CONTENTS

A FRAMEWORK FOR ANALYSIS THE IMPACTS OF RFID ON REVERSE SUPPLY CHAIN PERFORMANCE MEASURED BY HIERARCHICAL REGRESSION ANALYSIS

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Introduction

The success of supply chain depends on good management and good communication, as well as reverse supply chain. Reverse supply chain is the returning flow of goods and information from consumers back to manufacturers for the purpose of recapture, recreate value or disposal. In recent years, many industries have been increasing attention in reverse supply chain because they concern about the effects of environments, socials and economics (Sustainable Development). This concerned has influenced around the globe. For example, Switzerland have legislation for used products called Advance Recycle fee, Thailand established the Ministry of Natural Resources and Environment (MNRE) to support organizations and industries to effectively use energy and preserve the environment. Some industries such as computers and battery industries have reused obsolete products from consumers to reduce production cost. The main activities of reverse supply chain are getting products back from consumers and including support activities such as managing, inspecting, monitoring information and communication. Therefore, application of information technologies, such as RFID, the technology which used to identify the information of products and tracking location of the products. It will provide convenience for any related tasks, process improvement and inventory control. However, due to the cost in investment, alternatives technology such as barcode, which are arguably less powerful than RFID in manufacturing durability, usability and field application. This paper presents the framework for analysis the impact of RFID practices on reverse supply chain performance measured by Hierarchical Regression Analysis. We focused on three major industries in Thailand; automobiles, electrics and electronics industries as a result of being the top 3 ranking export industries in Thailand in 2015. (Custom Report, 2015) The results of this analysis help to decide which process should develop RFID by choosing the process that get high impact on performance from RFID practices.

Literature Review

Radio Frequency Identification

RFID (Radio Frequency Identification) is the technology which provides ability to identify and locate information of matter by using radio frequency. This technology functions mainly by using electronic tags which registered information within the tag. This information includes, for example products identification code, production date or expire date. (Hunt, et al. 2007). The tag used altogether with Reader instrument which used to read any information stored within the tag. This process operates by middleware that send the feedback to user to evaluate or calculate information provided by the tag. The information received normally used further to support any operation which related to planning operation or Enterprise Requirement Planning (ERP) (Wang, et al. 2010). Nowadays, the RFID technology is the key of many significant activities in industrial organization such as inventory control, warehouse management, Job scheduling and production execution. (Jedermann, et al. 2006; Chow, et al. 2006; Huang, et al. 2007). Frequently, many industrial companies have interested and adopted RFID to help increase their proficiency and capability. Many academic researches (Bagchi, et al. 2007) have forecast the demand and growth rate of RFID from 1 billion dollars in 2003 to 4 billion dollars in 2008 and 20 billion dollars in 2013.

The adaptation of RFID is the descendent of barcode technology which it meant to be replaced. Both RFID and barcode technology functionally execute by the same method. The different of both technologies is the ability to store information, range of identifying, and size of information, obstacle and cost. Although acquisition of RFID is more expensive than barcode technology, RFID prove to be far more advantage in every way mentioned. (Lee, et al. 2011 cited in InLogic, 2008) RFID offers the real time information which enhance the traceability of product or information dramatically without line of sight (Non-line of sight). Additionally, RFID is simple to apply and endure to harmful environment which extend the length of used. (Garcia, et al. 2007; Gaukler, 2005; Vlachos, 2014; Lee, et al. 2011; Ramanathan, et al. 2014). The best practice in adopting RFID technology is Wal-mart. Wal-mart gets benefit from enhancing its inventory control and management by using RFID technology. Wall-mart significantly able to decrease inventory level, lower counting time, increase the capacity and efficiency of the warehouse. (Chow et al., 2006). Other than Wal-mart, Federal express, Dell computer, Procter and gamble, United state department of defense (Lin and Ho, 2009). Any airliner and transported are benefit from RFID technology.

Reverse Supply Chain

The research concerned reverse supply chain can be traced back to 1993 when Lund studied about the idea of remanufacturing. Later in 1995, Thierry analyzed the subject which included the management of retrieving products and renews into additional value. Rogers and Tibben-Lembke (1999) defined the meaning of reverse logistic is that the strategy that control, evaluate and plan the flow of information and product since the end of supply chain back to the origin of production process. This chain meant to be renew, add additional value or effectively eliminate any remaining wastes form production line Especially, renewing or recycling prove to be key of success in many organization (Fuente, et al. 2010). Forward logistic indicate the process and value chain since the beginning of creating production's good into the hand of customer, which is the ordinary. In the other hand, the reverse logistic concerns about following method which provided additional value to the goods (Lee and Chan, 2009; Rahman and Subramanian, 2012)

- Reuse : The renew of product or material
- Recycle : Transforming used goods by adaptation or remedy material by cleansing, re-fabrication of re-assembly into different product.
- Disposal : Endanger waste must be handle with care and appropriate way in disposal.

Moreover, the exceed inventory and variety of product are also the main reason of producing the bullwhip effect. Even more, the uncertainly of quality and quantity is also one of the major threat to the financial crisis to every organization. To solve these problems and effectively enhance the value of supply chain, many companies have adopted the technology of RFID to solve their supply chain problem.

The advantage of reverse supply chain is not also just providing additional value to the customer, it creates the opportunity to acquire additional resource or appropriately get rid of any remaining waste. The effectiveness of reverse logistic relied heavily on the accurate information in collecting and precision of data. Many organizations have realized and adopting RFID Technology to take advantage of this tool to enhances the effectiveness of reverse logistic. This research is to focus on adapting RFID technology to provide effectiveness which leads to increase profit or added additional value in to any firm organizations.

Methodology

Research Design

This research applied the theory of Hierarchical Regression Analysis by using SPSS program to synchronize and evaluate the impact of RFID practices on reverse supply chain. The results generated by applying Hierarchical Regression would present the significant values. The R square is the anticipate factor since it indicates significant of variance prediction interested in outcome.

In order to evaluate the impact of RFID practices on reverse supply chain, we focused on automobile industries, electric industries and electronic industries. By using structured questionnaire with Likert scale from 1-5 (Strongly disagree to strongly agree) and distribute to managers in the company. The samples are from list of companies in the Ministry of Natural Resources and Environment website via an online methodology (i.e. google survey or survey monkey)

RFID Factor or independent variable were collected from review papers with high impact factors (shown in Table 1) that related with reverse supply chain and RFID. There're transportation, distribution center inventory, collection point, retailer's warehouse, landfill, application system, stock level, recovery facility, store, manufacturer, supplier's warehouse and manufacture's warehouse. Moreover, the reverse supply chain performance variables were derived from the SCOR model. All of dependent and independent variables will use in analysis the impact of RFID practices in Hierarchical Regression Model.

Hierarchical Regression Analysis

Hierarchical Regression is use to analysis to understand the impact of RFID practices on reverse supply chain performances. The model of Hierarchical was shown in Figure.1. We will employ a Hierarchical Regression procedure in 3 steps; firstly, control variables (i.e. firm size or number of employees) are considered in regression model. Second, we create independent model by adding the 12 RFID practices into regression model. Third, enter interactions of 12 independent variables into regression analysis to create interaction model. The interaction term shows the significant and statistical power results. Additional the significant change in R^2 indicates that when RFID apply in reverse supply chain, it shows how much will improve the performance of each activity.

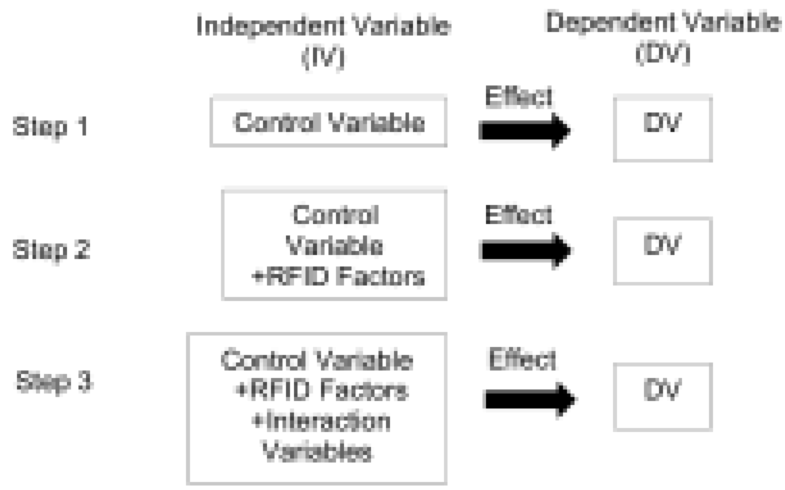

Figure.1 Hierarchical Regression Model

Authors	Tsoulfas et al. (2002)	Daniel et al. (2003)	Hou and Huang (2006)	Prahinski and Kocabasoglu (2006)	Ngai et al. (2007)	Amaro and Barbosa-Povoa (2008)	Skinner (2008)	Kumar et al. (2008)	Gou et al. (2008)	Lee et al, (2009)	Becker et al. (2009)	Poon et al. (2009)	Lee and Chan (2009)	Trappey et al. (2010)	Zhang et al. (2011)	Lee et al. (2011)	Turrisi et al. (2013)	Bogataj and Grubbstrom (2013)	Govindan et al. (2015)	Zhong et al. (2015)	Frequency
Transportation	/	/		/		/			/	/	/		/		/		/	/	/	/	13
Distribution Center Inventory			/	/		/		/	/	/			/	/	/	/	/		/		12
Collection Point		/	/			/					/	/	/		/		/	/	/		10
Retailer's warehouse	/	/		/				/	/	/							/		/	/	10
Landfill		/				/	/						/	/	/		/	/	/		9
Application System			/		/		/	/			/	/		/		/				/	9
Stock Level			/		/			/		/	/				/	/				/	8
Recovery Facility	/			/			/							/				/	/		6
Store	/	/	/	/				/		/											6
Manufacturer			/	/				/		/										/	5
Supplier's warehouse				/		/													/	/	4
Manufacturer's warehouse								/			/	/									3

Table 2: Independent Variable Analysis

Anticipated Results

The results from Hierarchical Regression analysis presented the impact of RFID practices on reverse supply chain performances indicated in the value of change in R^2. So, it means percent of improving performance. According to Vlachos (2014), the different percentage of R^2 indicate the significant value of variable. For example, in table 2, if the value of change in R^2 of Dependent Variable 1 is 0.338, we can define that if we apply RFID on Dependent Variable 1 the reverse performance of this activity will improve 33.8 percent and performance of dependent variable 2 is improve 26.8 percent.

		Step 1	Step 2	Step 3
Dependent Variable 1	Change in R square	3.604	0.134	**0.338**
Dependent Variable 2	Change in R square	0.006	0.109	**0.268**

Table 2 : Example of HReg Results (Vlachos, 2014)

After we analysis all of activities (independent variable), the percent of improvement will have presented. The Results from this analysis is the information for companies to make a decision in adopting RFID in reverse supply chain activities. Moreover, we can make a priority of applying RFID by adopting RFID on activity that gets high impact on performances first.

Conclusions and future work

In this paper presents the framework that guide how to analysis the impacts of RFID on reverse supply chain performance. The contribution of this paper included the details and model of Hierarchical regression analysis for evaluating, the variables; dependent and independent that used to analysis was presented. In the future, we will use this framework to evaluate the impact of RFID on reverse supply chain performance.

Acknowledgement

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A SYSTEMATIC REVIEW OF THE HUMANITARIAN LOGISTICS AND SUPPLY CHAIN PERFORMANCE MEASUREMENT LITERATURE

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Introduction
Humanitarian performance should be defined in terms of both its effects on those affected by crisis and according to core humanitarian principles. A more integrated approach to performance bringing together different levels, functions and initiatives within the system, could help to overcome many of the perceived failures of humanitarian assistance (Ramalingam et. al, 2009). There are many existing projects, initiatives and approaches for monitoring and reporting on performance within the humanitarian system. However, these have been established for a range of different purposes and different focuses and address aspects of performance. Many operate in parallel, and some overlap. Most efforts do not involve regular collection and analysis of data. Those that do are often fragmented in their approach.

The purpose of this paper is to provide a systematic literature review of the humanitarian logistics and supply chain performance measurement literature combined with a citation network analysis approach. This will enable the identification of the main research clusters in the field of humanitarian logistics and supply chain performance measurement.

This paper is separated into 2 main sections. The first section will discuss the systematic review methodology while the 2nd section will focus on the findings of the review. The findings of the review will be presented through the use of the Pajek software and conclusions will be derived.

The systematic review methodology
This manuscript follows the guideline provided by Hemingway and Brereton (2009). Figure 1 describes how the articles were selected, evaluated, analysed and interpreted. The objective of this systematic review methodology will help identify the research streams related to performance measurement in the humanitarian logistics and supply chain context. The first stage of the review process involved the identification of papers and research reports that were concerned with humanitarian logistics and supply chain performance measurement. The authors identified electronic databases and websites that could provide potentially relevant articles. The following databases were searched: Emerald, Science Direct, Taylor & Francis, Springer, ABI/Inform, Scopus and Wiley Online Library. However, some journals are available in more than 1 database, such as IJPDLM which is published in Emerald but available in ABI/Inform. To ensure that there has no duplicated journals, ABI/Inform and Scopus were selected as the main database in this systematic review.

The period of publication of the journal articles is from 1990 to 2016. 1992 was chosen as the anchor point for the review because it was the year that had the highest number of hits when keywords such as "Humanitarian" or "Logistics" or "Supply Chain" or "Performance Measurement" were selected. Nonetheless, earlier literature was also included. This figure also presents the decline by more than 9 percent of humanitarian, logistics, supply chain and performance measurement articles in the year 2015. Moreover, the numbers of articles went down by 62 percent by mid-year 2016 and this particular aspect of humanitarian logistics may have reach its saturation point. The evidence from

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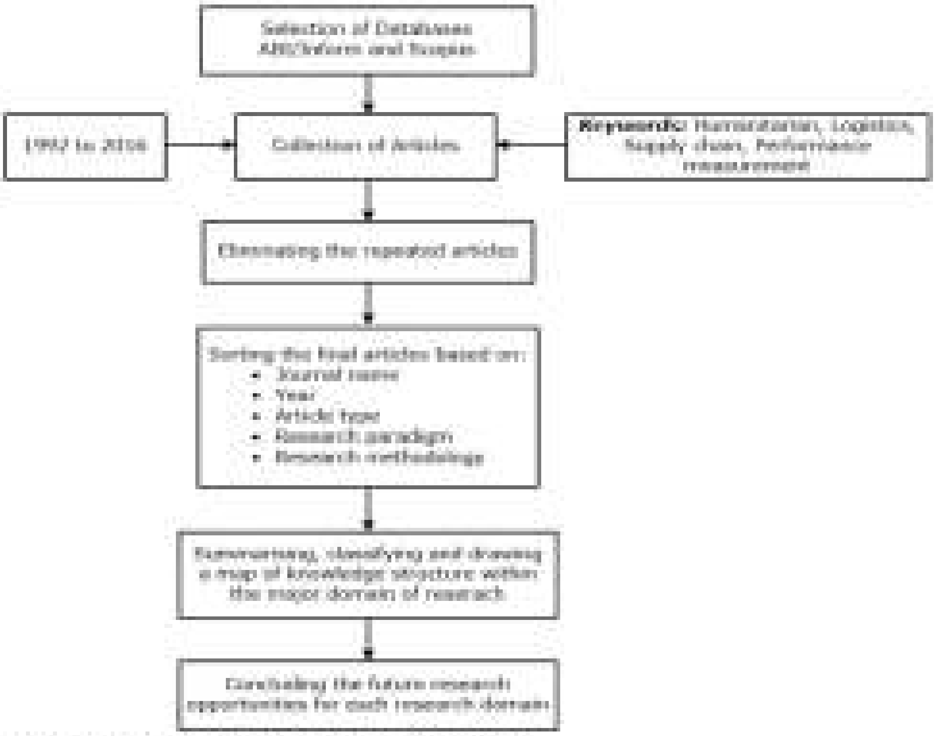
ABI/Inform and Scopus database show that researchers have interest in other humanitarian logistics and supply chain facets; such as knowledge transfer and management humanitarian supply chains; information and communication technology for humanitarian logistics; supply chain co-operation, integration and collaboration in the humanitarian setting; or the role of donors and volunteers in humanitarian logistics, etc.



Source: adapted from Hemingway and Brereton (2009)
Figure 1: Review methodology

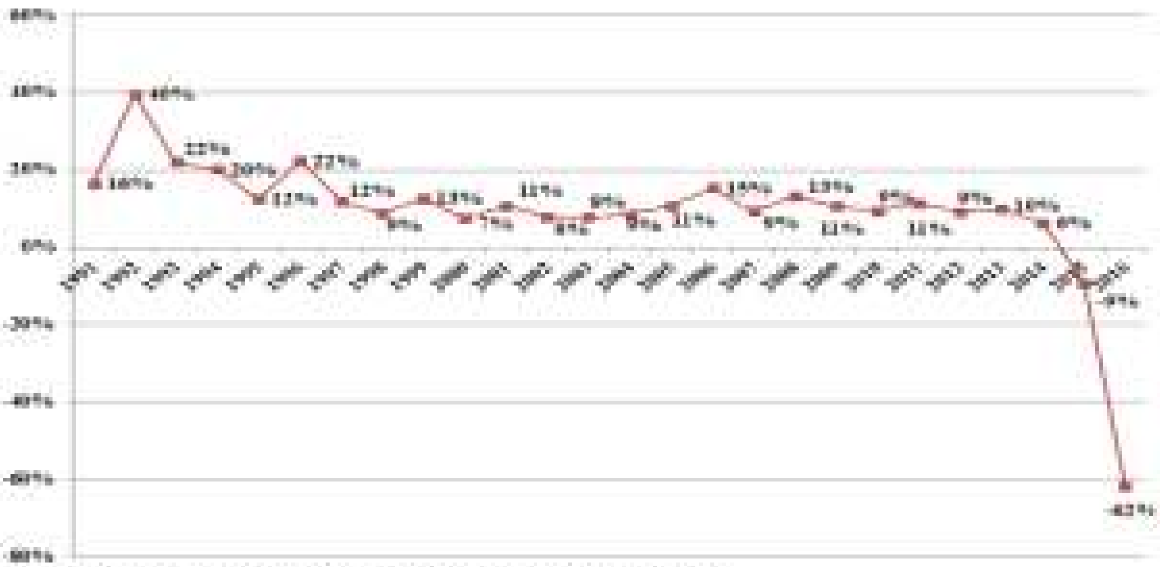


Figure 2: percentage change Y-O-Y of humanitarian logistics
and supply chain performance measurement

There are four main keywords used in this review "logistics performance measurement", "supply chain performance measurement", "logistics and supply chain performance measurement", "humanitarian logistics and supply chain performance measurement" and equivalent keywords are also used for covering all the potential relevant papers. Table 1 summarises the keywords and the search results. This table shows the number of article identified.

Keywords	**Equivalent keywords and search strings**	**Number of articles**	
		ABI/Inform	**Scopus**
Logistics Performance Measurement	Logistics Performance Assessment; Logistics Performance Evaluation	39,208	8,196
Supply Chain Performance Measurement	Supply Chain Logistics Performance Assessment; Supply Chain Logistics Performance Evaluation	41,988	2,016
Logistics and Supply Chain Performance Measurement	Logistics and Supply Chain Performance Assessment; Logistics and Supply Chain Performance Evaluation	15,160	310
Humanitarian Logistics and Supply Chain Performance Measurement	Humanitarian Logistics and Supply Chain Performance Assessment; Humanitarian Logistics and Supply Chain Performance Evaluation	495	195

Table 1: Search keywords and results (1992-2016)

In total 323 articles published in 127 journals were discovered. In order to reduce the number of potential papers related to humanitarian logistics and supply chain performance measurement, the 323 abstracts were screened and 63 abstracts were determined based on the keywords and their suitability for inclusion in the systematic literature review.

The next step was the analysis and interpretation of the selected articles by focusing on the authors, year of publication, research context (country and industry), objective, methodology, article type, data collection method, data analysis method, contributions and classification dimension according to Di Fan *et al.* (2014). The last step was focused on understanding the structure of the research domains by following the guideline of Main Path Analysis (MPA) (Colicchia and Strozzi, 2012) with the Pajek software 4.01 (De Nooy *et al.*, 2005).

Classification of research domains

According to the authors' initial finding, humanitarian logistics and supply chain performance can be divided into four categories: (1) mitigation phase, (2) preparedness phase, (3) response phase and (4) recovery phase. It was observed that there were 22 articles related to preparedness phase while 17 and 11 articles focused on preparedness and response phase respectively, then 13 papers on the recovery phase were presented in figure 2 to 5.

Figure 2: Citation network of the articles in mitigation perspective

Figure 3: Citation network of the articles in preparedness perspective

Figure 4: Citation network in response perspective.

Figure 5: Citation network in recovery perspective.

Research streams path analysis

Figure 2 to 5 illustrated the structure of four research domains which are mitigation, preparedness, response and recovery phase by following Main Path Analysis (MPA) approach (Colicchia and Strozzi, 2012), the authors used the citation network as the key to link each article with Pajek software 4.01 (De Nooye *et al.*, 2005).

Reviewing the "mitigation" phase

The first domain is the mitigation perspective as started in 2006 by Altay and Green, also van Wassenhove. After that in 2007, Kovacs and Spens identified a conceptual model that serves as a basis to identify these preparedness challenges. Beamon and Balcik considered facility location decisions for a humanitarian relief chain responding to quick-onset disasters in 2008. Last but not the least, there were two articles published in 2009. The first article is about the critical success factors in Humanitarian Logistics by Pettit and Beresford and the other's aim to discuss three dimensions identified in logistics and organization theories and how they relate to three different cases of humanitarian logistics operations by Jahre, Jensen and Listou. Finally, Blecken *et al.* (2010) identified the practice of supply chain coordination mechanisms and evaluated their adaptability to the unique relief environment.

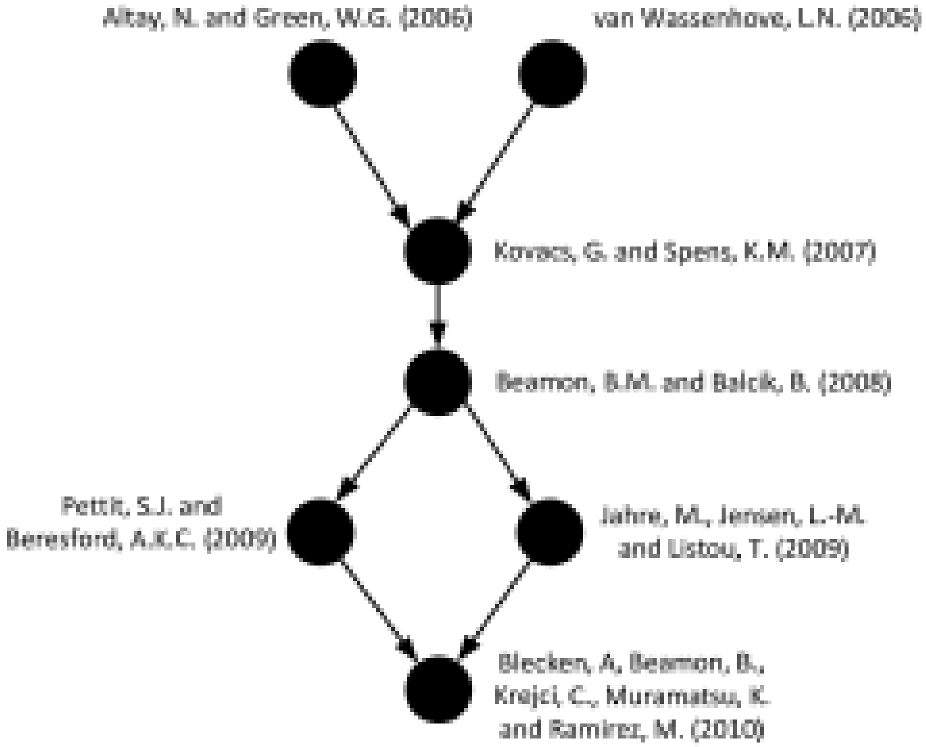


Figure 9: Mitigation path

Reviewing "preparedness" phase

This research domain presents only one cluster with six articles that have the most citations. The starting point is in the year 2006 with three seminal papers by Altay and Green which discussed about OR/MS research in disaster operations management. The second paper is proposed by Pettit and Beresford, they proposed a refined model for logistics requirements in emergency conditions. The last paper introduced by van Wassenhove was built on the idea that private sector logistics can and should be applied to improve the performance of disaster logistics.

In 2007, Kovacs and Spens proposed a conceptual model for disaster's preparedness while Beamon and Balcik identified a model for facility location decisions in 2008. In 2010, Blecken *et al.* reviewed the challenges in coordinating humanitarian relief chains and described current and emerging coordination practices in disaster relief.

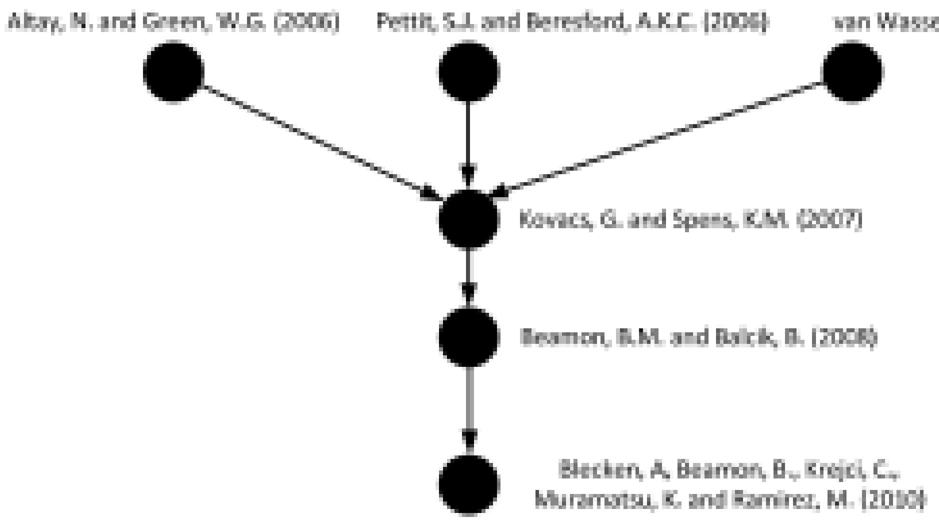


Figure 6: Preparedness path

Reviewing "response" phase

The second domain is focused on the response phase which was classified into 2 research streams. The first stream is similar to the preparedness phase with only two seminal papers by Altay and Green, also van Wassenhove in 2006. After that Kovacs and Spens (2007) and Beamon and Balcik (2008) was linked. The last paper connected to this domain was published in 2009 by Pettit and Beresford related to the critical success factors (CSFs) in the context of humanitarian aid.

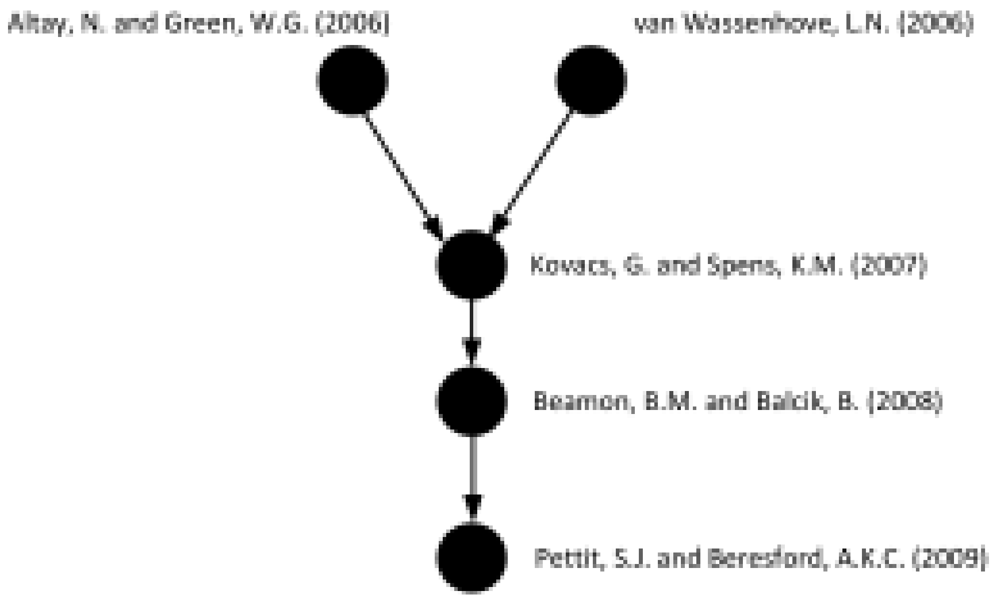


Figure 7: Response path I

There is a second research stream in the response phases which was started by Asghar, Alahakoon and Churilov in 2006, they proposed an integrated model to be used as a solution to reduce the complexity and inefficiency of dealing with multiple Decision Support System (DSS) models for disaster management. After that in 2009, Matisziwa and Murraya proposed an alternative model for constraint structure over existing models. In 2010, Vitoriano *et al.* proposed several criteria for an aid distribution problem. In 2011, Rodríguez *et al.* developed a decision support system (DSS) for the assessment of the severity of natural disasters. It can be noticed that this stream is very focused on how to improve decision-making during a humanitarian event through the use of a DSS model.

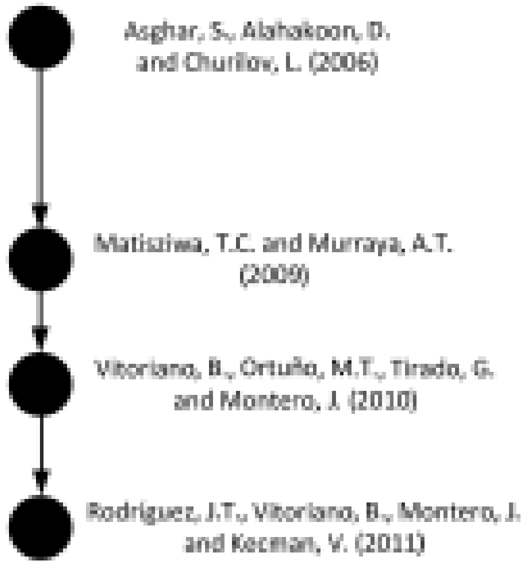


Figure 8: Response path II

Reviewing "recovery" phase

The next research domain is the recovery perspective as proposed by van Wassenhove in 2006, Kovacs and Spens (2007) and Beamon and Balcik (2008) respectively. They provided models to identify and improve the performance of humanitarian logistics such as facility location selection.

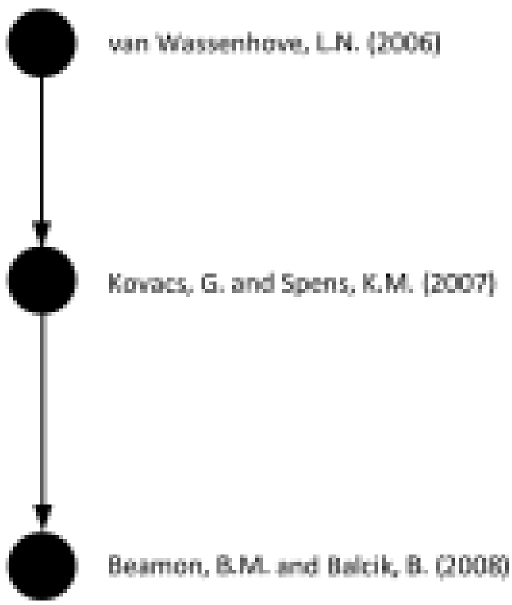


Figure 9: Recovery path

Summary

This study aimed to describe the state of the art literature related to performance measurement in humanitarian logistics and supply chains by using a systematic review. The authors aimed to define the gaps and the challenges in this field and provide insights for future research in this domain. For this performance measurement was based on the classification of the phases of emergency management in four phases developed by Federal Emergency Management Agency (FEMA) in 1978. In doing so, it found that four seminal papers by Altay and Green (2006), van Wassenhove (2006), Kovacs and Spens (2007) and Beamon and Balcik (2008) must be referred to when reviewing humanitarian logistics and supply chain performance measurement as they are at the centre of all research related to performance in the humanitarian logistics and supply chain literature.

The following insights were derived from the systematic literature review: the total number of research articles in this specific field of performance measurement in humanitarian logistics and supply chains is still low compared to the commercial sector. The authors furthermore observed that the topic has gained more attention among European researchers than among US or Asian researchers. There are many valuable contributions based on theory and models, but the number of contributions that deal with actual application in humanitarian sector is limited (too theoretical). Further work is needed on the application of theory and models, particularly in the area of mathematical and stochastic programming as well as decision theory.

A limitation of this study therefore relates to the general validity and reliability of qualitative literature research. Further research in the area of performance measurement is pivotal to not only advance theory but more importantly help improve the logistics and supply chains in the humanitarian context. The success of humanitarian organisations these days relies heavily on excellence in logistics and supply chain as a core competence and functionality of their missions and that requires appropriate performance measurement. Another limitation of this systematic review is based on the restricted scope of material used as the focus has been exclusively on published research papers in academic journals. This narrow scope does not provide insights into the possible direction of each path that may be found in white and policy papers or even conference papers.

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CENTRALIZED PURCHASING OF MANAGEMENT CONSULTING SERVICES. BEYOND INVOLVEMENT, TOWARDS OUTSOURCING.

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Introduction

Purchasing of management consulting services is a challenging and complex task (Mitchell, 1994; Smelzer and Ogden, 2002; Werr and Pemer, 2007; Pemer *et al.*, 2014) that has received increasing attention in research and practice. As other professional services they are abstract, built on intangible qualities and dependent on the buyer-supplier interaction which make them difficult to specify, compare and evaluate. But management consulting services (MCS) normally have high strategic stakes, including high prices for the services and giving advice concerning critical situations (Mitchell, 1994). Siewke *et al* (2012) find two main approaches for purchasing MCS: a decentralized where the functional high-level manager decides whether to use consultancies, which, and how much to spend; and a more centralized where e.g. the purchasing department is more involved in selection and contract negotiation phases. Werr and Pemer (2007) add a hybrid approach with some stages in the purchasing approach centralized while other still run by the functional manager. Traditionally, and still in many companies, MCS have been purchased without the involvement of purchasing professionals (Smelzer and Ogden, 2002; Ellram *et al.*, 2004; Schiele, 2005; Werr and Pemer; 2007), as the managers instead personally handle the purchase themselves, leading to a situation where the personal relationships between high-level managers and consultants play a central role (Clark, 1995; Smelzer and Ogden, 2002). Although recent studies argue that purchasing professionals could contribute in the purchase of MCS (Ellram *et al.*, 2004; Schiele, 2005; Werr and Pemer, 2007; Siewke *et al*, 2012; Pemer *et al*, 2014) to make it more professional (Höner and Mohe, 2009), they also indicate that MCS are among the most difficult for professional purchasers to get involved in.

While researchers argue that there is now a shift ongoing to the more centralized approach (Werr and Pemer, 2007; Siewke *et al*, 2012) there have been little research really exploring the structure and the process of centralized purchasing of MCS. Werr and Pemer (2005) studied 6 companies that used, or discussed to introduce, more professional procedures for purchasing MCS. But they characterized only one of those 6 as centralized, while two were coordinated decentralized, and the final three were decentralized when it came to the purchasing of MCS. The hybrid approach (coordinated decentralization) meant that the purchasing department had taken initiatives to select preferred suppliers, establish master service agreements, developing procedures and templates for dealing with different challenges in the purchasing process.

This explorative study intends to increase the understanding of both the structure and the process of the purchasing function after that purchasing of MCS has been centralized. This is done based on case studies of four large companies that all have centralized their purchasing of MCS and where purchasing professionals are more than just slightly involved. This study extends current research by discussing how the centralization evolves over time; by finding that service definition and supplier selection are done twice; by finding that the cases with longest experience of centralized purchasing of consultancy services even outsources certain steps of the purchasing process to an external middleman that does parts of both tactical and operative purchasing. All of this challenges the traditional perspective that the functional manager must be as a key person in the purchasing process.

This article is structured as follows. First a framework regarding the organization structure and the purchasing process of management consultant services is given before the methodology of the study is described. A cross case analysis follows, before conclusions are spelled out in the final section.

Structure and process of purchasing management consulting service

Organizational Structure

Organization of purchasing is highly dependent on the characteristics of the company, the type of industry, and the characteristics of the products purchased (van Weele, 2010). Traditionally the discussion has been between the decentralized and centralized structure, but Johnson *et al.* (2006, 2012) showed that different kind of hybrid structures summed up to be the most popular organizational mode for purchasing in general. But while around 65% in their studies leaned towards centralization (centralized and centralized hybrid) only 25% leaned against decentralization. van Weele (2010) points in his purchasing development model out centralized and co-ordinated purchasing as an important dimension for more developed practices. In a centralized purchasing structure, a purchasing department can be found where corporate contracting specialists operate at the strategic and tactical level, while operational purchasing still can be done locally (van Weele 2010). Main advantages are that through co-ordination can better conditions in terms of price, cost, service and quality from suppliers be achieved, it facilitates efforts towards production and supplier standardization, better control and compliance (van Weele 2010; Karjalainen 2011). One result of centralized purchasing are often framework agreements, and Karjalainen (2011) describes their results in three main categories of synergies: economies of scale, economies of process, and economies of information and learning. A decentralized structure is characterized of that the management of a business unit is fully responsible for all its purchasing activities (van Weele, 2010). Negative consequences of more relationship-oriented (decentralized) approach to purchasing MCS has been argued to be e.g. uncertain/mis-estimation of consulting demands, unsystematic selection of consultants, the reinterpretation of aim and scope to suit the consultants in consulting projects, assignment of inexperienced consultants in projects, no utilization of synergy potentials, and no evaluation of consulting projects (Ellram *et al.* 2004; Mohe, 2005; Werr and Pemer, 2007).

Purchasing Process

Purchasing activities are often outlined in a purchasing process to get the work more rational, structured and formalized. Contemporary studies of purchasing of professional services in general (van der Valk and Rozemeijer, 2009), and management consulting services in particular (Werr and Pemer, 2007; Pemer *et al* 2014), take van Weele's six-step process for goods as a starting point. This purchasing process (e.g. van Weele 2010) is divided into steps for determining specification, selecting suppliers, contracting (that together forms tactical purchasing), ordering, expediting & evaluation, and follow-up & evaluation (that together form operational purchasing). Although the major steps is argued to work well both for goods and services, different activities in the separate steps get more complicated (or different) when buying services (Axelsson and Wynstra, 2002), due to e.g. the intangible nature of services, the use of personal contacts and experience, and co-production between consultant and client (see e.g. Werr and Pemer 2007 for deeper discussion). A tension was observed between this kind of rational and effective purchasing process and managers' actual purchasing of MCS that was more relationship-oriented. Van der Valk and Rozemeijer (2009) argue that the success of the service purchase is primarily determined during the first step of the purchasing process, and they add two substep after determining specification: request for information, and detailed specification. The information requested from the suppliers should help to further jointly develop and improve the service specification. In essence, they argue for a pre-selection step where the initial specification can be detailed in close collaboration with the pre-selected suppliers.

Centralization vs. decentralization depends on who is performing the different steps in the process. In a centralized structure, strategic activities but also the tactical steps of the purchasing process are driven by purchasing professionals from a central department while the ordering steps can be performed either decentralized (by buying from framework agreements) or by the central function. In a decentralized structure, the central purchasing professionals are very limited and ad hoc involved, and the non-purchasing managers or local purchasers carry out most of the entire process themselves (Werr and Pemer, 2007).

Methodology

This research was part of an explorative project aiming to build knowledge for company X planning to centralize their purchasing of MCS. The study should inform how other companies were doing this and what challenges they have faced, something we argue also is of a general and academic interest. Easton (2007) suggests that if the aim is to advance theory, a comparative case study on elements of that theory is a suitable methodology. Hence, a multiple-case embedded design (Yin 2003) was applied for two reasons. Firstly, case studies are suitable for building in-depth understanding and developing theory when little is known about the studied phenomenon (Voss *et al.*, 2002). These cases allowed us to explore and get deep insights into centralized processes for purchasing MCS. Secondly, the embedded case design allowed capturing both insights of the centralized structure, the process, particular activities in different purchasing process steps, and how this evolved over time. So in addition to the focus on the centralized purchasing process (primary unit of analysis), the study also explores the centralization process. For those looking for statistical generalization an often stressed limitation with case study research is its aim to arrive at analytical/theoretical generalization (Yin, 2003). But cases are chosen because of their literal and theoretical relevance, while "generalizability to the sampling population is not of main concern" (Barratt *et al*, 2011, p. 332). Our case selection followed literal replication logic (Yin, 2003) and the research questions informed the selection of four cases of companies that centralized their purchasing of MCS. Other criteria were that they should be large and provide access. (The cases are referred to as InfoCom, FinanceCom, MachineCom, and RetailCom based on their industry). The cases are summarized in table 1. (Page restrictions make us not being able to describe the cases in more details, but short case descriptions could be received by the corresponding author).

	InfoCom	FinanceCom	MachineCom	RetailCom
Year starting to centralize purchase of MCS	1993	2004 (coordination of strategic purchasing; 2007 Framework Agreements; 2011 coordination of oper. purchasing + broker).	2012 (only techn mgmt consulting) (2000 temporary labor services).	2011
Organizational structure for purchasing before centralization of MCS	*Indirect material:* decentralized and unstructured. *Direct material:* decentralized.	*Indirect material:* decentralized and unstructured. *Direct material:* centralized.	*Indirect material:* decentralized. *Direct material:* decentralized.	*Indirect material:* decentralized. *Direct material:* centralized.
Type of MCS centralized	Business services, financial, marketing, management, IT etc.	IT (70%), management, accountants.	Technology mgmt consulting.	IT, management, finance, insurance, marketing, technology.
Type of MCS NOT centralized yet	None.	Some strategic MCS doesn't follow similar process as others, but are dealt with centrally.	IT, general management, accountant, project, quality, environment, law, HR, recruitment.	Confidential.
Differences in purchasing process.	All follow the same purchasing process.	Most follow the same purchasing process. Exception, see above.	Non-centralized MCS are planned to follow the standardized purchasing process later.	All follow the same purchasing process.
Centralized activities	Strategic, tactical, and most of operative purchasing.	Strategic, tactical, and most of operative purchasing.	Strategic and tactical purchasing. A centralized VMS-system will coordinate and control most of oper purchasing.	Strategic and tactical purchasing.
Possibility to buy outside Framework agreements	No.	No (some exceptions).	No.	No.
Number of suppliers	1 Framework agreement with Vendor broker (since many years).	1 Framework agreement with Vendor broker.	Tech mgmt consultants: a few framework agreements, one with broker.	15 (including both framework agreements and for separate services).

Table 1: Overview of the cases

InfoCom is a big global company leading its industry, having over 400 000 employees when the centralization process of indirect material and services started 1993. For InfoCom the vendor broker has had a crucial role in the ordering process since 2007 with which the main framework agreement is and with whom they have a close relationship. Employees from the vendor broker sit a few days per week in InfoCom's offices so that information can be shared more easily. FinanceCom is a leading player on the Nordic financial market, with activities in Northern Europe, and about 15 000 employees. It started to centralize purchasing of indirect material and services 2004, when the company had a decentralized structure where each line managers purchased consultants needed themselves. Before the implementation of the vendor broker, FinanceCom used about 150 consultancy providers whereof 10-15 were more strategic and had a framework agreement. Now the vendor broker handles most of the operative purchasing, and this firm is in principle the only provider FinanceCom has a framework agreement with. MachineCom is a big global company (~150 000 employees) leading its industry. Data is collected from the Nordic region (including the Nordic countries, British Island, Baltic states, and Russia), but this purchasing department is part of a global corporate structure. The company has a decentralized purchasing structure for direct material, but for indirect material and services strategic and tactical activities have been centralized for most categories. Within the category Contracted services, purchasing of e.g. temporary labor (blue and white collar) was centralized already from 2000, but the work to centralize purchasing of consultants (black collar) started 2012. RetailCom is a Swedish retail chain with about 3000 employees. It has two separate purchasing processes for direct vs. indirect material. RetailCom started to centralize the purchasing of indirect material 2011, and part of this was professional services including MCS.

Guiding theory and investigation framework were developed based on current research on centralized purchasing of MCS, purchasing processes in general and professional services in particular, and purchasing organization. The framework served to map where, how and by whom different activities in the purchasing process were performed. A pilot study (a fifth case not explicit reported here) was used for fine tuning the investigation framework, case study protocol and interview guide. An important observation from this, as supplement to previous literature, was the separation of selecting consultancy firm for the framework agreement, and selecting the individual consultant for a specific project. This made us more thoroughly investigate the specification, selection and ordering process.

One of the strengths of the case study method is the possibility of carrying out multiple data collection techniques to get a deeper understanding of the phenomenon (Eisenhardt, 1989). Data were collected through nine semi-structured open interviews with strategic purchasers and managers leading the transformation, were the interview guides were send in advance. The interviews covered multiple themes to map current and previous organization and processes, as well as the change management process. The interviews (in average 90 minutes) were both recorded and transcribed. Data were triangulated with other data collection techniques and sources (Yin, 2003; Ellram, 1996; Marshall and Rossman, 1999). Interviews were complemented by collection and analysis of annual reports as well as company internal documents (organization charts, process descriptions). Finally the cases were sent to respondents for validation and confirmation.

The analysis was conducted in two rounds: first for cases individually, and then across cases. In line with qualitative data analysis guidelines (Miles and Huberman, 1994), the raw data were progressively reduced and organized. After all individual case descriptions were finalized, a number of tables were devised for each case (as suggested by Miles and Huberman, 1994). A pattern matching approach (Yin, 2003) was followed using manually constructed cross-case tables and processes (see table 1, figures 1 and 2). These helped to reduce and make sense of the data (Miles and Huberman, 1994) and identify theoretically important similarities and differences (Yin, 2003) across the cases. The understanding gained from this analysis was compared with suggestions from theory to refine the conceptual model and further our understanding of the topic.

Cross case analysis and discussion

Centralized purchasing process for MCS

The purchasing process for management consulting services (MCS) follows similar patterns for the four studied cases. It is handled by a central function for purchasing of Indirect Material and Services, and as is often treated as a sub-category to the category Professional services. The cases have all centralized their strategic and tactical purchasing activities (policy and process development, spend analysis, defining specification, supplier selection, and contracting) that lead to a framework agreement with a consultancy firm. The operative steps (ordering, evaluation & follow up) had more decentralized and local involvement, but were still within standardized processes and getting support from central purchasing, automatic support system, or external vendor brokers. The operative steps resulted in a call off of an individual consultant coming from one of the few providing companies having a framework agreement. This observation can be noted as a clear distinction from the view of authors like Gummesson (1977) stating "..buyers purchase the services of individuals in whom they have confidence, not those of consulting companies"; and Edvardsson (1990) stating "buyers is less interested in the service itself and more in the individual service provider/consultant". In the systematic purchasing processes developed by professional purchasers, seen in our cases, the focus is instead first on selecting the providing firms based on the needed and specified services. In comparison to previous discussed processes in literature, the four cases had then established a specific sub-ordering process for calling off individual consultants based on a previously centrally negotiated framework agreement. In the latter steps the functional manager/user had a larger role and could make interviews with individual consultants, based on selected CV's. This indicates a movement of roles and responsibilities. In comparison with Werr and Pemer (2007), the degree and scope of centralized activities in the purchasing process observed in our cases were much larger, and suggest that the trend of more specialized purchasing professionals involved in purchasing of MCS has continued.

For most of our cases the operative purchasing steps were decentralized and done locally, but three of the four cases had also involved a neutral external middleman, vendor broker, for these steps. (Examples of such vendor brokers on the market are ZeroChaos and eWork). This use of an external middleman for purchasing MCS is something we have not seen discussed before in research literature. To move the involvement and execution of buying activities from the functional managers first to centralized purchasing professionals – and then further beyond this to external companies, is from our perspective an interesting observation. This might indicate that when the purchasing of MCS can be demystified and separated from functional managers, purchasers might be able to better define the services and make them so "tangible" that parts of the purchasing processes can be more automated and even outsourced.

A purchasing process for MCS, developed based on the four cases and van Weele's (2010) classical process, is outlined in figure 1. This process clearly divides between the more tactical sourcing activities (leading to framework agreements with providers) and the more operative ordering processes (starting from the framework agreement and leading to a purchase order) of an individual consultant. For all companies spend analysis was stressed as an important and initial step, and hence it has been added not only as a part within "selecting supplier" but as an initial step before specification of the service. A reason for the importance of spend analysis related to purchasing of MCS might be its history of decentralized purchasing, and that companies in their transformation to centralized purchasing really have to understand what were bought, from whom and by whom.

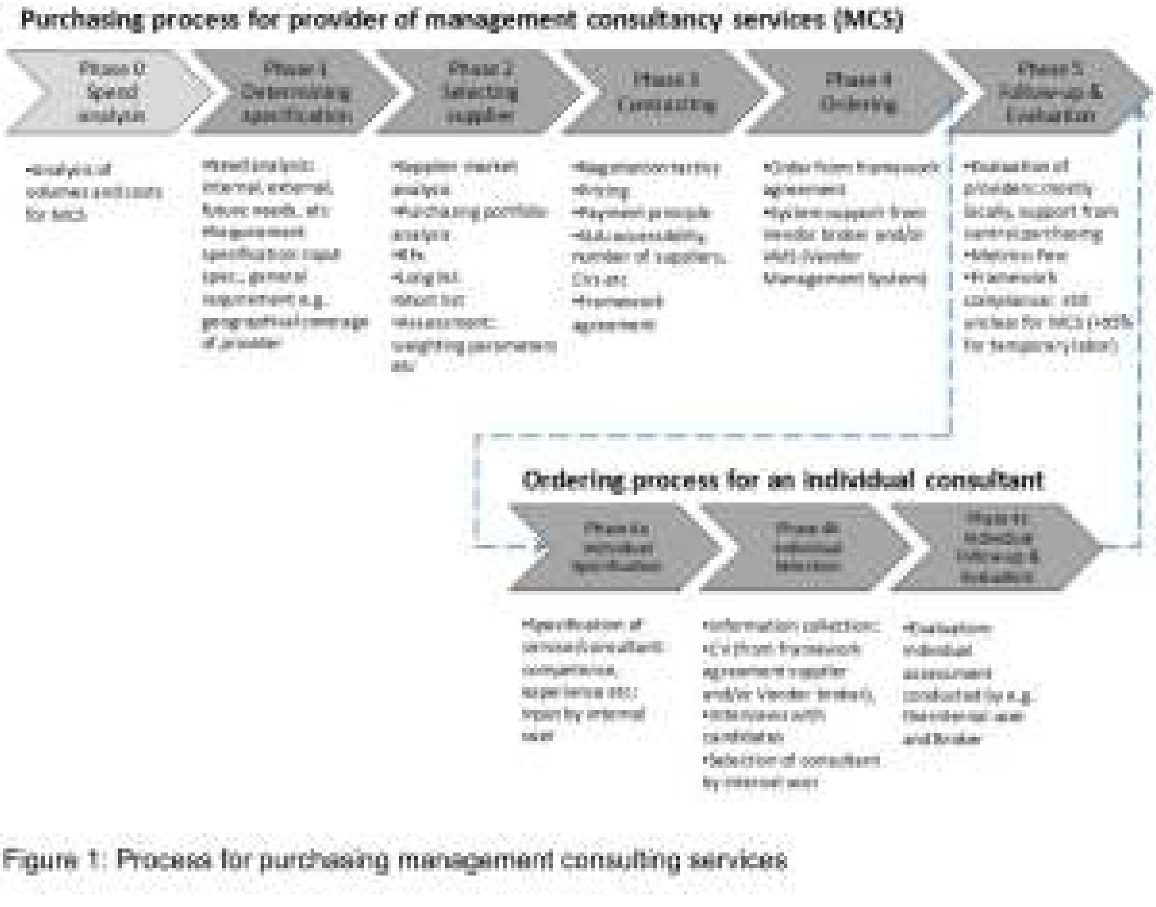

Figure 1: Process for purchasing management consulting services

While the tactical steps (until phase 3) are well aligned with the classic and rational process normally used for goods, we see some differences in the ordering process that are needed to handle some of the particularities of MCS. Some more steps are taken when an individual consultant should be hired. First a specification of the individual service/consultant needed is further detailed by purchasing professionals and functional managers/users working together. In some cases the user is filling in templates previously defined by central purchasing. Based on this specification, the central purchasing (sometimes with help from a system or an external vendor broker) collects different individual consultant's CVs, and gives the functional manager a selection of those that meet the specification. The CVs come from different companies that either have a framework agreement with the company, or are part of the vendor broker's supply base (in case only the vendor broker has a framework agreement). Then, if needed, the functional manager/user interviews some of the selected candidates, and the user makes this final selection. Assessment of the individual consultant is done later by the user, following a process and using templates developed centrally. Evaluation of the providing firms is done by the professional purchaser, and sometimes supported by the external vendor broker.
Our observation of the second round of specification and selection in the ordering process was a distinction to previous theory (van der Valk and Rozemeiher, 2009). They suggested a second round of specification to take place already in the tactical process before contracting.

Outsourcing of purchasing activities to middlemen
As mentioned, a surprising observation was the use of a neutral external middleman. The explanation might be that the demystification of the purchasing of MCS in three of the cases had gone so far that an external middleman could take over activities in the tactical sourcing steps. In the two most mature cases (InfoCom and FinanceCom) most of the activities in the ordering process were also moved to the vendor broker. In fact those two companies only had framework agreements with the vendor brokers and not directly with consultant firms. The third case, MachineCom, had a Vendor Management System (VMS) supporting internal local buyers for most of the operative purchasing, but used the vendor broker to handle the "tail of suppliers". From a supply risk and a government perspective, it has to be reflected on whether the use of a vendor broker creates more of a neutral and transparent market place for the purchaser, or it instead leads to a monopoly situation.

Sequential development of the centralized purchasing of MCS
Werr and Pemer (2007) ask for longitudinal studies for finding evolutionary paths of purchasing's functional role in purchasing professional services. The design of this study is not longitudinal, but our observations of the companies' development over time can be seen through such a lens.
A pattern of different sequential stages of the centralization process can be outlined, where the two most centralized cases (InfoCom and FinanceCom) also are the ones that started to implement it first, while the newer cases (MachineCom and RetailCom) not are as centralized. It seems hence that the degree of centralization develops over time (see figure 2). All cases first centralized the more strategic/tactical steps, while InfoCom and FinanceCom then centralized also more operational activities. To do this, they leveraged information systems and an outsourced partner (the vendor broker). For InfoCom we also observe a more centralized process for monitoring and evaluation, while FinanceCom so far only is planning for this. The power of the functional managers/user has in general decreased, and their role are more to first give input to the specification, and then, if needed, to be part of the individual assessments of proposed consultants. Another observation is that more activities get automated over time, by the use of different systems (such as VMS).

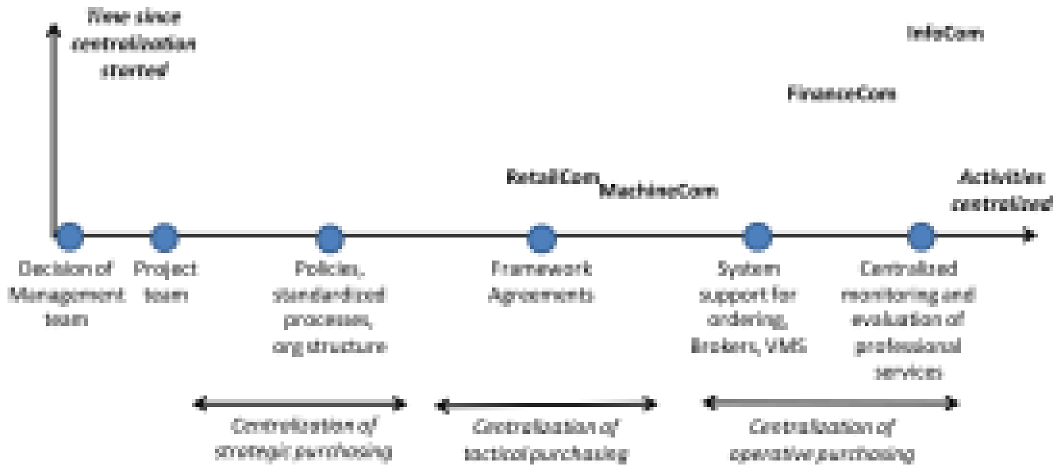

Figure 2: Development for centralization of purchasing of management consulting services

The least developed cases, MachineCom and RetailCom, both have reached the stage where the tactical purchasing is centralized with framework agreements as output. MachineCom has then continued, and developed a plan for their centralization of operative purchasing, e.g. the implementation of the VMS and the use of a vendor broker for "the tail" of their suppliers. In much, their plans are aligned with the pattern observed for InfoCom and FinanceCom.

Conclusions

Contributions

In general purchasing develops toward centerled organizations (centralized and centralized hybrids), while purchasing of management consulting services often have been purchased directly of the functional managers/users (decentralized). Previous research has lately argued for a movement also for this category towards centralization and more involvement from professional purchasers, but there has been a lack of deeper empirical studies into it. This study has focused on to understand the centralized purchasing of MCS, and confirms that companies can go in this centralized direction of implementing more rational purchasing process where functional managers get separated from controlling the strategic and tactical purchasing process. The functional manager/users are often still involved by giving input for the specification of the general services needed, and in particular involved in the operative ordering process of individual consultants. This study contributes with descriptions, discussions and insights from cases that have gone further in their implementation of centralization (really done it) than we have found in previous reported research. In doing this, we have contributed by outlining an adapted purchasing process based on findings from the cases.

It seems possible to implement a centralized purchasing process, although the power position functional managers/users historically have had. Traditionally, the view was that consulting services were not purchased from providing firms, but individual managers bought individual consultants (compare Gummesson (1977) and Edvardsson (1990)). We have now observed a clear pattern of clients' professional purchasers selecting consultancy firms that gets framework agreements, and then the selection of individual consultants is a step in the ordering process where the functional managers might be involved for further service specification and direct interviews. As previous studies in this area, we used van Weele's (2010) classic purchasing process as a starting point. This study confirms that it seems to work well in general also for centralized purchasing of MCS. However we observe, in comparison both to van Weele's processes and the suggested process from van der Valk and Rozemeijer (2009) a difference. We suggest the sub-specification and sub-selection of individual consultants to take place in the operative ordering process. Demystification of services seems to be critical for being able to implement a more centralized and rational purchasing process. This is for MCS done by approaching their intangible nature with 2 stages of specification (first for the providing service/firm, later for the specific service/consultant), the personal contact by involving more

professional and central purchasers or external middlemen on the tactical level, and letting the user evaluate only a proposed limited number of individuals first in the ordering process.
Another contribution is the observation and discussion of the use of an external middleman both in the tactical sourcing process and in the operative ordering process of MCS. This contradicts the previous argued importance of the functional manager. It indicates not only involvement of central purchasers, but also that after centralization, demystification and structuring of the purchasing process of MCS could certain activities also be outsourced. Further we point out a sequential development process of the centralized purchasing organization, where first strategic purchasing activities are centralized, then the tactical sourcing process. Finally companies, that have been working long time with centralization, also could centralize some of the operative ordering activities, e.g. by automating or outsourcing some of them. Measurement and follow up are finally approached from the centralized function, but involve functional managers/users to get their assessments as input regarding individual consultants.

Limitations and further research
The study is limited to the general boundaries of case study research, e.g. the inherent boundaries of the range and size of the sample. Four large companies from four different industries have been studied, and this research could be extended by more companies – especially from other industries and sizes. Although some of the companies have been global, the data collection has been done mainly in Sweden, a country that from a cultural perspective is characterized as a feminine and low level uncertainty avoidance culture. Our observations of processes that have increased their formalization and created a larger distance between functional user and provider are not fully in line with the current research of Pemer *et al* (2014a). The cultural aspects of the centralization issue, especially when it should be implemented in global companies, is hence a research area worthwhile continuing in. Our findings should be seen as early indicators and propositions, and must be further evaluated and tested. Especially the question of where in the process specification of the service should be done could be further researched, as our observations differ from van Valk and Rozemeijer's (2009) suggestion. Research could for example investigate if the positioning is dependent of different situations and contingencies. Our proposition regarding the sequential centralization process must also be further tested.
Finally, the potential role and long term impact of middlemen's (vendor brokers) involvement in the purchasing process of services would be interesting to increase knowledge about. Issues here could be the development of middlemen's power position, and the functional user's acceptance for those new players. Of interest would also be how problems in the service delivery are handled when the client's contract is with the vendor broker, and how risk and gain sharing looks like in this extended service supply chain. Another research topic is the middlemen's role in the service triad, e.g. the vendor broker's relation to their suppliers (the consultancy forms) and how it works with communication and feedback. In this direction follows also issues connected with if the client would like to transfer more of consultancy projects into performance based contracting.

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CHARACTERIZATION OF FOOD PROCESSING MANUFACTURERS WITHIN THE CHAOPRAYA WATERSHED

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Introduction

Food industry is, economically, one of the most important manufacturing sector of Thailand. Possessing the rich of natural resources, the country's food processing industry is relied on agricultural products, within related supply chains. There are plenty of agricultural products, which are used as raw materials in the food industry. Moreover, Thailand also exploits modern production technology for adding value to agricultural products. This mechanism strengthens the food security of the country. Although most processed food products target the international market, domestic consumption continues to grow due to lifestyle changes that have resulted in increased demand for greater convenience concerning food. Processed food products are available in a wide variety of local retail outlets, most major Thai supermarkets such as Tesco Lotus, Makro, Gourmet Market, Big C, Foodland, and Tops. The boost by a government policy, namely, "Kitchen of the World", is a driving force for Thailand's food industry has expanded in recent years. The policy has focused, tactically, on the field of food production in the region and expand investment channels to an increasingly global market. Thailand, recently, become an important production-base in the region, and a major food exporter in the world market. In 2014, Thailand exported about US$ 30 billion in the amount of food to the major countries, such as Japan, USA, China, UK and ASEAN. Thailand's food exports are evenly distributed across major geographical regions. National Institute for Food (NIF) states that Japan was Thailand's biggest market for food products, taking 14% of the total the export values, followed by the US at 11.1%, China at 7.6%, and Indonesia 3.8%. NIF, in addition, forecasts that Thailand's food industry will increase by 17% in 2015. Important Thai food exports in the following areas: fishery products, meat products, cereal products, fruit products, and vegetable products as shown in table 1 Thailand's exported food products, 2011 – 2014.

In the year 2011, Thailand's worst flooding in half a century, is severely impaired the economies of the industry and society. Floodwaters inundated 90 billion square kilometres of land, more than two-thirds of the country, ranking as the costliest natural disaster. Flood crisis affected a total of 4,039,459 households and 13,425,869 people; 2,329 houses were completely destroyed, while 96,833 houses were partially damaged; the death toll has reached 657 people and 3 were missing. As of December 2011, World Bank estimates the damage to have reached THB 1,440 billion. Because of the effects on the major industrial sector, unemployment repressed due to the closure of several factories. The economy continues to be in an awkward position that the impact of flooding has reduced the confidence of investors and insurance, which will lead to an increase in unemployment and poor economy. The water has cut off areas north of Bangkok, including a significant number of key industrial centers located in the Chao Phraya watershed, and the output is stopped. Food processing industry, another substantial income in the economy has suffered a loss of THB 1.2 billion.

These types of natural disasters do not fundamentally change the current structure of food processing supply chains as the companies concerned will pay more attention to planning for emergencies, business continuity risk management of suppliers and management of its operations. The logic of this argument is based on the fact that the relevant place of production selected for economic reasons, and which might not easily be changed due to natural disasters. We now consider the characterization of food industry supply chain network for business continuity which may disrupt flood disaster, looking at the case of a manufactures in the Chaopraya watershed area. Effective food supply chain network (FSCN) is explored dynamic behaviours for Thai food manufacturers a competitive advantage and improve the flexibility of the organization very devastative flood disaster today.

This study identifies the behavioural characteristics of dynamic FSCN from the producers of food processing and tests their relationship to organizational performance. The main focus is to explore the characters and behaviours of food processing manufacturers within the Chaopraya watershed. Data were collected from the enterprises of food processing supply chain in the area. The questionnaire was distributed to organizations in the four food industry supply network i.e. processed meat, processed fruit, packed rice, and sugar. The observed data were analyzed based on collaborative strategy framework. using statistical analysis software package with appropriate descriptive analysis. The finding results will be an underpinning data to formulating of damage evaluation model: modification of existing model flood and drought damage function model. The fundamental limitation of lacking d of data sources.

Related literature

Overview of Thai food processing supply chain

In 2014, GDP agriculture agricultural sector (excluding forestry) accounted for 39.14 billion USD or 10.5 % of nominal GDP of the country. Thai food processing industry's raw materials is relied on production of agricultural supply chain, with complement with of imported agricultural raw materials, partly. The underpinning agricultural sub-sectors are crop production 84 %, livestock 9 %, and fisheries 7%, respectively. The cereal crops mainly comprise of sugarcane, rice, cassava, while fruit corps include mango, pineapple plants. Vegetable corps, majorly, consist of potatoes, garlic, onions, shallots. Livestock groups include chicken meat, and fisheries include shrimp (please see details in table 1). Thailand's agricultural sector utilizes 12.7 million workers, representing 33.4 % of the country's employment.

Food processing production has the highest proportion value of Thai manufacturing sector, accounted for 22 % of GDP in the entire manufacturing sector in 2014. Main players of food processing industry are in small and medium enterprises (SMEs). Production capacity of Thai food processing industry increase continuously to 28.5 million metric tons, which 59% for domestic market, 35% supply to export market, and the rest 6% is reserve as nation food security storage. The food processing products on the domestic market, include condiments, feed package, vegetable oil, animal fats, meat and dairy products, respectively. While the major export food processing product are cassava starch, sugar. aquatic processing, and process fruit and vegetable. The food processing industry have used appropriated innovative technologies, which can add value and achieved the quality and safety standards at the international level.

Export Group	2011		2012		2013		2014	
	Metric Ton	Million US$	Metric Ton	Million US$	Metric Ton	Million US$	Metric Ton	Million US$
Fisheries	1,669,774	7,977	1,632,453	7,958	1,406,924	6,789	1,419,377	6,322
Cereal	11,263,918	6,682	7,028,034	4,857	7,357,066	4,702	11,821,834	5,816
Meat	645,219	2,335	648,676	2,646	640,971	2,689	706,184	2,892
Sugar	6,521,046	3,602	6,853,112	3,929	5,994,946	2,812	6,293,590	2,710
Fruit	2,169,739	2,285	2,290,247	2,123	2,292,276	2,224	2,279,196	2,494
Non-Alcoholic Beverage	962,011	1,197	1,130,606	1,340	1,448,976	1,499	1,686,789	1,719
Tapioca starch'	1,894,194	928	2,237,932	993	2,451,236	1,135	3,019,855	1,268
Vegetable	528,353	645	508,943	612	473,368	601	495,019	629
Condiment & Seasoning	234,648	472	243,659	503	263,270	545	283,137	596
Alcoholic Beverage	306,386	338	616,609	547	392,110	450	316,080	436
Baby food	125,168	369	114,216	357	131,944	366	145,172	391
Palm oil	381,647	394	292,830	305	549,213	427	221,929	199
Confectionery	41,642	161	44,518	181	43,133	179	39,605	138
Other	1,172,678	2,269	1,266,311	2,365	1,417,236	2,615	1,450,116	2,805
Total Food	27,864,638	29,664	25,096,346	28,739	24,862,990	27,033	30,477,893	28,405

Table 1 Thailand's Exported Food Products, 2011 – 2014 Source: Anomynous (2015)

Food Supply Chain Network (FSCN)

The food industry is becoming an interconnected system with a large variety of relationships. This is reflected in the market place by the formation of (virtual) FSC alliances, horizontal and vertical cooperation, and forward and backward integration (Van der Vorst, et al., 2009). An FSCN comprises organizations that are responsible for the production and distribution of vegetable or animal-based products. From a general perspective, there are two main types:

1. FSCN for fresh agricultural products (such as fresh fruit and vegetables). In general, these schemes may be manufacturers, auctions, wholesalers, importers and exporters, retailers and their suppliers, as well as specialized logistics services. Processes are the primary method of treatment (with air conditioning), storage, packaging, transport and distribution of food. Over time the quality of the product may either increase (e.g. fruit ripening) or decrease - if they are harvested at the mature stage.
2. FSCN for food (such as meat, portioned meals, snacks, desserts, canned). Generally, these chains consist of manufacturers, importers, food industry, and retailers and out-of- home segment and logistics service providers. In these chains, agricultural products used as raw material for the production of consumer goods with higher value added. Sometimes consumer goods hardly tenable on savings processes.

Supply Chain Risk Management in food industry

Several articles review of the literature on supply-chain disruption (Ellis et al., 2011; Ivanov et al., 2014; Heckmann et al., 2015). Tan and Musa (2011) show that research in this area has increased dramatically since 2004. Tang (2006) defines supply chain risk management as " the management of supply chain risks through coordination or collaboration among the supply chain partners so as to ensure profitability and continuity." Diabat et al. (2012) organize the risk sources relevant for supply chains into three categories: (1) external to the supply chain; (2) internal to the supply chain; and (3) network-related. Moreover, they classify risks into two categories: (1) supply risks (e.g. capacity limitations, currency fluctuations and supply disruptions); and (2) demand risks (e.g. seasonal imbalances, volatility of fads, new products). Since supply chain disruptions can have long-term negative effects on a firm's supply chain performance, competitiveness, and financial performance, firms need to implement a proactive supply chain risk management toward their vulnerabilities.

The manufacturing process may be designed in different ways. For example, changes in manufacturing activity may be indicated by a comparison output during certain subsequent periods. This method of analysis generally provides acceptable measurement variable success of the manufacturing process, but says little about the production process itself (Kittipanya-ngam et al., 2011). Nothing indicated the relative importance of different types of productive activity or the respective amounts of productive resources are used in the production of different types of property. The results illustrate the significant positive relationships between the eight characteristics of FSCN and organizational performance. This indicates the importance of these behavioural characteristics FSCN dynamics that companies need to develop and implement effectively to maximize organizational performance. The results reveal that the flexibility of the organization has the strongest relationship with performance. Therefore, it should be a top priority of management in the implementation FSCN.

Effect of Natural Disasters to Supply-chain disruption

Contemporaneous with rising climate change, the frequency of natural disasters in the world has been steadily increasing over the years, reaching its highest rate (with an average of 450 natural disasters per year) in the past decade. Flood, one of devastated natural disasters, inflict tremendous social, economic and human costs. It has the potential to affect the economic development not only of a domestic economy, but also the rest of the world, given the extent of interconnected production networks in this globalized era. Several recent flood disasters have been of an extremely large magnitude and have resulted in proportionately large economic and social costs for the affected domestic economies, and their effects have increasingly extended to many other parts of the world. Flood disasters not only create large economic costs, but also have a direct impact on people in terms of loss of lives and dislocation of families. Thus, it is imperative for us to study these tragic events carefully, to ascertain policy gaps and lessons, and to highlight key economic and social policies to manage such a disaster. Pettit et al. (2011) suggests that the new economic dimension of natural disasters is a fragile supply chains. As policymakers must address the dangers to citizens caused by natural disasters, it is now necessary for economists and business people to find ways to soften. The very real threat of these events on the international economy. Many Japanese companies, have operations in Thailand, play important role in the supply chains. The companies that suffer significant efforts to recover activities quickly. In the latter two cases, serious problems need to be addressed. In addition, assessing how disasters may influence firms' strategic decisions regarding their subsidiary activity and structure, managers may employ an initial risk calculus where the firm's response would be in proportion to the loss of life and the duration and severity of the disaster (Abe and Thangavelu 2012). Chomsri and Sherer (2013) shows the most recent example of a major natural disaster disrupt both domestic production and regional supply chains in Thailand in the fall of 2011, when production was affected by widespread flooding in huge parts of the country. This was the second incident within one year have been severely affected by a major natural disaster, the activities of "Factory Asia", and served to the threat to the global manufacturing and the need for appropriate measures to be taken to further underline. Abe and Thangavelu (2012) study, on Indonesia, the economic and social consequences of the earthquake in Yogyakarta in 2006. The earthquake led to the deaths of more than 5,700 people, and hundreds of thousands lost their homes. The paper examines the determinants of livelihood recovery after this natural disaster and in particular the role of the support that the recovery process. They found that: (a) small businesses are resilient and thus be able to recover faster; (b) an industrial cluster system within a district judge provides the necessary support for the companies to recover; (c) the quality of the village infrastructure can be important; and (d) it is important to support early as possible to minimize the damage caused by natural disasters.

In recovery phase after natural disaster hit, supply chain resiliency is enhanced when the capacity is increased by the alternative sources of supply. A number of documents, to evaluate the benefits of using multiple power sources. Anupindi and Akella (1993) consider the procedure for the assignment between the two providers, one of which is more expensive, and the production process makes it uncertain supply. Development of an optimal ordering policy for three types of contracts. Li et al. (2010), to analyze the situation of a dealer who buys from two suppliers (subject to random failures) and the spot market. The stated results include the characteristic equivalent Librium prices, the impact of pricing strategies violations, as well as the coordination mechanism in order to maximize profits, if the suppliers cooperate.

Collaborative supply chain (CSC)

Collaboration between supply chain partners was widely covered in the strategic management literature (Gilmour 1999, Bowersox et al. 2000). Studies have shown more research, for example, those in the main direction of the supply chain is to improve the inter-enterprises level (Stank et al. 1999). Chen (2001) has examined the theoretical implications of supply chain collaboration and by unilateral policies. Others have used theoretical models to examine the bilateral exchange of information instead of unilateral political incentives (He et al. 2002, Li 2002). Some studies, recently, (Simatupang and Sridharan 2005, Lambert et al. 2004), are interested in a better characterization of the CSC. SC is working often defined as two or more companies working together to create a competitive advantage and more profile that can only be achieved by acting alone. In the paper the term collaboration, is chosen to describe the close cooperation between independent partners in the mutual efforts to effectively meet the needs of the end customer at a lower cost. The advent of supply chain collaboration creates a need, to inter- enterprises level, to pay particular attention to the understanding of cooperation to prepare the partner for the creation of collaborative e ff orts success (Lambert et al. 2004)

The advent of collaborative supply chain creates the need, multi-level to pay particular attention to the understanding of cooperation to prepare members of the chain to create a successful partnership initiative (Lambert et al., 2004). However, previous research supports the hypothesis that collaboration is a one-way phenomenon that emphasizes collaboration feature such as information sharing or co-managed inventory. Little attention was paid to capture the different features that represent different areas of cooperation. This lack of consideration helps explain why operators find it difficult to address the issue of partnership understanding (Mentzer et al., 2000). Alternatively, a mutual approach is more appropriate to define the collaborative supply chain because explicitly revealed a phenomenon of interaction between key collaboration features (Lee, 2000). Since the objective of improving the overall performance, the mutual approach is to ensure that the main characteristics match or complementary.

Building a framework for characterization of food industry supply chain network

In order to identifies the behavioural characteristics of dynamic FSCN from the food processing producers and tests their relationship to organizational performance, the methodology must be as follow:

1) To explore the typical characteristics exhibited by manufacturers who are in the Chaopraya watershed area. The study data are collected from 151 manufacturing organizations in the Chaopraya watershed region, located on the banks of Chaopraya River, listed from north to south.
2) To identify dynamic behaviours in food processing businesses that have specifically increased the complexity beyond the capability of existing supply risk management approaches.

This article selected the term collaboration to address the close cooperation between strategic partners who are involved in joint efforts to effectively meet describe the needs of customers from the end of less. The emergence of supply chain collaboration creates a need, at the international level companies, to pay particular attention to the concept of collaboration to prepare partners for joint efforts with success (Derrouiche, et al. 2008).

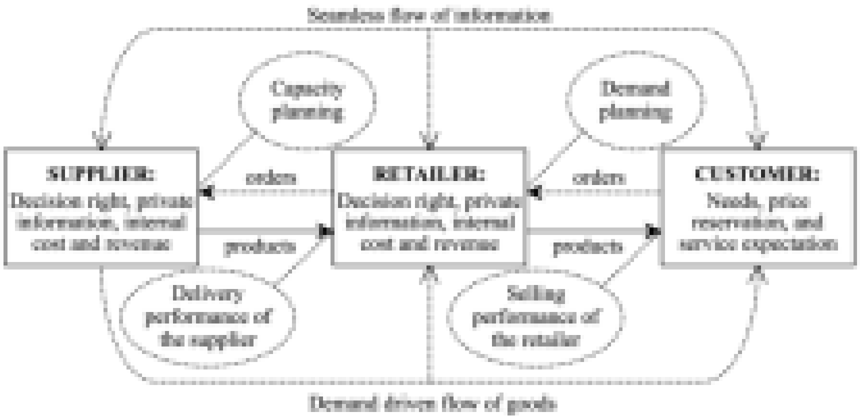

Figure. 1. A simple structure of a collaborative supply chain (Simatupang, and Sridharan, 2004)

Figure 1 shows a simple structure of the collaborative SC with two players who are on the same consumer. Consumers may be included in the collective, if it takes a major role participating in the development and delivery of the product. The following properties are inherent to SC: the retailer has the right to make decisions to make (for example, placing orders and targeted sales), personal information, (e.g. consumer demand) and internal costs and revenues. The supplier also has the right to their own solutions (e.g. supply and installation of the production), personal information (e.g., product specifications) and the internal costs and revenues (Simatupang, and Sridharan, 2004).

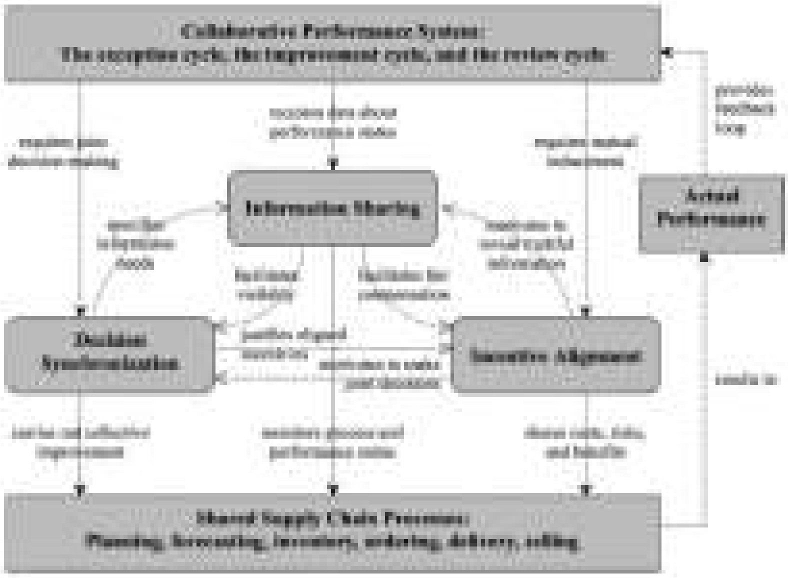

Figure. 2. the collaborative supply chain framework (Simatupang and Sridharan, 2005).

Simatupang and Sridharan (2005) presents a framework for understanding the phenomenon of interaction among the different characteristics of cooperation in the supply chain of the Inter-Organization perspective. It consists of five cooperation elements, that constitute the core of the collaborative supply chain framework (CSCF): (1) a collaborative performance system (CPS), (2) information sharing; (3) decision synchronization, (4) incentive alignment; and (5) integrated supply chain processes, as show in figure 2. By theoretical, in addition with empirical background evidence is produced to justify and support the proposed framework (Simatupang and Sridharan, 2005). Each function can be considered as the favourable factor that facilitates collaboration acts. The arrows in Figure 2 represent an attempt to capture the dynamic nature of the reciprocal relationship between multiple frame of connection characteristics.

Methodology

Data collections and sample

In this paper, we construct the questionnaire survey, based on collaborative supply chain framework (CSCF) which proposed by Simatupang and Sridharan (2005). A regional self-reported manufacturer questionnaire survey was carried out in food processing industry sector in Thailand. A sampling based on the Chaopraya watershed area (according to Department of Water Resource (DWR), comprises, geographically, of 19 provinces, this thesis will scope the area in 9 provinces: Nakhon Sawan, Chainat, Singburi, Ang Thong, Ayutthaya, Pathum Thani, Nonthaburi, Bangkok and Samut Prakan, following the Chaopraya water board, as stated by DWR.) was conducted to ensure the representativeness of the regional-wide surveyed sample. Data were collected from the enterprises of food processing supply chain in the area.

Factor	Catigories	Amount	Percentage
Number of employees	Up to 10	18	11.92%
	11-50	72	47.68%
	51-250	42	27.81%
	over 250	18	11.92%
Registed Capital (THB Millon)	Up to 2	11	7.28%
	3-10	40	26.49%
	11-55	24	15.89%
	56-100	12	7.95%
	Over 100	13	8.61%
Annual income (THB Millon)	Up to 10	10	6.62%
	11-50	39	25.83%
	51-100	25	16.56%
	101-500	12	7.95%
	over 500	14	9.27%
Ownership structure	Domestic private	72	47.68%
	Domestic public	13	8.61%
	Foreign	0	0.00%
	Combined domestic/foreign	15	9.93%
Indusrty	Prossed Fruit	58	38.41%
	Packed Rice	61	40.40%
	sugar	32	21.19%
		151	

Table 2 Summarizes the company characteristics of the respondents to this survey

Source: Authors' own research

The questionnaire was distributed to organizations in the four food industry supply network i.e. sugar, packed rice, and processed fruit. The sampling unit is the business firms and the questionnaire was rated by respondents with the main responsibilities for supply chain risk management. General company-profiles (e.g. number of employee, registered capital, annual income level, entrepreneurship status, and industry type) were also collected. Of a total of 300 questionnaires sent out, 151 were returned, with a successful response rate of 40.33 per cent, as shown in Table 2.

Data analysis and results

The results from one-way ANOVA tests shown in Table 3 indicate that food processing manufacturers' practices toward awareness of collaboration strategy, namely well development of front end agreement, create joint business plan, and create sales forecast, indeed differ among these three clusters, respectively ($F\text{–value}_{sugar}$=565.32, p<0:0001; $F\text{–value}_{packed\ rice}$=35:98, p< 0:0001; $F\text{-value}_{processed\ Fruit}$= 1313:05, p< 0:0001). The mean scores of the respondents' well development of front end agreement for sugar, packed rice, and processed meat are 2.44, 3.90, and 5.5.57, respectively; and the mean scores of the respondents' create joint business plan for sugar, packed rice, and processed fruit are 5.00, 4.87, and 5.64, respectively. The mean scores of the respondents' create sales forecast: sales forecast exception criteria for sugar, packed rice, and processed fruit are 2.61, 4.07, and 5.60, respectively.

The results from repeated measures ANOVA tests for each segment are also reported in table 3. The respondents of each segment indeed have different levels of collaboration strategy practicing in the nine criterion of CSCF, based-on to the food supply chain network (FSCN) investigated in this study ($F\text{-value}_{sugar}$ = 3:88; p < 0:0001; $F\text{–value}_{packed\ rice}$= 27:33; p < 0:0027; $F\text{–value}_{processed\ fruit}$= 8:78; p < 0:0001).

Charaterization by Collaboration Strategy	Sugar		Packed Rice		Processed Fruit			
	n_1=26		n_2=35		n_3=91			
	Mean	SD	Mean	SD	Mean	SD	F-Value	Pr>F
1. Well development of front end agreement	2.46	0.87	3.90	0.77	5.57	0.85	565.32	<0.0001
2. Create joint business plan	5.00	1.30	4.87	0.85	5.64	0.83	35.98	<0.0001
3. Create sales forecast: sales forecast exception criteria	2.61	0.66	4.07	0.41	5.80	0.53	1313.05	<0.0001
4. Identify exceptions for order forecast: order forecast exception criteria	2.43	1.00	3.71	0.92	5.18	1.11	295.18	<0.0001
5. Resolve on exception items	2.62	0.91	4.19	0.74	5.89	0.75	583.92	<0.0001
6. Resolve on Delivery condition	2.51	0.88	3.93	0.74	5.54	0.84	550.31	<0.0001
7. Order forecast	3.45	1.19	4.64	0.99	5.61	0.82	185.61	<0.0001
8. Order generation	2.76	1.03	4.11	0.83	5.73	0.69	485.23	<0.0001
9. Delivery process	2.87	1.32	4.59	1.09	5.85	0.92	290.9	<0.0001
	3.86		23.71		8.76			
	<0.0027		<0.0001		<0.0001			

Table 3 Mean scores characterization of food processing manufacturers by Collaboration Strategy
Source: Authors' own research

Conclusion

In conclusion, FSCN with the Chaopraya Watershed no matter whether industrial types are lack of strategically supply chain risk management, they do significantly not exploit collaborative strategy practices. However, the respondents among the three food processing networks all utilize joint business plan. Furthermore, the respondents loosely possess cooperation in delivery and order fulfil processes.

Indeed, the manufacturing process may be designed in different ways. For example, changes in manufacturing activity may be indicated by a comparison output during certain subsequent periods. This method of analysis generally provides acceptable measurement variable success of the manufacturing process, but says little about the production process itself. Nothing indicated the relative importance of different types of productive activity or the respective amounts of productive resources are used in the production of different types of property. The study helps manufacturers in the development and implementation of effective FSCN. The next step is developing a damage recovery from flood disasters numerical model, based on the complexity beyond the capability of existing supply risk management approaches.

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COMPARING DIFFERENT PERCEPTIONS TOWARD LOGISTICS MEGA PROJECT: A CASE OF PAKBARA DEEP SEA PORT IN THAILAND

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Introduction

Nowadays, the logistics infrastructure was play important role in developing area. Especially, the mega logistics project can ease daily live and can also bear the social attitude, which is the dominant factor to the project. There are many people who had affect with the project; government sector, private sector, especially local residents. This paper aims to demonstrate the conflict of perception on logistics mega project by using the case of Pakbara deep-sea port in Satun province, which is the project that had been planning for long time but there is no permission to construct until now. People who live in project area disagree with the government and push their campaign to against this project consistently.

The goal of this study is to better understand the difference perception between local residents on the logistics mega project in the case of Pakbara project in Thailand, including their concern about the project.

Literature Review

Social support

Social support is the support from individuals or groups. The social support may be in terms of information, money, workforce, or emotional support. This support can push the people who get supported o reach the goals (Caplan, 1976). In Addition, Gottlieb (1985), Duangkhamsawad, (1996), Cassel (1997) mentioned in the same that social support is giving the helps in terms of information data and psychological support for those who were supported.

In another way, there is the difference definition of social support. Albrech et al. (1987) mentioned that social support is the reaction between the donor and recipient to help, including the developing the awareness of the issues. In this paper, the study of perceptions of the people to mega project in Thailand: Pakbara deep-sea port, was develop the support model under the concept of social support from Caplan (1976), Gottlieb (1985), Duangkhamsawad, (1996), and Cassel (1997). The social support in mega project divided into 4 aspects: emotional, appraisal, information, and instrument support.

Literature in port development project

There are many papers that studied about the development in port. Anastasopoulos, Kolios,, & Stylios (2011) Wang (2011), Jiun-Bing Sheu et. Al (2013), Burskyte, Belous, and Stasiskiene (2011), and Shan, Yu, and Lee (2014) mentioned about port development that the key factor of successful port development is the readiness of basic facility. The seaports in the many countries have successful in port operation because they had good infrastructure. For example, Rotterdam port in Netherland has the warehouse for special containers; there are a lot of technology to transfers the containers, etc.

From the literature review found that the most of researches were about port operation, including the impact arising from port operation. There is less studied about the perception of the port project. In addition, there is less research about the conflict on the logistics project from stakeholders, especially institutional trust. Therefore, this study aims to demonstrate the perception of people on port project by comparing the difference perception between stakeholders in that area.

Methodology

For comparing the perception of locals, the respondents were separated in 2 groups. The multiple group analysis will be in term of the difference in gender (male and female) and the difference in address (La-ngu district and other district) (Figure 1).

The perceptions of supporting Pakbara deep-sea port was used under the sustainable development model which consists of 3 aspects: economic, environment, and social and culture (WCED, 1987). Moreover, this study aims to examine the perceptions on logistics mega project, the logistics and technology aspect was added to the model. In addition, this project has a lot of conflict between stakeholders. Therefore, the trust aspect was added to the model as well.

In endogenous latent variable, the supporting theory was used to explain the supporting of the project. The social support is consists of 4 aspects; emotional, appraisal, information, and instrument support (Gottlieb, 1985).

Construct		Items	Item description
Supporting the project	SUP	SUP_1	emotional support
		SUP_2	appraisal support
		SUP_3	information support
		SUP_4	instrument support

Table 1: The observed variables for endogenous latent variable

Construct		Items	Item description
Economic	ECN	ECN_1	better income distribution
		ECN_2	higher employment
		ECN_3	higher land value
		ECN_4	higher foreign investment
		ECN_5	better economic in overview
Environment	ENV	ENV_1	air pollution
		ENV_2	noise pollution
		ENV_3	waste pollution
		ENV_4	marine resource
		ENV_5	worse environment in overview
Social & culture	SOC	SOC_1	more safety
		SOC_2	better life style
		SOC_3	more turbulence
		SOC_4	worse in health
		SOC_5	better social and culture in overview
Logistics & Technology	LOG	LOG_1	variety of transportation mode
		LOG_2	variety of route
		LOG_3	easier to connect by electronics
		LOG_4	better technology in port
		LOG_5	better logistics in overview
Institutional Trust	TRS	TRS_1	more trust in main government
		TRS_2	more trust in local government
		TRS_3	more trust in project owner
		TRS_4	more trust in institution overview

Table 2: The observed variables for exogenous latent variables

The data of this study were collected through a self-administrative questionnaire. The questionnaire was distributed to 310 people who live in Satun province. The number of samples was calculated by the Rule of Thumb in the ratio of 1 parameter to 5 samples (Diana, 2006). The questionnaire consisted of 4 parts: social-economic demography, the perception of impact from this project, the perceived support in this project and the suggestion for this project. The questions of this study were used in Likert scale questions from 1 (strongly disagree) to 5 (strongly agree). The multiple groups – structural equation model (MG-SEM) was conducted for measuring the difference local perceptions.

This paper use Structural Equation Model (SEM) using "Lavaan" package in R software to access the relationship between the impact and support for the project. SEM estimation consists of Confirmatory Factors Analysis (CFA) that was run to test the measurement model and Path analysis which is used to test the relationship between exogenous latent variable (impact) and endogenous latent variable (support). in this study, the multiple group structural equation model was used to demonstrate the SEM in terms of difference characteristics of respondents.

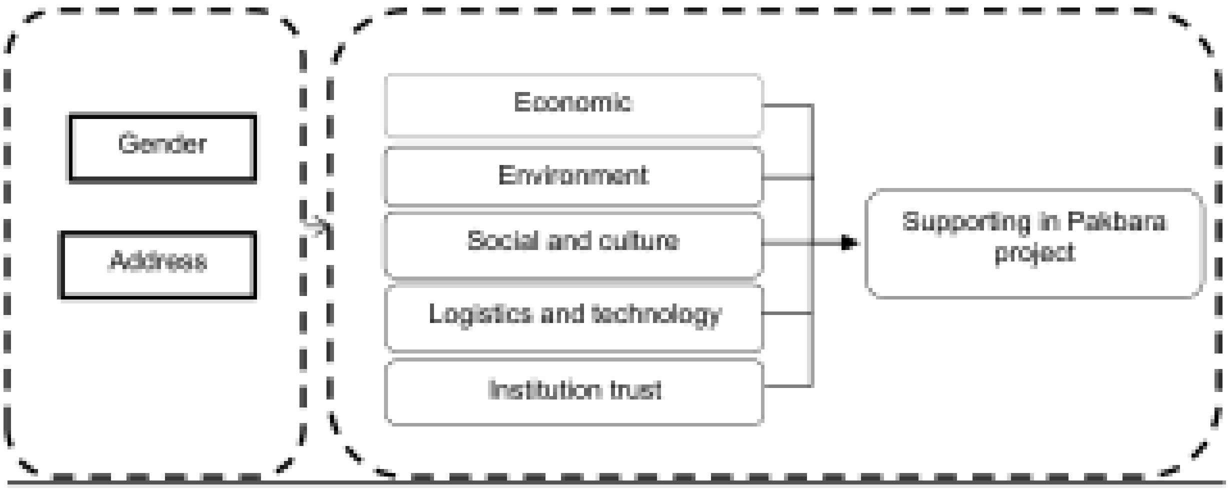


Figure 1: Conceptual Framework of this study/ Research model

Result

The characteristics of respondents

Genders	**Frequency**	**per cent**
Male	119	38.39
Female	191	61.61
Address		
La-ngu district	196	65.33
Other district	114	34.67
Total	**310**	**100.00**

Table 3: The characteristics of respondents

Respondents were questioned about demographic characters as shown in Table 1. There were 61.61% female respondents and 38.39% were male. The majority respondents were lived in La-ngu district which is the project area, with 65.33%, and 34.67% were live in the other district in Satun province as well.

The multiple groups – structural equation model (MG-SEM) (in Gender)

In term of gender, the multiple groups – structural equation model is statistically fitted to the data at the goodness of fit index more than 95% (CFI = 0.960, TLI = 0.952).

In measurement model of female, all items in economic aspect have statistically significant at at *p*<0.05. Higher land value (ECN_3) has highest factor loading (0.913). Better economic in overview (ECN5) has 0.904, higher foreign investment (ECN4) has 0.857 of factor loading, more job creation (ECN2) has 0.772, better income distribution (ECN1) has 0.733, respectively. In environment aspect, all items have significant. More waste pollution (ENV3) has highest factor loading, with 0.928, worse environment (ENV5) has 0.921, worse in marine resource (ENV4) has 0.918, more noise pollution (ENV2) has 0.854, more air pollution (ENV1) has 0.787, respectively. In social and culture aspect, there are only 3 items that have statistically significant; worse in health (SOC4) with 0.934 of factor loading, 0.892 in better social in overview (SOC5), and 0.663 in more turbulence (SOC3). In logistics aspect, 4 items have significant at *p*<0.05. Trust in project owner (TRS3) has highest factor loading, with 0.882, 0.787 in overview trust (TRS4), 0.836 in local government, and 0.673 in main government.

In measurement model of male, there is the same structure significant but there is a little bit different on factor loading. All items in economic aspect have statistically significant at at *p*<0.05. Higher land value (ECN_3) has highest factor loading (0.938). Better economic in overview (ECN5) has 0.888, higher foreign investment (ECN4) has 0.843, more job creation (ECN2) has 0.777, and better income distribution (ECN1) has 0.771, respectively. In environment aspect, all items have significant. More waste pollution (ENV3) has highest factor loading, with 0.906, worse environment (ENV5) has 0.872, worse in marine resource (ENV4) has 0.836, more noise pollution (ENV2) has 0.853, more air pollution (ENV1) has 0.788, respectively. In social and culture aspect, there are only 3 items that have statistically significant; worse in health (SOC4) with 0.922 of factor loading, 0.852 in better social in overview (SOC5), and 0.698 in more turbulence (SOC3). In logistics aspect, 4 items have significant at *p*<0.05, with 0.798 in variety of route (LOG2), 0.774 in better in logistics overview (LOG5), 0.767 in easier connect the information (LOG3), and 0.567 in variety of mode transportation (LOG1). In institutional trust, trust in project owner (TRS3) has highest factor loading, with 0.882, 0.787 in overview trust (TRS4), 0.836 in local government, and 0.673 in main government.

From figure 2, the MG – SEM in female was shown that the factors that have effect to female support are environmental impact (ENV) and institutional trust (TRS) with factor loading of -0.181 and 0.442. This means that the environmental impact had effect to female's support in negative way but it was quite small impact. The institutional trust had effect to female's support in positive way. On the other hand, the factor that has effect to male's support just only logistics and technology impact (LOG), with the factor loading 0.373. This means that logistics and technology impact has positive impact to male's support.

Construct	Estimate	Std. err	Z-value	P(>|z|)	Std. lv	Std. all
ECN	0.101	0.106	0.949	0.343	0.075	0.075
ENV	-0.227	0.100	-2.269	0.023	-0.181	-0.181
SOC	-0.195	0.123	-1.585	0.113	-0.125	-0.125
LOG	0.261	0.147	1.778	0.075	0.184	0.184
TRS	0.704	0.156	4.519	0.000	0.442	0.442

Table 4: The path analysis in MG-SEM (Female)

Construct	Estimate	Std. err	Z-value	P(>|z|)	Std. lv	Std. all
ECN	-0.015	0.154	-0.100	0.921	-0.012	0.012
ENV	-0.323	0.179	-1.800	0.072	-0.234	-0.234
SOC	-0.206	0.216	-0.957	0.339	-0.130	-0.130
LOG	0.728	0.345	2.112	0.035	0.373	0.373
TRS	0.143	0.207	0.693	0.448	0.082	0.082

Table 5: The path analysis in MG-SEM (Male)

The multiple groups – structural equation model (MG-SEM) (in Address)
In analysis of MG – SEM with the difference in address, we separate the respondents in 2 groups, the people who have lived in La-ngu district and other district in Satun province. The model was fitted more than 90% level of goodness of fit (CFI = 0.949, TLI = 0.939).

In measurement model of La-ngu people, all items in economic aspect have statistically significant at at $p<0.05$. Better economic in overview (ECN_5) has highest factor loading with 0.914, higher land value (ECN_3) has 0.895, higher foreign investment (ECN4) has 0.889, better income distribution (ECN1) and job creation (ECN2) has 0.808, respectively. In environment aspect, all items have significant too. More waste pollution (ENV3) has highest factor loading, with 0.889, worse in marine resource (ENV4) has 0.884, worse environment overview (ENV5) has 0.867, more noise pollution (ENV2) has 0.814, more air pollution (ENV1) has 0.691, respectively. In social and culture aspect found that there are only 3 items that have statistically significant; worse in health (SOC4) with 0.936 of factor loading, 0.879 in worse social and culture in overview (SOC5), and 0.679 in more turbulence (SOC3). In logistics aspect, 4 items have significant at $p<0.05$, with 0.845 in better in logistics overview (LOG5), 0.815 in easier connect the information (LOG3), 0.755 in variety of route (LOG2), and 0.716 in variety of mode transportation (LOG1). In trust aspect, trust in overview has highest factor loading with 0.882, 0.880 in trust in project owner (TRS3), 0.806 in local government trust, and 0.719 in main government, respectively.

In measurement model of other district people, there is the same structure significant but there is a little bit different on factor loading like the estimation in gender. All items in economic aspect have statistically significant at at $p<0.05$. Higher land value (ECN_3) has highest factor loading (0.949). Better economic in overview (ECN5) has 0.877, higher foreign investment (ECN4) has 0.805, more job creation (ECN2) has 0.718, and better income distribution (ECN1) has 0.661, respectively. In environment aspect, all items have significant. More waste pollution (ENV3) has highest factor loading, with 0.912, worse environment overview (ENV5) has 0.909, worse in marine resource (ENV4) has 0.871, more noise pollution (ENV2) has 0.858, more air pollution (ENV1) has 0.828, respectively. In social and culture aspect seen that there are only 3 items that have statistically significant; worse in health (SOC4) with 0.935 of factor loading, 0.846 in better social in overview (SOC5), and 0.653 in more turbulence (SOC3). In logistics aspect, 4 items have significant at $p<0.05$, with 0.890 in variety of route (LOG2), 0.786 in easier connect the information (LOG3), 0.667 in variety of mode transportation (LOG1) and 0.627 in better in logistics overview (LOG5). In institutional trust, trust in project owner (TRS3) has highest factor loading, with 0.899, 0.795 in local government (TRS2), 0.777 in overview trust (TRS4), and 0.544 in main government (TRS1).

From figure 3, the MG – SEM in address model is interesting that the people who live in project's area and others have completely difference perception in supporting this mega project. The impact aspect that has effect to people who live in La-ngu district are logistics and technology impact (LOG), institutional trust impact (TRS) and social impact (SOC) with the factor loading 0.388, 0.293 and -0.268, respectively. This means that social and cultural that may change from this project has negative effect to La-ngu people's support.

Construct	Estimate	Std. err	Z-value	P(>|z|)	Std. lv	Std. all
ECN	-0.122	0.096	-1.264	0.206	-0.121	-0.121
ENV	0.233	0.125	1.861	0.063	0.154	0.154
SOC	-0.369	0.120	-3.080	0.002	-0.268	-0.268
LOG	0.495	0.186	2.660	0.008	0.388	0.388
TRS	0.404	0.188	2.153	0.031	0.293	0.293

Table 6: The path analysis in MG-SEM (La-ngu people)

Construct	Estimate	Std. err	Z-value	P(>|z|)	Std. lv	Std. all
ECN	0.488	0.184	2.658	0.008	0.313	0.313
ENV	-0.487	0.139	-3.505	0.000	-0.433	-0.433
SOC	0.067	0.193	0.348	0.728	0.042	0.042
LOG	0.216	0.191	1.128	0.259	0.132	0.132
TRS	0.308	0.176	1.749	0.080	0.158	0.158

Table 7: The path analysis in MG-SEM (Other district people)

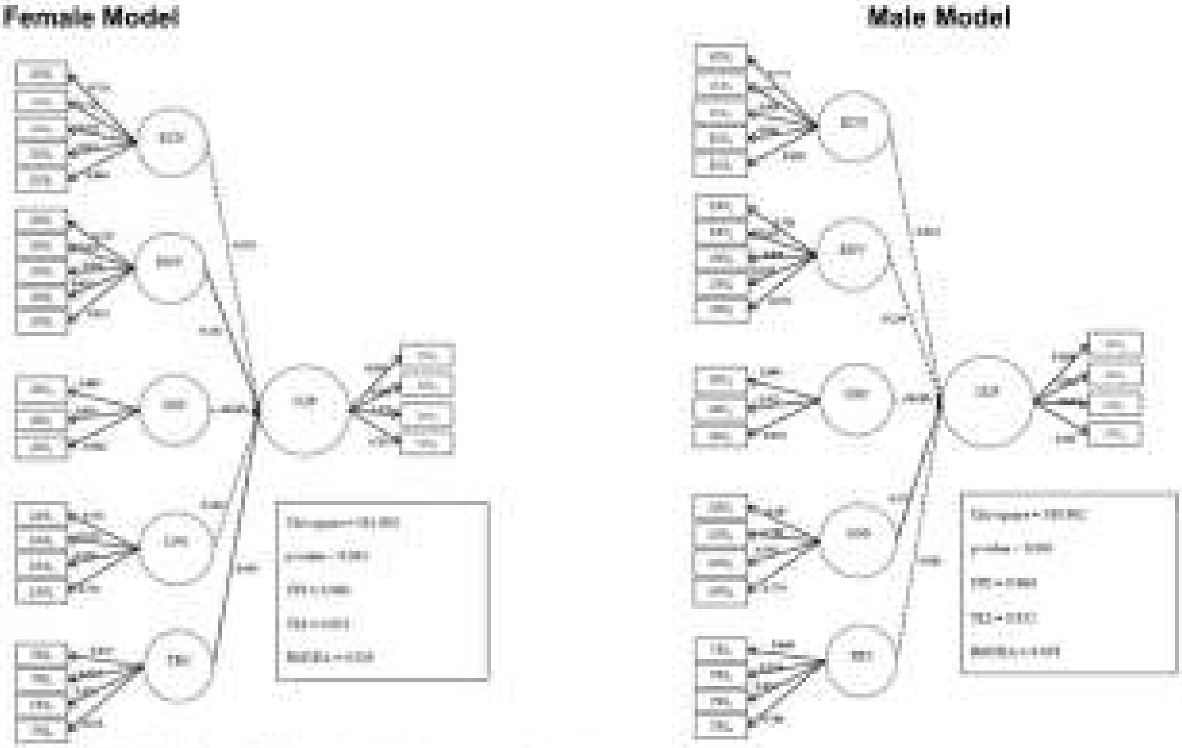
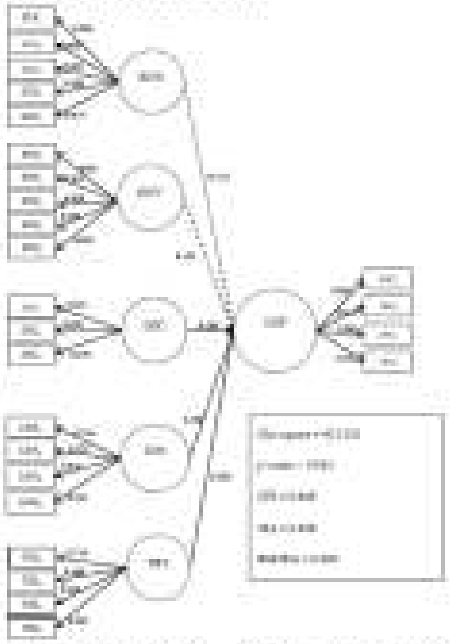


Figure 2: The MG – SEM analysis in term of gender

La-ngu district Model **other district Model**



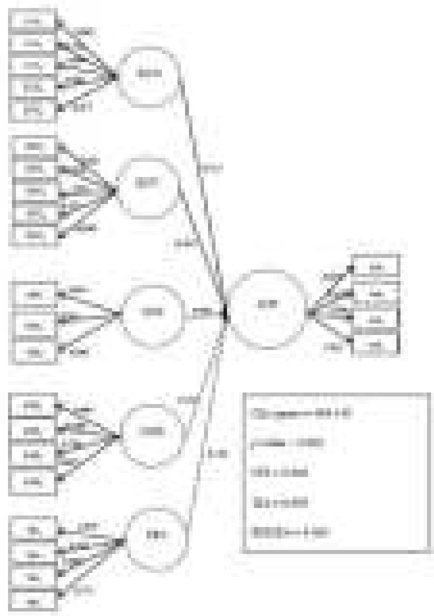


Figure 3: The MG – SEM analysis in tern of address

Conclusion

The mega logistics project has affected many stakeholders. There are evidences that the people with different characteristics have the difference perception. In this case, the result shows that the difference in gender and address has significant in their perception on logistics mega project. Female are more concerned about environmental and institutional aspect, but only logistics aspect that has affected to male. Moreover, it is interesting that people who live in difference area has completely difference perception in the mega logistics project. People who live near the project's area concerned about social and culture changing, logistics development, and institution trust, while the others more concerned about economics and environmental aspect. Therefore, the institution who conducted the project should consider in the different perception of stakeholders in order for project to proceed smoothly.

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