology.”

- Before adopting new Inventory Management Technologies, did you find the perceived increase in productivity to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived increase in productivity was a very important factor in adopting the new technology. The Interviewee said, “To remain competitive on a global scale, constantly adapting to the current technological environment, especially when it can increase our productivity, is vital to our success and future growth.” For Company B, the Interviewee replied that the perceived increase in productivity was also a very important factor in adopting the new technology. The Interviewee said, “Having the opportunity to update our technology to increase our productivity while giving us a greater competitive advantage was one of our deciding factors.” For Company C, the Interviewee replied that the perceived increase in productivity was also a very important factor in adopting the new technology. The Interviewee said, “Being able to possibly increase our productivity through the implementation of new technology was possibly one of our most contributing factors, and a possibility we could not ignore.”

- Before adopting new Inventory Management Technologies, did you find the perceived improvement of making the task easier to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived improvement of making the task easier was somewhat important in adoption of the new technology. The Interviewee said, “ Giving our employees the option of

presenting them a task with fewer obstacles due to the adoption of the technology while also being able to assist them in accomplishing their task more efficiently and effectively factored in to our decision to adopt the technology." For Company B, the Interviewee replied that the perceived improvement of making the task easier was also somewhat important in adoption of the new technology. The Interviewee said, "Making the task easier for our employees is important to us when considering to adopt a new technology." For Company C, the Interviewee replied that the perceived improvement of making the task easier was not very important in adoption of the new technology. The interviewee said, "Making the task easier for our employees was not among the top factors that we considered before adopting the technology."

- Before adopting new Inventory Management Technologies, did you find the perceived conclusion that the Inventory Management Technology would be useful to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, "Along with the other factors such as increased productivity and shorter response time, we ultimately concluded that the technology would be useful." For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, "We decided that the technology we were looking to adopt met the needs of our company and would become very useful." For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be useful was very important in the decision to adopt the technology. The Interviewee said, "We found that the technology would be useful to handle out company's operations."

Perceived Ease of Use

- Before adopting new Inventory Management Technologies, did you find the perceived conclusion that the Inventory Management Technology would be easy to learn to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to learn was somewhat an important factor in adopting the technology. The Interviewee said, " Our employees were trained extensively on the previous technology and there was not much of a learning curve in order to implement the new technology." For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to learn was also somewhat an important factor in adopting the technology. The Interviewee said, "In the past we have had some difficulty adjusting to technology that was substantially different than a previous one. This was one factor we had to consider before implementation." For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to learn was also somewhat an important factor in adopting the technology. The Interviewee said, "Before adopting a new technology that manages out logistic operations, we always take into consideration how easy it is for the technology to be learned for out employees."

- Before adopting new Inventory Management Technologies, did you find the perceived conclusion that the Inventory Management Technology would be clear and easy to understand to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be clear and easy to understand was

somewhat an important factor before adopting the technology. The Interviewee said, “It was important to us that the technology that we were adopting was easily understood by our employees.” For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be clear and easy to understand was also somewhat an important factor before adopting the technology. The Interviewee said, “Department Managers go through extensive training and dry runs of the technology to make sure that they understand how to use and also to instruct other employees.” For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be clear and easy to understand was an important factor before adopting the technology. The Interviewee said, “In order for out employees to do their task effectively, understanding the technology that manages our logistical operations is important to us.”

- Before adopting new Inventory Management Technologies, did you find the perceived conclusion that the Inventory Management Technology would be easy to use to be an important factor in implementing the technology?

  For Company A, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to use was an important factor in adopting the technology. The Interviewee said, “Along with the previous factors of if we thought that the technology that was to be adopted was easy to learn and understand, we found that whether or not the new technology was easy to use, was an important factor in determining if we decided to adopt the technology.” For Company B, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be easy to use was a very important factor in adopting the technology. The Interviewee said, “We determined that the ease of use of a technology was a very important factor to our adoption of the system.” For Company C, the Interviewee replied that the perceived conclusion that the Inventory Management Technology would be

easy to use was an important factor in adopting the technology. The Interviewee said, “Being able to easily use the technology was a factor we considered before adoption and implementation.”

Current Technology

- What other factors did you consider before adopting the new technology?

  For Company A, the Interviewee replied that they also considered cost of adoption as well as how long it would take you fully integrate the new system. For Company B, the Interviewee replied that they considered also the cost and compatibility with their current processes. Company C the Interviewee replied that they considered the cost of adopting the technology and the time it would take to complete the transition.

- What type of Inventory management system do you use?

  For Company A, B, and C, the Interviewees replied that they all use a similar type of RFID inventory management system.

- Did you adopt and implement the technology previously mentioned?

  For Company A, B, and C, the Interviewees replied that they all adopted and implemented the technology in which they were previously questioned about.

- Were your expectations met with the previous assumptions before the adoption of the new technology?

  For Company A, B, and C, the Interviewees replied that they all said that there previous assumptions proved to be accurate regarding to the perceived usefulness and ease of use for the technologies in which they were considering adopting.

- How important was the Perceived Usefulness and Perceived Ease of Use over all in factoring in the adoption of the technology?

For Company A, The Interviewee said, “Overall the Perceived Usefulness carried heavier weight in the decision process due to the actually practicality of the technology, but both were very vital in the decision to adopt the technology.” For Company B, The Interviewee said, “ Regarding to your questions you asked about Perceived Usefulness and Perceived Ease of Use, both had a significant impact on our adoption of the new system. For Company C, the Interviewee said, “Our Perceived Usefulness and our Perceived Ease of Use of the technology we were looking to adopt, along with some other factors that we mentioned earlier, were very important in our final decision.

- Would you have still adopted the technology in the absence of the perceived factors?

  For Company A, B, and C, the Interviewees replied that they all said that although there were a few other factors that they took into consideration such as cost, compatibility, and time spent in transition, but they all would not have adopted the technology without the Perceived Usefulness and Perceived Ease of Use factors.

- What do consider the most important out of the following perceived factors: improvement in response time; improvement in communication; increase in productivity; making the task easier; overall usefulness; easy to learn; clear and easy to understand; overall ease to use.

  For Company A, B, and C, the Interviewees replied that they all found the perceived increase in productivity, overall usefulness, and overall ease of use to be the most significant factors in deciding to adopt the new technology.

BIOGRAPHY

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