FEATURES OF THE INTERORGANIZATIONAL SYSTEM TO SUPPORT THE INITIAL TRUST OF JOINING THE TRANSPORTATION COLLABORATION

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คุณลักษณะของระบบสารสนเทศระหว่างองค์กรเพื่อสนับสนุนความไว้วางใจแรกเริ่มของการเข้าร่วมความร่วมมือในการขนส่ง

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การปฏิเสธที่จะเข้าร่วมในความร่วมมือทางการขนส่งขององค์กรต่างๆได้รับการยอมรับว่าเป็นอุปสรรคที่สำคัญของการแก้ปัญหาการวิ่งรถเปล่า จากการที่ระบบสารสนเทศระหว่างองค์กรมักจะถูกแสดงในระหว่างที่องค์กรต่างๆได้รับการเชิญชวนเข้าร่วมในความร่วมมือ ระบบสารสนเทศระหว่างองค์กรที่ประกอบด้วยคุณลักษณะที่สนับสนุนความไว้วางใจแรกเริ่มควรจะเพิ่มความตั้งใจเข้าร่วมในความร่วมมือทางการขนส่ง วัตถุประสงค์ของการศึกษาครั้งนี้คือการศึกษาผลของคุณลักษณะที่สนับสนุนความไว้วางใจแรกเริ่มประกอบด้วยคุณลักษณะด้านความน่าไว้วางใจและคุณลักษณะด้านความฝังตัวทางสังคมต่อความตั้งใจเข้าร่วมความร่วมมือในการขนส่ง การศึกษาครั้งนี้ใช้การวิจัยเชิงทดลองในห้องปฏิบัติการโดยใช้การออกแบบ 2x2 แฟกทอเรียลภายในหน่วยทดลองซึ่งมีการใช้หน่วยทดลองสองกลุ่ม การศึกษานี้ได้พัฒนาระบบสารสนเทศระหว่างองค์กรสำหรับการทดลองขึ้นมา 4 รูปแบบโดยได้นำคุณลักษณะเพื่อสนับสนุนความไว้วางใจแรกเริ่มเข้าไป ผู้รับการทดลองได้ถูกขอให้เล่นบทบาทสมมติเป็นเจ้าของธุรกิจที่มีรถบรรทุกจำนวนหนึ่งเป็นของตัวเองและเผชิญกับปัญหาการวิ่งรถเปล่า กลุ่มทดลองสองกลุ่มประกอบด้วย (1) นิสิตหลักสูตรโลจิสติกส์จำนวน 58 คน ซึ่งได้ใช้ระบบสารสนเทศที่พัฒนาขึ้นในระหว่างการทลองและ (2) นิสิตหลักสูตรบริหารธุรกิจมหาบัณฑิตจำนวน 61 คน ซึ่งชมการสาธิตระบบที่พัฒนาขึ้นผ่านวิดีทัศน์ ผลจากการวิเคราะห์ข้อมูลเมื่อนำตัวแปรเกี่ยวกับความเอนเอียงของความไว้วางใจส่วนบุคคลและลักษณะเฉพาะรายการของการร่วมมือในการขนส่งพบว่าคุณลักษณะความน่าไว้วางใจไม่มีผลต่อความตั้งใจเข้าร่วมในความร่วมมือทางการขนส่งของนิสิตหลักสูตรโลจิสติกส์ แต่มีผลต่อความตั้งใจของนิสิตหลักสูตรบริหารธุรกิจมหาบัณฑิต ส่วนคุณลักษณะด้านความฝังตัวทางสังคมมีผลต่อความตั้งใจของนิสิตหลักสูตรโลจิสติกส์แต่ไม่มีผลกับนิสิตหลักสูตรบริหารธุรกิจบัณฑิต

สาขาวิชา<u>เทคโนโลยีสารสนเทศทางธุรกิจ</u> ลายมือชื่อนิสิต.....

ปีการศึกษา <u>2553</u> ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก.....

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ANIRUT ASAWASAKULSORN : FEATURES OF THE INTERORGANIZATIONAL SYSTEM TO SUPPORT THE INITIAL TRUST OF JOINING THE TRANSPORTATION COLLABORATION. ADVISOR : PROF. UTHAI TANLAMAI, Ph.D., 147 pp.

Organizations' reluctance to join a transportation collaboration has been acknowledged to be a vital obstacle to solving the empty truck syndrome. Since the interorganizational system (IOS) is typically shown during the invitation session of collaboration, well equipped features to support initial trust should increase intention to join the transportation collaboration. The purpose of this study was to investigate the effects of features to support initial trust - trustworthness features and social embeddedneess features - on intention to join the transportation collaboration. A laboratory experiment was conducted using a 2x2 factorial within-subjects experimental design with two settings. Four versions of the experimental IOS system with intial trust-embeded features were manipulated. Subjects were asked to play the role of business owners whose organizations owned some trucks and who faced an empty truck problem. There are two experimental settings: (1) 58 logistics students participating in a "Hands-on Workshop" experiment, and (2) 61 MBA students participating in a "Watching a Demonstration via Video clips" experiment. After considering the effects of disposition to trust and transaction characteristics in the transportation collaboration, trustworthiness features did not affect the logistics students' intention to join transportation collaboration but these features had led to the increase in MBA students' intention. Whilst, social embeddedness features had some effects on the logistics students' intention but not the MBA students' intention.

Field of Study :Information Technology in Business Student's Signature .....

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Chapter I

Introduction

1.1 Background and Rationale of the Study

The empty truck problem is one that all countries around the world, especially developing countries, face. For example, according to a study by the Department of Land Transport in Thailand, about 46% of total truck trips were empty between the years 1996-2000. Furthermore, this problem is so costly as transportation is a major component of business, accounting for about 41% of total logistics costs in Thailand.

When transportation costs increase, especially in times of increasing oil prices, it can also lead to political and economic crises for developing countries like Thailand. Thus, not only focal organizations but also other stakeholders such as government agencies have tried to improve transportation activities in order to reduce costs. Every possible measure has been considered for reducing the cost of operations, and many believe that there are no additional measures to be taken. Solving the empty truck problem is possibly only one of the few things that can actually help reduce transportation costs.

However, the empty truck problem is by no means easy to solve. Although some organizations internally handle the empty truck problem better than others, most of them realize the difficulties they face if they have to solve the problem alone. This is because an organization usually transports its shipments one way at a time as either linehauls or backhauls (e.g., Alshamrani et al., 2007; Asawasakulsorn, 2007). Only a few organizations have been successful in balancing both their linehaul and backhaul shipments.

Rather than solving the problem alone, organizations know that an efficient solution is at hand if they engage in interorganizational collaboration by transportation exchange in the following manner. If an organization's shipment involves only one-way hauling (linehaul or backhaul), this organization can make either of two

choices: (1) request a shipment for its empty route from other organizations (in-sourcing), or (2) give the shipment to another one who can carry it (out-sourcing). Transportation exchange can thus be viewed as a combination of both out-sourcing and in-sourcing transportation. This can maximize the utilization of trucks in the collaboration and also minimize the empty truck problem.

The simplest type of collaboration – of which an organization could initially engage in – is dyadic collaboration whereby an organization collaborates with another. With the two organizations' combined efforts, the problem, however, still usually remains as it does for one. The more organizations there are in transportation collaboration, the greater the pool of shipment jobs, and thus, increased utilization of the trucks. To solve the empty truck problem effectively, interorganizational collaboration with more than two organizations – multilateral interorganizational collaboration – is usually preferred.

With the increased complexity from the greater number of collaborating organizations, it is necessary to assign one to manage the collaboration. A multilateral interorganizational collaboration can be managed by different parties such as an organization in collaboration, a third-party moderator or an association of organizations, etc.(Clarke, 2001). Of these, transportation collaboration is frequently operated by a third-party moderator. This is due to government agencies often taking active roles in fostering transportation collaborations by supporting the initial investment and then assigning another to run the collaboration. For example, in Thailand, the Transportation Collaboration Center (TCC) was supported by the government agency Electrical and Electronics Institute (EEI). EEI then assigned another company to act as a third-party moderator in its transportation collaboration.

With this interorganizational collaboration to tackle the empty truck problem in mind, this study aims to investigate "transportation collaboration", referred to throughout this study as "multilateral interorganizational collaboration among

organizations engaging in transportation exchange managed by a third-party moderator".

Although organizations can gain obvious benefits from transportation collaboration, most organizations are reluctant to join the collaboration for various reasons. This is quite serious because without a sufficient number of collaborators in the transportation collaboration, the collaboration is ineffective and unattractive. Consequently, this makes attempts for attracting organizations to join the transportation collaboration even more difficult.

Since there are various risks involved in joining the transportation collaboration (Asawasakulsorn, 2007; Cruijssen et al., 2007), it is believed that trust is required for interorganizational collaboration for it to succeed (Jones and Bowie, 1998; Ring, 1996). On top of that, trust is important right from the formation stage so as to facilitate the organizations' decisions to participate in interorganizational collaboration (Gallivan and Depledge, 2003). It has been argued by researchers that trust can be formed ever since the formation stage (Jarvenpaa and Leidner, 1999; Lewicki and Bunker, 1996; McKnight et al., 1998).

Since nearly all transportation collaboration operates on the interorganizational system (IOS) which is normally shown to potential collaborators during the inviting session, the features of the system might affect initial trust. Although some researchers realized the benefits of studies of IOS on trust during the later stage (Hart and Saunders, 1997; Karahannas and Jones, 1999), almost no studies of IOS have taken a close look at initial trust. This study aims to explore this research stream by adopting features to support initial trust from information system literature and applying them to IOS context. There are at least two groups of features to support initial trust in the literature: (1) trustworthiness features (e.g., Egger, 2003; Lanford and Hubscher, 2004) and (2) social embeddedness features (Riegelsberger et al., 2005).

Furthermore, almost no studies have taken a serious look at link between the effect of the features of IOS to support initial trust and intention to join the

transportation collaboration. This study tries to make an initial attempt to take a close look at this missing link.

1.2 Problem Statement

With this stated gap between IOS features to support initial trust and intention to join the transportation collaboration, the research question is as follows:

- Do trustworthiness features and social embeddedness features in the interorganizational system (IOS) influence the intention to join multilateral interorganizational collaboration among organizations engaging in transportation exchange managed by a third-party moderator?

1.3 Objectives of the Study

The objective of this study is to examine the effects of IOS features to support initial trust comprising trustworthiness features and social embeddedness features on the intention to join transportation collaboration.

1.4 Significance of the Study

Empty truck syndrome is a costly logistics problem. Transportation collaboration can help not only collaborators but also other stakeholders such as consumers who are affected by higher consumer prices caused by higher logistic costs and the government who may then be affected by political and economic crises. Since this problem is not new, there have been many attempts to solve the problem of transportation collaboration. For the problem that most organizations are reluctant to join, many efforts to establish collaboration have been unsuccessful. IOS features to support initial trust, which are supposed to affect the intention to join transportation collaboration but, in the past, have lacked serious investigation, are thus worth examining.

Apart from transportation collaboration, there exist many other types of multilateral interorganizational collaboration managed by third-party moderators, which might face similar problems as transportation collaboration as well. For example, Siam Commercial Bank (SCB) recently offered a new service to its customers. SCB worked as a moderator of money matching among organizations. Organizations can borrow money from other organizations in the collaboration rather than from banks as is usual. Collaborators benefit from lower interest rates while financial institutions benefit from management fees and the risk-free element of this situation. Thus, this study might also contribute to these types of collaborations.

Although transaction cost economics has contributed a lot to the studies of interorganizational collaboration (Williamson, 1979), its predictive power is limited without incorporating initial trust (Chiles and McMackin, 1996). Although there have been a number of studies investigating the role of initial trust in transaction cost economics, with a number of antecedents of initial trust, clarity of its integration to transaction cost economics is still needed. This study tries to clarify how these antecedents of initial trust can integrate with transaction cost economics to explain the intention to join the transportation collaboration.

Since there have been limited studies attempting to identify the IOS features to enhance trust, especially to support initial trust like Kumar et al. (1998) called for, this study aims to be one of the initial attempt to investigate the features that support initial trust. On top of that, addressing this gap between IOS features to support initial trust and intention to join the transportation collaboration would help solve organizations' reluctance to join the transportation collaboration and is thus worth examining.

1.5 Summary of Chapter I

This chapter laid the foundations for the motivation of this study. It revealed the practical problem and research gap. Subsequently, the research question and objective were presented. The remainder of the dissertation is structured as follows. The next chapter reviews the related literature. Then, the research methodology using experimental

research method will follow. Data analysis is further presented. And this dissertation will be summarized with conclusion and discussion. Implications and limitations are also provided.

Chapter II

Literature Review

This chapter reviews and examines previous research in the area related to the research objective of this study. It begins with the clarification of the term "transportation collaboration" which is drawn from studies of interorganizational collaboration. A discussion about the intention to join transportation collaboration – which this study aims to investigate – is elaborated. Further, initial trust embedded in transaction cost economics which is an important factor explaining intention to join is reviewed. Subsequently, interorganizational system features for supporting initial trust will be discussed. The chapter ends with the proposed conceptual framework.

2.1 Interorganizational Collaboration

Different terms and vocabularies are used to represent interorganizational relationships, including interorganizational collaboration, interorganizational cooperation, strategic alliance, and partnership. Although these terms are slightly different and vary in different situations, they are often used interchangeably. Strategic alliance usually refers to a situation in which the mutual goal among organizations is formal, strategic, and long-term (Arino, 2003; Bronder and Pritzel, 1992; Tsang, 1998). Compared with strategic alliance, partnership is used in more specific objectives (Mohr and Spekman, 1994). For example, there are partnerships in supply chain, R&D, and research (Hagedoorn, 2002; Hagedoorn et al., 2000; Maloni and Benton, 1997). However, partnership is also used in individual partnership (Cooper-Patrick et al., 1999) or even non-human partnership (Lagna et al., 1996).

In this study, the author will use the term "interorganizational collaboration" to refer to interorganizational relationships which are formal and long-term, but it is unclear whether the relationships are strategic (Hardy et al., 2003; Powell et al., 1996; Schermerhorn Jr, 1975).

There are many ways organizations can collaborate. Interorganizational collaboration can be classified into a number of categories, such as functional, intra- or inter-industry, intra-international, strategic and operational, equity arrangement, and supply chain (Jarratt, 1998; Simatupang and Sridharan, 2002; Yoshino and Rangan, 1995). From the functional category, an organization can collaborate only in a specific function such as joint manufacturing, joint marketing, transportation, etc (Jarratt, 1998). For equity arrangements, organizations can collaborate by creating no new entities (minority equity investments and equity swaps), creation of entity (joint venture), or dissolution of entity (merger and acquisitions) (Yoshino and Rangan, 1995). The supply chain category is further divided into vertical, horizontal, and lateral collaboration (Simatupang and Sridharan, 2002). Vertical collaboration is the partnership along the supply chain while horizontal collaboration is among companies within the same level of the supply chain. Vertical and horizontal collaboration can be integrated into lateral collaboration.

Besides this, interorganizational collaboration can be categorized based on the number of collaborators. Dyadic interorganizational collaboration is collaboration with only two collaborators, while multilateral interorganizational collaboration involves more than two collaborators and encompasses greater complexity (Gudmundsson and Lechner, 2006).

The success of interorganizational collaboration depends on both the formation stage and ongoing operation (Ariño et al., 2001; Gallivan and Depledge, 2003). During the formation stage, decisions to join the interorganizational collaboration of organizations are very important. If there are insufficient numbers of collaborators in interorganizational collaboration which by their very nature require a lot of collaborators to gain greater benefit, such as in transportation collaboration, the interorganizational collaboration will be ineffective and unattractive and will most definitely fail. Thus, this study focused on the problem of reluctance to join. In transportation collaboration, although many organizations realize the benefits, they are hesitant when it comes to committing themselves to collaboration. Indeed, various risks in the collaboration hinder

the decision to join. For example, a managing director of a third-party logistics provider (3PL) once said, “Permitting other providers to offer services to our customers means inviting competitors to know our customers, and vice versa. Our company can easily lose our customers in this situation because customers in the logistics industry are not loyal and it is easy to switch to other providers” (Asawasakulsorn, 2007: 12). In addition, an organization worries about the risk of the low service quality of others (Asawasakulsorn, 2007).

According to D'Aunno and Zuckerman (1987), there are four phases in the lifecycle model of interorganizational collaboration including: (1) emergence of a coalition, (2) transition to a federation, (3) maturity of federation, and (4) critical crossroads. Additionally, Zajac and Olsen (1993) proposed a three-stage model including: (1) initializing stage, (2) processing stage, and (3) reconfiguration stage with additional feedback to earlier stages. This study focuses on the formation stage of transportation collaboration. This stage is compared to the transition to a federation or initializing stage in the literature (D'Aunno and Zuckerman, 1987; Zajac and Olsen, 1993). In this stage, no transportation exchange has occurred yet. Furthermore, this is when the decision is made about which organizations will join the collaboration.

2.2 Transportation Collaboration

Transportation collaboration is one of the interorganizational collaboration types. It refers to an interorganizational collaboration among organizations engaging in transportation activities. According to the supply chain category, transportation collaboration can be divided into vertical, horizontal, and lateral collaboration (Simatupang and Sridharan, 2002). Compared with the vertical collaboration, the horizontal transportation collaboration is quite new in studies of transportation collaboration (Cruijssen et al., 2007). Apart from the benefit of solving the empty truck problem by freight sharing, organizations can gain other benefits from transportation and logistics collaboration such as lobbying group, maintenance group, purchasing group, chartering, warehouse sharing, knowledge center, road assistance,

co-branding, tendergroup, asset pooling, intermodal group, shared crossdock, etc (Verstrepen et al., 2006).

There have been existing transportation collaborations around the world. For example, in 1993, eight competing medium-sized Dutch producers of sweets and candy decided to collaborate together in the collaboration called “Zoetwaren Distributie Nederland” (ZDN) (Cruijssen et al., 2007). They shared a lot of common drop-off points. A third-party logistics (3PL) provider was hired to consolidate and deliver the shipments to their customers in order to cut transport costs and increase customer service from consolidated shipments that can reduce the number of deliveries. Furthermore, Audy et al. (2011) illustrated examples of transportation collaboration in the forest industry. First, in 2004, a group of eight forest companies in southern Sweden had common supply and demand. They approached the problem as an integrated one for a single, artificial company. Another example is an outbound transportation collaboration between four furniture manufacturers in Canada. The transportation faced the empty truck problem. Their mills were located in the same region, whereas their customers were located across the United States. The manufacturers joined transportation collaboration to solve the empty truck problem.

Apart from the land transportation collaboration, there have been collaborations in maritime shipping and aviation industry as well. In maritime shipping, collaborations offer advantages such as economies of scale, improved customer service, etc. (Sheppard and Seidman, 2001). Moreover, collaborations prevent price wars by offering standard price (Clarke, 1997). For aviation industry, examples of collaboration are: Skyteam, Star Alliance, OneWorld, etc. (Gudmundsson and Lechner, 2006). An airline can gain benefits from joining a collaboration such as greater market access, cost reductions, capacity optimization, etc. (Goh and Uncles, 2003).

Apart from lack of trust to obstruct an organization to join a transportation collaboration, the concern of unfairness in determining and dividing the gains can obstruct an organizations to join a transportation collaboration as well (Gibson et al.,

2002). A collaborator concerns about its individual profit rather than overall profit (Krajewska and Kopfer, 2006). One of the recent profit sharing schemes is the scheme with the use of Shapley value (Krajewska et al., 2007). The scheme aimed to propose fair profit sharing by dividing the profits according to contribution of each collaborator in a transportation collaboration. The more cost savings there are in a transportation collaboration if a collaborator collaborates in, the greater the profit sharing to the collaborator.

2.3 Intention to Join Transportation Collaboration

This study examines the intention to join rather than actual participation in interorganizational collaboration since this study focuses on the formation stage – when the decision maker decides whether to join or not. Furthermore, intention is closely related to actual behavior if the behavior is fully under the control of the actor according to the theory of reasoned action (TRA) and theory of planned behavior (TPB) (Ajzen, 1991; Ajzen and Fishbein, 1975). TPB came after TRA and differs in its additional inclusion of "perceived behavioral control." TRA was originally established to explain the relationships among attitude, belief, intention and behavior.

Whether an organization participates in transportation collaboration may depend on the number of persons in the organization. Nonetheless, this study investigated only one key informant per organization. Examining one key informant as reflects of overall organizational decision-making has been widely accepted and is very typical for empirical research (Bagozzi et al., 1991: 423). Previous studies suggested that the information from different informants in one firm normally does not differ significantly than if the informants are selected carefully (John and Reve, 1982: 522).

Based on the given theories, behavioral intention is partly explained by evaluation of the outcome. In this interorganizational context, evaluation of the outcome of participation in transportation collaboration is to some extent from organizational factors. Barringer and Harrison (2000) summarized there to be at least six theoretical paradigms explaining the motivations of organizations in joining interorganizational

collaboration: transaction cost economics, resource dependence, strategic choice, stakeholder theory of the firm, organizational learning, and institutional theory. They categorized these theories according to the rationale of each into economics, behavioral, and other rationales. From an economic rationale, the theories involved are transaction costs economics and resource dependence. From a behavioral rationale, the theories involved are organizational learning and institutional theory. Given that an organization is motivated to join transportation collaboration for economic reasons, transaction cost economics can well explain the motivation of an organization to do so. The subsequent section discusses the transaction cost economics which this study has used as one of the underlying theories to explain the motivation behind an intention to join transportation collaboration.

2.4 Transaction Cost Economics

Traditionally, studies of economic organization had dealt principally with markets and market mechanisms and it was assumed that acquiring any kind of products or services from markets is the most cost-effective means of procurement (Barnard, 1968; Chandler, 1962, 1977). Differing from this perspective is the assertion that organizations do not acquire all of their products or services from the market. Typically, an organization acquires only some products or services from the market while the rest are obtained from other sources such as being made in-house.

An organization makes a make-or-buy decision based on the optimum of the sum of production and transaction costs (Williamson, 1979). Transaction costs are usually higher when dealing with an outsider through market mechanisms while production costs are usually higher when acquiring products or services in-house. Thus, there exist various governance structures (such as market, hierarchy, etc.) from which organizations choose based on whether one has optimum overall costs.

Chiles, et al.(1996) summarized there to be two approaches of studies in transaction cost economics: (1) the economic natural selection approach and (2) the managerial-choice approach. The former was studied by the evolutionary theorists that

adopted the population of organizations as the level of analysis. The latter involved studies that used transaction cost economics to explain choices of governance structures made by managers faced with given levels of asset specificity, uncertainty, and frequency of interaction. In the economic natural selection approach, evolutionary theorists consider a long-run time frame, in which the market, or population of organizations, is the level of analysis (Hill, 1990; Ulrich and Barney, 1984). In the managerial-choice approach, it is assumed that managers make contracting decisions based on transaction characteristics (Walker and Weber, 1984; Wiliamson, 1985; Williamson, 1975).This study adopted the managerial-choice approach as it is argued that intention to join the transportation collaboration is based on its transaction characteristics.

Although initially Williamson (1975) acknowledged polar forms of markets and hierarchies (in-house), he later acknowledged a hybrid form (interorganizational collaboration) that lies on the continuum between market and hierarchy (Williamson, 1991). Since interorganizational collaboration is one of three forms of governance, it is necessary to have two comparisons including: (1) that between interorganizational collaboration and market, and (2) that between interorganizational collaboration and hierarchies. The former is discussed first followed by the latter.

Williamson (1975) argued that there are three critical dimensions of transaction characteristics that predict the governance structure that organizations will choose: frequency, uncertainty, and asset specificity. The choice will be the one that minimizes overall costs including transaction and production costs. Of these dimensions, the most important is asset specificity which is a kind of transaction named idiosyncratic (Williamson, 1979). Williamson (1979) defines an idiosyncratic transaction as a transaction that needs specialized investment and whose value in other uses is much smaller than the use for which it was intended. Thus, a party that invests in this specialized capital will have no choice but to be locked in with the specific partner. This occurs when there are high switching costs involved. On the other hand, transactions that are non-asset specific do not face this problem since the parties in these situations

can turn to new parties without difficulty. Buyers can acquire alternative sources, and suppliers can simply sell their products to other buyers. These circumstances will be symmetrical if suppliers invest in idiosyncratic investment and buyers cannot turn to alternative sources of supply since the cost of supply from unspecialized investment is typically higher. Organizations that have asset-specific transactions need a governance structure that provides guarantees of a continuing relationship to encourage idiosyncratic investments. Thus, for these idiosyncratic transactions, market mechanism is frequently not the optimum governance structure.

Idiosyncratic investments include not only physical capital but also human capital investments. For transportation collaboration, a collaborator needs to invest in some equipment for their participation within the collaboration. Moreover, transportation activities need to change to comply with the transportation collaboration procedures and rules and users need to take time to be educated about the new transportation collaboration system. Thus, transactions in transportation collaboration, to some extent, can be judged as idiosyncratic transactions.

Apart from the asset-specific dimension, there are two other dimensions in transaction characteristics – frequency and uncertainty. As mentioned earlier, asset specificity is the most important dimension, without asset specificity, the market is the most optimal source to acquire products or services regardless of frequency and uncertainty. For uncertainty and frequency, only transactions that have low levels of both of them tend to use market mechanisms. In other words, without uncertainty and frequency, any governance structure will do and, thus, the market is the most appropriate.

Uncertainty in the transportation exchange is due to the transportation quality of the others which is usually perceived as large amount of uncertainty. For frequency, they will have different levels of the dimension of frequency, which can be characterized as one-time, occasional, and recurrent. The greater the frequency of transportation exchange of an organization in transportation collaboration, its tendency

to use more complex governance structure will increase (in-house or interorganizational collaboration) rather than the market.

With frequency driven, an organization's decision tends to use a complex governance structure over the market. The still remaining question is whether to choose in-house or interorganizational collaboration.

As mentioned earlier, the problem of empty trucks cannot be solved effectively by an organization alone. If they want to tackle the issue in-house, they need to merge with another. The drawback of this approach is the lack of adaptiveness (Williamson, 1991). At the heart of transaction cost is the cost optimization. An organization in a transportation collaboration can reduce its transportation costs from the transportation exchange. Moreover, the greater the frequency of transportation exchange, the greater the benefits of cost reductions gained from the transportation collaboration. Thus, apart from explaining the migration from market to interorganizational collaboration, frequency in a transportation collaboration can also explain the migration from in-house to interorganizational collaboration.

Since there are various risks involved in joining a transportation collaboration (Asawasakulsorn, 2007; Cruijssen et al., 2007), trust can play an important role right from the formation stage in which it can facilitate an organization's decision to participate (Gallivan and Depledge, 2003). The next section will further discuss this area.

2.5 Trust

Although trust is a feature of everyday life, there are different ways to define the term. Rousseau et al (1998) synthesized definitions of trust in the literature and found that the most frequently cited terms associated with trust are "willingness to be vulnerable" and "positive expectation". This study adopted their definition of trust as "a psychological state comprising the intention to accept vulnerability based upon

positive expectation of the intentions or behavior of another" (Rousseau et al., 1998: 395).

2.5.1 Trusted Actors in the Transportation Collaboration

Riegelsberger et al. (2005) depicted two types of actors in a general trust situation including the trusting actor and the trusted actor based on an analysis of the trust game from the work of Bacharach and Gambetta (2001b). The framework (see Figure 1) shows the sequential interaction between a trusting actor and a trusted actor.

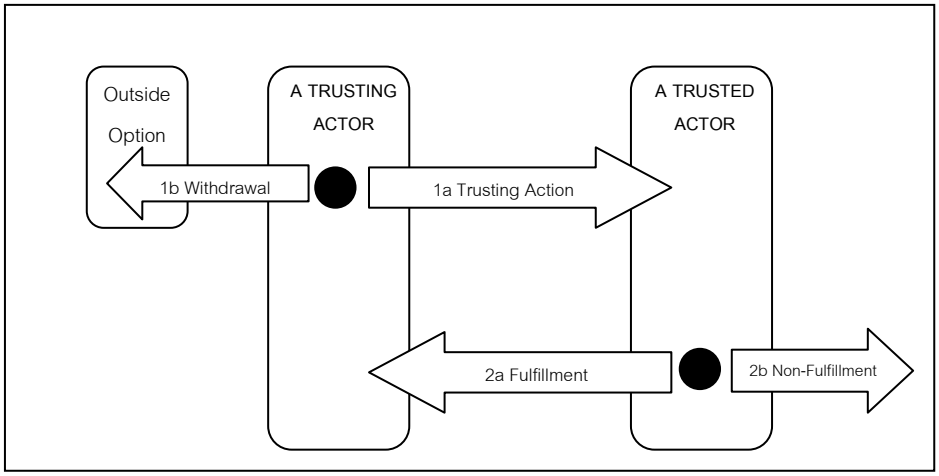

Figure 1 Basic Trust Situation Modified from Riegelsberger et al. (2005)

Riegelsberger et al. (2005) provided the following explanation of the figure above. Depending on the level of trust in a trusted actor, the trusting actor will either engage in a trusting action (1a) or withdraw from the situation (1b). The reason for a trusting actor to engage in a trusting action is that one can realize the gain to be had if the trusted actor fulfils his/her part of the exchange (2a). However, the trusted actor may also lack the motivation to fulfill their part, or the trusted actor might simply not have the ability. Both possibilities result in non-fulfillment (2b).

There are two types of trusted actors in the transportation collaboration: a moderator and other collaborators. Although a trusted actor is usually an individual person, there has been literature investigating trust in organizations. Researchers have addressed that relationships of individuals in organizations can affect interorganizational relationship. Fichman and Goodman (1996) argued that understanding

interorganizational relationships requires a multilevel analysis. However, Zaheer et al. (1998) asserted that institutionalizing processes can lower the individual relationships that can affect interorganizational relationship.

In dyadic interorganizational collaboration, trust in the other organization is sufficient for the organization to engage in the trusting action. However, in multilateral interorganizational collaboration, involving more than two collaborators, one organization's trust in another is not sufficient to cause the organization to behave cooperatively (Yang and Jarvenpaa, 2005). Indeed, it is necessary for an organization to trust all collaborators in a multilateral collaboration (Kramer et al., 1996).

In addition, non-human entities such as an information system can be treated as a trusted actor. Traditionally, trust refers to only that of humans. However, in more recent times, trust in technology has been widely researched (Riegelsberger et al., 2005). Although technology is not a moral actor and lacks motivation, humans can trust technology regarding its ability. On top of that, trust in technology can increase trust in the actor that the system represents (e.g., Egger, 2003; Lanford and Hubscher, 2004).

When a trusting actor trusts in a trusted actor, it is not necessary that trust exist in all situations (Currall and Judge, 1995). Thus, an organization may trust another organization as concerns transportation activities, but may not when it comes to other activities and vice versa. Furthermore, whether a trusting actor will decide to make a trust-requiring action depends not only on a trusted actor but also on other factors. Depending on the situation, there may be more than one influencing factor. Raub and Weesie (2000) introduced the term "parametric risk" to capture the complexity of the situation. A situation with high parametric risks comprises many factors affecting its outcomes. For example, bad weather or a traffic jam could be the cause of late delivery rather than the low transportation quality of others. Thus, trust in a trusted actor highly correlates with trust in a situation if parametric risk is low.

2.5.2 Initial Trust

During the formation stage of multilateral interorganizational collaboration, organizations may not be too familiar with a moderator or the other collaborators. Trust during this period is quite different from trust in the later stages which is based on prior interactions (Jarvenpaa and Leidner, 1999; Lewicki and Bunker, 1996; McKnight et al., 1998). Can trust grow in a short duration during the formation stage? In the literature, researchers have noticed and studied this phenomenon. For example, McKnight et al. (1998: 473) declared that initial trust occurs when "parties first meet or interact". They noticed that a high level of trust during the initial stage has been found in many studies. This contradicts several trust theorists who assume low initial trust. Meyerson et al. (1996) agreed with the concept of initial trust and referred to it as 'swift trust'.

2.5.3 Antecedents of Initial Trust

Initial trust is based on a different set of antecedents than mature trust, excluding the experiential processes which are antecedents for the latter. Lewicki and Bunker (1995) proposed that initial trust is deterrence-based trust rather than a knowledge-based or a shared identification-based trust.

There are a number of antecedents of initial trust in the trust research streams. This study adopted the work of McKnight et al. (1998), which categorized the antecedents of initial trust into three groups: (1) personality-based, (2) institution-based, and (3) cognition-based trust.

Regarding personality-based trust, this is based on the assumption that trusting actors differ in propensity to trust (Mayer et al., 1995) or their disposition to trust (McKnight et al., 2003). People are likely to have fairly stable trust of others in general situations due to them having different backgrounds and experiences (e.g., Hofstede, 1980).

Cognition-based trust is based on knowledge and having good reasons to trust. According to McKnight et al. (1998), humans can form initial trust which relies on cognitive rapid cues or first impressions. For example, based on categorization processes from cognitive-based trust, there are three groups of initial trust antecedents: (1) unit grouping, (2) reputation categorization, and (3) stereotyping (McKnight et al., 1998).

McKnight et al. (1998) defined institution-based trust as that based on the "security one feels about a situation because of guarantees, safety nets, or other structures" (McKnight et al., 1998: 475) and that "one believes the necessary impersonal structures are in place to enable one to act in anticipation of a successful future endeavor" (McKnight et al., 1998: 478). In line with institution-based trust, Shapiro (1987) proposed that the existence of "side bets" or warranties also influence trust.

Tan et al. (2000) categorized trust into the two basic components of party trust and control trust. They defined party trust as trust in the other party while control trust was defined as that in a control procedure which is created by an institution. It is argued that institution-based trust is supposed to increase control trust, while cognition-based trust is supposed to support party trust. The existence of institution-based trust can explain why an entity can trust in another they do not know and with whom they have not yet had the chance to interact. There have been several studies investigating this phenomenon. For example, Resnick et al. (2002) explained why buyers trust unknown sellers of eBay. Furthermore, institutional-based trust can reduce the problem termed mimicry (Bacharach and Gambetta, 2001a). This arises when a trusted actor acting in bad faith makes themself appear trustworthy in order to obtain benefits from a naive trusting actor. Institutional-based trust could reduce this problem because it is based on trusted actors' motivations rather than their appearances as in cognition-based trust.

With the three groups of antecedents of initial trust – personality-based, cognition-based, and institution-based trust – explained, the next section will now

discuss IOS and its features that can support initial trust through their relationships to each of these groups of antecedents.

2.6 Integration of Initial Trust with Transaction Cost Economics

This study incorporated initial trust with transaction cost economics to explain the intention to join transportation collaboration. According to Chiles, et al.(1996), trust can be embedded in transaction cost economics if the opportunism assumption of transaction cost economics is relaxed. It is in this manner, they argued, that trust can be incorporated into the TCE model in a way that enhances the predictive validity of the theory. With a deductive theorizing approach, the relaxation of assumptions refers to assumptions that are initially less realistic relaxed over time, in order to bring greater realism to the model (Camerer, 1985).

Transaction cost economics was based on the behavioral assumption of opportunism which assumes that individuals are "self-interest seeking with guile" (Wiliamson, 1985: 47). More realistically, not all actors are assumed to behave opportunistically, but rather any given actor will do so some of the time with some degree of probability (Chiles and McMackin, 1996). The assumption of opportunism has been critically addressed by many researchers as less than realistic for economic exchange relationships (Granovetter, 1985; Heide and John, 1992; Hill, 1990; Larson, 1992; Maitland et al., 1985). Chiles, et al.(1996) argued that trust's role in constraining opportunistic behavior allows collaborators to accept less complex safeguards, and then adjust the choice of governance structure. With trust, some costs such as monitoring cost can be lower. Transactions involving sufficiently large investments in transaction-specific assets that would conventionally be appropriate for being carried out within an organization in the absence of trust may be suitable for interorganizational collaboration in the presence of trust (Chiles and McMackin, 1996). Thus, this study argues that, embedded in transaction cost economics, initial trust can predict the intention to join transportation collaboration.

2.7 Interorganizational System (IOS)

In the literature, the information system that is used in an organization can play a key role within an organization's boundaries. Furthermore, an information system used from more than one organization can contribute beyond an organization's scope (George and King, 1991; Huber, 1990). The information system, which is used in organizations, is usually used in monitoring and collaborative uses (Gallivan and Depledge, 2003). Although this paper uses only the term "IOS," many different terms and definitions are closely related to IOS in the literature (Table 1).

Table 1 Related Terms and Definitions for Interorganizational System

Term	Definition	Author(s)
Extra-corporate system	Extra-corporate systems operate beyond organization boundaries for linking buyers and sellers or companies performing similar functions	Kaufman (1966)
Interorganizational information sharing systems	Interorganizational information sharing system is a general term referring to systems that involve resources shared between two or more organizations	Barrett and Konsynski (1982)
Interorganizational computer networks	Interorganizational computer networks support the exchange of computer-stored information across organizational boundaries	Hart and Saunders (1997)
Interorganizational System	Automated information systems shared by two or more companies	Cash and Konsynski (1985)
Interorganizational System	An Interorganizational System exists to support and implement cooperation and strategic alliances between two or more organizations	Kumar et al. (1998)

Term	Definition	Author(s)
	An interorganizational system consists of a computer and communications infrastructure for managing interdependencies between firms	Chi and Holsapple (2005)
Multi-organizational systems	A system that is designed to support multiple linkages with many organizations, and, in principle, with any other organization with which there is a need to communicate	Clarke (2001)
Interorganizational information systems	Computer networks that support information exchange across organizational boundaries	Da Silveira and Cagliano (2006)

This study uses the term “Interorganizational System (IOS)” to refer to an information system that is used by more than one organization. Since IOS is used by many organizations, a number of issues need to be resolved such as information standardization, investment, management, etc. Before the era of the internet, the popular IOS is Electronic Data Interchange (EDI) (Chwelos et al., 2001; Hart and Saunders, 1997; Walton and Gupta, 1999).

Business-to-Business (B2B), a type of IOS, has recently and commonly been used due to the popularity of the internet. B2B can be categorized as networking (m-to-n) schemes and hub-and-spoke (1-to-n) systems (Clarke, 2001). Different from networking schemes which connect each organization in a 1-to-1, in hub-and-spoke (1-to-n) systems, each of the participants links to a single point. Regarding hub-and-spoke systems, Clarke (2001) also categorized the system into three taxonomies according to those who manage the system comprising: (1) schemes – those run by organizations that dominate their sector; (2) intermediated schemes – those run by a third-party organization; and (3) consortia-operated schemes – those formed by an association of organizations.

In the literature, there have been studies about the features of IOS affecting interorganizational collaboration. For example, there are a number of studies identifying IOS factors affecting interorganizational collaboration success. These factors comprise integration, security, standard, hardware and software infrastructure, etc. (Emmelhainz, 1992; Hart and Saunders, 1997; Kumar et al., 1998; Pitts, 1991; Ramamurthy and Premkumar, 2002). However, almost none of the studies have taken a serious look at the connection between IOS features and intention to join a transportation collaboration. Relating to the concept of initial trust, this study focuses on the features of IOS that can support initial trust and investigate how they increase the intention to join which will be discussed in the next section.

2.7.1 Interorganizational System (IOS) Features to Support Initial Trust

Traditionally, trust is not considered to reside in IT/IS, and definitely also not in IOS (Kumar et al., 1998). Chatterjee and Ravichandran (2004) put forward two categories of IOS studies comprising transactional and non-transactional views. While in the transactional view of IOS, efficiency gains of IOS are ends in themselves, the non-transactional view refers to the fact that mere efficiency enhancements capture little about the actual appropriation of gains from these systems. In line with the non-transactional view, trust can be a benefit of IOS – Kumar et al. (1998) called for studies from this approach. Gallivan et al. (2003) reviewed a number of IOS studies and concluded that two types of using IOS can affect trust – collaborative uses of IOS and monitoring uses of IOS. Two-way information sharing (e.g., shared forecasts, production planning) is an example of the collaborative uses of IOS that can enhance trust. The effects on trust were inconclusive as regards monitoring the uses of IOS. In some cases, such monitoring destroys trust while in others it can enhance it.

Since nearly all transportation collaboration operates on IOS and the system is normally shown to potential collaborators during the inviting session of the transportation collaboration, the features of the system might affect initial trust. As mentioned earlier, although some researchers have realized the benefits of studies of IOS on trust during the later stage (Hart and Saunders, 1997; Karahannas and Jones,

1999), almost no studies of IOS have seriously addressed initial trust. This study aims to explore this research stream by adopting features to support initial trust from information system literature and applying them for use in IOS.

Of the three groups of antecedents of initial trust, only two – cognition-based and institution-based trust – have IOS features associated with them while no IOS features have found to be associates with personality-based trust. For cognition-based trust, the features have been called trustworthiness features (e.g., Egger, 2003; Lanford and Hubscher, 2004). As for institution-based trust, this includes social embeddedness features (Riegelsberger et al., 2005), developed from the concept of Granovetter (1985). The next section discusses trustworthiness features and, subsequently, the social embeddedness concept and social embeddedeness features are elaborated.

2.7.2 Features in Cognition-based Trust: Trustworthiness Features

In line with McKnight et al. (1998), previous studies have investigated a set of website design features with which humans can form initial trust based on cognitive rapid cues or first impressions. There are numerous studies, especially in e-commerce research dedicated to the establishment of guidelines for increasing the perceived trustworthiness of technology (e.g., Egger, 2003; Lanford and Hubscher, 2004). By developing a trustworthy website, a trusting actor trusts not only the website but also the company behind it (e.g., Egger, 2003; Lanford and Hubscher, 2004). Trustworthiness features are important in e-commerce website because there are many e-commerce websites and customers usually do not have time to get familiar with all of them. Within a short period, websites need to gain trust in order to persuade customers to make a purchase. There are lots of website design features provided in the literature (Rattanawicha and Esichaikul, 2005; Wang and Emurian, 2005).

This situation is also true for a moderator in a multilateral interorganizational collaboration. Organizations may not know the moderator and so the moderator needs to gain the trust of organizations rapidly.

2.7.3 Features in Institution-based Trust: Social Embeddedness Features

This study employed the concept of social embeddedness (Granovetter, 1985) to enhance the trust categorized as being institution-based trust. Before discussing its features, the concept of social embeddedness needs first to be discussed. The concept of social embeddedness assumes that humans are rational actors, which is the same assumption as neoclassical economists. However, Granovetter (1985) argues that rational actors are socially embedded and thus social influence can affect their behavior while neoclassical economists assume that humans behave as "undersocialized" or atomized actors.

According to transaction cost economics (Williamson, 1975, 1991; Williamson, 1979), social embeddedness was discarded in the theory with the theory focusing only on the effects on formal institutions. Apart from the embeddedness of transactions in formal institutions, transactions are also embedded in social structure and relations (Granovetter, 1985). Later, Williamson (2000) acknowledged that social embeddedness can be treated as one of the informal institutions. With the inclusion of social embeddedness into the theory, transaction cost economics can make more accurate predictions.

There have been studies arguing that social embeddedness can manifest itself as social influence and thus influence trust (Bacharach and Gambetta, 2001a; Buskens, 2002). Two forms of structural embeddedness of transactions in social relations have been identified – temporal and network embeddedness(Granovetter, 1985; Rooks et al., 2000). Social embeddedness has two roles affecting trust, those of controlling and learning (Buskens and Buskens, 2002). In its learning role, social embeddedness is used for acquiring information about the attributes of a trusted actor. For example, in temporal embeddedness, a trusting actor needs previous interactions with a trusted actor to learn about them. In network embeddedness, a trusting actor can learn about a trusted actor indirectly from his/her network. In Initial trust, the trusting actor does not have sufficient time to interact, so the controlling role of social embeddedness is the only effective one.

Regarding the controlling role of temporal embeddedness, the expected future incentives of a trusted actor can function as warranties. If a trusted actor might interact again with a trusting actor in the future, a trusted actor has the incentive to behave well in the present interaction. Axelrod (1980) called this the “shadow of the future”. This warranty is temporal embeddedness in social embeddedness (Granovetter, 1985). In sum, a trusted actor’s behavior depends not only on present incentive but also on the incentive of likely future interactions.

As concerns the controlling role of network embeddedness, all organizations want to maintain a good reputation as it allows them to easily collaborate with others. Thus, the reputation of a trusted actor can be a “hostage” in the hands of a trusting actor (Raub and Weesie, 2000). Reputations of trusted actors are referred to as network embeddedness in social embeddedness (Granovetter, 1985). If a trusting actor can complain about the bad present behavior of a trusted actor to the trusted actor’s network, the trusted actor will then try to behave well in the relationship.

Different types of social embeddedness influence a trusted actor separately. The effects of temporal embeddedness come from the trusting actor itself. On the other hand, effects of network embeddedness also come from the network of a trusted actor when the trusting actor can communicate with the former’s network. Figure 2 illustrates the differences between temporal and network embeddedness.

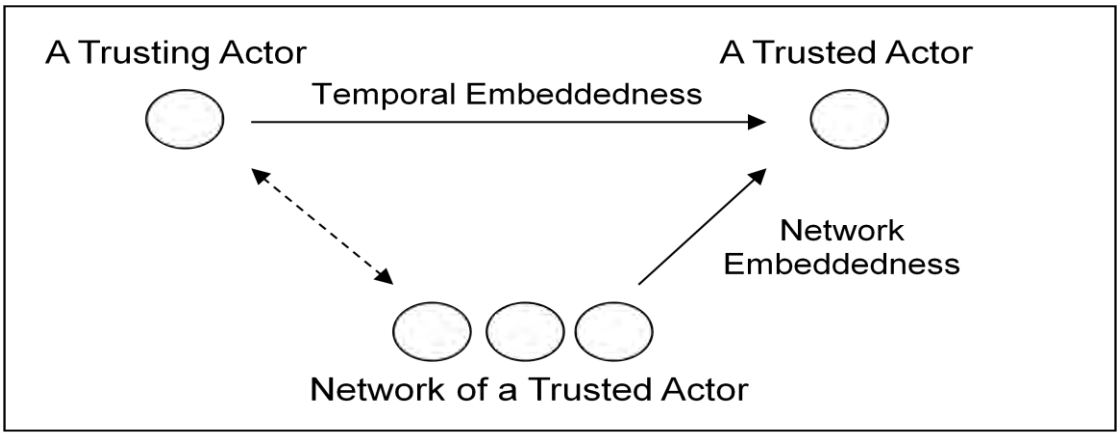

Figure 2 Differences between Temporal and Network Embeddedness

Studies of features brought about by the concept of social embeddedness are quite new compared with trustworthiness features. Riegelsberger et al. (2005) have contributed to a great extent in this approach. With the concept of social embeddedness, they suggested that system designers can design an information system to strengthen social structure. As mentioned earlier, temporal and network embeddedness are two types of social embeddedness focused upon in this study.

In sum, according to temporal embeddedness, the expected future incentives of a trusted actor can be function as warranties. Features in temporal embeddedness should provide guarantees that a collaborator will interact with its partner/s again in the future.

According to network embeddedness, the reputation of a trusted actor can be held “hostage” in the hands of a trusting actor. The reputation mechanism is a feature in network embeddedness popularly used in many systems such as in eBay. The feature involves traditional word-of-mouth. There are different input and output formats for the reputation mechanism (Dellarocas, 2003). For example, the input format could be multiple scores – positive, negative or neutral, yes/no, or short comments. The output format could be an average rating score or the frequencies of each rating category.

2.8 Conceptual Framework

The main thrust of this study is to see whether IOS features to support initial trust can actually increase the intention to join transportation collaboration. The conceptual framework for the study is shown below in Figure 3.

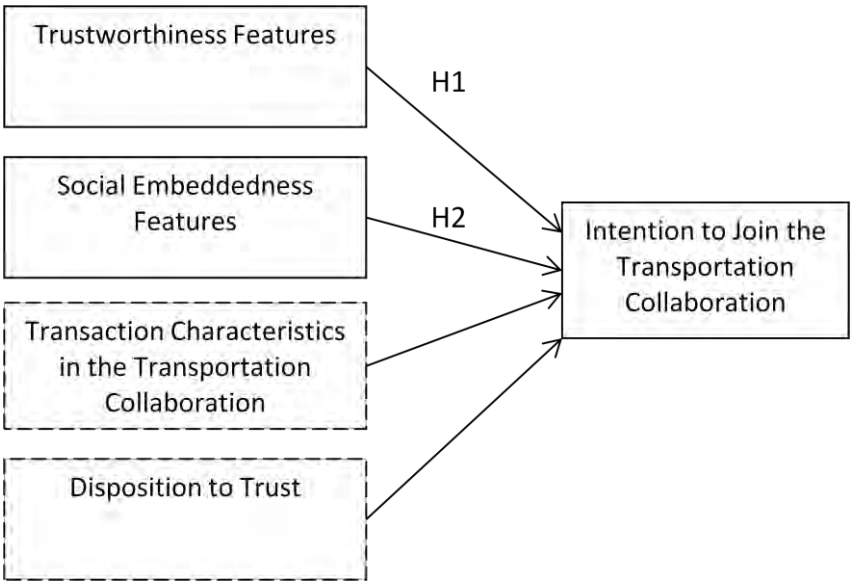

Figure 3 Conceptual Framework

According to transaction cost economics (Williamson, 1975), transaction characteristics can predict whether an organization will join transportation collaboration. Consequently, this study includes transaction characteristics in transportation collaboration in a conceptual framework as a control variable.

As mentioned earlier, this study argues that initial trust can be incorporated with transaction cost economics to explain the intention to join transportation collaboration. Furthermore, according to the work of McKnight, et al.(1998), the antecedents of initial trust can be categorized into three groups comprising: (1) personality-based, (2) cognition-based, and (3) institution-based trust. Personality-based trust can be captured by the construct of disposition to trust (McKnight et al., 2003). It is included in the conceptual framework as well as a control variable.

Two constructs that are argued as affecting the initial trust based on cognition-based and institution-based trust are from two groups of features that support initial trust in the literature: trustworthiness features (e.g., Egger, 2003; Lanford and Hubscher, 2004) and social embeddedness features (Riegelsberger et al., 2005) respectively. Furthermore, there are two types of trusted actor in transportation collaboration comprising a third-party moderator and other collaborators. The effects of

IOS features upon support of the initial trust on each type of trusted actors will be discussed shortly. Table 2 shows the matching of IOS features to support initial trust and the trusted actors they are supposed to support.

Table 2 Matching of IOS features to support initial trust and Trusted Actors

IOS features to support initial trust	Trusted Actor
Trustworthiness Features (Cognition-based)	A Third-party Moderator
Social Embeddedness Features (Institutional-based)	Other Collaborators

According to several e-commerce studies (e.g., Egger, 2003; Lanford and Hubscher, 2004), trustworthiness features can enhance the trustworthiness of the actors the system represents, which in this context is a moderator. The moderator is responsible for designing, implementing, and administrating the system. Indeed, the transportation collaboration system will represent the moderator. Thus, trustworthiness features should increase initial trust in the moderator, and thus, increase the intention to join. The first hypothesis, hence, is to test whether trustworthiness features increase the intention to join in transportation collaboration.

Hypothesis1: Trustworthiness features increase intention to join transportation collaboration

Social embeddedness can be treated as an informal institution in institution-based trust (Granovetter, 1985). Furthermore, IOS features can be operated as structure in social embeddedness (Riegelsberger et al., 2005). For temporal embeddedness, features can provide guarantees that a trusted actor will interact again with a trusting actor in the future. In this manner, the expected future incentives of a trusted actor can function as warranties. For network embeddedness, the reputation mechanism feature means the reputation of a trusted actor is effectively held “hostage” in the hands of a trusting actor (Raub and Weesie, 2000). If there exists social embeddedness, this study argues that it be considered as another safeguard and that it increases the intention to join a transportation collaboration. Thus, the second

hypothesis is to test whether social embeddedness features, which support trust in other collaborators, increase the intention to join transportation collaboration.

Hypothesis2: Social embeddedness features increase the intention to join transportation collaboration

2.9 Summary of Chapter II

This study is based on three important theories – (1) theory of planned behavior (TPB) (Ajzen, 1991), (2) transaction cost economics (Williamson, 1975, 1991; Williamson, 1979), and (3) studies of initial trust (Jarvenpaa and Leidner, 1999; Lewicki and Bunker, 1996; McKnight et al., 1998). Subsequently, the conceptual framework is proposed to investigate the effects on IOS features to support initial trust and intention to join transportation collaboration. The research methodology used to validate the proposed model will be discussed in the next chapter.

Chapter III

Research Methodology

This chapter describes how the conceptual model was tested. An experimental research method was employed to examine the effects of IOS features to support initial trust on the intention to join transportation collaboration. The chapter is organized as follows. Firstly, the conceptual framework is revisited. Then, the chosen setting – transportation collaboration among shippers who own a number of trucks – is discussed. Subsequently, the experimental design, laboratory setting, and experimental settings are described. This chapter ends with the manipulations and measurements being defined.

3.1 Proposed Research Framework

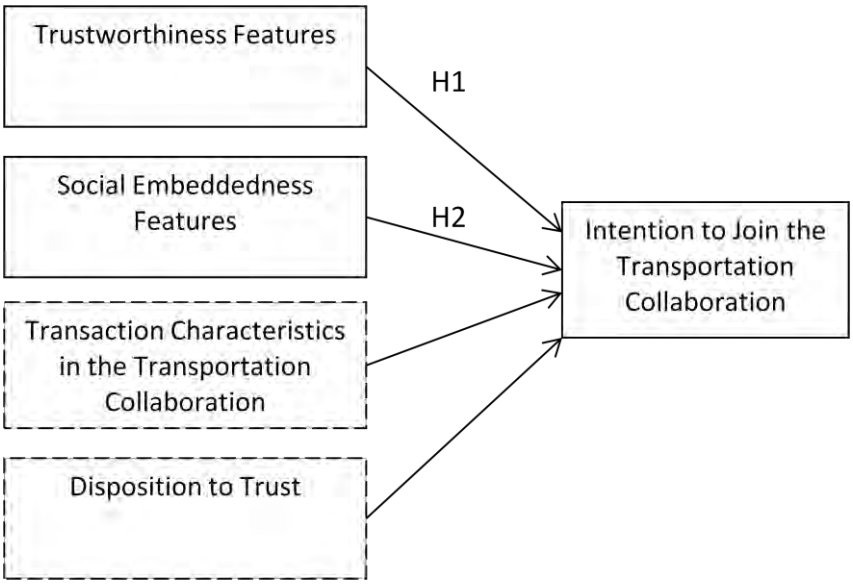

Figure 4 Conceptual Framework

The research framework, presented here again in Figure 4, was proposed in order to examine whether the IOS features to support initial trust can increase the intention to join transportation collaboration. The two research hypotheses are listed in Table 3.

Table 3 List of Hypotheses

Hypothesis	Description
H1	Trustworthiness features increase the intention to join transportation collaboration
H2	Social embeddedness features increase the intention to join transportation collaboration

3.2 The Chosen Setting

Potential collaborators in transportation collaboration can be any organizations who have faced the empty truck problem, and who definitely need to own a number of trucks. Among the three types of transportation collaboration according to the supply chain category: vertical, horizontal, and lateral collaboration (Simatupang and Sridharan, 2002), this study focused on the horizontal transportation collaboration. A horizontal transportation collaboration that is supposed to firstly be established is the transportation collaboration among third-party logistics (3PL) providers as they own many trucks and have many daily shipment jobs. However, collaboration among them is a bit difficult to make happen due to the fact that they are direct competitors and transportation services are their core business.

Alternatively, there are some shippers who own trucks and carry out transportation services by themselves rather than using services from 3PL providers. Collaboration among shippers who own a small number of trucks themselves seems more feasible because transportation services are not their core business. Thus, this study chose transportation collaboration among shippers who own a number of trucks as the primary setting.

Transaction cost economics can explain why a shipper owns their trucks and why a shipper wants to join a transportation collaboration as well. A shipper that perceives uncertainty in 3PL providers and has high frequency in shipment jobs tends to have their own trucks rather than use transportation services from 3PL providers. However, external factors such as rising oil prices pressure the shippers to adapt. When the price rises, the empty truck problem intensifies the transportation costs of a shipper. To optimize the overall costs, transaction cost economics predicts a transition to a transportation collaboration. Although the shippers only need shipment jobs from others to utilize their trucks in an insourcing manner – transport jobs for others, they have to outsource their shipment jobs to others as well through transport exchange. While insourcing does not hinder shippers from joining a transportation collaboration, outsourcing does According to transaction cost economics, there are additional costs when an organization deals with others. An organization might feel uncertain about joining the transportation collaboration because of risks such as losing its shipments or having low transportation quality if the organization lets others do the transporting instead of itself (Asawasakulsorn, 2007).

3.3 Experimental Design

This section is devoted to explaining how to test the two research hypotheses that examine whether the IOS features to support initial trust can increase the intention to join transportation collaboration. There are possible design alternatives for this purpose. One such research method which can be used is the survey study. For this type of method, data on a number of existing transportation collaborations in the formation stage and with IOS features to support initial trust need to be collected. Because of difficulties in data collection in the survey research method, this study used experiment as the research method instead. Moreover, this study can actively manipulate the features and control nuisance factors with experimental research method.

This study used a 2x2 factorial design. This is due to the two groups of IOS features – trustworthiness features and social embedded features – to support initial trust, and there are the two levels of inclusion or exclusion of the features in the experimental system for both groups. With this design, the effects of the features can be examined simultaneously.

The experimental system was implemented in four versions. Although a paper-based approach can be used as in previous studies (e.g., Asawasakulsorn, 2009), it is in an unrealistic setting with many limitations. Thus, the author chose to develop a real experimental system. To easily identify each version, the author named the four versions as version A, version B, version C, and version D. The matching between names and versions is listed below in Table 4.

Table 4 Four Versions of Experimental IOS

Social Embeddedness Features	Trustworthiness Features	Version of Experimental System
Excluded	Excluded	A
Excluded	Included	B
Included	Excluded	C
Included	Included	D

Researchers frequently have to decide in their experiments whether to investigate the effects of manipulations by exposing each subject to (a) only a single manipulation (between-subjects design), or (b) several or all of the manipulations (within-subject or repeated-measures design). This study chose the within-subjects design. The biggest advantage of the within-subjects design is the statistical efficiency afforded by removing individual variance from error terms (Greenwald, 1976). It is necessary in this work because most IOS features to support initial trust in this study are quite subjective. The effects of the features will be considerably reduced by subject variance if using between-subjects design rather than within-subjects design.

Within-subjects design also has its drawbacks when subject to context effects of practice, sensitization, and carry-over (Greenwald, 1976). Effects of practice are crucial in studies that depend on the level of practice such as a study that examines task performance from each manipulation. It seems that effects of practice are minimal in this study. Effects of sensitization are serious if noticeable differences among manipulations interfere with the study's results. Nevertheless, like studies of perceptual discrimination, sensitization effects greatly facilitate this study. Effects of carry-over are effects of previous manipulation that still affect later manipulation. Once more, the carry-over effect helps this study because efficient comparisons among experimental versions are from the subjects' persistent memory. This study, however, might face sequence effects. According to studies in the marketing field, researchers have investigated the differences between pioneer and follower brands (e.g., Alpert and Kamins, 1995). Exposure to a version of the experimental system at different sequences may affect subjects differently. This study handled this effect by counter-balancing the order of manipulations. To counterbalance, an equal number of subjects were shown each version of the experimental system in each position.

3.4 Laboratory Setting

It is necessary to propose a transportation collaboration to be used in the laboratory setting. The proposed transportation collaboration was developed based on the literature, existing transportation collaboration, and suggestions from an expert panel. This section includes: (1) the period of the experimental transportation collaboration, (2) the transportation collaboration model, and (3) the transportation collaboration system.

Currently, there are a limited number of transportation collaborations in Thailand. One example is Business Matching initiated by The Federation of Thai Industries as a transportation collaboration project (www.ftibusinessmatching.com). A further drawback is that most of the information details involved in transportation collaboration are only accessible from their potential collaborators. Thus, the author

encountered difficulties in exploring them. Fortunately, the author has had the opportunity to participate in one of the transportation collaboration projects – the "Transportation Collaboration Center (TCC) project" established by the Electrical and Electronics Institute in order to facilitate transportation collaboration among organizations in the Electrical and Electronics (E&E) industry. Thus, this study has used many parts of this transportation collaboration project as a base model.

The earlier version of the proposed transportation collaboration was shown to the expert panel, which consisted of two experts from the logistics field and one from the information technology field. The logistics experts comprised the director of a logistics program at the author's university and a managing director of a transportation company while the IT expert was a lecturer at the author's university who specialized in e-commerce.

The experts commented on a number of parts in the proposed transportation collaboration that they felt were still unclear. For example, there was no profit sharing scheme mentioned. Suggestions were addressed by modifying the earlier version and the modified one is presented below.

3.4.1 Transportation Collaboration Formation Period

Based on existing transportation collaborations, this study has assumed that the steps of transportation collaboration during the formation stage are as follows. First, a third-party moderator plans to initiate a transportation collaboration project. Second, the moderator defines the procedures and rules such as process standards, benefit-sharing scheme, insurance method, etc. Third, the moderator sets up a Transportation Matching Center and also implements a transportation collaboration system. Fourth, the moderator attracts potential collaborators by inviting them to attend an introduction session which provides them with the details of the collaboration scheme and also shows them the system – this period is the experimental transportation collaboration period. Then, interested organizations decide whether to join the project.

After that, the transportation collaboration operates until it ends. Figure 5 below shows all the steps during the formation stage.

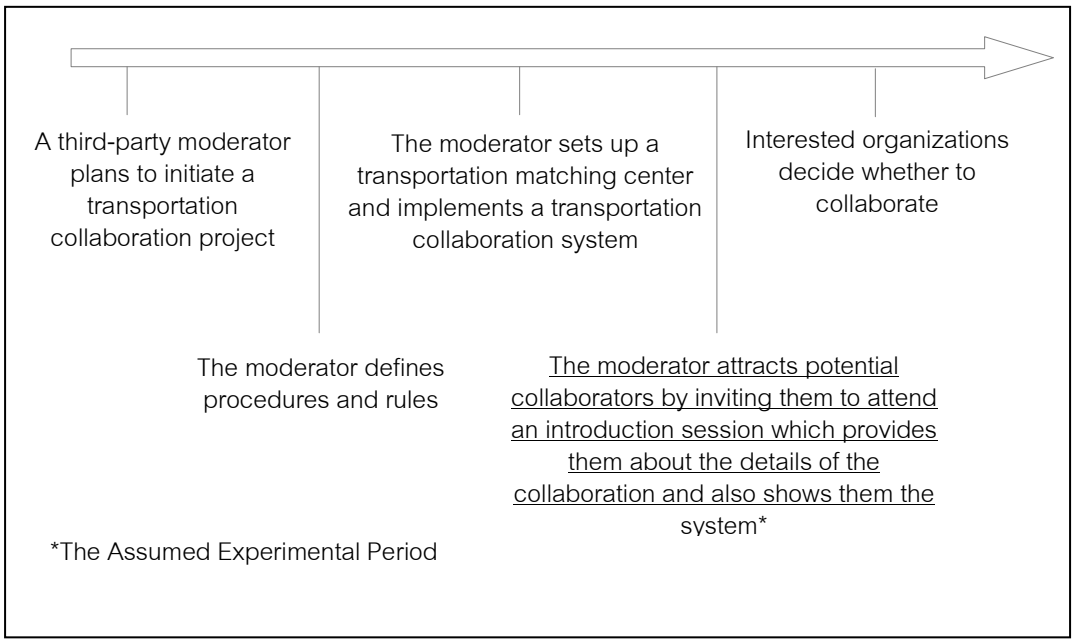

Figure 5 Transportation Collaboration Formation Steps

3.4.2 Proposed Transportation Collaboration Model

Based on the literature and existing transportation collaborations, a transportation collaboration model was proposed. A hub-and-spoke model was employed as a base model for transportation collaboration (Clarke, 2001). There is a web server at the Transportation Matching Center which is responsible for matching transportation jobs from its collaborators. For collaborators, they only need computers and an internet connection to communicate with the center. Figure 6 shows the proposed system architecture.

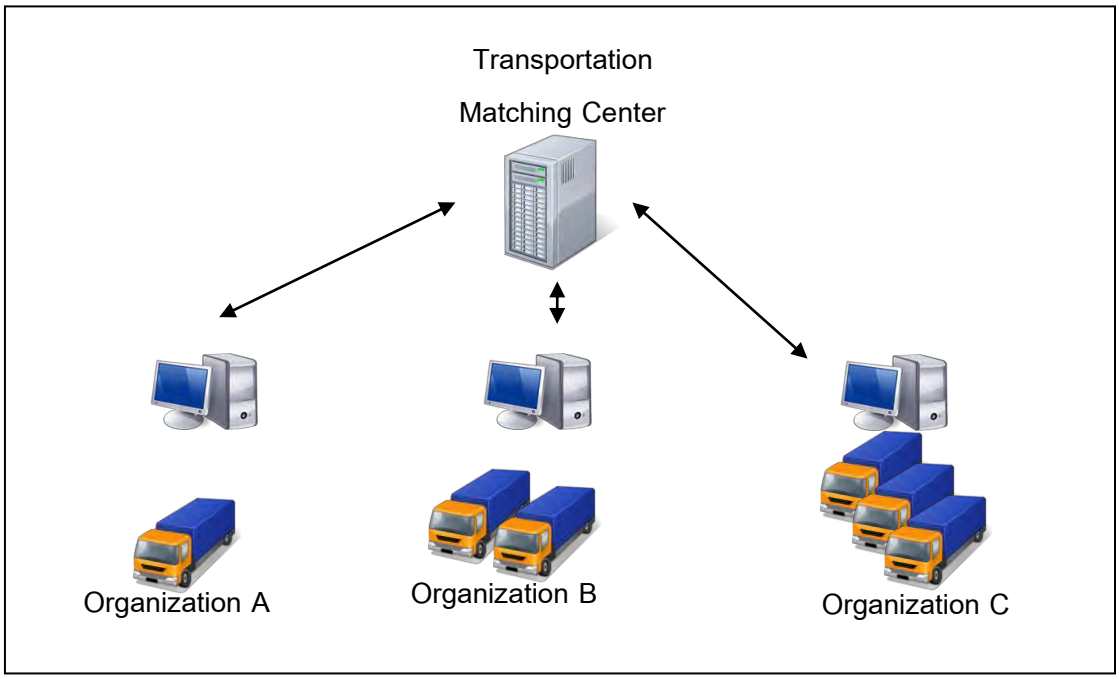

Figure 6 Proposed System Architecture

Transportation collaboration can be accomplished by various collaboration methods. One popular method is the use of transportation exchange which operates in the following manner. Each organization sends its transportation jobs to the Transportation Matching Center on a regular basis such as daily or weekly. After that, the Transportation Matching Center assigns job by processing transportation matching software to maximize the utilization of the trucks in the collaboration and also to minimize the empty truck problem. Then, organizations will receive assigned transportation jobs back which are of one or more of these two types of jobs: (1) their own transport jobs, and (2) insourcing jobs – transport jobs for others. Undeniably, some of the organization's jobs will be assigned to others as outsourcing jobs. Thus, a transportation exchange can be viewed as a combination of both outsourcing and insourcing transportation.

3.4.3 Proposed Transportation Collaboration System

Based on the transportation collaboration system which was used in the TCC project, system standard functions and procedures were proposed. Roughly, the functions can be grouped into five menu sections comprising: (1) home section, (2) the

company's profile management section, (3) transport job entry section, (4) transport job assignment section, and (5) report section. Anyone can access only the menu "Home" and the menu "Contact Us" while the rest can be accessed only by the collaborators that have usernames and passwords. All versions of the experimental system have got these five menus in common. However, there are some extra menus added in the versions with IOS features to support initial trust. Table 5 shows descriptions of the menus.

Table 5 Menus and their Descriptions

Menu	Description
1. Home	This section is about an overview of the transportation collaboration.
2. About	This section is about the detailed information of the transportation collaboration and the moderator.
3. Profile	This section is about to provide and edit its profile comprising company information, pickup and delivery location information, vehicle information, and package information.
4. Shipment Job	This section is about entering and submitting transport jobs to the Transportation Matching Center. It also includes the results of job assignments from the Transportation Matching Center.
5. Report	This section is about showing reports including the profit sharing scheme.

The collaborator must follow established procedures on a daily basis. First, the collaborator checks and, if needed, updates its profile in the company's profile management section. Then, the collaborator enters its next-day transport jobs to the system. Before a daily deadline, such as 8pm, the collaborator must submit all of its transport jobs to the Transportation Matching Center. After the Transportation Matching Center gets all the transport jobs from all its collaborators, it then executes the matching algorithm and assigns transportation jobs to the appropriate collaborators. Finally, each

collaborator receives a transportation job assignment from the Transportation Matching Center and carries out the task according to the assignment. Figure 7 shows the standard procedure of a collaborator in a transportation collaboration.

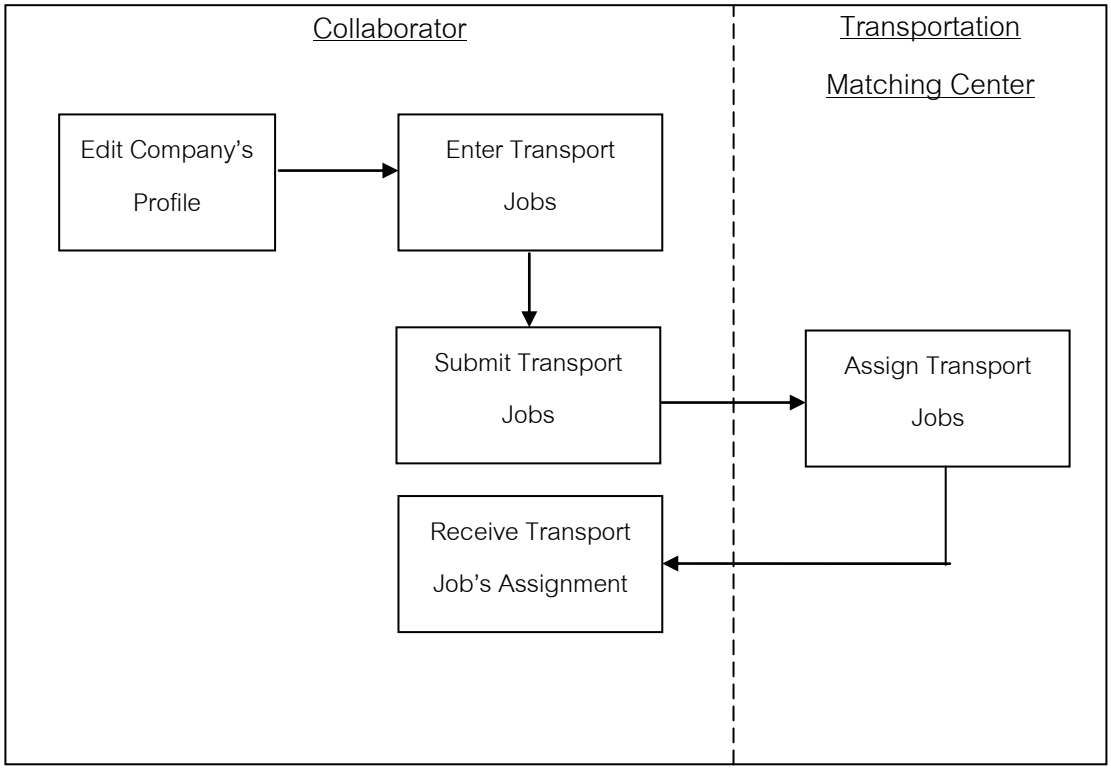

Figure 7 Standard Procedures of a Collaborator in a Transportation Collaboration

3.5 Subjects

From a theoretical point of view, it would have been desirable to include all employees of an organization involved in making the decision about whether to join the transportation collaboration in this study. However, this would result in making the data collection process overly complex. So to simplify things, only one key informant per organization participated. This method is widely accepted and very typical for empirical research (Bagozzi et al., 1991: 423). These studies suggest that the information from different informants in one firm normally does not differ significantly if the informants are selected carefully (John and Reve, 1982: 522).

Key persons in the transportation collaboration could be business owners or heads of logistics departments. Although this study used students as subjects, these subjects are quite suitable because they have studied much about management and logistics activities and thus they are supposed to make not much different decisions in the transportation collaboration from the key persons. The sample comprised: (1) thirty-three third year bachelor's students, majoring in International Logistics Management, (2) twenty-five master's students in the Master's of Science Program in Logistics Management, and (3) sixty master's students undertaking a Master's of Business Administration (MBA).

This study directed them to put themselves in the role of a business owner of an organization in a transportation collaboration setting. The subsequent section discusses how these subjects were used in the experiments.

3.6 Experimental Settings

Apart from the factors in the conceptual framework, there are a number of factors that could vary in experimental settings. To increase the external validity of this study, those factors should be included. This approach is in line with one type of triangulation, that is data triangulation, (Denzin, 1970). Taking this approach, a number of experiments are carried out in a variety of settings. Although there are a number of factors, this study has chosen two factors varying in experimental settings – the experimental system's exposure methods and the academic major of the subjects.

Subjects can be exposed to the experimental system via a variety of methods. According to Dale's cone of experience (Dale, 1969), there are many learning methods, including hands-on workshop and watching a demonstration, which are two of the most popular methods. Thus, these two learning methods are included in this study's experiments. The latter, watching a demonstration, was done via the watching of video clips.

This study has categorized subjects according to their academic majors into two groups: logistics majors (bachelor's and master's students) and MBA students. Subjects in both groups were exposed to different exposure methods. The logistics students were exposed to a hands-on workshop, while the MBA students watched a demonstration via video clips. Table 6 below provides the details of the two experimental settings.

Table 6 Experimental Settings

Setting	Academic Majors	Exposure Methods
1	Logistics	Hands-on Workshop
2	MBA	Watching a Demonstration via Video Clips

3.7 Facilities and Equipment

3.7.1 Experimental System

The experimental system was developed by the author according to the proposed transportation collaboration system. The details of the developmental tools are as follows. The author used Microsoft Visual Studio 2010 which was the latest version of the software available during the developmental period. Microsoft Visual Studio is a tool for developing various types of applications including website applications. The author chose the ASP.NET MVC Project as the developmental project because it was the latest paradigm to develop website applications. MVC is short for Model, View, and Controller. The MVC paradigm, as stated in its name, is the paradigm that lets programmers do coding in the loosely-coupled style. The author chose Microsoft SQL Server as the database management system as it usually works better with Microsoft Visual Studio compared to other database tools. Appendix A shows the details of the experimental system.

3.7.2 Experimental Web Server

A personal computer was used as an experimental web server for the experiment. Its specifications were Microsoft Windows7, IIS7, .NET Framework v4.0, and Microsoft SQL Server 2005.

3.7.3 Experimental Laboratory

Computer labs were used in the experiments. According to their availability, some experiments didn't take place in the same computer labs as others. The lab sizes varied from 20 to 60 seats accompanied with computers.

3.8 Pilot Study

Two pilot studies were conducted prior to the actual experiment. Fifty-one undergraduate accounting students participated in the first pilot study while fifty-eight undergraduate logistics student participated in the second. Both groups were fourth year students. These two pilot studies served different objectives. The first was to test whether the facilities and equipment would work as expected. The performance of the PCs, responsible for the experimental web server when it serves many concurrent sessions, was also tested. With about 50 subjects using the experimental system simultaneously, the PCs still performed well. There were no problems found from the first pilot study.

The second pilot study, which used the same procedure as the actual study, was conducted to help the author become familiar with the experimental procedure. On top of that, this pilot study was also used for manipulation checks which will be discussed shortly. Moreover, the clarity of the questionnaire was tested as well.

3.9 Procedure

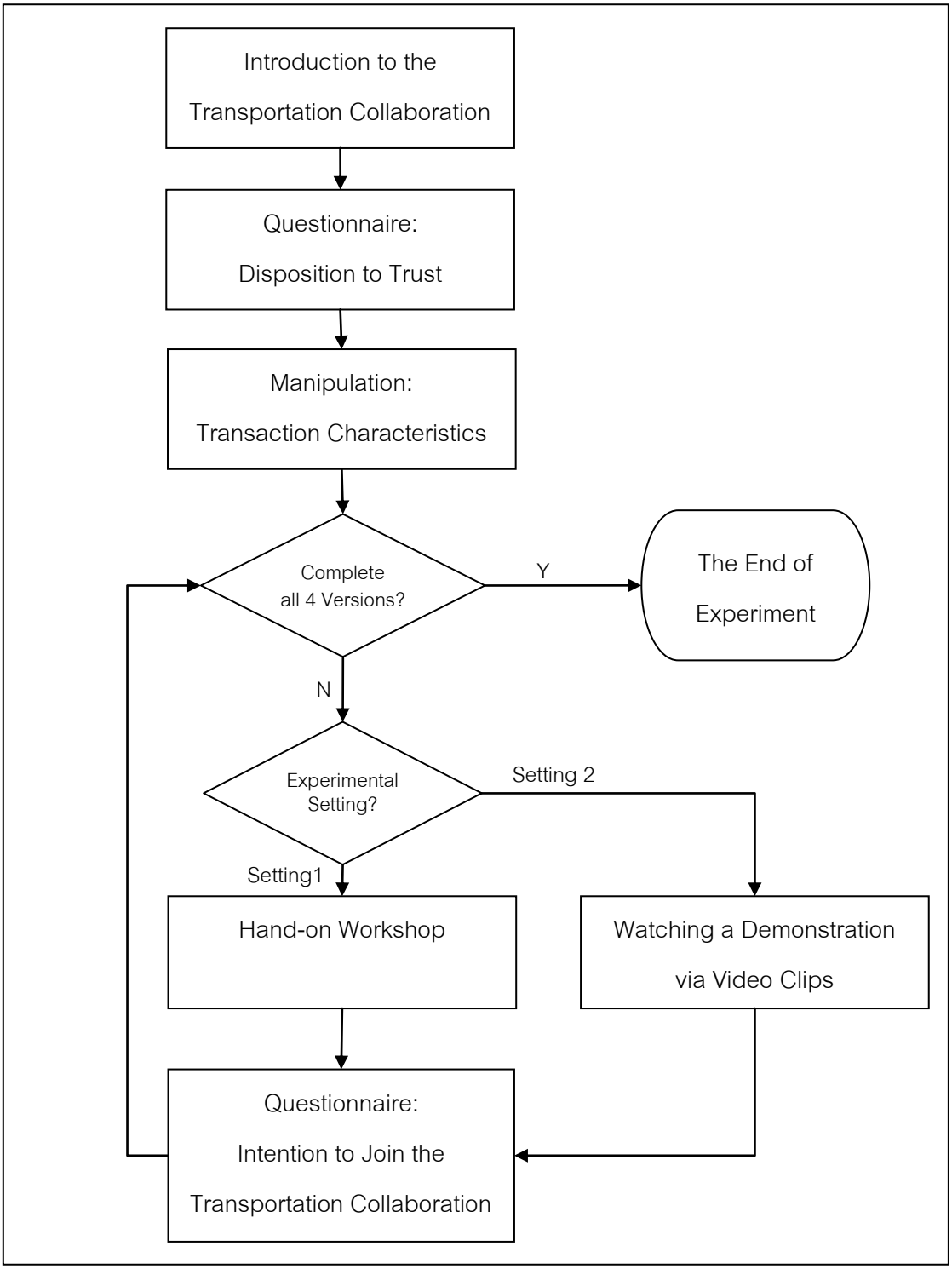

Figure 8 Experimental Procedure

The author conducted the experiments by himself. The experiment began by telling subjects to take on the role of the business owner of an organization that owns the trucks themselves and faces the empty truck problem. Then, the proposed transportation collaboration and system were introduced. The author developed a script to make the introduction the same throughout all experimental sessions. Then, the subjects were asked to complete the questionnaire in the section of disposition to trust.

Next, subjects were exposed to the experimental system. For the setting of the hands-on workshop, there were sessions for each group with each subject. For the setting of watching a demonstration via video clips, subjects participated in the experiment all together. For watching demonstrations via video clips, subjects went through the same steps as in the hands-on workshop. However, rather than participating in the hands-on workshop, subjects sequentially opened files of video clip according to instructions.

Finally, subjects were asked to complete the questionnaire on their intention to join in the transportation collaboration. The experiment ran until the subjects completed all four versions of the experimental system.

Details of experimental procedure including the scripts used in the introduction and the steps of subjects to be exposed to the experimental system are provided in Appendix B. The overall experimental procedure is shown in Figure 8.

3.10 Manipulation

To test the research hypotheses via the experimental research method, two groups of IOS features to support initial trust – trustworthiness features and social embeddedness features – were necessary for active manipulation. Furthermore, since the subjects were students and not actual business owners, it was necessary to manipulate the transaction characteristics in the transportation collaboration as well as one of the control variables in the conceptual framework.

3.10.1 Trustworthiness Features

There are a couple of previous studies in e-commerce literature placing the emphasis on collecting trustworthiness features. The author chose the features from the work of Rattanawicha and Esichaikul (2005) as it was more complete compared with that of others and also that it categorized the features into hygiene (Must-have) and motivator (Nice-to-Have) features. Since there are a lot of trustworthiness features, this study aimed to include all the hygiene features and only some of the motivator features.

Most of the trustworthiness features are impossible to operationalize without the context of the information system in which they are supposed to be embedded. Thus, this study developed operationalizations with the proposed transportation collaboration system. Furthermore, since a feature frequently can be operationalized by more than an operationalization and, vice versa, an operationalization usually affects more than a feature. Thus, mapping between trustworthiness features and their operationalization took a many-to-many approach.

As mentioned earlier, this study aimed to include all the hygiene features. However, three of them were excluded from this study because they were treated as irrelevant to the transportation collaboration context. These comprised: (1) provision of product and service details, (2) product and service pricing, and (3) product and service availability. Two more hygiene features were excluded because they were for formal institutions which were intentionally rejected in this study. Furthermore, since the “use of loginID and password” is a very standard feature nowadays, this study has included it in both the control and manipulated versions. Besides, order tracking and provision of internet vendor information were changed to shipment tracking and provision of moderator information consecutively. Table 7 shows the operationalization of the trustworthiness hygiene features in this study. Their definitions are shown in Appendix C.

Table 7 Operationalization of Trustworthiness Hygiene Features

Group	Feature	Operationalization
Content Quality	Accuracy of Content	In the menu “Shipment Job Detail”, the system shows the transportation job information such as weight per unit, calculated total weight, etc.
Content Quality	Accuracy of Content	In the menu “Shipment Job Exchange”, the system provides the transportation route map.
Content Quality	Accuracy of Content	In the menu “Profile Location”, you can key in the pickup and delivery locations and then the system provides maps of those locations for others.
Content Quality	Completeness of Content	In the menu “Shipment Job Detail”, the system shows the transportation job information such as weight per unit, calculated total weight, etc.
Content Quality	Completeness of Content	In the menu “Shipment Job Exchange”, the system provides information about which organization is undertaking your transportation jobs.
Content Quality	Completeness of Content	In the menu “Shipment Job Exchange”, the system provides the transportation route map.
Content Quality	Completeness of Content	In the menu “Profile Location”, you can key in the pickup and delivery locations and then the system provides maps of those locations for others.
Content Quality	Completeness of Content	In the menu “Shipment Job Pending”, the system provides a calculated route distance.
Content Quality	Currency of Content	In the menu “Home”, the system provides recent activities and news.
Content Quality	Clarity of Content	In many menus, when there is no item, the system displays red text.

Group	Feature	Operationalization
Content Quality	Clarity of Content	In the menu “Shipment Job Exchange”, the system shows outsourcing, insourcing, and own jobs with different highlight colors. Furthermore, job statuses are identified by color as well.
Content Quality	Clarity of Content	In the menu “Shipment Job Exchange”, the system provides the transportation route map.
Content Quality	Clarity of Content	In the menu “Profile Location”, you can key in the pickup and delivery locations and then the system provides maps of those locations for others.
Content Quality	Usefulness of Content	In the menu “Shipment Job Exchange”, the system provides the tracking information of the transportation job serviced by others.
Content Quality	Usefulness of Content	In the menu “Shipment Job Exchange”, the system provides the transportation route map.
Content Quality	Conciseness of Content	In the menu “Shipment Job Exchange”, the system provides hyperlinks to see details in popup windows.
Content Quality	Conciseness of Content	In many menus, the system uses icons instead of texts.
Navigation and Usability	Ease of Navigation	The system uses high-quality menus.
Security and Privacy Concerns	Security Mode of the Site	In the “Home” menu, the system shows the text of “this system is implemented on state-of-the-art security technology”.
Transaction Concerns	Reversibility of Actions	In the “Shipment Job Exchange” menu, the system shows the submitted jobs and allows them to be edited.

Group	Feature	Operationalization
Transaction Concerns	Reversibility of Actions	In the “Shipment Job Detail” menu, the system permits the deletion of shipments in a transportation job.
Transaction Concerns	Informative Feedback	In the menu “Shipment Job Detail”, the system shows the transportation job information such as weight per unit, calculated total weight, etc.
Transaction Concerns	Shipment Tracking	In the menu “Shipment Job Exchange”, the system provides the tracking information of transportation jobs serviced by others.
Transaction Concerns	Transaction Acknowledgement	In the “Shipment Job Exchange” menu, the system shows the submitted jobs and allows to bring them to be brought back for editing.
Transaction Concerns	Preciseness of Calculation	In the menu “Shipment Job Detail”, the system shows the transportation job information such as weight per unit, calculated total weight, etc.
Existence of Moderator	Provision of Moderator Information	In the menu “About”, the system shows the moderator’s information.
Existence of Moderator	Headquarter Address	In the menu “Contact”, the system shows the headquarter address.
Existence of Moderator	Phone Numbers	In the menu “Contact”, the system shows phone numbers.
Existence of Moderator	Contact E-mail Addresses	In the menu “Contact”, the system shows e-mail addresses.

Apart from the hygiene features, only some of the motivator features were chosen for this study. Table 8 below shows the operationalization of trustworthiness motivator features.

Table 8 Operationalization of Trustworthiness Motivator Features

Group	Feature	Operationalization
Visual Appearance	Attractiveness	The system has a logo.
Visual Appearance	Attractiveness	The system uses high-quality menus.
Visual Appearance	Attractiveness	In the menu “About”, the system shows appropriate pictures.
Visual Appearance	Professional Look	In the menu “About”, the page is divided into sections with pictures in the headings of sections.
Visual Appearance	Professional Look	The system uses high-quality menus
Visual Appearance	Professional Look	In the menu “Home”, the page is divided into sections with pictures in the headings of sections.
Security and Privacy Concerns	Privacy Policy	In the menu “About”, there is a section on privacy policy declaration.

3.10.2 Social Embeddedness Features

While trustworthiness features were embedded in many parts of the transportation collaboration system, social embeddedness features were embedded only in the menu “Report”. The details of the operationalization are as follows.

As mentioned earlier, the features in temporal embeddedness should provide guarantees that a collaborator will interact with its partner again in the future. To ensure that a collaborator will insource transportation jobs from its partner if a collaborator outsources its jobs to its partner on the same day, the transportation collaboration system used the “Equality Transportation Exchange Algorithm” which has

a threshold in matching algorithms and tries not to assign jobs that are excessively one-sided assignments. A collaborator is informed about this guarantee in the menu “Report” under the submenu “Transportation Exchange Point”. In the menu, the system clearly indicates the outsourcing/ insourcing balance between the collaborator and all other collaborators.

As for the features in network embeddedness, the reputation mechanism is used. In the transportation collaboration, the transportation service quality of all collaborators is collected, and then feedback is given to all collaborators by the reputation mechanism. This feature was implemented in the menu “Report” under the submenu “Feedback of Quality Score”. The system shows the quality scores of all collaborators and is sorted by their ranking.

3.10.3 Developmental Processes of IOS Features to Support Initial Trust

First, the author has implemented experimental system according to the proposed transportation collaboration system and the operationalization. As mentioned earlier, trustworthiness features were embedded in many parts of the system while social embeddedness features were embedded only in the “Report” menu.

After implementation of the experimental system, the author showed PhD. students in IT in the Business program and a PhD. student in Logistics program the experimental system. They made a number of comments regarding the appropriateness of operationalization and implementation such as FAQs should be more included more items, privacy policy should be modified to fit with the transportation collaboration context, some words in the menus should be modified to make them more understandable, etc. Then, the operationalization and experimental system were modified according to their suggestions. The revised system was then used in the pilot studies. Furthermore, as mentioned earlier, the subjects in the second pilot study – fifty-eight undergraduate logistics students – did manipulation checks. The procedure of the manipulation checks and the results are given in Appendix D.

3.10.4 Transaction Characteristics in the Transportation Collaboration

As mentioned earlier, it is the frequency dimension that predicts whether an organization will join the transportation collaboration. In the transportation collaboration, frequency refers to the number of transportation exchanges. When an organization faces more empty truck problems, this number increases. Thus, the percentage of empty truck problems was used as the operationalization of transaction characteristics in transportation collaboration.

According to a study by the Department of Land Transport of the period 1996-2000, about 46 percent of total truck trips were empty. This study rounded the number to 50 percent and used it as an average percentage of the empty truck problem. This study chose two other percentages: 20 percent indicating a low empty truck problem, and 80 percent indicating a high empty truck problem.

3.11 Measurement

Apart from the manipulated constructs, the two constructs of intention to join the transportation collaboration and disposition to trust remained in the conceptual framework. These were measured in the questionnaire (See Appendix E). The following are their measurements.

3.11.1 Intention to Join the Transportation Collaboration

Researchers have assessed intention using different terms such as would, willing, intend, will try, etc (Ajzen and Fishbein, 1975). This study adopted the work of Venkatesh et al. (2003) which measured intention using the three indicators of intend, predict, and plan. Furthermore, these indicators were measured using a hundred-point Likert scale (0 = strongly disagree and 100 = strongly agree). The indicators were phrased as follows.

1. I intend to join the transportation collaboration

2. I predict that I would join the transportation collaboration

3. I plan to join the transportation collaboration

3.11.2 Disposition to Trust

Disposition to trust was measured by 12 indicators adopted from the work of McKnight et al. (2003). These indicators were grouped as competence, integrity, benevolence, and trusting stance and were measured by a seven-point Likert scale (1 = strongly disagree and 7 = strongly agree). Table 9 below shows all the indicators for disposition to trust used in this study.

Table 9 Indicators of Disposition to Trust

Group	Indicator
Benevolence	1. In general, people really do care about the well-being of others.
	2. The typical person is sincerely concerned about the problems of others.
	3. Most of the time, people care enough to try to be helpful, rather than just looking out for themselves
Integrity	4. In general, most folks keep their promises.
	5. I think people generally try to back up their words with their actions.
	6. Most people are honest in their dealings with others.
Competence	7. I believe that most professional people do a very good job at work.
	8. Most professionals are very knowledgeable in their chosen field.
	9. A large majority of professional people are competent in their areas of expertise.
Trusting Stance	10. I usually trust people until they give me a reason not to.
	11. I generally give people the benefit of the doubt when I first meet them.
	12. My typical approach is to trust new acquaintances until they show that I should not.

3.12 Summary of Chapter III

This chapter has described the research methodology used in this study. An experimental research method was employed to validate the conceptual framework. The experiments were conducted in two settings: logistics students participated in the hands-on workshop setting and MBA students participated in the watching a demonstration through video clips setting. They were exposed to all four versions of the experimental system according to the within-subjects design. Inquiries were made as to their intention to join the transportation collaboration via questionnaire after being completely exposed to each version. The next chapter will provide the results of the data analysis.

Chapter IV

Data Analysis

4.1 Approach to Data Analysis

Consistent with within-subjects design, this study used repeated measures in the general linear model (GLM) in SPSS statistics. Trustworthiness features and social embeddedness features were within-subjects variables. Intention to join the transportation collaboration was a dependent variable. The control variables were covariate variables. The composite scores of the intention to join the transportation collaboration and disposition to trust indicators were combined with equal weighting (averaging). Although differential weights may be applied to the separate items (such as assigning weights from a factor analysis), equal weighting has been shown to produce satisfactory results (Pedhazur and Schmelkin, 1991).

The set of acronyms used in this chapter is listed below in Table 10.

Table 10 Acronyms of Constructs and Variables

Acronym	Construct/ Variable
IJ	Intention to Join the Transportation Collaboration
TW	Trustworthiness Features
SE	Social Embeddedness Features
TC	Transaction Characteristics in the Transportation Collaboration
Disposition	Disposition to Trust
Degree	Academic Degree comprising Master's and Bachelor's Degrees

4.2 Reliability and Validity of Measurements

For this study, all measurement items in the questionnaire were developed by either adopting or adapting measures that have been validated by other researchers. Disposition to trust was adopted from the work of McKnight et al. (2003). A researcher in logistics field was invited to assess wording clarity and relevance of items of intention to join the transportation collaboration because they were adapted from the work of Venkatesh et al. (2003) which were used in other context. Furthermore, the English to Thai translations were checked by a Thai IS researcher who is fluent in English.

The reliability of measurement was assessed by Cronbach's Alpha. There are two measurements in this study – intention to join and disposition to trust. Since there are two experimental settings in this study, the two values of Cronbach's alpha for each measurement are shown in Table 11. With all the Cronbach's alpha values above 0.7, the measurements were acceptable (Nunnally, 1978)

Table 11 Cronbach's Alpha

Measures	Setting	Cronbach's Alpha
Intention to join the transportation collaboration	Logistics	0.962
	MBA	0.963
Disposition to trust	Logistics	0.856
	MBA	0.844

4.3 Results

4.3.1 Descriptive Statistics of Composite Score of Disposition to Trust

Twelve indicators were used to measure disposition to trust using a seven-point Likert scale. The descriptive statistics of the composite score of disposition to trust are reported separately for each experimental setting below in Table 12

Table 12 Descriptive Statistics of Composite Score of Disposition to Trust

Statistical Data	Disposition To Trust	
	Setting 1 (Hands-on workshop setting of logistics students)	Setting 2 (Watching a demonstration through video clips setting of MBA students)
N	58	61
Minimum	2.8	2.83
Maximum	5.48	6.50
Mean	4.59	4.53
Standard deviation	0.60	0.76

According to the statistical data, the standard deviations in setting 1 (hands-on workshop setting of logistics students) and setting 2 (watching a demonstration through video clips setting of MBA students) were 0.60 and 0.76. Furthermore, the mean of the composite score of disposition to trust in setting 1 and in setting 2 were 4.5986 and 4.53 respectively. The means of disposition to trust between these two settings were not significantly different at the 0.05 level ($t_{58,61}$=0.48, p=0.627).

4.3.2 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration

According to the within-subjects design, all subjects were exposed to four versions of experimental system. After they had been exposed to each version, they responded to three items on the intention to join the transportation collaboration measured by a one hundred-point Likert scale. Descriptive statistics of composite score of intention to join the transportation collaboration are reported separately for each experimental setting in Table 13 and depicted graphically in Figure 9

Table 13 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration

Setting	Statistical Data	Intention to Join the Transportation Collaboration			
		Version A	Version B	Version C	Version D
Setting 1 (Hands-on workshop setting of logistics students)	N	58	58	58	58
	Minimum	0	16.33	6.67	24
	Maximum	100	100	100	100
	Mean	47.86	65.21	63.13	77.20
	Standard deviation	27.25	19.84	24.89	16.08
Setting 2 (Watching a demonstration through video clips of MBA students)	N	61	61	61	61
	Minimum	0	0	7	7
	Maximum	99	100	100	100
	Mean	50.39	54.78	61.06	70.34
	Standard deviation	25.30	23.34	21.92	20.60

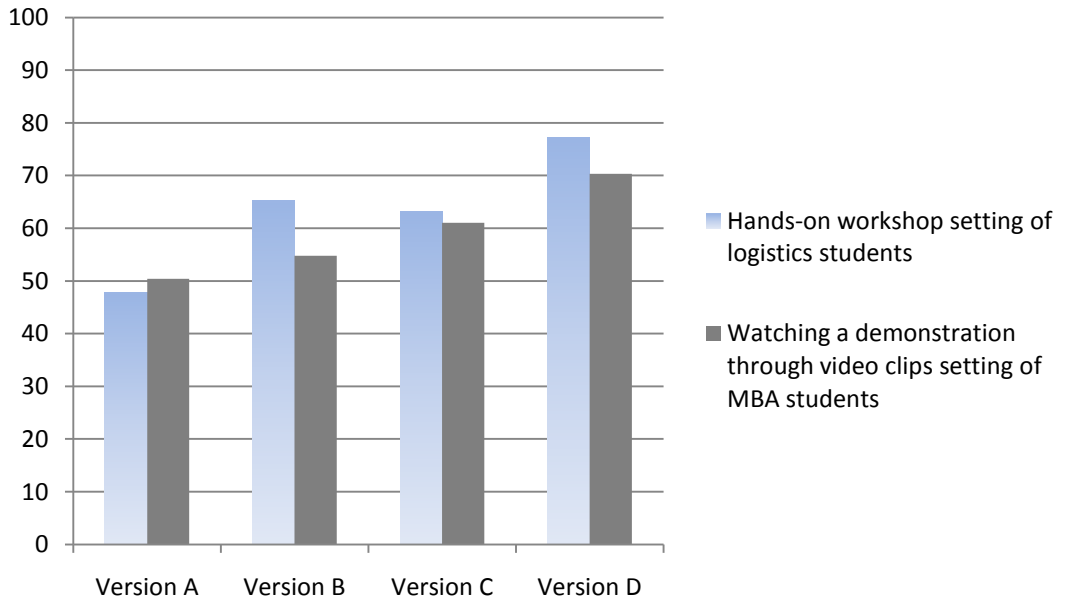

Figure 9 Chart of Intention to Join the Transportation Collaboration

According to the statistical data, the standard deviation of the composite score of intention to join the transportation collaboration ranged from 16.08 to 27.25 in setting 1 and from 20.60 to 25.30 in setting 2. Furthermore, in both settings, the highest standard deviation was that of the composite score of intention to join the transportation collaboration after the subjects were exposed to version A, which included neither trustworthiness features nor social embeddedness features. In contrast, the lowest standard deviation was that score of the subjects exposed to version D, which included both trustworthiness features and social embeddedness features.

The mean of the composite score of intention to join the transportation collaboration after subjects were exposed to version A, which included neither trustworthiness features nor social embeddedness features, was the lowest. On the other hand, the mean in version D, which included both trustworthiness features and social embeddedness features, was the highest. Furthermore, the mean of the composite score of intention to join the transportation collaboration in setting 1 (hands-on workshop setting of logistics students) was higher than that in setting 2 (watching a demonstration through video clips of MBA students) after subjects were exposed to all versions except version A.

4.3.3 Descriptive Statistics of the Composite Score of Intention to Join the Transportation Collaboration Grouped by Transaction Characteristics in the Transportation Collaboration

Descriptive statistics of the composite score of intention to join the transportation collaboration are reported separately for each experimental setting and each group of transaction characteristics in the transportation collaboration in Table 14.

Table 14 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration Grouped by Transaction Characteristics in the Transportation Collaboration

Setting	TC	Statistical Data	Intention to Join the Transportation Collaboration			
			Version A	Version B	Version C	Version D
Setting 1 (Hands-on workshop setting of logistics students)	20	N	18	18	18	18
		Mean	43.18	59.48	62.46	73.05
		Standard deviation	21.29	21.56	22.47	17.19
	50	N	22	22	22	22
		Mean	42.78	61.93	54.84	74.69
		Standard deviation	28.19	20.18	25.76	16.72
	80	N	18	18	18	18
		Mean	58.75	74.96	73.94	84.42
		Standard deviation	29.55	14.25	23.22	12.026
Setting 2 (Watching a demonstration through video clips of MBA students)	20	N	23	23	23	23
		Mean	42.34	45.89	52.17	63.10
		Standard deviation	25.75	22.50	22.67	23.21
	50	N	16	16	16	16
		Mean	50.56	57.68	62.83	69.25
		Standard deviation	27.28	19.74	20.42	16.21
	80	N	22	22	22	22
		Mean	58.68	61.95	69.06	78.71
		Standard deviation	21.46	24.51	19.52	18.13

In both settings, the mean of the composite score of intention to join the transportation collaboration after subjects were exposed to version D and were informed that they had an 80 percent empty truck problem, was the highest. On the other hand, the lowest in setting 1 was that of version A and a 50 percent empty truck problem while the lowest in setting 2 was that of version A and a 20 percent empty truck problem.

4.3.4 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration Grouped by Disposition to Trust

Subjects were categorized into two groups as having low and high disposition to trust. Mean scores (4.59 in setting 1; 4.53 in setting 2) were used to differentiate the low and high groups. The composite score of intention to join the transportation collaboration were reported separately for each experimental setting and each disposition to trust in Table 15. In both settings, the mean of the composite scores of intention to join the transportation collaboration after subjects were exposed to version A and had a low disposition to trust, was the lowest. On the other hand, the mean in version D with the high disposition to trust was the highest.

Median-split of the disposition to trust scores were also used (4.67 in setting 1; 4.58 in setting 2) to see whether the intention to join the transportation collaboration would differ from the mean-split grouping criteria (e.g.,Parks and Hulbert, 1995). The analysis showed that only the descriptive statistics in setting 1 were different while in setting 2 is the same. In low disposition group in setting 1(N = 30), the means (and standard deviation) of the composite scores of intention to join the transportation collaboration after subjects were exposed to version A, B, C, D were 48.86 (25.60) , 60.02 (21.26), 62.67 (23.07), and 74.32 (18.48) respectively. In high disposition group in setting 1 (N =28), the means (and standard deviation) of the composite scores of intention to join the transportation collaboration after subjects were exposed to version A, B, C, D were 46.79 (29.35) , 70.78 (16.84), 63.63 (27.12), and 80.29 (12.64) respectively. The mean in version A and had a high disposition to trust, was the lowest while the mean in version D with the high disposition to trust was the highest.

Table 15 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration Grouped by Disposition to Trust

Setting	Disposition to Trust	Statistical Data	Intention to Join the Transportation Collaboration			
			Version A	Version B	Version C	Version D
Setting 1 (Hands-on workshop setting of logistics students)	Low	N	25	25	25	25
		Mean	45.44	58.36	60.34	71.98
		Standard deviation	24.46	22.47	22.70	19.07
	High	N	33	33	33	33
		Mean	49.70	70.41	65.25	81.16
		Standard deviation	29.43	16.07	26.57	12.26
Setting 2 (Watching a demonstration through video clips of MBA students)	Low	N	28			
		Mean	42.09	52.04	54.44	66.17
		Standard deviation	25.15	22.13	23.13	22.11
	High	N	33	33	33	33
		Mean	57.43	57.10	66.67	73.87
		Standard deviation	23.57	24.41	19.47	18.85

4.3.5 Correlation Matrix

A correlation matrix among disposition to trust, transaction characteristics in the transportation collaboration, and intention to join after subjects were exposed to versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in setting 1 (hands-on workshop setting of logistics students) is shown in Table 16.

Table 16 Correlation Matrix of Setting 1 (Hands-on Workshop Setting of Logistics Students)

	Disposition	TC	IJ-A	IJ-B	IJ-C	IJ-D
Disposition	1					
TC	.014	1				
IJ-A	.072	.227	1			
IJ-B	.209	.310*	.427**	1		
IJ-C	.086	.183	.785**	.433**	1	
IJ-D	.055	.281*	.442**	.681**	.616**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

According to the correlation matrix of the constructs in setting 1, the correlations were significant at the 0.01 level among composite scores of intention to join the transportation collaboration after subjects were exposed to versions A, B, C, and D ($r1_{IJ\text{-}A,\ IJ\text{-}B}$ = .427, p= .001; $r1_{IJ\text{-}A,\ IJ\text{-}C}$ = .785, p=.000; $r1_{IJ\text{-}A,\ IJ\text{-}D}$ = .442, p=.001; $r1_{IJ\text{-}B,\ IJ\text{-}C}$ = .433, p=.001; $r1_{IJ\text{-}B,\ IJ\text{-}D}$ = .681, p=.000; $r1_{IJ\text{-}C,\ IJ\text{-}D}$ = .616, p=.000). Correlations between the composite scores of disposition to trust and those of intention to join the transportation collaboration after subjects were exposed to the four versions were not significant at the 0.05 level. Correlations between transaction characteristics in the transportation collaboration and composite scores of intention to join the transportation collaboration after subjects were exposed to the four versions were significant at the 0.05 level only for versions B and D ($r1_{TC,\ IJ\text{-}B}$ = .310, p=.018 ; $r1_{TC,\ IJ\text{-}D}$ = .281, p=.033). The correlation between transaction characteristics in the transportation collaboration and the composite score of disposition to trust was not significant at the 0.05 level.

The correlation matrix among disposition to trust, transaction characteristics in the transportation collaboration, and intention to join after subjects were exposed to versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in setting 2 (watching a demonstration through video clips of MBA students) is shown in Table 17.

Table 17 Correlation Matrix of Setting 2 (Watching a Demonstration through Video Clips of MBA students)

	Disposition	TC	IJ-A	IJ-B	IJ-C	IJ-D
Disposition	1					
TC	0.007	1				
IJ-A	0.339**	0.279*	1			
IJ-B	0.147	0.299*	0.580**	1		
IJ-C	0.274*	0.334**	0.855**	0.581**	1	
IJ-D	0.229	0.328**	0.631**	0.670**	0.772**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

According to the correlation matrix of constructs in setting 2, the correlations are significant at the 0.01 level among the composite scores of intention to join the transportation collaboration after subjects were exposed to versions A, B, C, and D ($r2_{IJ\text{-}A,\ IJ\text{-}B}$ = .580, p= .000; $r2_{IJ\text{-}A,\ IJ\text{-}C}$ = .855, p=.000; $r2_{IJ\text{-}A,\ IJ\text{-}D}$ = .631, p=.000; $r2_{IJ\text{-}B,\ IJ\text{-}C}$ = .581, p=.000; $r2_{IJ\text{-}B,\ IJ\text{-}D}$ = .670, p=.000; $r2_{IJ\text{-}C,\ IJ\text{-}D}$ = .772, p=.000). Correlations between the composite score of disposition to trust and composite scores of intention to join the transportation collaboration after subjects were exposed to the four versions were significant in version A ($r2_{Disposition,\ IJ\text{-}A}$ = .339, p=0.008) and significant in version C ($r2_{Disposition,\ IJ\text{-}C}$ = .274, p=0.033). Correlations between the transaction characteristics in the transportation collaboration and the composite scores of intention to join the transportation collaboration after subjects were exposed to the four versions were significant at the 0.01 level in versions A ($r2_{TC,\ IJ\text{-}A}$ = .279, p= .029) and B ($r2_{TC,\ IJ\text{-}B}$ = .299, p= .019) and at the 0.05 level in versions C ($r2_{TC,\ IJ\text{-}C}$ = .334, p= .009) and D ($r2_{TC,\ IJ\text{-}D}$ = .328, p= .010). The correlation between transaction characteristics in the transportation collaboration and the composite score of disposition to trust was not significant at the 0.05 level.

4.3.6 Analysis of Intention to Join the Transportation Collaboration

The approach of GLM repeated measures was used to analyze the intention to join the transportation collaboration. The assumptions in the analysis of repeated measures were checked and are shown in Appendix F. Of the three assumptions for repeated measures analysis: (1) independence of the observations, (2) multivariate normality, and (3) sphericity (Stevens, 2002), only the multivariate normality assumption cannot be assumed. However, the repeated analysis is still fairly robust against violation of multivariate normality (Stevens, 2002). Subsequently, the experimental data in the hands-on workshop setting of logistics students were analyzed. Table 18 shows the results of the testing of within-subjects effects in the hands-on workshop setting of logistics students.

Table 18 Test of Within-subject Effects in Hands-on Workshop Setting of Logistics Students

Source	Type III Sum of Squares	df	Mean Square	F	p Value
TW	68.20	1	68.20	0.15	0.700
TW * Dispositional	27.10	1	27.10	0.06	0.808
TW * TC	4.04	1	4.04	0.01	0.925
TW * Degree	339.34	1	339.34	0.74	0.391
Error(TW)	24504.44	54	453.78		
SE	697.72	1	697.72	4.16	0.046*
SE * Dispositional	126.91	1	126.91	0.75	0.388
SE * TC	150.38	1	150.38	0.89	0.348
SE * Degree	3.56	1	3.56	0.02	0.885
Error(SE)	9052.48	54	167.63		
TW * SE	168.61	1	168.61	1.81	0.183
TW * SE * Dispositional	199.32	1	199.32	2.15	0.148
TW * SE * TC	1.89	1	1.89	0.02	0.887
TW * SE * Degree	184.22	1	184.22	1.98	0.164
Error(TW*SE)	5006.46	54	92.71		

*p < .05

Only the effects of social embeddedness features on intention to join the transportation collaboration were statistically significant at the 0.05 level (F_{SE} = 4.162, p=.046). The interaction effect between trustworthiness features and social embeddedeness features (TW*SE) was not statistically significant at the 0.05 level. The interaction effects of all pairs of covariates and either trustworthiness features or social embeddedness features were not statistically significant at the 0.05 level. The interaction effects among trustworthiness features, social embeddedness features and each covariate were also not statistically significant at the 0.05 level. Since hypothesis 2 is

one-sided, additional post-hoc analysis is needed to test to see whether social embeddedness features increase intention to join. Table 19 shows that the post-hoc analysis hypothesis 2 was statistically significant at the 0.01 level. Next is the testing of the between-subjects effect as shown in Table 20.

Table 19 Post-hoc Analysis of Effects of Social Embeddedness Features on Intention to Join the Transportation Collaboration

(I) SE	(J) SE	Mean Difference (I-J)	Std. Error	p Value
Included	Excluded	13.62	1.70	.000**

**p < .01

Table 20 Test of Between-Subjects Effects in Hands-on Workshop Setting of Logistics Students

Source	Type III Sum of Squares	df	Mean Square	F	p Value
Dispositional	883.59	1	883.59	0.72	0.400
TC	6957.41	1	6957.41	5.66	0.021*
Degree	1387.22	1	1387.22	1.13	0.292
Error	66283.61	54	1227.47		

*p < .05

The effects of transaction characteristics in the transportation collaboration on intention to join the transportation collaboration were statistically significant at the 0.05 level ($F_{TC} = 5.668$, p=.021) while the effects of disposition to trust on intention to join the transportation collaboration were not statistically significant at the 0.05 level. Since this setting comprised of bachelor's and master's students, the variable "academic degree" was included in the model. However, the effect of the variable was not statistically significant.

Next, the results of the data analysis of the watching a demonstration through video clips setting of MBA students are presented. Table 21 shows the testing

of within-subjects effects in the watching a demonstration through video clips setting of MBA students.

Table 21 Test of Within-subject Effects in Watching a Demonstration through Video Clips Setting of MBA Students

Source	Type III Sum of Squares	df	Mean Square	F	p Value
TW	1064.38	1	1064.38	4.08	0.048*
TW * Dispositional	620.85	1	620.85	2.38	0.128
TW * TC	5.90	1	5.90	0.02	0.881
Error(TW)	15119.98	58	260.68		
SE	431.96	1	431.96	2.67	0.107
SE* Dispositional	24.73	1	24.73	0.153	0.697
SE * TC	0.02	1	0.02	0.00	0.990
Error(SE)	9369.16	58	161.53		
TW * SE	110.87	1	110.87	1.21	0.274
TW * SE * Dispositional	224.89	1	224.89	2.47	0.121
TW * SE * TC	3.72	1	3.72	0.04	0.840
Error(TW*SE)	5278.92	58	91.01		

*p < .05

Only the effects of trustworthiness features on intention to join the transportation collaboration were statistically significant at the 0.05 level (F_{TW} = 4.083, p=.048). The interaction effect between trustworthiness features and social embeddedness features (TW*SE) was not statistically significant at the 0.05 level. The interaction effects of all pairs of covariates and either trustworthiness features or social embeddedness features were not statistically significant at the 0.05 level. The interaction effects among trustworthiness features, social embeddedness features and each covariate were also not statistically significant at the 0.05 level. Since hypothesis 1 is one-sided, additional post-hoc analysis is needed to see whether trustworthiness

features increase intention to join. Table 22 shows that the post-hoc analysis of hypothesis 1 was statistically significant at the 0.01 level. Next is the testing of the between-subjects effect in Table 23.

Table 22 Post-hoc Analysis of Effects of Trustworthiness Features on Intention to Join the Transportation Collaboration

(I) TW	(J) TW	Mean Difference (I-J)	Std. Error	p Value
Included	Excluded	6.83	2.06	.002**

**p < .01

Table 23 Test of Between-Subjects Effects in Watching a Demonstration through Video Clips Setting of MBA Students

Source	Type III Sum of Squares	df	Mean Square	F	p Value
Dispositional	7595.55	1	7595.55	5.84	0.019*
TC	11718.78	1	11718.78	9.02	0.004**
Error	75354.66	58	1299.21		

*p < .05, **p < .01

The effects of transaction characteristics in the transportation collaboration on intention to join the transportation collaboration were statistically significant at the 0.01 level, while the effects of disposition to trust on intention to join the transportation collaboration were also statistically significant at the 0.05 level.

This study also analyzed data as in between-subjects designs. The additional data analyses are shown in Appendix G. The results showed that in setting 1, the effect of transaction characteristics in the transportation collaboration on intention to join the transportation collaboration was statistically significant at the 0.05 level. Moreover, the interaction effect between trustworthiness features and social embeddedness features was statistically significant at the 0.05 level. In setting 2, the effect of transaction characteristics in the transportation collaboration in the intention to

join the transportation collaboration was statistically significant at the 0.05 level. Moreover, the effect of disposition to trust was statistically significant at the 0.05 level

4.4 Summary of Chapter IV

The GLM repeated measures approach was employed to assess the conceptual framework. The results in setting 1 (hands-on workshop setting of logistics students) shows that only hypothesis 2 (social embeddedness features increase intention to join the transportation collaboration) was statistically significant at the 0.05 level. On the other hand, results in setting 2 (watching a demonstration through video clips setting of MBA students) revealed that only hypothesis 1 (trustworthiness features increase intention to join) was statistically significant at the 0.05 level. The next chapter will discuss the results and draw conclusions on the findings of the current study.

Chapter V

Discussion and Conclusion

5.1 Summary of Discussion

The results of the experiments were provided in the previous chapter. This chapter summarizes the results of the two hypotheses in the two experimental settings. Furthermore, this section recaps the essential findings in order to provide answers to the research question.

5.1.1 Hypothesis Testing

The summary of analyses of research hypotheses is presented below in Table 24. In conclusion, hypothesis 1 (trustworthiness features increase intention to join the transportation collaboration) was supported only by the watching a demonstration through video clips setting of MBA student, while hypothesis 2 (social embeddedness features increase intention to join the transportation collaboration) was supported only by the hands-on workshop setting of logistics students.

Table 24 Summary of Analyses of Research Hypotheses

Setting	Research Hypothesis	p Value	Finding
Hands-on workshop setting of logistics students	Hypothesis 1	0.700	Non Significant
	Hypothesis 2	0.046*	Significant
Watching a demonstration through video clips setting of MBA students	Hypothesis 1	0.048*	Significant
	Hypothesis 2	0.107	Non Significant

* $p<.05$

Figure 10 depicts the overall results of data analysis. A solid line represents an effect that was statistically significant, whereas a dotted line represents an effect that was not statistically significant.

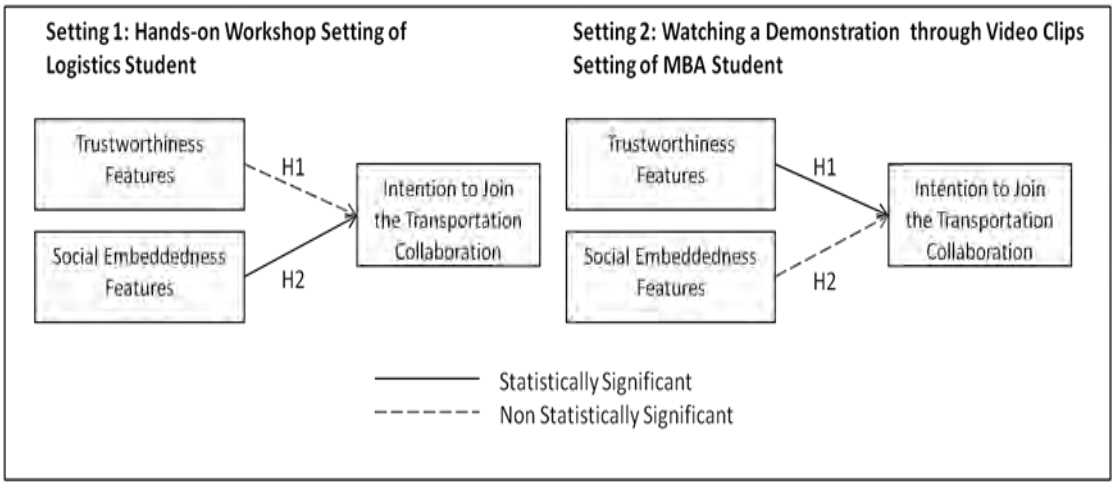

Figure 10 Overall Data Analysis

5.1.2 Results Discussion

As summarized above, the IOS features to support initial trust - trustworthiness and social embeddedness features - were found to contribute to the intention to join the transportation collaboration differently in two different experimental settings. This section elaborates on these differences and discusses whether the results found in this study answer the following research question:

- Do trustworthiness features and social embeddedness features in the interorganizational system (IOS) influence the intention to join multilateral interorganizational collaboration among organizations engaging in transportation exchange managed by a third-party moderator?

In order to provide explanations to the mixed findings, comments provided by subjects in the questionnaires were extracted to give more insights. Also, additional interviews were conducted with logistics MBA students asking their opinions regarding the joining of transportation collaboration.

In setting 1 (the hands-on workshop setting of logistics students), the research question was partially answered. In this setting, the findings did not support

Hypothesis 1. The intention to join transportation collaboration of logistic students was not related to trustworthiness features (p = 0.700). Although the intention to collaborate of subjects when were exposed to the IOS with trustworthiness features (mean = 65.21) was significantly higher than when were exposed to IOS without trustworthiness features (mean = 47.86), when taking into accounts both transaction characteristics in the transportation collaboration and disposition to trust, the mean-square of variance explained for within-subject effects was not significant.

Although the existing literature provides evidence that through trustworthiness features, the subjects would attribute initial trust to third-party moderator who brings about the transportation collaboration system (Egger, 2003; Lanford and Hubscher, 2004), the same evidence was not found in this study. An explanation can be made regarding the non-significant result. Since logistics students have learned a lot about related logistics topics, logistics students have knowledge and many extensive experiences with transportation collaboration. Being in this profession or studying toward becoming as specialist in this area, logistic students felt that they knew what to do when facing transportation problems. This is confirmed by the interviews with two logistics students as quoted below.

> *Logistics is a specialized field of study. For those of us who get into this field, we learn how to deal with transportation problems. Indeed, I know a lot about how to run a transportation collaboration myself. So, I don't need to rely much on any third-party moderator to help us do our work.*

> *Trustworthiness of a third-party moderator is not much as important as of other collaborators. There are much more risks from other collaborators than from a third-party moderator.*

Without the identity of a third-party moderator being presented in the experiment, the logistics students did not relate the trustworthiness features to their intention to join in the transportation collaboration. By not knowing which institution hosted the IOS, logistics subjects did not know the reputation of the moderator as a

result did not consider trustworthiness features when rate their intention. According to McKnight et al (1998), initial trust was affected by reputation categorization. Reputation in turn reflected professional competence (Barber, 1983; Powell et al., 1996). By knowing the moderator's identity, subjects would be able to assess the reputation of moderator. This line of rationale to explain the lack of support on Hypothesis 1 of this study was also confirmed by interview with a logistics student who stated:

> *Identity of a third-party moderator is an important factor for deciding whether to join a transportation collaboration. A third-party moderator should be professional and unbiased and have sufficient experience.*

Despite some indications that the third-party moderator's identity would influence subject's intention to join in the transportation collaboration, the inclusion of moderators would create a major problem to the current experimental study. Which moderator and how many would be enough to warrant feasible research design? Consequently, it is likely that the study would need a great number of additional control variables to be included with additional risks to mitigate when conducting the experiments. For example, if three alternative moderator's identities are used, the current 2 x 2 design will become 2 x 2 x 3 design. The new experimental design would require a large sample size and address a different research question. The current identity free moderator being implemented in the experiment IOS, both standard and manipulated versions, was the design choice of the study because the effect of trustworthiness features on the intention to join transportation collaboration would be surfaced without identity attached biases.

Hypothesis 2 was supported by the finding of setting 1. The intention to join transportation collaboration of logistics students was found significantly related to social embeddedness features of the IOS. The finding was consistent with previous research (Riegelsberger et al., 2005). Furthermore, according to comments that subjects in this setting put in the questionnaire, it was showed that they paid much attention to social embeddedness features. There were many suggestions about social embeddedness features' modifications such as how to rate quality score, etc.

Furthermore, according to the interviews with two logistics students, they really concerned about risks from other collaborators. With the high awareness of the risks from other collaborators, social embeddedness features were effective in this setting (Boon and Holmes, 1991; Das and Teng, 2004).

In setting 2, (the watching a demonstration through video clips setting of MBAs), the findings showed partially support the hypotheses but were opposite to the setting 1. MBA students with at least 2 years of working experience and one year training in general management, found trustworthiness features to significantly link to intention to join the transportation collaboration. As a result which the data support Hypothesis 1, this finding was consistent with previous research (Egger, 2003; Lanford and Hubscher, 2004). The intention to join transportation collaboration of MBA students related to IOS's trustworthiness features ($p = 0.048$). It indicated that MBA students saw trustworthiness features related to the moderators to be important in determining their intention to join. Being trained in general business subjects, MBA students when encountered problems of transportation exchanges, they might not have alternative solutions at hands. A trustworthy moderator would become their structural safeguards (Shapiro, 1987). The positive effect of third-party institutional-based trust on interorganizational trust will diminish as the relationship moves from the exploration to the maturity phase (Pavlou et al., 2003). Evidence that subjects in this setting relied on a third-party moderator to do the work for them was revealed in comments that two subjects in this setting put in the questionnaire.

> *Trustworthiness of a third-party moderator is the most important to decide to join transportation collaboration. The third-party moderator should be responsible for several works such as calculating profit, sharing profit, etc.*

> *The matching of transportation exchange is a complex job. A third-party moderator needs to be very careful about this.*

In this setting, hypothesis 2 was not supported. The MBA students did not relate the intention to join transportation exchanges with social embeddedness

features. From the interview of two MBAs, they viewed themselves as having good overall networking. Thus, they paid less attention to social embeddedness features (F_{SE} = 2.674, p= 0.107). Furthermore, MBA students did not have extensive background in transportation exchanges and logistics. Thus, they might not be aware of the risks involved in the transportation exchange activities. Since trust will be effective only when a person is aware of the risks involved (Boon and Holmes, 1991; Das and Teng, 2004), without risk awareness, trust is less effective. The findings suggested that MBAs might not be aware of the risks from other collaborators, thus the social embeddedness features did not influence their intention to join in transportation exchanges.

5.2 Conclusion

Based on three important theories – (1) theory of planned behavior (TPB) (Ajzen, 1991), (2) transaction cost economics (Williamson, 1975, 1991; Williamson, 1979), and (3) studies of initial trust (Jarvenpaa and Leidner, 1999; Lewicki and Bunker, 1996; McKnight et al., 1998), the purpose of this research was to investigate whether interorganizational system (IOS) features to support initial trust increase the intention to join the transportation collaboration. The findings from this study were mixed. The evidence did not support the claim that the two types of IOS features to support initial trust, trustworthiness features and social embeddedness features, increased the intention to join transportation exchanges collaboration across both experimental settings – logistics students with hands-on workshop and MBA students watching video clips demonstration.

Partial support to the claim was found that trustworthiness features as suggested in literature to enhance initial cognitive-based trust in the moderator (e.g., Egger, 2003; Lanford and Hubscher, 2004) and resulted in the increased intention to join transportation collaboration. After considering the effects of disposition to trust and transportation characteristics in the transportation collaboration, the evidences from logistics students in the hands-on workshop setting did not show an increase in their intention to collaborate but the evidences from MBA students watching video clips demonstration showed some support. According to the interviews with logistics

students, they mentioned that they were familiar with the transportation problems and rely on their own self efficacy to deal with problems in transportation collaboration. Thus, IOS features that led to the initial trust in moderator did not have effects on their intention to join in the collaboration. However if they knew the identity of the moderator, their intention might be affected (positive or negative) depending on the reputation of the specific moderator known in their profession. On the other hand, MBA students' knowledge and experience in transportation collaboration's problems were general so they relied on the existence of a moderator without having to know its identity per se. Thus, trustworthiness features were rated by MBA students to play a role in their intention to join transportation collaboration.

Similar to trustworthiness features, only partial support was found from the present study that social embeddedness features that enhanced institution-based trust in other collaborators (Riegelsberger et al., 2005) increased the intention to join transportation collaboration. Unlike the trustworthiness features which logistics students did not show support to the hypothesized relationship, the social embeddedness features was seen as having effects on the intention to join transportation collaboration by the logistics students. The features to support initial trust in other collaborators are important to those who are already in or are studying to be in logistics profession. The IOS features showing the equality of exchanges and the quality of individual work transactions being performed by other collaborators were seen by logistics students as the factor supporting initial trust and subsequently the intention to join transportation collaboration. Nevertheless, the evidence from MBA students did not show support that social embeddedness features would increase their intention to join the collaboration. Being a generalist, MBA students did not seem to bring the context sensitive of social embeddedness features into their intention consideration.

The findings were also mixed when considering the effect of disposition to trust on intention to join the transportation collaboration (Table 20 and Table 23). Choosing to pursue a specialized field of study, logistics students did not differ in the influence of disposition to trust on their intention to join the transportation collaboration. The generalist MBA students, on the other hand, operated on their disposition to trust

when considering their intention to join the transportation collaboration. Coming from a different background and having opportunity to pursue diverse career paths seemed to be one of the factors contributing to their differing in disposition to trust that in turn affected their intention to collaborate. Despite the mixed findings found above, transportation characteristics were the only factor that had consistent effect on intention to collaborate across all experimental settings. The higher the level of empty truck faced by the subjects, the higher their intention to join the transportation collaboration.

In sum, trustworthiness and social embeddedness features to support initial trust in transportation collaboration should be carefully examined and incorporated into a transportation collaboration system so as to increase the intention to join by prospective collaborators. Additional characteristics and identity of the third party moderator should be considered as part of the IOS features for logistics professionals to increase their initial trust and intention to collaborate. Features that would induce involvement attention to the structural characteristics of collaborative exchanges can also be considered in future work to see whether they would increase the initial trust in other collaborators by non-logistics professionals and general management.

5.3 Research Contributions

This study provides a number of theoretical contributions. The main one is the theoretical link between IOS features to support initial trust and intention to join the transportation collaboration. The empirical evidence showed that initial trust can be induced through IOS features differently by the academic major of participants, which in turn, influenced intention to join the transportation collaboration. In this study, the features to support initial trust include trustworthiness features (e.g., Egger, 2003; Lanford and Hubscher, 2004) and social embeddedness features (Riegelsberger et al., 2005), Trustworthiness features appear to enhance the intention to join the transportation collaboration of MBA students whereas the effects of social embeddedness features on this intention to join were significant only in the setting of logistics students. This implies the interplay among the IOS features, the intention to join, and the characteristics of prospective collaborators.

Among the theoretical paradigms to explain the motivation of an organization in joining interorganizational collaboration comprising transaction cost economics, resource dependence, strategic choice, stakeholder theory of the firm, organizational learning, and institutional theory (Barringer and Harrison, 2000), this study chose transaction cost economics (Williamson, 1975, 1991; Williamson, 1979) to predict and explain the intention of an organization to join interorganizational collaboration including the transportation collaboration. Given that an organization is motivated to join the transportation collaboration for economic reasons, transaction cost economics can effectively explain the intention to join the transportation collaboration. The findings are in line with the results of previous studies.

Furthermore, previous study argued that trust can be incorporated with transaction cost economics to provide more predictive power (Chiles and McMackin, 1996). One of the arguments in the present study is that initial trust can be incorporated with transaction cost economics to explain the intention to join transportation collaboration. The results support the argument and confirmed the findings of the previous literature.

Regarding the methodological contribution, the merit of this study is that the experimental system was implemented for the experiments. This experimental system can be seen to enhance the external validity of the study compared to a paper-based experimental study where it lacks genuineness. With the purposefully developed system, participants in this study had actual experiences with the system allowing them to better understand the real world situation.

So far, due to difficulties in developing the system, there have not been many studies that have employed the experimental research method in IOS studies. Almost no guidelines for the development and implementation of the IOS features to support initial trust in the experimental system were offered in the literature. This study is an initial attempt at proposing guidelines for the development and implementation of the experimental system with the features and offers an approach to set the laboratory settings in IOS studies as well.

The experimental system was designed to fit with the context of the study, transportation collaboration systems. The access to this existing particular system was limited. Most of the operationalizations of the system features needed to be developed from the beginning. The author had to develop them with consideration of both the definitions of the features and the proposed functions of the transportation collaboration system. To gain more validity, this study included validation by experts in both the information system and transportation collaboration fields and this should also be included in future studies if the researchers are in the same predicament of having to develop their own operationalizations.

This study employed a within-subjects design with the subjects being exposed to all versions of the experimental system and there were some similar functions and interfaces across different versions. During the experiment, subjects could effectively recall these similar functions and interfaces. Future research could shorten its experimental duration, as in this study, by showing subjects only different portions across versions.

Consequently, this study adopted the technique of master page to ease the implementation efforts since a number of versions of experimental system had to be developed according to factorial experimental design. According to this approach, the common functions and structure were developed in the master page. Then, additional derivations in different versions were implemented based on the master page. This study suggests that future studies should consider this approach to reduce the developmental time of the experimental systems.

This study proposed a transportation collaboration model to simulate an actual transportation collaboration project and the subjects were informed during the initial session of the experiments. The proposed model was developed based on an existing transportation collaboration project and was modified according to the expert panel's suggestions. The experimental procedure was developed to resemble the actual invitation session of the existing transportation collaboration project. Moreover,

scenarios needed to be generated and data were needed for a mockup for use in the experiment. Future studies can follow this approach in their experiments.

5.4 Managerial Implications

Organizations have long faced the empty truck problem. Many efforts have been made to solve the problem but without success. Although transportation collaboration has been recognized as potentially alleviating the problem, it introduced a new problem, namely that of the organizations' reluctance to join the transportation collaboration. Although lack of initial trust has been acknowledged as being an important cause of this reluctance, IOS features to support initial trust have not garnered the attention they deserve. This study raises awareness of the importance of the features to the stakeholders.

As found in the study, social embeddedness features related to the intention to join transportation collaboration in setting 1 (the hands-on workshop setting of logistics students), it implies that initial trust might be stronger if the IOS to be developed for logistics professionals. The more social embeddedness features including the equality transportation exchange algorithm and reputation mechanism features are built into the IOS, the higher level of trust during the initial stage can be gained (McKnight et al., 1998). Likewise, the implication for higher level of initial trust formation for general management is to have the IOS with trustworthiness features, e.g., provision of moderator information, information feedback, transaction acknowledgement and general information quality features of content. The two effects can complement one another. It is conceivable that the decision to join transportation collaboration is made by a general manager who consults with his line management in logistics area. Both are also likely to be introduced to the IOS and each would be looking for different trust features. Consequently, the absence of these trust related features in the IOS may deter initial trust of these decision makers (Lewicki and Bunker, 1996).

Although benefits are gained from the inclusion of IOS features to support initial trust, there are usually additional developmental efforts and costs

involved. This is because most of the features require specific context for their designs and implementation. From the standpoint of software designers who typically focus on designing software using conventional requirements, extra attention must be made. During the design of a transportation collaboration system, they should incorporate a pool of IOS features to support initial trust. In addition, software designers can use the features that are likely to increase initial trust in the experimental system of this study as prototype for the development of a transportation collaboration system.

5.5 Limitations

Although the author has carefully planned and executed this study, there were many limitations. First of all, generalizations to other types of transportation collaboration or other interorganizational collaboration could be limited to multilateral interorganizational collaboration among organizations engaging in transportation exchange managed by a third-party moderator.

Second, there may be questions regarding the subject of the experiment. As all of the subjects were bachelor's and master's students in the author's university, one may doubt the representativeness of a true population. Actual business owners might render more external validity to this study. Moreover, increasing the number of subjects would be required to provide more statistical power and robustness of data analysis.

Third, there may be questions regarding the laboratory setting. Subjects were informed in only a short period of time about the transportation collaboration, which might have been insufficient for their understanding. Moreover, due to time constraints, information about the collaboration was incomplete and lacked important issues. The expert panel expressed similar concerns with many suggestions about the information being too simple and lacking details about the model. The author accepted their comments. However, the pros and cons between less and more detail in the experiment should be considered. Too much detail can decrease subjects' attention, especially if students are used as subjects. Moreover, it would definitely require more experiment

time. Since two experimental settings were different in both exposure methods and academic majors of subjects, the comparative analysis between the two experimental settings was limited.

Lastly, regarding the within-subjects design, although the author tried to control for sequential effect and other effects, they might have affected the results of this study. As mentioned earlier, this study used a counter-balanced design to safeguard against such effects.

5.6 Future Research

Future research can follow up on this study, which was an initial attempt to investigate IOS features to support initial trust, in a number of ways. Since this study examined the features at group level, future research should take a closer look at the level of each feature. Such studies would extend our knowledge to see how each feature operating separately can affect the intention to join transportation collaboration and their interaction effects can also be examined. Furthermore, since an interesting feature might frequently be operationalized by more than an operationalization and, vice versa, an operationalization usually affects more than a feature. Thus, some features might be operationalized in the many-to-many approach. Future research, if looking at the level of each feature rather than at group level, should address this issue.

Furthermore, greater consideration should be taken emphasizing on some specific features. For example, the reputation mechanism, which can support initial trust and then increase the intention to join transportation collaboration, may have the side effect of decreasing this intention because an organization may fear reporting its transportation quality score. To examine such features more closely, greater insight needs to be gained.

The mediating role of initial trust between IOS features to support initial trust and intention to join the transportation collaboration was not included in the present study. Future studies should include initial trust and other mediating variables in the model. Although they may result in more complexity in the statistical method, a fuller

insight can be gained about the unexplored effect between the features and the intention to join the transportation collaboration.

Because of the limited number of subjects and limited number of experimental settings in this study, future research should follow this study in using various experimental settings to provide clearer findings. As regards the inconsistencies in the results from the two different experimental settings, future research should further examine how factors of experimental setting such as exposures and subject characteristics affect the results. For example, further experiments can be done with the participation of subjects who have similar characteristics and the experiments use one exposure method of either hands-on workshop or watching a demonstration. On the other hand, the experiments choose only one exposure method and include subjects who have a variety of characteristics and backgrounds. Otherwise, given there are a sufficiently large number of subjects, future studies should design the experiment to include all the factors of those experimental setting with all possible experimental settings combined in its study. Furthermore, to gain greater external validity, future research should invite decision makers from organizations with the potential to join transportation collaboration. On top of that, this study investigated only one key informant per organization. Future research should investigate the decisions from a number of relevant persons to see how decisions are aggregated to form an overall organizational decision and whether the organizational decision is different from one key informant's decision.

Apart from the chosen setting of a shipper who owns trucks, future research should investigate how the conceptual framework can explain the setting of third-party logistics (3PL) providers. Since transportation is 3PL's core business, future research should examine how IOS features to support trust affect the intention to join transportation collaboration in this setting.

Aside from the transportation collaboration, future research should examine the effects of the features specified in this study on the intention to join in other multilateral interorganizational collaborations managed by a third-party moderator. As

mentioned before, other interorganizational collaborations, such as money matching among organizations moderated by a third party financial institute might also face the problem of reluctance to join like that in transportation collaboration. Future study should investigate how the features affect intention to join within these contexts.

According to the experimental design, future study could use a between-subjects design rather than a within-subjects design. Since a between-subjects design is less effective than a within-subjects design in capturing individual differences, future research should further identify control variables and include them to remove these individual differences.

Although this study examined only the effects of features to support initial trust on intention to join the transportation collaboration during the formation stage, it does not mean that the features are ineffective later on. Social embeddedness features are supposed to affect trust in the later stages as well. Future study should examine those effects. Besides, since some collaborators might already have joined the transportation collaboration during the formation stage and are known to potential collaborators. Future studies should identify additional features that support initial trust on those collaborators who have already joined; for example, features that provide some trust-inducing information about the collaborators.

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Appendices

Appendix A Experimental System

The experimental system was developed for use in this study's experiments. It was developed based on the existing transportation collaboration system. According to the 2x2 factorial design, there were four versions of experimental system from two groups of features including trustworthiness features and social embeddedness features and from two levels of each group comprising inclusion and exclusion of the features in the experimental system. The four versions were referred to as versions A, B, C, and D. Version "A" included neither trustworthiness features nor social embeddedness features and thus, it was a control version. The control version was developed primarily from the standard template of Microsoft Studio.NET 2010.

Developmental Tools

This study chose Microsoft Visual Studio.NET 2010 as the developmental tool. One of the project types called ASP.NET MVC can help develop the experimental system in the website style. There were many reasons to use Microsoft Visual Studio.NET. First, the author has the expertise in programming in VB.NET. The author had used the programming language for more than five years. Secondly, this development tool supports the new programming paradigm called MVC (Model-View-Controller). It was loosely-coupled among the model (data), view (interface), and controller (logic) which made the system easy to develop especially with the system that had four versions in this study. Third, it was one of the latest development tools during the development period.

The experimental system was deployed in the web server. This study used a PC in a computer lab for use as the web server. The following shows how to deploy the experimental system to the web server.

For the database management system, this study chose Microsoft SQL Server. This is due to it usually working well with Microsoft Visual Studio.NET. Furthermore, the author has been familiar with it for more than five years.

Database Design

The primary data necessary in the system are the data of exchanging shipment jobs including data about which shipment to transport to each job, where the pickup and delivery locations are, who the customers are, and when the pickup and delivery time are. For the transportation matching center to assign jobs for its truck pool, information about trucks in the collaboration was required. It is sometimes necessary to contact other collaborators who are the owners of transportation jobs, and information about collaborators is also needed to store in the database. Since this system authenticates the subscribed user from its collaborators using password authentication, the information for username and password were also needed for storing. Lastly, the information used for the features in manipulation was needed to add to the database as well.

Database was designed according to the above data requirements. There were nine tables in the experimental database including: (1) Table “TCShipmentJobDetail”, (2) Table “TCShipmentJob”, (3) Table “TCShipmentJobExchange”, (4) Table “TCCompany”, (3) Table “TCLocation”, (6) Table “TCVehicle”, (7) Table “TCPackpage”, (8) Table “TCUser”, and (9) Table “TCExchangePoint”.

Table “ShipmentJobDetail” and Table “ShipmentJob” were master-detail tables to store data about shipment jobs. Table “ShipmentJobExchange” stored data from exchanging shipment jobs. Table “Company”, Table “Location”, Table “Vehicle”, and Table “Package” were groups of tables that stored data about each collaborator. Table “User” stored data which was used for the username and password. Table “ExchangePoint” stored data for the transportation exchange point. Figure 11 shows the database diagram from Microsoft SQL Server.

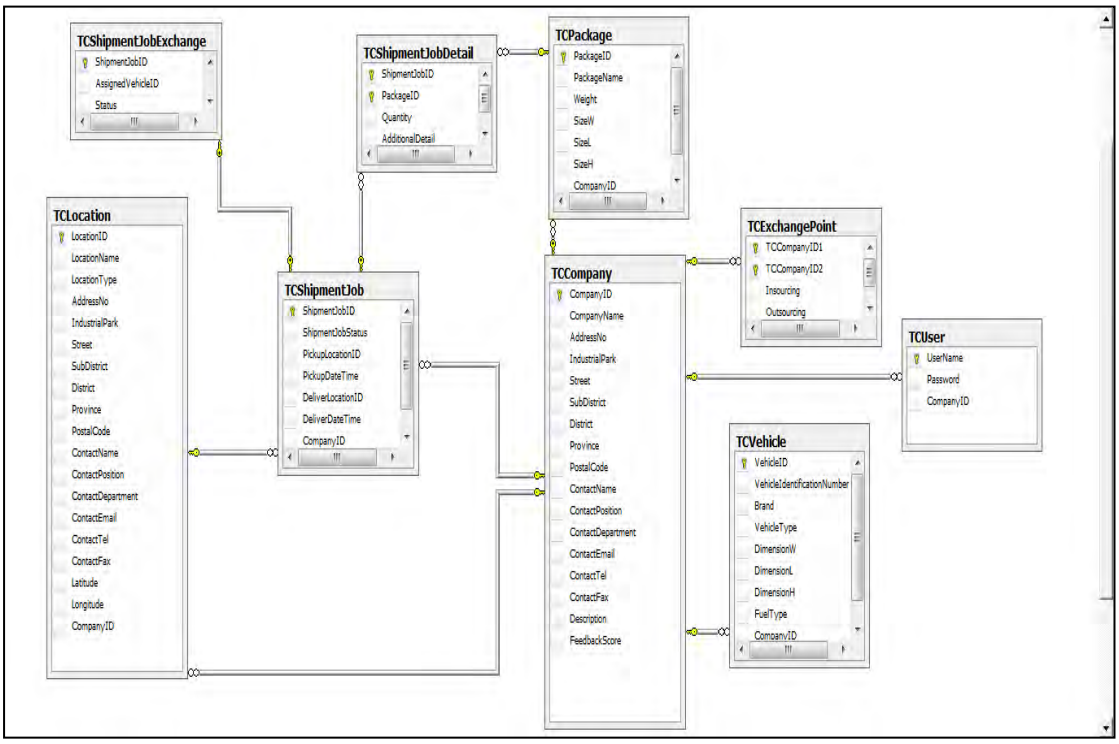


Figure 11 the database diagram from Microsoft SQL Server

The data dictionary of tables in experimental database including (1) Table “TCCompany”, (2) Table “TCExchangePoint”, (3) Table “TCLocation”, (4) Table “TCPackpage”, (5) Table “TCShipmentJob”, (6) Table “TCShipmentJobDetail”, (7) Table “TCShipmentJobExchange”, (8) Table “TCUser”, and (9) Table “TCVehicle” are shown in Table 25, Table 26, Table 27, Table 28, Table 29, Table 30, Table 31, Table 32, and respectively.

Table 25 Data Dictionary of Table “TCCompany”

Attribute Name	Attribute Type	Field Length	Key	Description
CompanyID	varchar	50	PK	Identifies each collaborator uniquely
CompanyName	varchar	200		Name of collaborator
AddressNo	varchar	200		Address number of collaborator’s headquarter office
IndustrialPark	varchar	200		Industrial park in which the collaborator’s headquarter office is located
Street	varchar	200		Road where collaborator’s headquarter office is located
SubDistrict	varchar	200		Sub-district where collaborator’s headquarter office is located
District	varchar	200		District where collaborator’s headquarter office is located
Province	varchar	200		Province where collaborator’s headquarter office is located
PostalCode	varchar	200		Postal code of collaborator’s headquarter office
ContactName	varchar	200		First name and last name of collaborator’s contact person
ContactPosition	varchar	200		Job position of collaborator’s contact person
ContactDepartment	varchar	200		Department of collaborator’s contact person

Attribute Name	Attribute Type	Field Length	Key	Description
ContactEmail	varchar	200		Email address of collaborator's contact person
ContactTel	varchar	200		Telephone number of collaborator's contact person
ContactFax	varchar	200		Fax number of collaborator's contact person
Description	varchar	200		Additional description about collaborator
FeedbackScore	float			Quality score which is collected from collaborator's customers

Table 26 Data Dictionary of Table "TCExchangePoint"

Attribute Name	Attribute Type	Field Length	Key	Description
CompanyID1	varchar	50	PK, FK	Identifier of the first collaborator
CompanyID2	varchar	50	PK, FK	Identifier of the second collaborator
Insourcing	float			Accumulated shipment quantity of transport jobs which the first collaborator undertakes on behalf of the second collaborator
Outsourcing	float			Accumulated shipment quantity of transport jobs which the second collaborator undertakes on behalf of the first collaborator

Table 27 Data Dictionary of Table “TCLocation”

Attribute Name	Attribute Type	Field Length	Key	Description
LocationID	varchar	50	PK	Identifies each location individually
LocationName	varchar	100		Name of customer, supplier or warehouse depending on location type
LocationType	varchar	100		Type of location including customer, supplier, and warehouse
AddressNo	varchar	200		Address number of customer/ supplier / warehouse’s location
IndustrialPark	varchar	200		Industrial park in which customer/ supplier / warehouse is located
Street	varchar	200		Road where customer/ supplier / warehouse is located
SubDistrict	varchar	200		Sub-district where customer/ supplier/ warehouse is located
District	varchar	200		District where customer/ supplier/ warehouse is located
Province	varchar	200		Province where customer/ supplier/ warehouse is located
PostalCode	varchar	200		Postal code of customer/ supplier/ warehouse
ContactName	varchar	200		First and last name of customer/ supplier/ warehouse’s contact person

Attribute Name	Attribute Type	Field Length	Key	Description
ContactPosition	varchar	200		Job position of customer/ supplier/ warehouse's contact person
ContactDepartment	varchar	200		Department of customer/ supplier/ warehouse's contact person
ContactEmail	varchar	200		Email address of customer/ supplier/ warehouse's contact person
ContactTel	varchar	200		Telephone number of customer/ supplier/ warehouse's contact person
ContactFax	varchar	200		Fax number of customer/ supplier/ warehouse's contact person
Latitude	varchar	200		Latitude of customer/ supplier/ warehouse's location
Longitude	varchar	200		Longitude of customer/ supplier/ warehouse's location
CompanyID	varchar	50	FK	Identifier of collaborator that has this customer/ supplier/ warehouse's location

Table 28 Data Dictionary of Table “TCPackage”

Attribute Name	Attribute Type	Field Length	Key	Description
PackageID	varchar	50	PK	Identifies each shipment package uniquely
PackageName	varchar	100		Name of shipment package
Weight	float			Weight of each shipment package
SizeW	float			Width of shipment package
SizeL	float			Length of shipment package
SizeH	float			Height of shipment package
CompanyID	varchar	50	FK	Identifier of collaborator that has this shipment package

Table 29 Data Dictionary of Table “TCShipmentJob”

Attribute Name	Attribute Type	Field Length	Key	Description
ShipmentJobID	varchar	50	PK	Identifies each shipment job individually
ShipmentJobStatus	varchar	50		Status of shipment job including pending and submitted
PickupLocationID	varchar	50	FK	Identifier of pickup location for this shipment job
PickupDateTime	datetime			Specified time to pickup shipment job
DeliveryLocationID	varchar	50	FK	Identifier of delivery location for this shipment job

Attribute Name	Attribute Type	Field Length	Key	Description
DeliveryDateTime	datetime			Specified time to deliver shipment job
CompanyID	varchar	50	FK	Identifier of collaborator that entered this shipment job

Table 30 Data Dictionary of Table “TCShipmentJobDetail”

Attribute Name	Attribute Type	Field Length	Key	Description
ShipmentJobID	varchar	50	PK,FK	Identifier of shipment job that has these details of shipment job
PackageID	varchar	50	PK,FK	Identifier of shipment package transported in this shipment job
Quantity	int			Number of shipment package transported in this shipment job
AdditionalDetail	varchar	100		Additional information for the details of shipment job

Table 31 Data Dictionary of Table “TCShipmentJobExchange”

Attribute Name	Attribute Type	Field Length	Key	Description
ShipmentJobID	varchar	50	PK	Identifier of shipment job assigned for vehicle
AssignedVehicleID	varchar	50		Identifier of vehicle assigned for this shipment job
Status	varchar	50		Status of shipment job including pending and completed

Table 32 Data Dictionary of Table “TCUser”

Attribute Name	Attribute Type	Field Length	Key	Description
UserName	varchar	50	PK	User name of collaborator for login
Password	varchar	50		Password associated with the user name for authenticating the user
CompanyID	varchar	50	FK	Identifier of collaborator assigned this user name

Table 33 Data Dictionary of Table “TCVehicle”

Attribute Name	Attribute Type	Field Length	Key	Description
VehicleID	varchar	50	PK	Identifies each vehicle uniquely
VehicleIdentificationNumber	varchar	50		Vehicle identification number for this vehicle
Brand	varchar	50		Vehicle brand such as Hino, Isuzu, etc.
Vehicle Type	varchar	100		Vehicle type such as trailer, pickup truck, etc.
DimensionW	float			Width of this vehicle
DimensionL	float			Length of this vehicle
DimensionH	float			Height of this vehicle
FuelType	varchar	50		Fuel type that this vehicle uses such as NGV, diesel, etc.
CompanyID	varchar	50	FK	Identifier of collaborator that owns this vehicle

Interface Design

The author designed the interface of the experimental system by fixing the main part the same for every page. This made the interfaces consistent throughout the whole system. Furthermore, together with the master page programming style in Visual Studio.NET 2010, the experimental system was implemented easily in this design. The author categorized the web page of the control version into three main parts including header, placement of menu, and working area. There were various alternatives to arrange this part on the master page. This study chose one of these layouts with the header at the top of the webpage. For versions that included trustworthiness features, a

logo was added to web page part of header in the master page. The placement of the menus was as below, next to the placement of logo. The large area below the placement of menus was for the working area. Figure 12 shows interface layout of the experimental system.

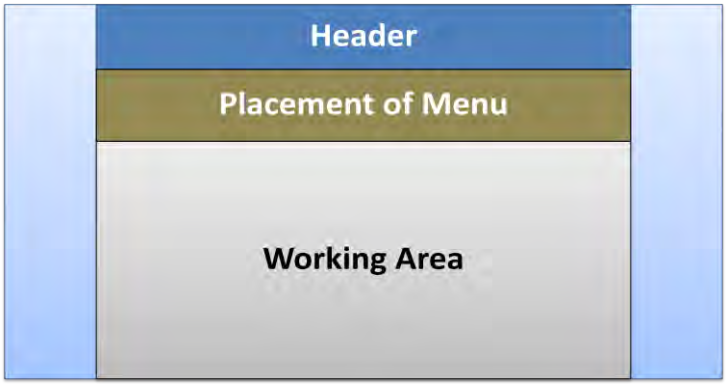


Figure 12 Interface Layout of the Experimental System

Menu Design

On the whole, there were seven menus in the experimental system: (1) Home, (2) About, (3) FAQs, (4) Contact Us, (5) Profile, (6) Shipment Job, and (7) Report. All of these menus were not shown at the same time. Some menus were shown before logon while some menus were shown after logon. Furthermore, some menus were shown only in the version that included trustworthiness features (version B and D). Table 34 shows the menus which were shown at different times and in different versions.

Table 34 Menus Shown at Different Times and Different Versions

Stage	Menu
Before Logon	Home, About, FAQs*, and Contact Us*
After Logon	Home, Profile, Shipment Job, Report

*FAQs and Contact Us Menus were shown only in Versions B and D (Versions that included Trustworthiness Features)

Menu “Home” is about the overview of the transportation collaboration. This is the default first page of the experimental system. In versions A and C (versions that excluded trustworthiness features), this page showed only the rationale of the

transportation collaboration. In versions B and D (versions that included trustworthiness features), this page additional showed recent news and activities.

The menu “About” showed the detailed information about the transportation collaboration. In versions A and C (versions that excluded trustworthiness features), this page showed the objectives and goals of the transportation collaboration. In versions B and D (versions that included trustworthiness features), this page additionally showed the privacy policy and visions of the moderator of the transportation collaboration.

The menu “FAQs” is about frequently asked questions about the transportation collaboration. This page shows a list of questions and answers of frequently asked questions. Examples of questions were, ”What are the benefits gained from joining the transportation collaboration?”, “What are the costs that need to be spent if an organization joins the transportation?”, “How was the profit of the transportation collaboration shared among its collaborators?” etc.

The menu “Contact Us” is about the information of the moderator of the transportation collaboration. This page showed the information of the moderator such as headquarter address, phone numbers, e-mail address, etc.

The menu “Profile” comprised the four submenus of “Company Information”, “Pickup and Delivery Location Information”, “Vehicle Information”, and “Package Information”. All of the submenus in the menu “Profile” were to show and edit the collaborator’s own information. The submenu “Company Information” was to show and edit the information of company name, company address, and contact person. The submenu “Pickup and Delivery Location” was to show and edit the information of pickup and delivery locations comprising customers, suppliers, and warehouses. The submenu “Vehicle Information” was to show and edit the information of vehicles. The information comprised vehicle dimensions including the maximum weight capacity, width, length, and height of its vehicles. The submenu “Package Information” was to show and edit the information of shipment packages. The information comprised shipment package

dimensions including the weight, width, length, and height of all possible shipment packages.

The menu “Shipment Job” comprised the two submenus of “Entering Transportation Jobs” and “Receiving Transportation Job’s Exchange”. The submenu “Entering Transportation Jobs” was for entering and submitting daily transport jobs to the transportation matching center. The information on transport jobs included pickup and delivery location, and shipments. The submenu “Receiving Transportation Job’s Exchange” included the results of the job assignment from the transportation matching center. The information comprised the assigned transportation jobs which are one or more of these two types of jobs: (1) own transport jobs, and (2) insourcing jobs – undertaking transportation jobs for others. In versions B and D (versions that included trustworthiness features), the submenu “Receiving Transportation Job’s Exchange” also showed the information of some outsourcing jobs that might be assigned to be carried out by others.

The menu “Report” comprised the three submenus of “Profit Sharing”, “Transportation Exchange Point”, and “Feedback of Quality Score”. The submenu “Profit Sharing” concerned showing the reports of profit which each collaborator gained based on the profit sharing scheme.

Appendix B Details of Experimental Procedure

The experiments began with the introduction of the transportation collaboration. To keep the introduction of the transportation collaboration the same as possible among the experimental sessions, the author had an introduction script. The following is the introduction script.

My Name is Anirut Asawasakulsorn. I'm a Ph.D. student in the IT in business program. Thank you for participating in this experiment. In this experiment, you will be asked to be exposed to a transportation collaboration system and complete the questionnaires. First of all, you need to take on the role of a business owner. Your organization needs transportation services as a normal organization. Differing from a typical organization, your organization owns some trucks. Thus, your organization can serve transportation services itself rather than using other logistics providers. Furthermore, your organization has faced the empty truck problem. The empty truck problem is when your trucks are empty or not fully utilized. Your organization usually transports its shipments one way at a time in either linehauls or backhauls. Efforts for solving this problem usually fail based on constraints such as customer's delivery requirements.

This problem has led you to rely on transportation collaboration. The transportation collaboration with many organizations has more transport jobs than just one organization on its own. Thus, this leads to the high probability of arranging transportation jobs in a fully utilized truck. With the internet and powerful information system, collaborators can easily send their information about transportation jobs to the center called the "Transportation Matching Center". The center will execute matching algorithm to arrange transport jobs and then inform collaborators which jobs they will do or others will do.

To facilitate the transportation collaboration, there is a third-party moderator to manage the collaboration and be responsible for the development and administration of the transportation collaboration system as well. Since the main

motivation for participating in the transportation collaboration is cost reduction, additional costs such as system development and equipment costs hinder the participation. Thus, a government agency takes a role in supporting the initial investment.

After subjects were informed about the introduction to the transportation collaboration, they were ask to complete the questionnaire on the "disposition to trust" section. After the subjects completed the questionnaire, four versions of experimental system were shown to them. This section shows the sequences of steps in the experimental system to which the subjects were exposed. Furthermore, screenshots of the experimental system are included to illustrate each step.

Steps in version A are similar to version C except there were an additional two submenus in the menu "Report" at the end of exposure to version C. The social embeddedness features in version C were manipulated in two additional reports. Similar to the common steps between versions A and C, all steps in version B are the same as the initial steps in version D. At the end of exposure to version D, similar to version C, there were an additional two submenus in menu "Report".

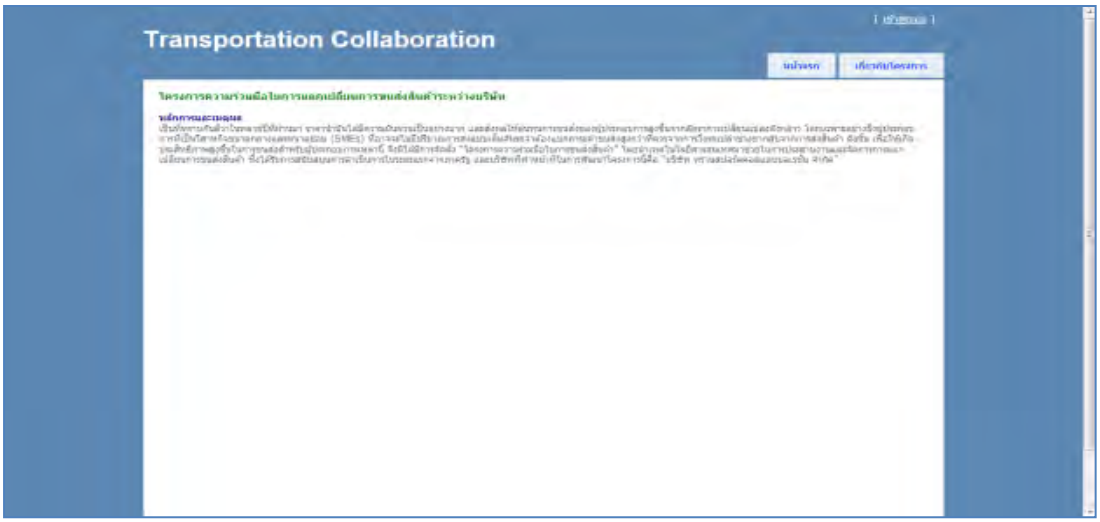
Thus, this section shows only the two paths from the four versions of the experimental system including path 1 and path 2. Path 1 was for versions A and C whereas path 2 was for versions B and D. Furthermore, path 1 and path 2 were shown side by side. Table 35 shows exposure steps according to two paths.

Table 35 Exposure Steps

Path For Version	Exposure Steps
1. Versions A and C	1. Home 2. About 3. Profile 4. Transportation Exchange 5. Report
2. Versions B and D	1. Home 2. About 3. FAQs 4. Contact Us 5. Profile 6. Transportation Exchange 7. Report

1. It begins with subjects opening the web browser and then typing in the URL according to the instructions. Next, subjects selected the version according to their assigned group. After typing the URL of the experimental system in the web browser, for versions A and C, the system showed the two menus “Home” and “About” while the system in versions B and D showed the extra two menus of “FAQs” and “Contact Us”. The subjects were asked to explore every available menu. The default first page of the experimental system was the web page from the menu “Home” (See Figure 13). This page showed only the rationale of the transportation collaboration in versions A and C while it also showed recent news and activities in version B and D.

Versions A and C



Versions B and D

Figure 13 Screenshots of Menu “Home”

2. The system showed the web page for the menu “About” after the subject clicked the menu “About” (See Figure 14). In versions A and C, this page showed the objectives and goals of the transportation collaboration. In versions B and D, it additionally showed the privacy policy and vision of the moderator of the transportation collaboration.

Versions A and C

Versions B and D

Figure 14 Screenshots of Menu “About”

3. In versions B and D, there were the extra two menus of “FAQs” and “Contact Us” (See Figure 15).

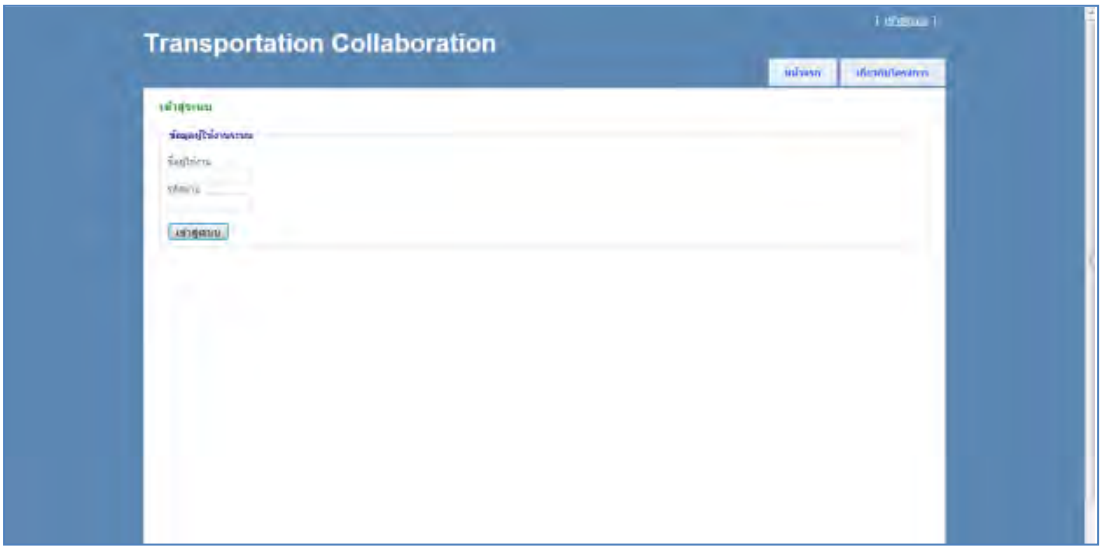
FAQs in Versions B and D

Contact Us in Versions B and D

Figure 15 Screenshots of Menu “FAQs” and “Contact Us”

4. Subjects were instructed to click “Login” and type the user name and password (See Figure 16).

Versions A and C



Versions B and D

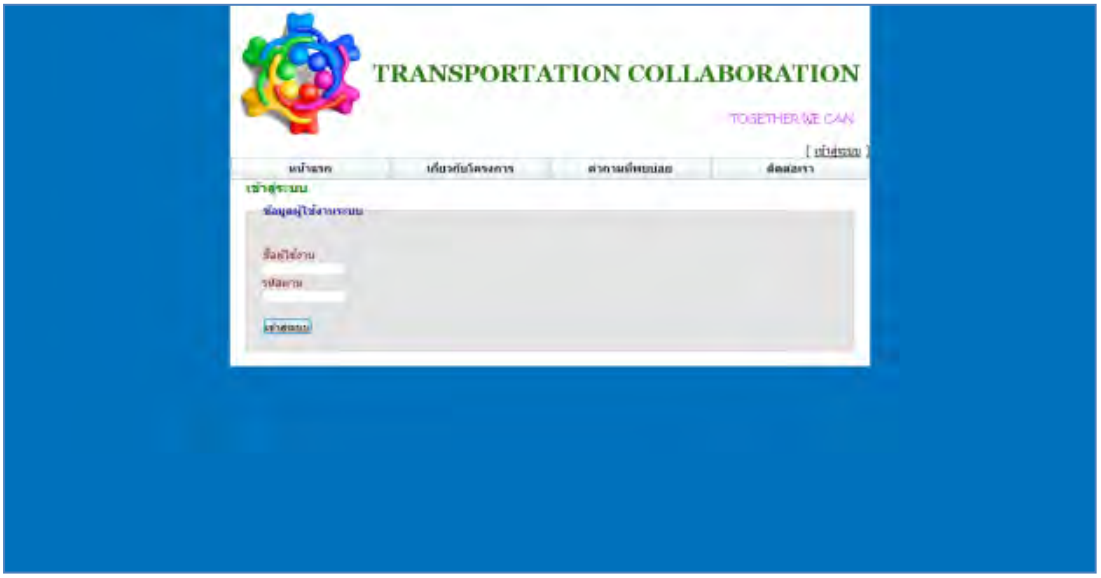
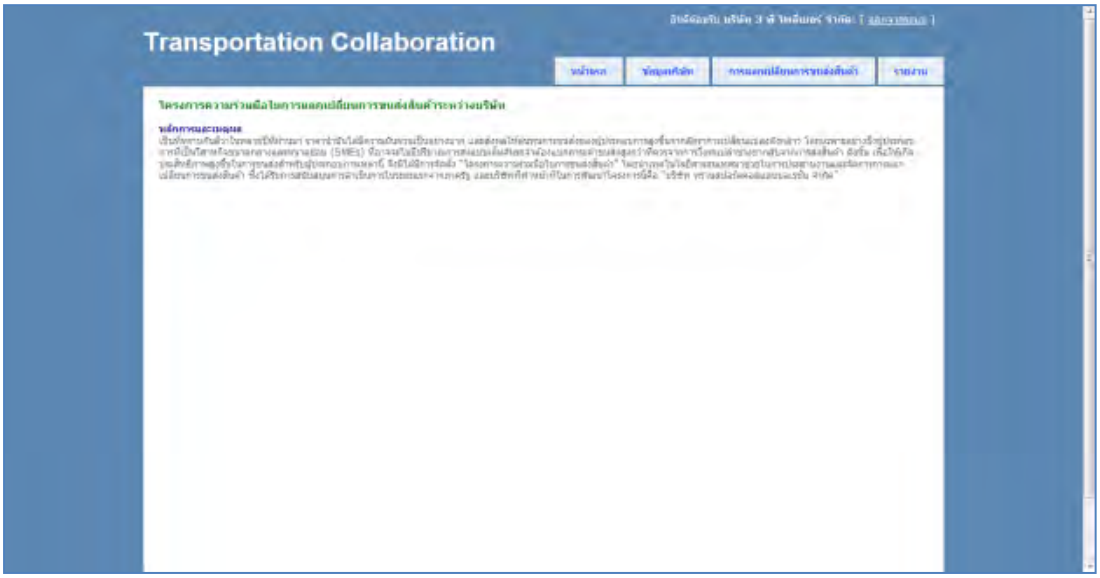


Figure 16 Screenshots of Webpage “Login”

5. After the subject entered the correct user name and password, the system showed the four menus “Home”, “Profile”, “Transportation Exchange”, and “Report”. The default web page is the web page in the menu “Home” (See Figure 17). Then, they were asked to explore all of available menus.

Versions A and C

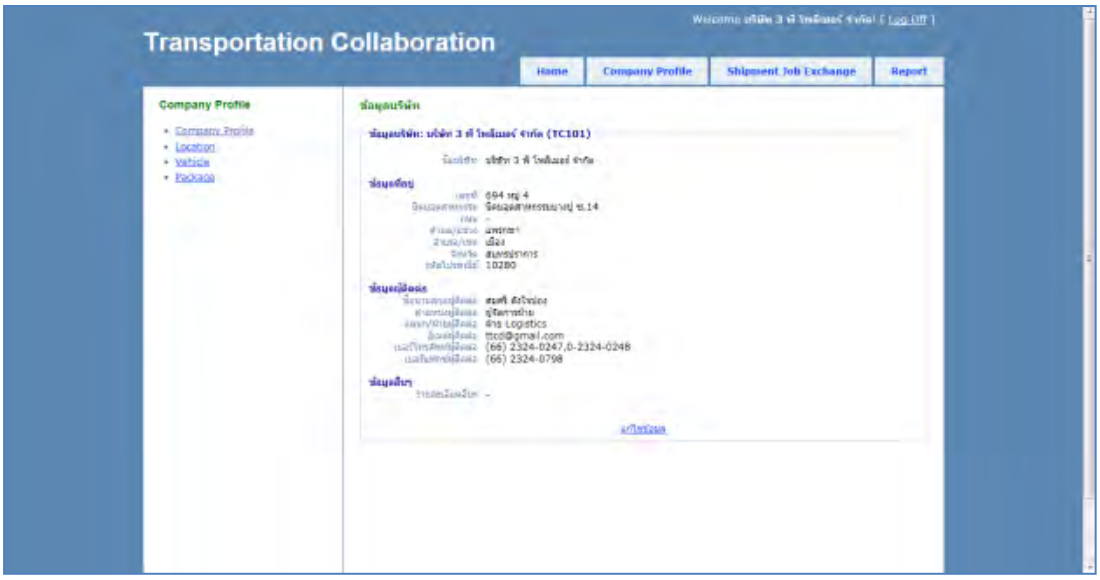


Versions B and D

Figure 17 Screenshots of Menu “Home” after Login

6. Then, subjects were then informed to click the menu “Profile”, the second menu from the left. The default web page was the web page in the submenu “Company Information” (See Figure 18).

Versions A and C

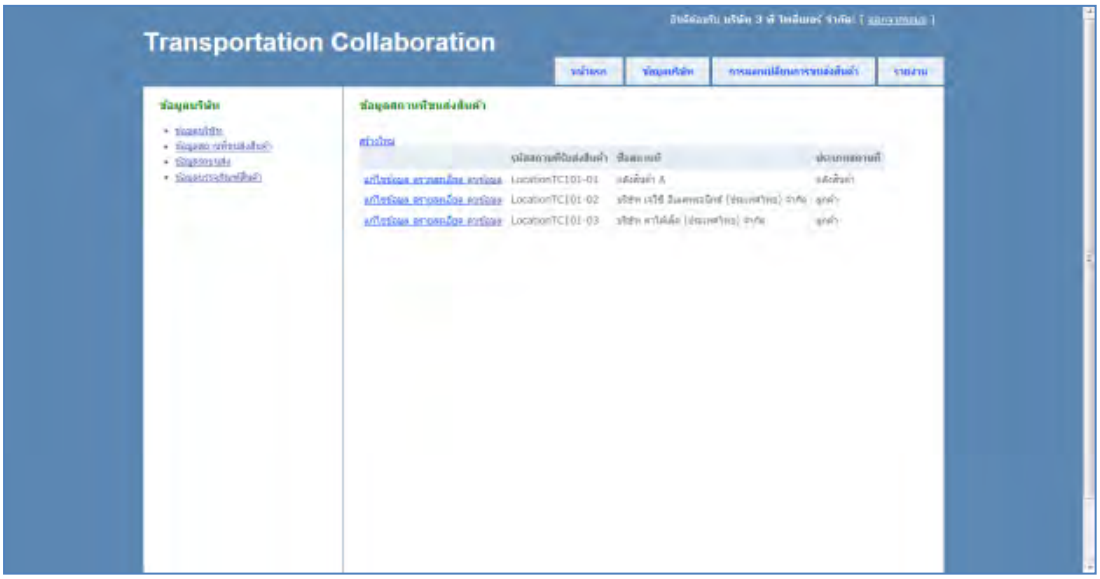


Versions B and D

Figure 18 Screenshots of Submenu “Company Information”

7. Subsequently, subjects were informed to click the submenu “Pickup and Delivery Location Information” in the menu “Profile” (See Figure 19).

Versions A and C



Versions B and D

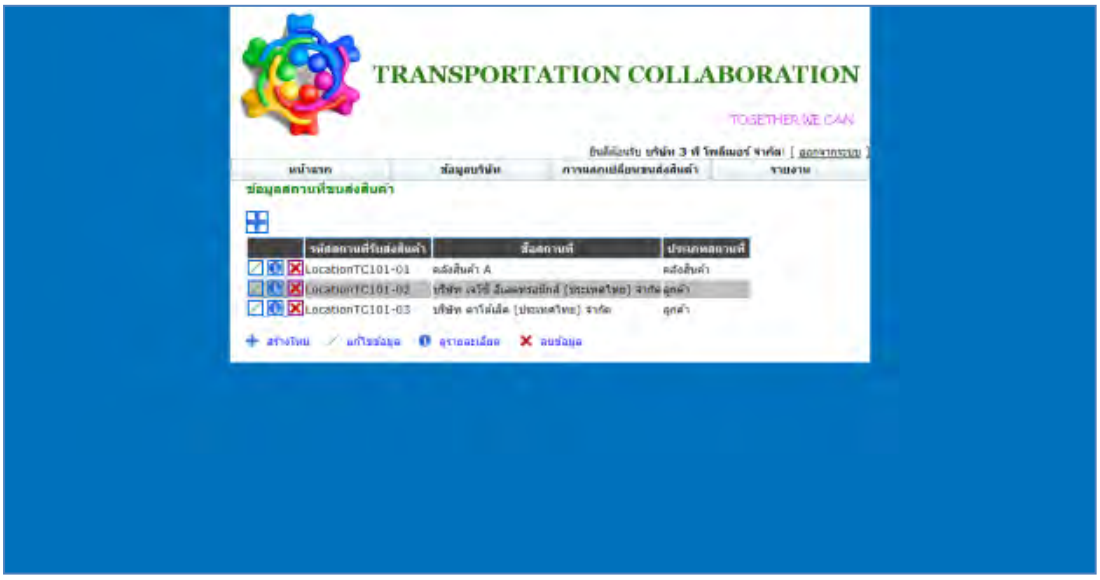
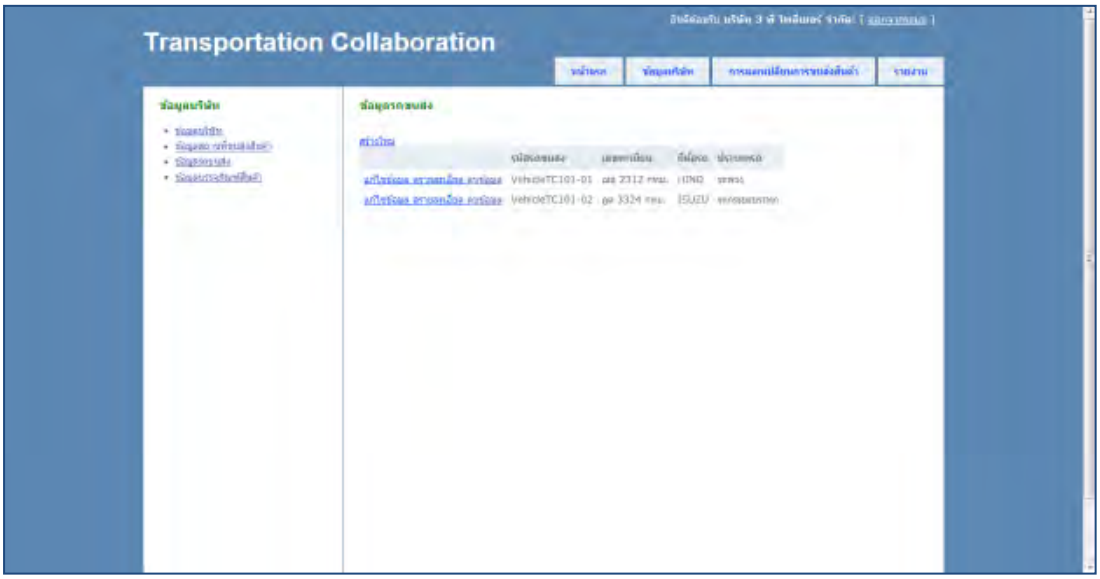


Figure 19 Screenshots of Submenu “Pickup and Delivery Location Information”

8. Subjects were then informed to click the submenu “Vehicle Information” in the menu “Profile” (See Figure 20).

Versions A and C



Versions B and D

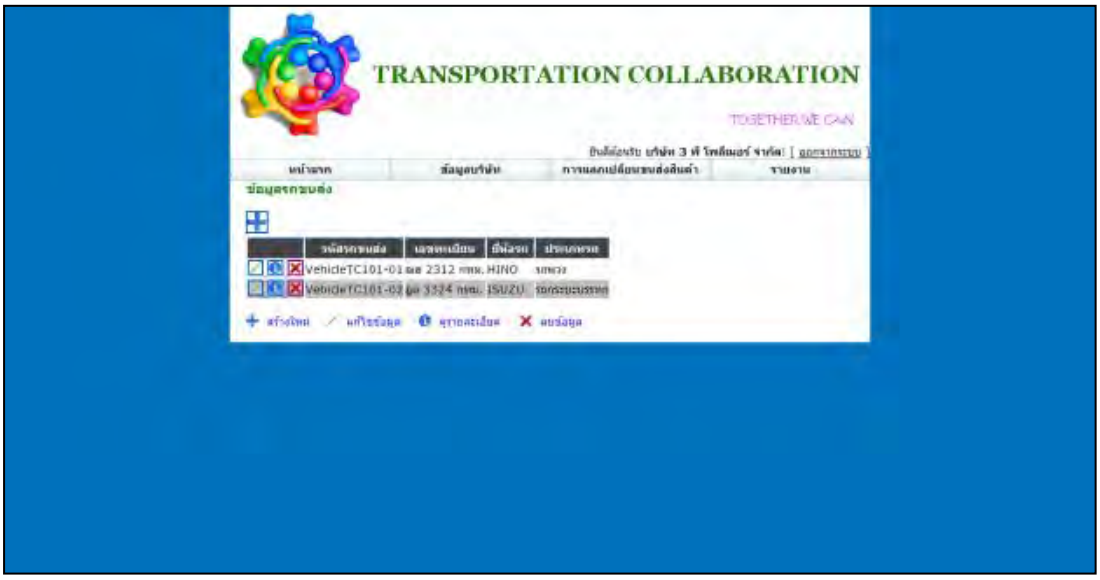
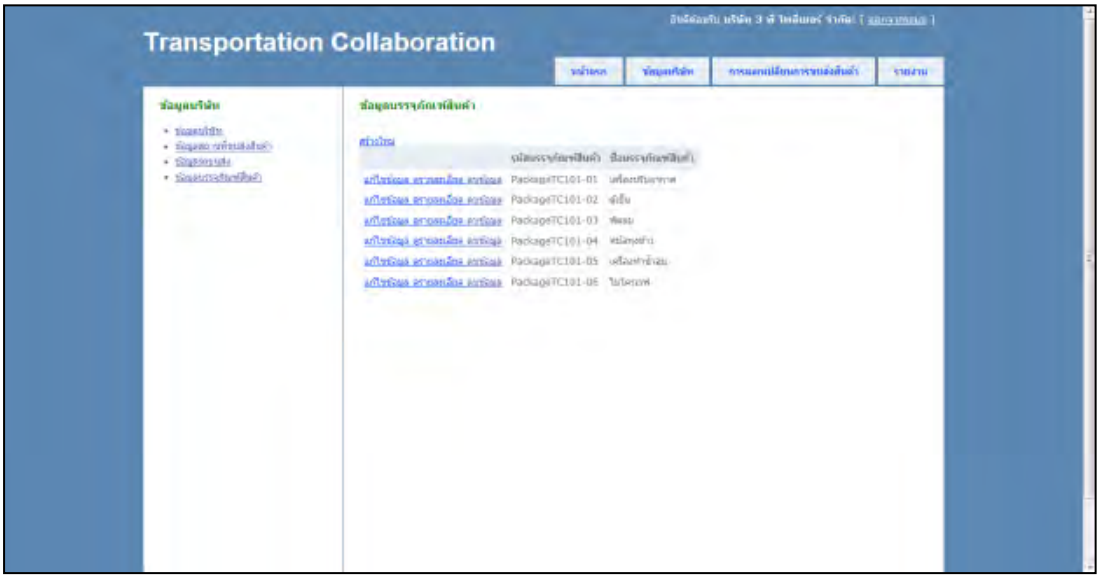


Figure 20 Screenshots of Submenu “Vehicle Information”

9. Subjects were informed to click the submenu “Package Information” in the menu “Profile” (See Figure 21). After they had finished exploring the menu “Profile”, the author informed them that there would be a workshop on transportation exchange in the menu “Shipment Job”. Then, the author explained daily transportation exchange to them.

Versions A and C

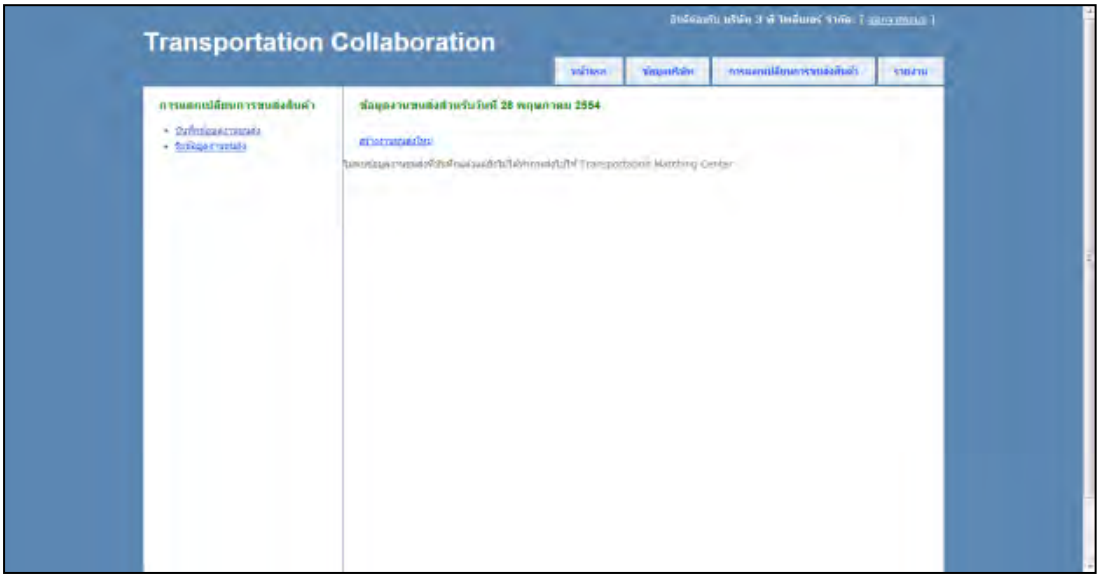


Versions B and D

Figure 21 Screenshots of Submenu “Package Information”

10. Then, the subjects were instructed to click the menu “Shipment Job”, the third menu from the left. The default web page was the web page in the submenu “Entering Transportation Jobs” (See Figure 22). In this menu, they sent transportation jobs according to the instructions.

Versions A and C

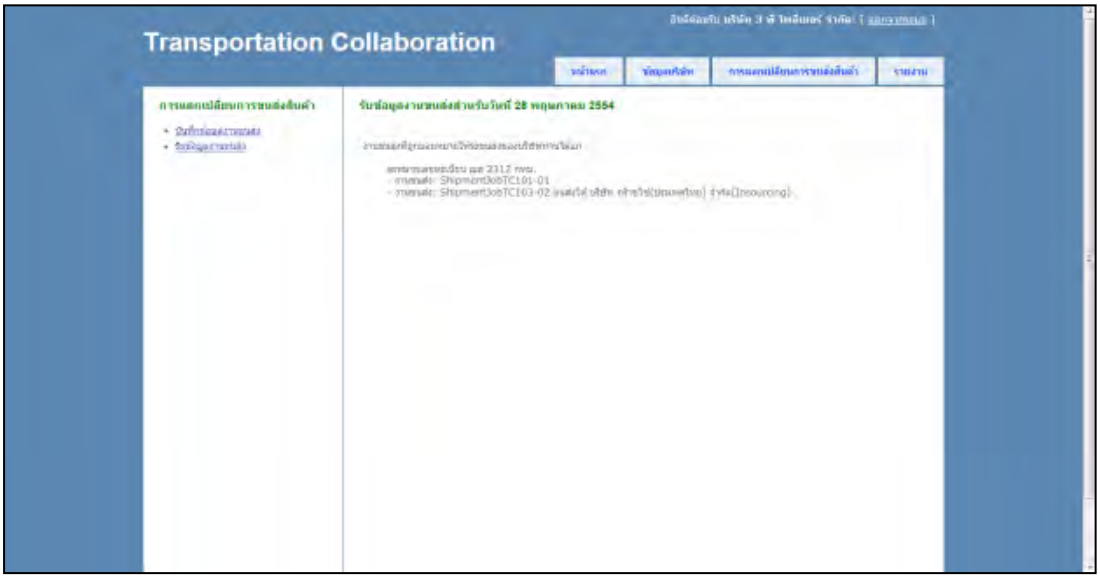


Versions B and D

Figure 22 Screenshots of Submenu “Entering Transportation Jobs”

11. After they had finished sending transport jobs, the subjects were then instructed to click the submenu “Receiving Transportation Job’s Exchange” in the menu “Shipment Job” (See Figure 23). They were told that the transportation matching center had finished its matching algorithm. Then, they were informed that the received transport jobs were available for them to look at.

Versions A and C

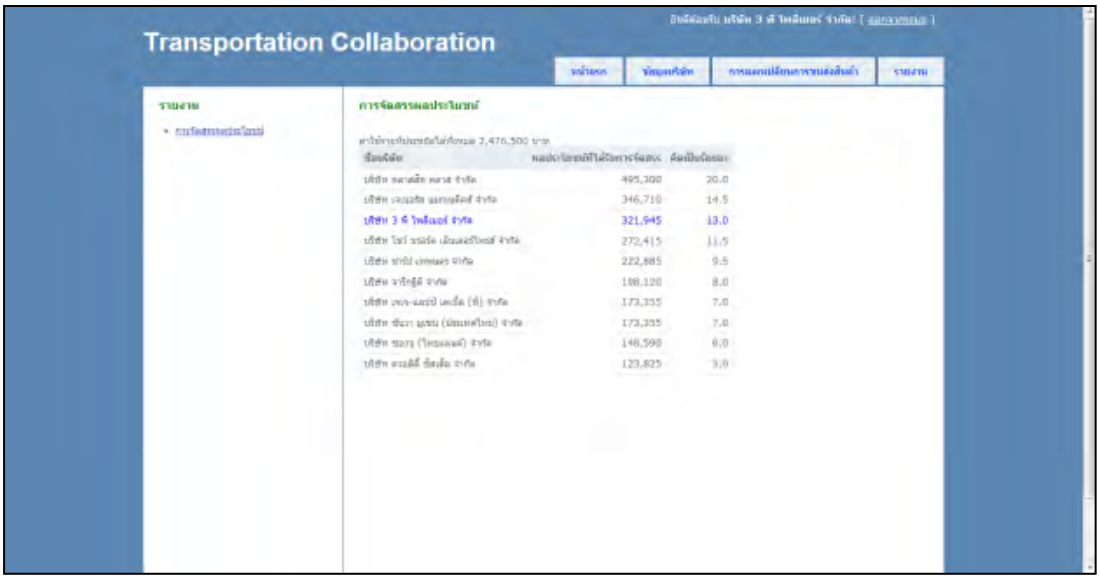


Versions B and D

Figure 23 Screenshots of Submenu “Receiving Transportation Job’s Exchange”

12. Then, the subjects were instructed to click the last menu “Report”. The default web page was the web page in the submenu “Profit Sharing” (see Figure 24).

Versions A and C

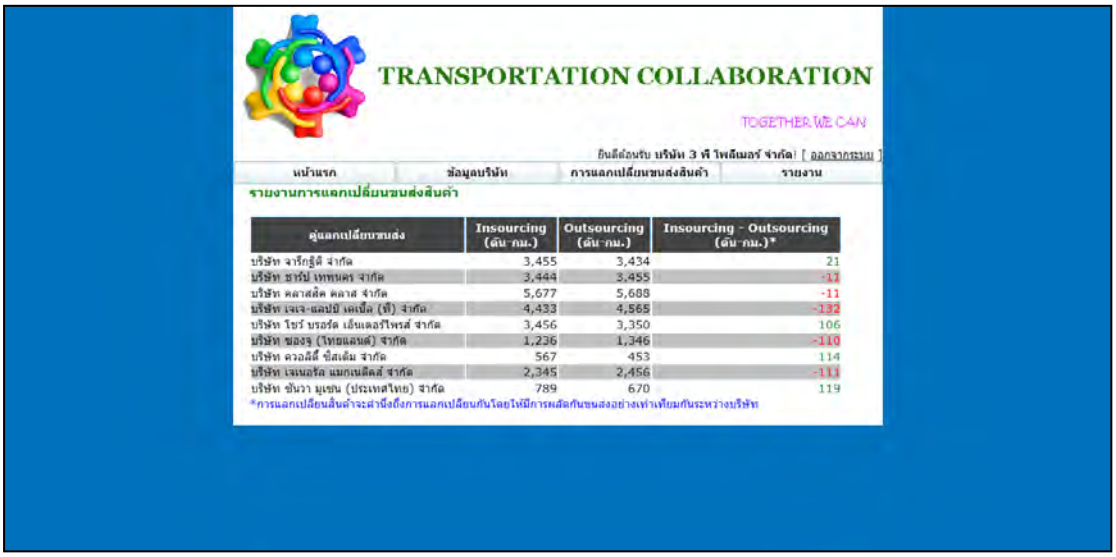


Versions B and D

Figure 24 Screenshots of Report “Profit Sharing”

13. In versions B and D, there were the extra two submenus of “Transportation Exchange Point” and “Feedback of Quality Score” (See Figure 25).

Submenu “Transportation Exchange Point” in Versions B and D



Submenu “Feedback of Quality Score” in Versions B and D

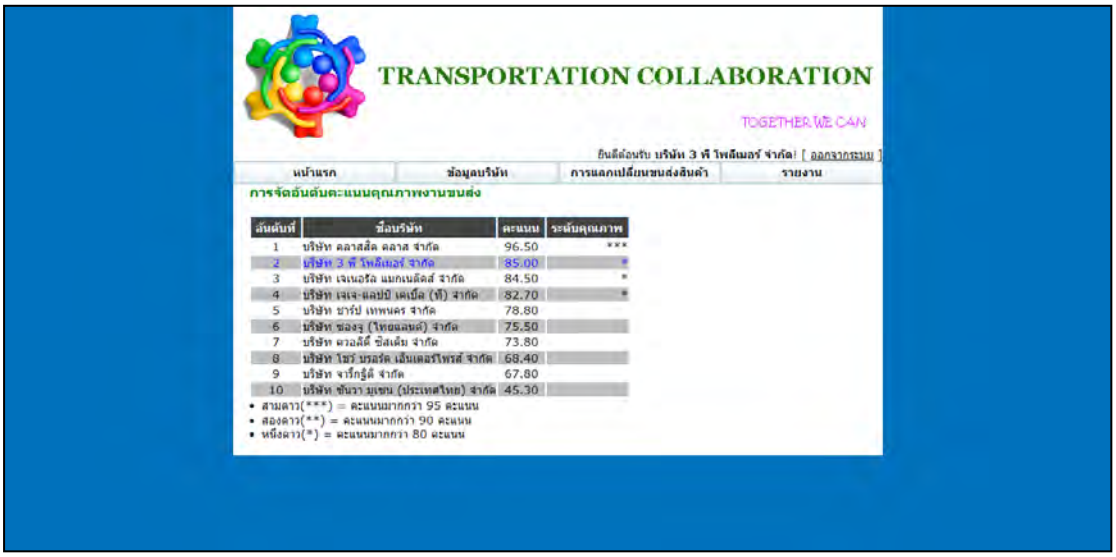


Figure 25 Screenshots of Report “Transportation Exchange Point” and “Feedback of Quality Score”.

After they had completed exploring every menu, the subjects were asked to complete the questionnaire and then they repeated all the steps above with the next version until all four versions were explored.

For the watching a demonstration through video clips setting, video clips were prepared to follow the same steps as above. Explanations were given through popup textboxes in the video clips.

Appendix C Definition of Trustworthiness Features

Table 36 shows definitions of trustworthiness features which were used in this study.

Table 36 Definition of Trustworthiness Features

Group	Feature	Definition	Author(s)
Content Quality	Accuracy of Content	The extent to which the data are correct, reliable, and certified free of error	(Wang and Strong, 1996)
Content Quality	Completeness of Content	The extent to which the data are of sufficient breadth, depth, and scope for the task at hand	(Wang and Strong, 1996)
Content Quality	Currency of Content	The extent to which the age of the data is appropriate for the task at hand	(Wang and Strong, 1996)
Content Quality	Usefulness of Content	The extent to which the data are beneficial and provide advantages from their use	(Wang and Strong, 1996)
Content Quality	Conciseness of Content	The extent to which the data are compactly represented without being overwhelming (i.e., brief in presentation, yet complete and to the point)	(Wang and Strong, 1996)
Navigation and Usability	Ease of Navigation	The extent to which the site is easy to navigate	(Barnes and Vidgen, 2002)
Security and Privacy Concerns	Security Mode of the Site	It feels safe to complete transactions My personal information feels secure	(Barnes and Vidgen, 2002)

Group	Feature	Definition	Author(s)
Transaction Concerns	Reversibility of Actions	The extent to which the site is easy to use with the existence of reversibility of actions	(Barnes and Vidgen, 2002)
Transaction Concerns	Informative Feedback	The extent to which interaction with the site is clear and understandable with the existence of information feedback	(Barnes and Vidgen, 2002)
Transaction Concerns	Shipment Tracking	The extent to which the system makes me feel confident that goods/services will be delivered as promised with the existence of shipment tracking	(Barnes and Vidgen, 2002)
Transaction Concerns	Transaction Acknowledgement	The extent to which interaction with the site is clear and understandable with the existence of transaction acknowledgement	(Barnes and Vidgen, 2002)
Transaction Concerns	Preciseness of Calculation	The extent to which the site conveys a sense of competency with preciseness of calculation	(Barnes and Vidgen, 2002)
Existence of Moderator	Provision of Moderator's Information	The extent to which the site provides information of the moderator	

Appendix D Manipulation Check

A manipulation check was carried out during the second pilot study. The objective of the manipulation check was to check whether the manipulation had its intended effect. In this study, IOS features to support initial trust were checked as to whether the subjects perceived the features. In the line with the within-subjects design, each subject was exposed to two versions of experimental system comprising the version with all IOS features to support initial trust and the version without the features. After the subjects were exposed to the two versions, they were asked whether IOS features to support initial trust in the version with the features were notably perceived compared with the version without the features. Each feature was rated either 1 (yes) or 0 (no). The subject was grouped into the "1 (yes)" group if he/she rated more than, or equal to, 50% of the trustworthiness features. Otherwise, he/she was grouped into the "0 (no)" group. According to the three-fourths majority rule (Nitzan and Paroush, 1984), it was hypothesized that more than 75% of subjects should be in the "1 (yes)" group. Table 37 shows that both trustworthiness features and social embeddedness features were statistically significant at the 0.05 level, t = 1.72 (p = 0.049) and t = 2.54 (p=0.009) respectively. Thus, the manipulation check was satisfied by the result.

Table 37 T-test for Manipulation Check

	t	df	Sig. (1-tailed)	Mean Difference
Social Embeddedness Features	1.72	28	.049*	0.11
Trustworthiness Features	2.54	28	.009**	0.14

* p<.05, ** p<.01

Table 38 shows the details of the ratio of each feature that subjects rated as 1(yes).

Table 38 Descriptive Statistics of Manipulation Check

	N	Ratio
Trustworthiness Feature		
Accuracy of Content	60	0.606
Completeness of Content	60	0.885
Currency of Content	60	0.655
Clarity of Content	60	0.819
Usefulness of Content	60	0.803
Conciseness of Content	60	0.524
Ease of Navigation	60	0.557
Security Mode of the Site	60	0.442
Reversibility of Actions	60	0.606
Informative Feedback	60	0.704
Shipment Tracking	60	0.786
Transaction Acknowledgement	60	0.737
Preciseness of Calculation	60	0.491
Provision of Moderator Information	60	0.655
Social Embeddedness Features		
Equality Transportation Exchange Algorithm	60	0.639
Reputation Mechanism	60	0.754

Appendix E Questionnaire

ส่วนที่ 1: ความคิดเห็นของท่านต่อบุคคลโดยทั่วไป

โปรดทำเครื่องหมาย ◯ ล้อมรอบตัวเลขตามระดับความคิดเห็นของท่าน	ไม่เห็นด้วยเลย							เห็นด้วยที่สุด
1) โดยทั่วไปคนเรามักจะให้ความห่วงใยในความอยู่ดีกินดีของผู้อื่น		1	2	3	4	5	6	7	
2) คนส่วนใหญ่มักจะเป็นกังวลต่อปัญหาต่างๆของผู้อื่น		1	2	3	4	5	6	7	
3) ปกติคนเราจะให้ความเป็นห่วงและพยายามให้ความช่วยเหลือผู้อื่นอื่นโดยไม่ได้คิดถึงแต่ตนเองเท่านั้น		1	2	3	4	5	6	7	
4) คนส่วนใหญ่รักษาสัญญา		1	2	3	4	5	6	7	
5) ท่านคิดว่าคนส่วนใหญ่พยายามจะรักษาคำพูดด้วยการกระทำ		1	2	3	4	5	6	7	
6) คนส่วนใหญ่จริงใจกับคนอื่น		1	2	3	4	5	6	7	
7) ท่านเชื่อว่าคนส่วนใหญ่ทำงานได้ดีในสาขาอาชีพของเขา		1	2	3	4	5	6	7	
8) คนส่วนใหญ่มีความรู้มากในสาขาอาชีพของเขา		1	2	3	4	5	6	7	
9) คนส่วนใหญ่มีสามารถในสิ่งที่เป็นความเชี่ยวชาญของเขา		1	2	3	4	5	6	7	
10) ท่านมักจะไว้วางใจผู้อื่นจนกว่าผู้อื่นจะแสดงให้ว่าเขาไม่น่าไว้วางใจ		1	2	3	4	5	6	7	
11) เมื่อท่านได้รู้จักใครก็ตามเป็นครั้งแรก ท่านจะคิดว่าเขาเป็นคนน่าไว้วางใจก่อนเสมอ		1	2	3	4	5	6	7	
12) ท่านมักจะไว้วางใจเพื่อนใหม่จนกระทั่งเขาแสดงให้เห็นว่าเขาไม่น่าไว้วางใจ		1	2	3	4	5	6	7	

สมมติว่าบริษัทของท่านมีร้อยละการวิ่งรถเปล่า 20/50/80 ของปริมาณการขนส่งทั้งหมด

ส่วนที่ 2: ความคิดเห็นต่อการเข้าร่วมโครงการฯ

ระบบแบบที่ 1

ขอให้ท่านทำเครื่องหมาย **X** ลงบนเส้นที่จุดใดก็ได้ให้ใกล้เคียงที่สุดกับความคิดเห็นของท่าน

หากบริษัทท่านมีร้อยละการวิ่งรถเปล่าตามที่สมมติ และมีการใช้ระบบแบบที่ 1 ในโครงการฯ	
ท่านตั้งใจที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านคาดว่าจะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านวางแผนที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก

ระบบแบบที่ 2

ขอให้ท่านทำเครื่องหมาย **X** ลงบนเส้นที่จุดใดก็ได้ให้ใกล้เคียงที่สุดกับความคิดเห็นของท่าน

หากบริษัทท่านมีร้อยละการวิ่งรถเปล่าตามที่สมมติ และมีการใช้ระบบแบบที่ 2 ในโครงการฯ	
ท่านตั้งใจที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านคาดว่าจะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านวางแผนที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก

ระบบแบบที่ 3

ขอให้ท่านทำเครื่องหมาย **X** ลงบนเส้นที่จุดใดก็ได้ให้ใกล้เคียงที่สุดกับความคิดเห็นของท่าน

หากบริษัทท่านมีร้อยละการวิ่งรถเปล่าตามที่สมมติ และมีการใช้ระบบแบบที่ 3 ในโครงการฯ	
ท่านตั้งใจที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านคาดว่าจะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านวางแผนที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก

ระบบแบบที่ 4

ขอให้ท่านทำเครื่องหมาย **X** ลงบนเส้นที่จุดใดก็ได้ให้ใกล้เคียงที่สุดกับความคิดเห็นของท่าน

หากบริษัทท่านมีร้อยละการวิ่งรถเปล่าตามที่สมมติ และมีการใช้ระบบแบบที่ 4 ในโครงการฯ	
ท่านตั้งใจที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านคาดว่าจะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก
ท่านวางแผนที่จะเข้าร่วมโครงการฯ	ไม่เห็นด้วยเลยที่สุด 0 20 40 60 80 100 เห็นด้วยมาก

ผู้ร่วมทำการทดลอง

ชื่อ _____ นามสกุล _____

ข้อเสนอแนะเพิ่มเติม

_____

_____

Appendix F Testing Assumptions for Repeated Measures Analysis

There are three assumptions for repeated measures analysis: (1) independence of the observations, (2) multivariate normality, and (3) sphericity (Stevens, 2002). This section discusses the method of assumption testing and provides the results of the test.

The independence of the observations requires that each of the observation is not correlated with the other. The lack of independence may come from various confounding factors, e.g., interactions among subjects, extraneous and unmeasured effects, noisy room, confusing set of instructions, etc (Hair et al., 1998). While there is no test with an absolute certainty of detecting all forms of dependence, the researcher should explore all possible effects and correct for them if found (Hair et al., 1998). Although in this study's experiment, there were a number of subjects in each session, their intentions to join the transportation collaboration were not supposed to be affected by other subjects in the session.

The multivariate normality assumption requires the dependent variables are multivariately normally distributed (Henson, 1999). There is no direct test for multivariate normality but most analysts test for univariate normality (Hair et al., 1998). While univariate normality is a necessary, but not sufficient, condition for multivariate normality to hold (Stevens, 2002), any departures from multivariate normality are usually inconsequential (Hair et al., 1998). The test for univariate normality can be performed statically and graphically.

Table 39 and Table 40 shows descriptive statistics used generally for assessing normal distribution including mean, median, standard deviation, skewness and kurtosis for setting 1 (hands-on workshop setting of logistics students) and setting 2 (watching a demonstration through video clips setting of MBA students), consequently. Skewness is a degree of the asymmetry of a probability distribution (Pearson, 1895), while kurtosis is a measure of peakedness of the distribution (Pearson, 1905). For a

normal distribution, both skewness and kurtosis statistics are zero. Absolute values of skewness above 0.2 implied skewed distribution (Hildebrand, 1986).

Not all of absolute values of skewness of composite score of intention to join the transportation collaboration is less than 0.2. In Setting 1, only absolute values of skewness of versions A (IJ-A) and B (IJ-B) are less than 0.2 (-0.001 and -0.058, respectively; skewness of C (IJ-C) is -0.572 and skewness of D (IJ-D) is -1.282). In Setting 2, the absolute values of skewness of version A (IJ-A), B (IJ-B), and D (IJ-D) are greater than 0.2 (-0.238, -0.381, and -0.980, respectively), while the absolute values of skewness of version C (IJ-C) is -0.058, less than 0.2.

The values of kurtosis of composite score of intention to join the transportation collaboration after subjects were exposed to versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in setting 1 (hands-on workshop setting of logistics students) are -0.957, -0.031, -0.568, and 2.328. The values of kurtosis of IJ-A, IJ-B, IJ-C, and IJ-D in setting 2 (watching a demonstration through video clips setting of MBA students) are -0.758, -0.328, -0.011, and -0.626.

Table 39 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in Setting 1 (Hands-on Workshop Setting of Logistics Students)

	Mean	Median	Std. Deviation	Skewness	Kurtosis
IJ-A	47.86	45.83	27.25	-0.001	-0.957
IJ-B	65.21	70.83	19.84	-0.058	-0.031
IJ-C	63.13	69.16	24.89	-0.572	-0.568
IJ-D	77.20	80.00	16.08	-1.282	2.328

Table 40 Descriptive Statistics of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in Setting 2 (Watching a Demonstration through Video Clips Setting of MBA Students)

	Mean	Median	Std. Deviation	Skewness	Kurtosis
IJ-A	50.39	53.33	25.30	-0.238	-0.758
IJ-B	54.78	60.00	23.34	-0.381	-0.382
IJ-C	61.06	66.66	21.92	-0.058	-0.011
IJ-D	70.34	74.66	20.60	-0.980	-0.626

Furthermore, the skewness and kurtosis values can be used to assess normality of data (See Table 39 and Table 40). For a normal distribution, both skewness and kurtosis statistics are zero. The values of skewness of composite score of intention to join the transportation collaboration after subjects were exposed to versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in setting 1 (hands-on workshop setting of logistics students) are -0.001, -0.058, -0.572, and -1.282. The values of skewness of IJ-A, IJ-B, IJ-C, and IJ-D in setting 2 (watching a demonstration through video clips setting of MBA students) are -0.238, -0.381, -0.058, and -0.980.The values of kurtosis of composite score of intention to join the transportation collaboration after subjects were exposed to

versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in setting 1 (hands-on workshop setting of logistics students) are -0.957, -0.031, -0.568, and 2.328. The values of kurtosis of IJ-A, IJ-B, IJ-C, and IJ-D in setting 2 (watching a demonstration through video clips setting of MBA students) are -0.758, -0.328, -0.011, and -0.626.

Kolmogorov-Smirnov test can also be used to test for normality (Hair et al., 1998). The variables which were not normally distributed will have p value lower than 0.05. In setting 1, IJ-B and IJ-C are lower than 0.05 (see Table 41). In setting 2, IJ-C and IJ-D are lower than 0.05 (see Table 42).

Table 41 Kolmogorov-Smirnov of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in Setting 1 (Hands-on Workshop Setting of Logistics Students)

	Statistic	df	p value
IJ-A	.094	58	.200
IJ-B	.149	58	.003**
IJ-C	.124	58	.026*
IJ-D	.135	58	.010*

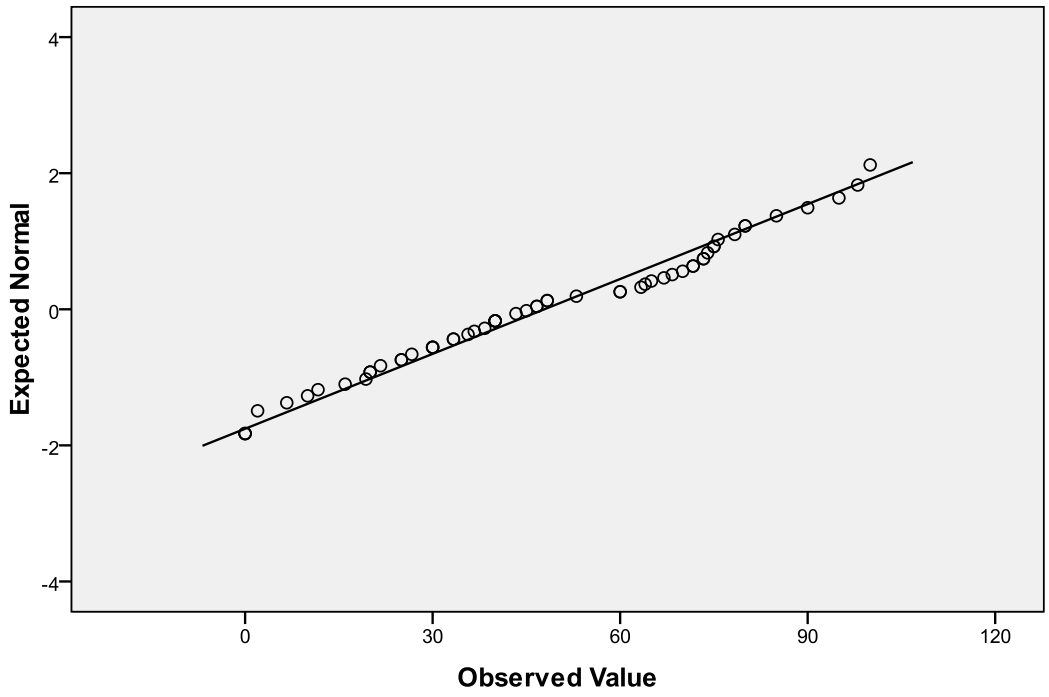
* $p < 0.05$, ** $p < 0.01$

Table 42 Kolmogorov-Smirnov of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D) in Setting 2 (Watching a Demonstration through Video Clips Setting of MBA Students)

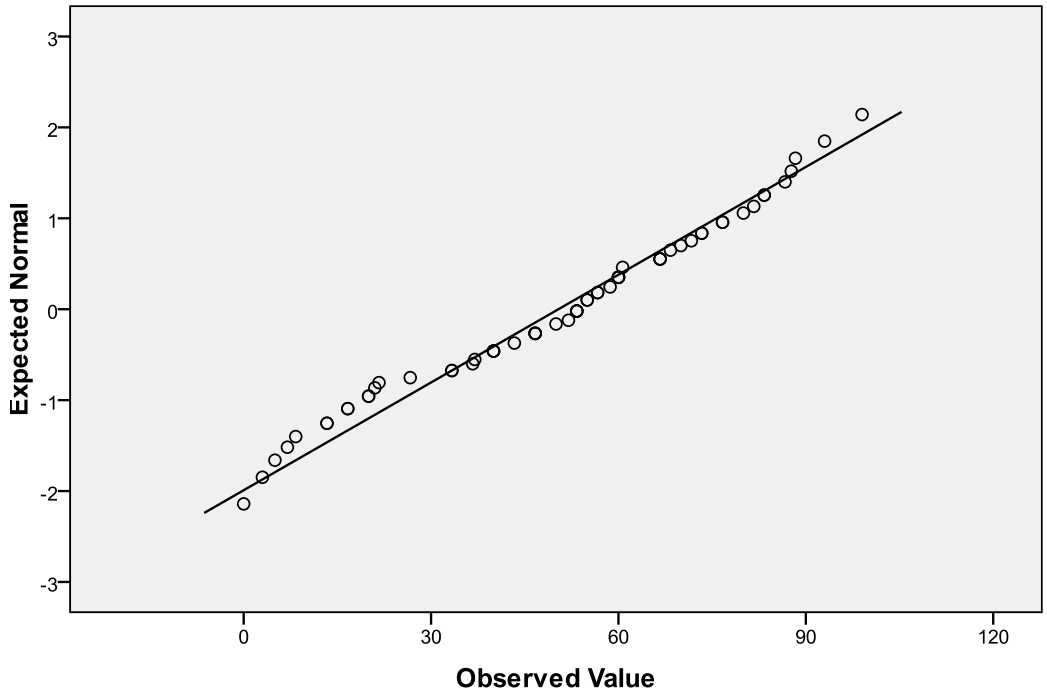
	Statistic	df	p value
IJ-A	.087	61	.200
IJ-B	.097	61	.200
IJ-C	.125	61	.018*
IJ-D	.149	61	.002*

* $p < 0.05$

In addition, Normal QQ plot and Box Plot can be used to visually check the normal distribution assumption as a graphical test. For the normality plots (see Figure 26, Figure 27, Figure 28, and Figure 29), the points on the graph should fall on the straight line. The box is determined by the median (the black line through the middle), the 25th percentile (lower boundary line) and the 75th percentile (upper boundary line). This means that 50% of cases will fall inside the box with the length of the box telling you about the spread of the data. If the median is not at the center, it means that the data is skewed (see Figure 30).

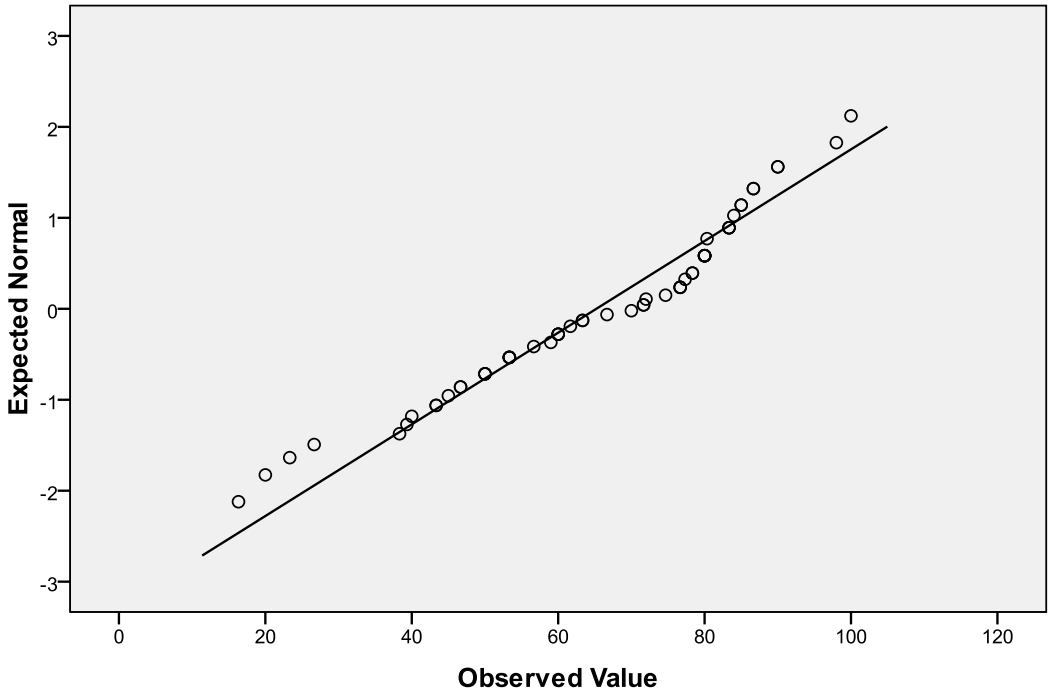


Setting 1 (Hands-on workshop setting of logistics students)

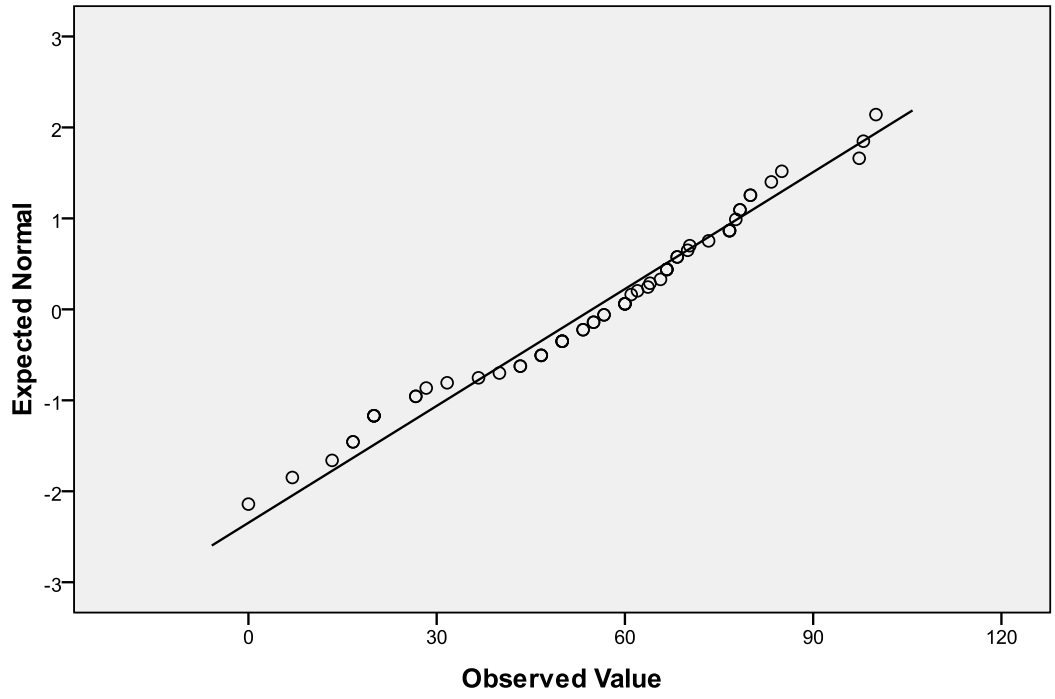


Setting 2 (Watching a demonstration through video clips setting of MBA students)

Figure 26 Normal QQ plot of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Version A (IJ-A)

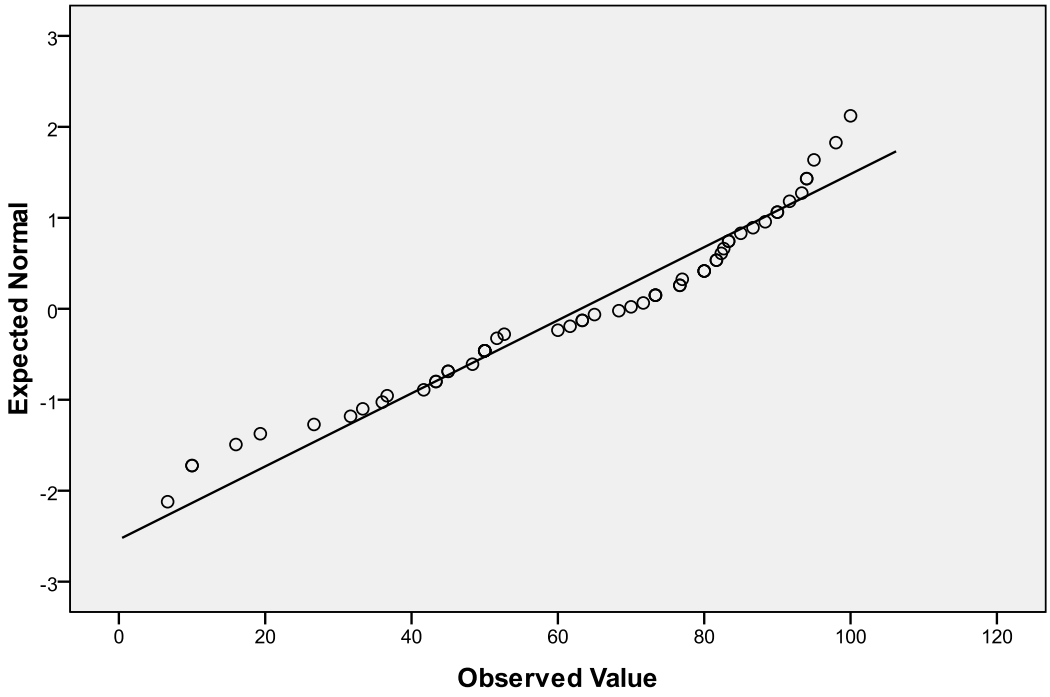


Setting 1 (Hands-on workshop setting of logistics students)

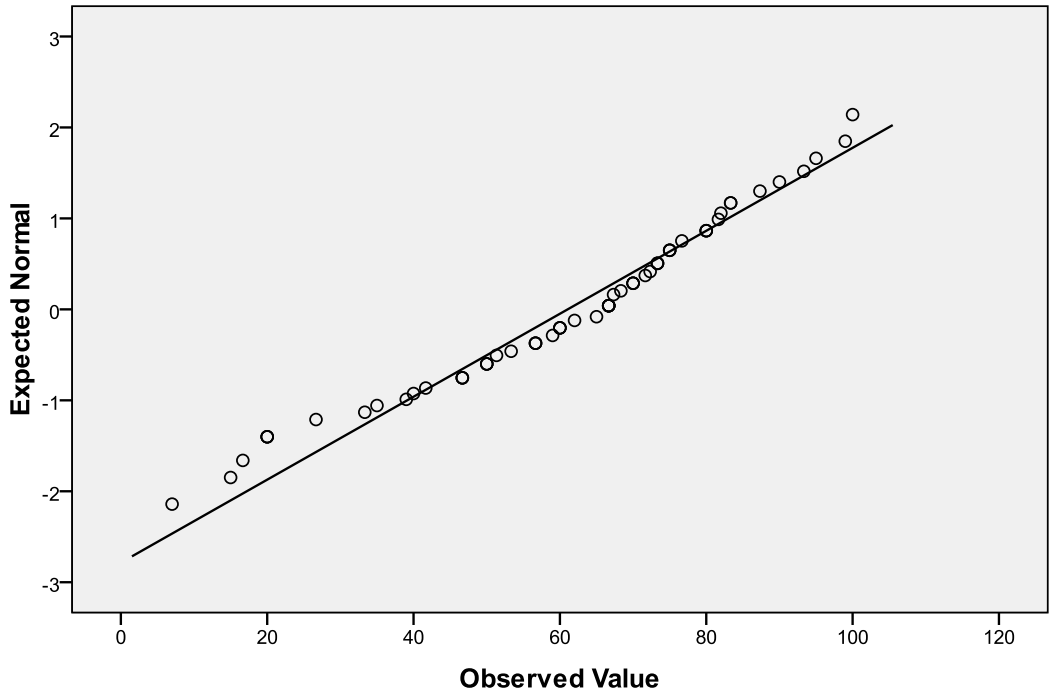


Setting 2 (Watching a demonstration through video clips setting of MBA students)

Figure 27 Normal QQ plot of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Version B (IJ-B)

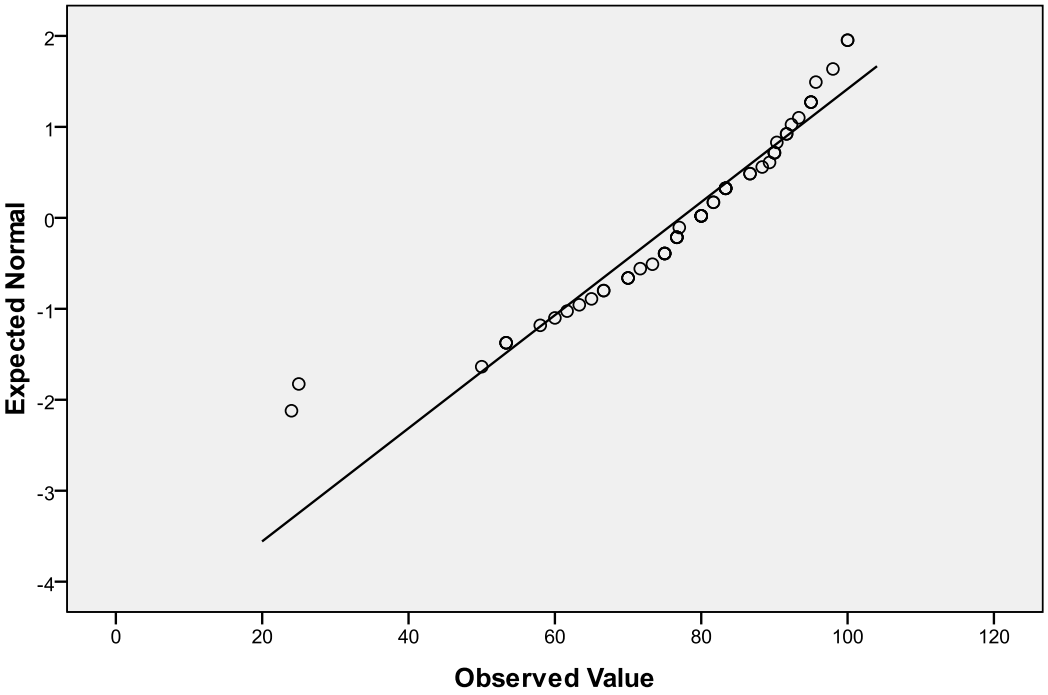


Setting 1 (Hands-on workshop setting of logistics students)

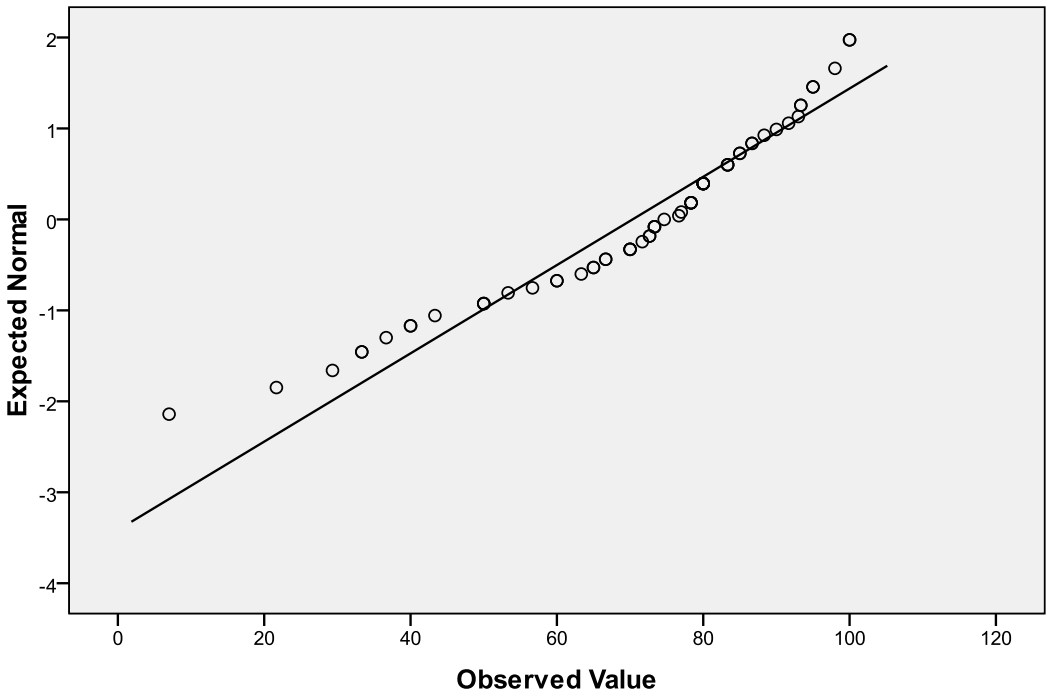


Setting 2 (Watching a demonstration through video clips setting of MBA students)

Figure 28 Normal QQ plot of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Version C (IJ-C)

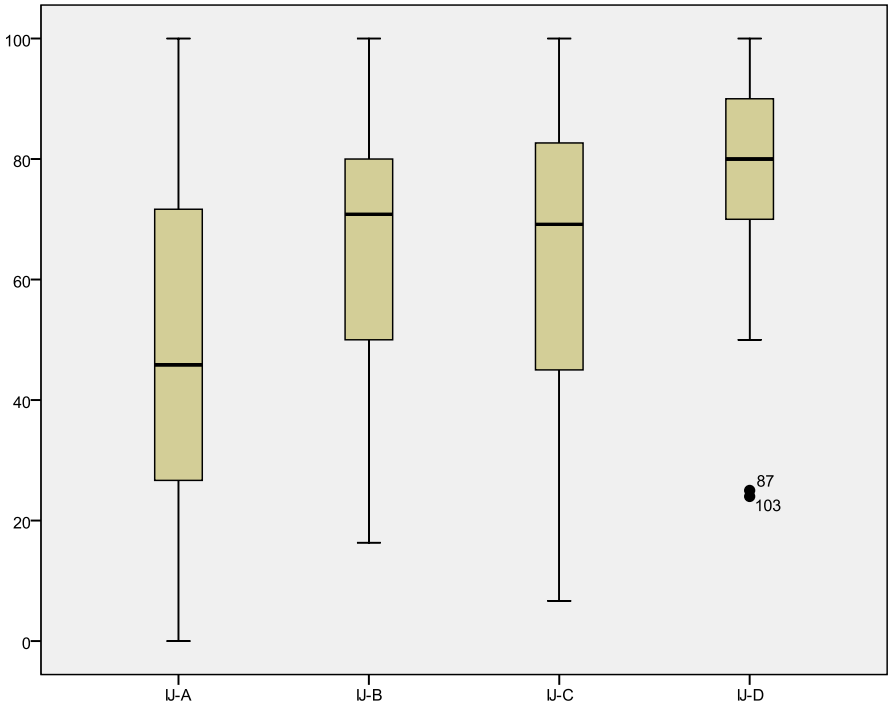


Setting 1 (Hands-on workshop setting of logistics students)

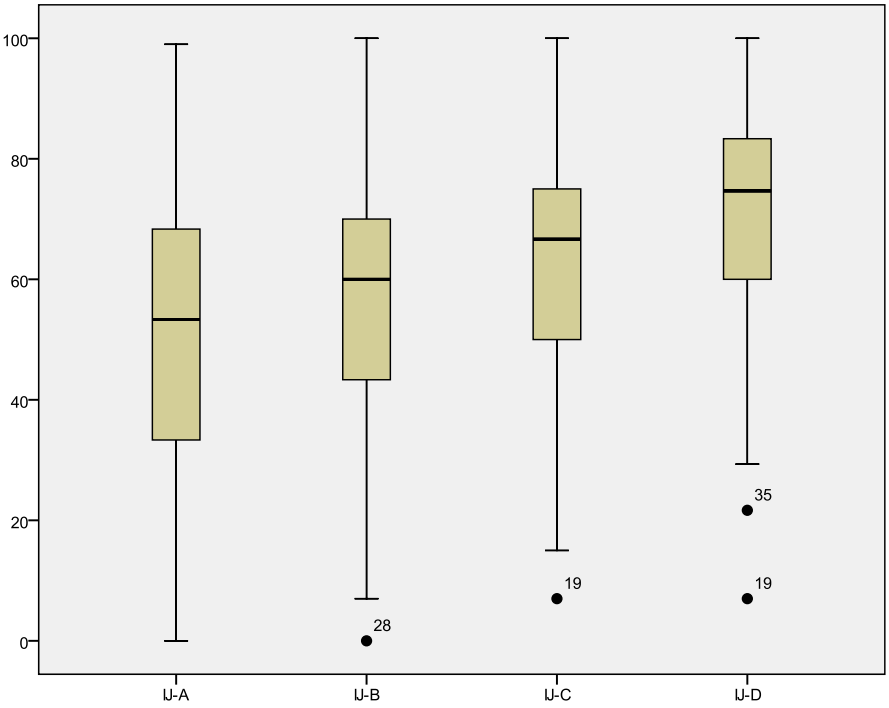


Setting 2 (Watching a demonstration through video clips setting of MBA students)

Figure 29 Normal QQ plot of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Version D (IJ-D)



Setting 1 (Hands-on workshop setting of logistics students)



Setting 2 (Watching a demonstration through video clips setting of MBA students)

Figure 30 Box Plot of Composite Score of Intention to Join the Transportation Collaboration after Subjects were Exposed to Versions A (IJ-A), B (IJ-B), C (IJ-C), and D (IJ-D)

To conclude the test of multivariate normal assumption, the results of test show that this assumption cannot be assumed. However, the repeated analysis is still fairly robust against violation of multivariate normality (Stevens, 2002)

To test the sphericity assumption, if there are k repeated measures, (k-1) new variables will necessarily be created. The sphericity assumption will be held if the new variables meet these two conditions: (a) their variances are equal, and (b) they are uncorrelated with each other. In this study, there are only 2 (k=2) levels for each repeated measures (within-subjects) factor, so only one (k-1) new variable is supposed not to violate the assumption.

Appendix G Additional Data Analysis

This study also analyzed data as in between-subjects designs. With this approach, only the intention to join the transportation collaboration after subjects were exposed to their first version was included in the analysis rather than the data from four versions. Analysis of covariance (ANCOVA) was used to analyze. Dependent variable is the intention to join the transportation collaboration and covariates are disposition to trust and transaction characteristics in transportation collaboration. The results of analyzing the data in setting 1 are shown in Table 43

Table 43 Test of Between-subjects Effects in Setting 1 (Hands-on Workshop Setting of Logistics Students

Source	Type III Sum of Squares	df	Mean Square	F	p Value
TW	765.96	1	765.96	2.73	.104
SE	169.81	1	169.81	0.60	.439
Disposition	467.40	1	467.40	1.67	.202
TC	1734.08	1	1734.08	6.20	.016*
TW * SE	1346.76	1	1346.76	4.81	.033*
Error	14264.85	51	279.70		

* p<.05

According to the results, the effect of transaction characteristics in the transportation collaboration on intention to join the transportation collaboration was statistically significant at the 0.05 level. Moreover, the interaction effect between trustworthiness features and social embeddedness features was statistically significant at the 0.05 level.

Next, the results of analyzing the data in setting 2 are shown in Table 44.

Table 44 Test of Between-subjects Effects in Setting 2 (Watching a Demonstration through Video Clips Setting of MBA Students)

Source	Type III Sum of Squares	df	Mean Square	F	p Value
TW	1131.30	1	1131.30	3.46	.068
SE	357.88	1	357.88	1.09	.300
Disposition	2788.77	1	2788.77	8.54	.005*
TC	4521.52	1	4521.52	13.84	.000*
TW * SE	193.66	1	193.66	0.59	.445
Error	17634.42	54	326.56		

* p<.05

According to the results, the effect of transaction characteristics in the transportation collaboration in the intention to join the transportation collaboration was statistically significant at the 0.05 level. Moreover, the effect of disposition to trust was statistically significant at the 0.05 level

Biography

Anirut Asawasakulsorn earned his Bachelor of Engineering, majoring in Computer Engineering, from Chulalongkorn University. Later, he received his Master of Science, majoring in Information Technology in Business. He worked as a staff member at the Chulalongkorn University Business Intelligence Center at the Office of Information Technology, Chulalongkorn University.