



# Internal Barriers of Energy Management Effectiveness by Using Reverse Logistics with Auto-Parts Industry in Thailand

Asst. Prof. Anuwat Charoensuk, Ph.D.\*

## Abstract

This research was conducted in order to study the effectiveness of energy management when reverse logistics was used in the auto-parts industry in Thailand and to investigate internal barriers that affected energy management effectiveness. Purposive random sampling was used to select the samples from 20 auto-parts industry companies consisting of 10 Tier 1 companies, 5 Tier 2 companies and 5 Tier 3 companies. The total number of participants was 1,120 employees. A 5-point rating Likert scale questionnaire was used to collect the data. The data were analyzed for descriptive analysis using SPSS and for confirmatory factor analysis (CFA), and single level Structural Equation Modeling analysis (SEM) using Mplus.

The results showed that the energy management effectiveness of using reverse logistics with the auto-parts industry in Thailand could be measured by three dimensions including cost (COS) with the factor loading of 0.882, time (TIM) with the factor loading of 0.848, and reliability (CON) with the factor loading of 0.799. The prediction power was 76.8%. Moreover, it was found that there were four internal barriers, with the factor loading of 0.670, that affected that energy management effectiveness of using reverse logistics with the auto-parts industry in Thailand including: 1) finance ( $\beta = 0.857$ ); 2) internal environment ( $\beta = 0.829$ ); 3) organizational structure ( $\beta = 0.771$ ); and 4) individual characteristics ( $\beta = 0.910$ ).

**Keywords:** revers logistics, auto-parts industries, energy management effectiveness, Thailand industries, internal barriers

---

\* Thai-Nichi Institute of Technology Bangkok, Thailand  
anuwat@tni.ac.th



## Introduction

One of the changes that Thailand had expected to occur after the opening of ASEAN Community in 2015 was to become a center of ASEAN countries such as a center of tourism and a center of aviation business (Office of National Economics and Social Development Board, 2013). Thailand was located in the center of ASEAN community; therefore, it provided an opportunity to Thailand to become a distribution center and a medical and public health center as well as supported the growth of tourism industry. Moreover, the automotive industry also provided a high economic value for Thailand with about 10% of gross domestic products (Thailand Automotive Institute & Ministry of Industry, 2012). Thus, Thailand had its aim to be a regional and global leader for automotive industry. With the growing economics in Thailand, it could not be denied that large amount of energy would be used for all industrial activities. More and more amount of energy use could be expected in the future. Ministry of Energy (2015) reported the statistic of energy use in different sectors as shown on Table 1. Industry was the sector that consumed energy the most and the second one was transportation.

**Table 1:** A Summary of Energy Consumption of Economics Sectors

Economic Sectors	Amount of Energy Use (ktoe)			Changing Ratio (%)	
	2013	2014	2015	2014	2015
Agriculture	1,648	1,662	1,735	0.8	4.4
Industry	11,668	11,812	11,859	1.2	0.4
Housing	4,768	4,815	5,023	1.0	4.3
Business	2,274	2,305	2,401	1.4	4.2
Transportation	11,168	11,262	12,220	0.9	8.5
<b>Total</b>	<b>31,526</b>	<b>31,859</b>	<b>33,238</b>	<b>1.1</b>	<b>4.3</b>

(Ministry of Energy, 2015)



One type of the automotive industry was auto-parts industry. The auto-parts industry was also an important industry in Thailand, especially Thailand was a base of motorcycle production and auto-parts production of the ASEAN region. Therefore, energy consumption was in the high amount. Auto-parts industry companies could not avoid the responsibility of some negative effect that could occur such as the emersion of carbon dioxide from the transportation vehicles, dust, waste, and energy waste. To solve these problems, reverse logistics seemed to be an effective solution as it was an operation that involved with return, disposal, reuse and recycle goods. Reuse and recycle were very important processes because companies could save cost for raw materials and goods. Using reverse logistics, instead of driving an empty truck back to a manufacturer, the truck could be filled with the returned goods that a manufacturer could reused or recycle them. Hence, if companies could manage reverse logistics effectively, companies could save more energy, cost, and environment. Steer (1977) addressed that factors affecting organizations' effectiveness were internal and external factors. The internal factors were the factors that organizations could control and manage such as tools and personnel. On the other hand, external factors were the factors that organizations could not control such as economy, laws, and politic.

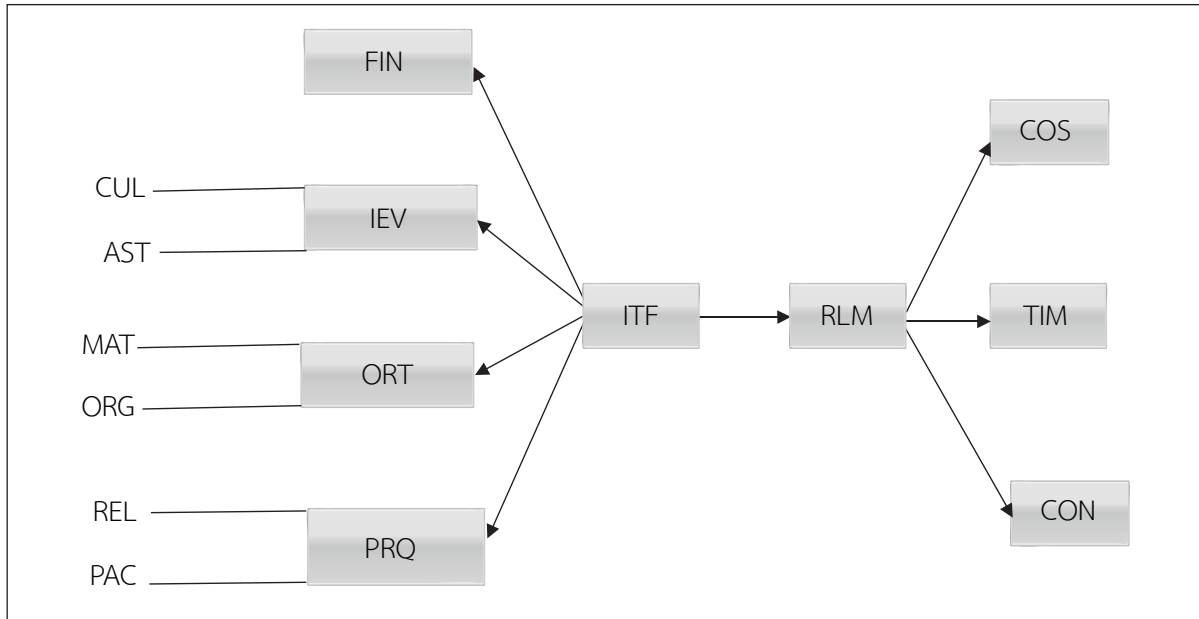
These factors were considered as barriers. The barriers could be divided into internal and external barriers. The researcher decided to investigate the internal factors because organizations would be able to manage them by themselves. To manage reverse logistics effectively, companies needed to manage the barriers first. However, in this study, to gain more insight, the researcher focused only on the internal barriers that affected the auto-parts industry companies in Thailand. To manage reverse logistics effectively, companies needed to manage the barriers first. However, in this study, to gain more insight, the researcher focused only on the internal barriers that affected the auto-parts industry companies in Thailand.

## Literature Review

Ravi and Shankar (2005) stated that the concept of reverse logistics had received more attention since the last decade. They identified 11 internal barriers that affected the effectiveness of reverse logistics management. Those barriers were lack of efficient information and technological systems, problems with product quality, company policy, resistance to change for activities related to reverse logistics, lack of appropriate performance metrics, lack of training related to reverse logistics, financial constraints, lack of commitment by top management, lack of awareness about reverse logistics, lack of strategic planning, and reluctance of the support of dealers, distributors and retailers.



## Framework



## Research Methodology

### *Participants*

The participants were employees who had responsibility in managing and operating reverse logistics, demand forecasting and planning, customer services planning and support, logistics communication and order processing, purchasing and procurement, material handling and packaging, inventory management as well as transportation managing and planning. Purposive random sampling method was used to select the samples from auto-parts industry companies including inside and outside industrial estates including 709 Tier 1 companies and 1,100 Tier 2 and Tier 3 companies. The participants were from ten Tier 1 companies, five Tier 2 companies, and five Tier 3 companies. Table 2 below is showing the number of auto-parts enterprises in Thailand.



Lau and Wang (2009) addressed that reverse logistics occurred from the drive of different factors that were system referring to basic structure and technology, economy referring to motivation and benefits, law referring to regulations and practices, and awareness referring to environmental interest, responsibility of goods producers and cooperation between supplier chain partners and competitors.

From the studies on automotive industry of Álvarez-Gil, Berrone, Husillos, and Lado (2007) and González-Torre, Álvarez, Sarkis, and Adenso-Díaz (2010), there were 4 internal barriers including lack of information and technological systems, lack of know-how, lack of top management commitment, and high cost in financial and human resources.

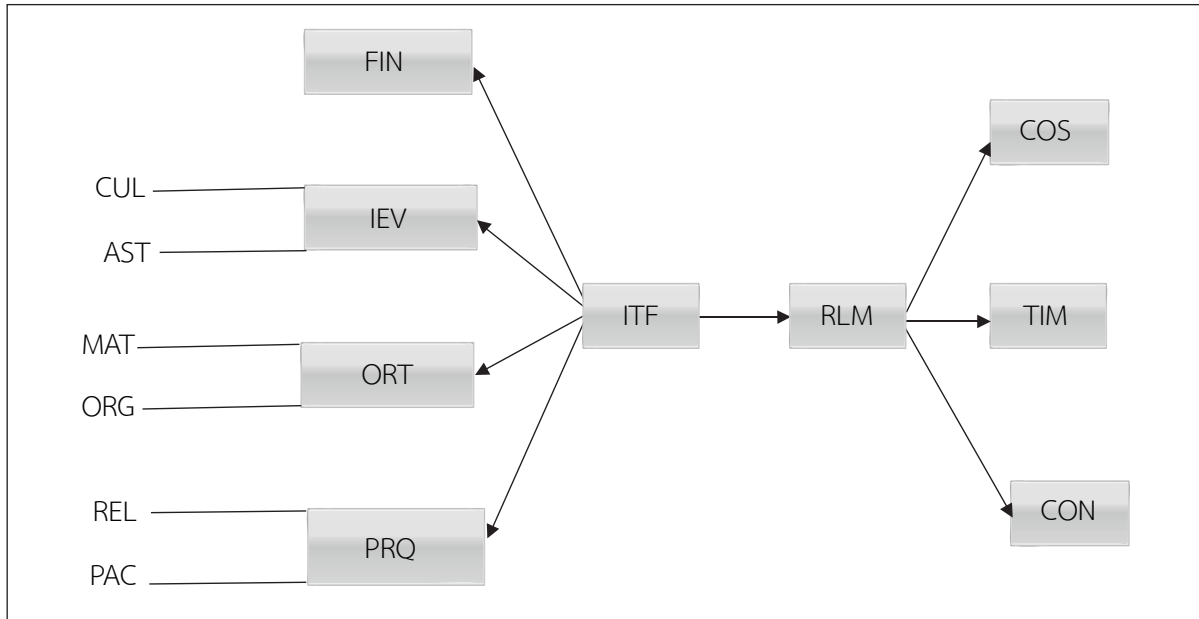
In addition, Abdulrahman, Gunasekaran, and Subramanian (2013) identified 4 internal barriers affecting reverse logistics management effectiveness. Their four internal barriers were management, finance, government law and policy, and basic structure. Ho, Choy, Lam, and Wong (2012) also agreed that financial issues were one of the internal barriers. They also raised 4 more barriers that were numbers of employees, human resources support, and awareness of advantages from reverse logistics.

From the review concepts, the researcher concluded that the internal barriers of reverse logistics management effectiveness were lack of efficient information and technology systems, problems of product quality, company policies, resistance to change for activities related reverse logistics, lack of appropriate performance, lack of training, financial limitation, lack of commitment by top management, and lack of strategic planning. Then to make it less complicated, the researcher integrated the mentioned barriers with the organizational concepts of Ivancevich and Donnelly (1973) and Steer (1977). Therefore, internal barriers could be divided into 4 dimensions.

The first dimension is finance referring to financial management in order to provide financial support to operate reverse logistics and to train employees as well as to follow up and examine tax policies. The second dimension was organizational structure referring to structure and technology systems. The third dimension was internal environment referring to organizational culture and atmosphere. The last dimension was individual characteristics referring to organizational commitment and personal academic pursue. To examine the internal barriers, the efficiency evaluation guideline of reverse logistics management from Ministry of Energy (2011) was used. The guideline evaluated the efficiency of each logistics activities in three dimensions including time, cost and reliability.



## Framework



## Research Methodology

### *Participants*

The participants were employees who had responsibility in managing and operating reverse logistics, demand forecasting and planning, customer services planning and support, logistics communication and order processing, purchasing and procurement, material handling and packaging, inventory management as well as transportation managing and planning. Purposive random sampling method was used to select the samples from auto-parts industry companies including inside and outside industrial estates including 709 Tier 1 companies and 1,100 Tier 2 and Tier 3 companies. The participants were from ten Tier 1 companies, five Tier 2 companies, and five Tier 3 companies. Table 2 below is showing the number of auto-parts enterprises in Thailand.



**Table2:** Number of Auto-Parts Enterprises in Thailand

	Numbers of Enterprises			Numbers of Employees
Enterprises	Motorcycle enterprises -7 companies -7 manufacturers	Sedan and truck enterprises -19 companies -19 manufacturers		Automotive enterprises -50,000 Dealers and Service centers -2,000,000
Tier 1 auto-parts manufacturers	Auto-parts manufacturers -396 companies	Motorcycle parts and Auto-parts Manufacturers -122 companies	Motorcycle parts manufacturers -201 companies	Auto-parts manufactures -350,000 Support industries -100,000
Tier 2 & 3 auto-parts manufacturers	Small and medium auto-parts manufacturers -1,100 companies			

Thailand Automotive Institute and Ministry of Industry (2012)

*Research Instrument*

The research instrument was a set of a 5-point rating Likert scale questionnaire divided into three sections. The first section was participants’ information. The second section was focusing on participants’ opinion towards external barriers of using reverse logistics in auto-parts industry companies. This section contained 86 items consisting of 14 items on organizational structure (ORT), 16 items on internal environment (IEV), 10 items on individual characteristics (PRQ), 18 items on finance (FIN), 9 items on cost (COS), 10 items on time (TIM), and 9 items on reliability (CON). The third section was an open-ended question for comments and suggestions.



The instrument was validated by three experts for content and construct validity. The instrument was revised and then piloted for its reliability. Cronbach’s alpha coefficient (Cronbach, 1970) was used for measuring internal consistency of items. The alpha coefficient of more than .5 was needed. After analyzed, the alpha coefficient of items was between .896-.971. Therefore, the result confirmed internal consistency of the instrument. Table 3 demonstrates the alpha coefficient of items of each barrier.

**Table 3:** Results of Alpha Coefficient of Each Variable

Variables	Alpha Coefficient
Organizational structure (ORT)	.896
Internal environment (IEV)	.897
Individual characteristics (PRQ)	.970
Finance (FIN)	.963
Cost (COS)	.899
Time (TIM)	.825
Reliability (CON)	.971

*Data Collection and Data Analysis*

The questionnaire was distributed to 1,500 participants and 1,120 sets of questionnaire were completed and returned. Then the data were analyzed for their descriptive analysis using SPSS and for confirmatory factor analysis (CFA) and single level Structural Equation Modeling analysis (SEM) using Mplus.





## Results

The first part of questionnaire was analyzed for descriptive analysis focusing on participants' demographic information. The result shows in Figure 1 below.

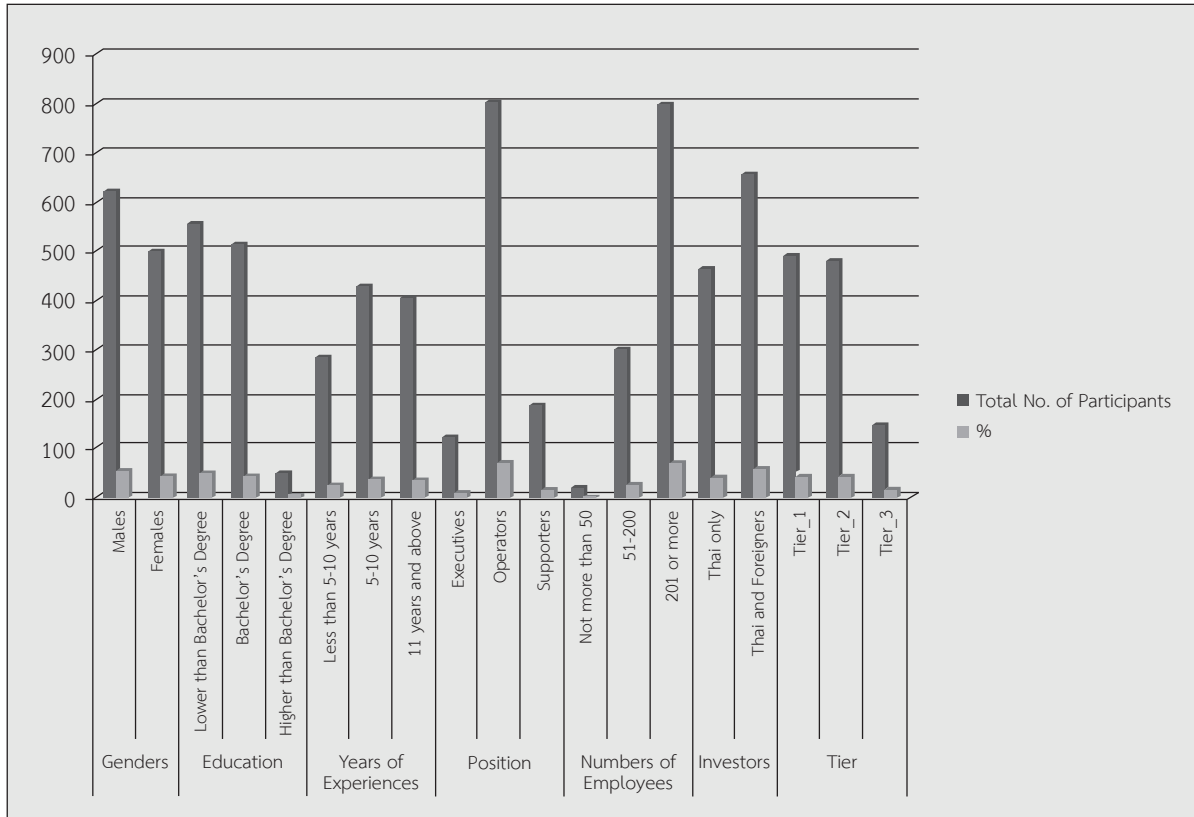


Figure 1: Demographic Information of Participants

From the graph, it shows that from 1,120 participants, there were 55.4% of males and 44.6% of females. Most participants did not have the bachelor's degree. For years of working experience, 38.3% had 5-10 years of experience, 36.3% had 11 years and above of experience, and the smallest group was 25.4% had less than 5 years of experience. The participants mostly were in the operation position. The data were collected mostly from companies with 201 employees and more. The companies with 100% Thai investors were 41.4% while the companies with parts of Thai and parts of foreign investors were 58.6%. The numbers of participants were 43.8% from Tier 1 companies, 42.9% from Tier 2 companies, and 16.6% from Tier 3 companies.



The data from the second part of the questionnaire were analyzed by Mplus for confirmatory factor analysis (CFA), and single level Structural Equation Modeling analysis (SEM). The results demonstrate on Table 4.

**Table 4:** Direct and Indirect Coefficient of Variation of Internal Barriers

Exogenous	Endogenous		
	Reverse Logistic Management (RLM)		
	Direct effect	Indirect effect	Total effect
FIN	0.857**	-	0.857**
IEV	0.829**	-	0.829**
ORT	0.771**	-	0.771**
PRQ	0.910**	-	0.910**
ITF	0.670**	-	0.670**
COS	0.882**	-	0.882**
TIM	0.848**	-	0.848**
CON	0.799**	-	0.799**
	R - square = 0.768		

\*\*Statistically Significant at 0.01

From Table 4, all variables were statistically significant. The overall internal barrier (ITF) affected the effectiveness of reverse logistics management of auto-parts industry companies with the factor loading of 0.670. The first internal barrier was finance with the factor loading of 0.857 and contained 18 variables. The three highest factor loading variables, ranging from the highest, were 1) budget control, 2) policies for budget management, and 3) providing data base for budget management between different departments in an organization.

The second internal barrier was internal environment with the factor loading of 0.829 and contained 14 variables. The three highest three highest factor loading variables were 1) specify clear responsibility in a written form, 2) have organized working processes, and 3) provide updated technology that could handle the future changes in operating design.



The third internal barrier was organizational structure. The organization structure had the factor loading of 0.771 and contained 16 variables. The three highest factor loading variables were 1) personnel's goal associated with organizational goal, 2) support of working as a team, and 3) internal environment was suitable to individual's needs.

The last barrier was individual characteristics with the factor loading of 0.910 and contained 10 variables. The three highest factor loading variables were 1) an individual capable of predicting future changes and adapting them for his or her own work, 2) an individual capable of improving their own work by searching for new knowledge themselves, and 3) an individual had confidence in his or her organization.

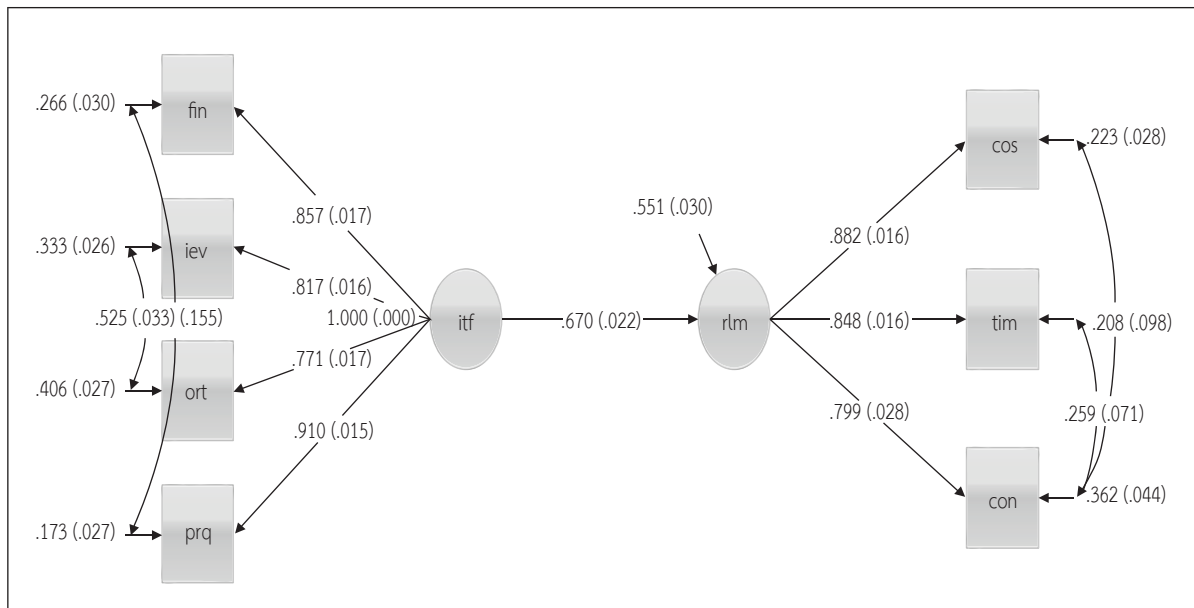
Furthermore, the internal barriers of the effectiveness of reverse logistics management of auto-parts industry companies was measure by using the three dimensions, the results revealed the factor loading of cost, time, and reliability.

Cost had factor loading at 0.899 and consisted of 9 variables. The three highest factor loading variables were cost for customer service. The second one was information processing cost per sales. The third highest ones included 3 variables with the same factor loading value that were forecasting cost per sales, transportation cost per sales, and inventory carrying cost per sales.

Time had factor loading at 0.824 and contained 10 variables. The three highest factor loading variables were average material handling and packaging cycle time, average inventory day, and average procurement cycle time, respectively.

Reliability had factor loading at 0.971 and contained 9 variables. The three highest factor loading variables were Delivered In-Full, On-Time (DIFOT) CS & Support rate, supplier DIFOT rate, and transportation DIFOT rate, respectively. The prediction power was 76.8%.

From the results, the model was created to demonstrate the causal relationship between internal barriers and the effectiveness of reverse logistics management. Figure 2 demonstrates the model.



Chi - square = 17.027, df = 9, p = 0.000, RMSEA = 0.030, CFI = 0.998, TLI = 0.996, SRMR = 0.010

**Figure 2: SEM Model of Causal Relation between Internal Barriers and Effectiveness of Reverse Logistics Management**

From Figure 2, the four barriers (FIN, IEV, ORT and PRQ) were the internal barriers (ITF). Individual characteristics had the most effect ( $\beta = 0.910$ ) on reverse logistics management (RLM). When combined four barriers together, the factor loading was down to 0.670. The model also showed the relationship between internal barriers and reverse logistics management (RLM). Then the effect of reverse logistics management would affect the three dimensions (COS, TIM, CON). It could be interpreted that if the four barriers were managed, reverse logistics management would be effective. When RLM was effective, it would increase the effectiveness of cost ( $\beta = 0.882$ ), time ( $\beta = 0.848$ ), and reliability ( $\beta = 0.799$ ).

### Discussion and Conclusion

The results of the present study confirmed the effect of internal barriers on the effectiveness of reverse logistics management including finance, internal environment, organizational structure, and individual characteristics. These barriers were such crucial factors that had strong effect on the reverse logistics management in auto-parts industry companies. By using Mplus with SEM, the model was created to illustrate the relationship among internal barriers and reverse logistics management. From the model, it could be interpreted that companies could save cost, time and increase their



reliability if they had effective reverse logistics management. Then the reverse logistics management would be success if companies could lower internal barriers.

Organizational structure was an internal barrier involving with two elements that were structure and technology systems. For structure, companies needed to organize their structure to suite with the operation. Structure should be flexible, clear, and organized which would make reverse logistics management successful. Vecchio (1991) and Luthans (2002) agreed that to organize any organizations, structure was important. It should be clear, suitable for work, and be able to respond for creative changes and development. Liu, Yamamoto, and Suk (2012) and Cagno, Worrell, Trianni, and Pugliese (2013) indicated that effective structure needed to determine clear responsibility for each position. Companies should have suitable numbers of employees who had appropriated qualification for their responsibility so that they could easily understand what they needed to do and communicate. Employees who worked in the same position could be able to substitute each other. Besides, human resources development needed to be on top management's concern.

For technology systems, companies needed to provide various kinds of technology devices because each duty may need different technology devices and programs. All devices should be in a ready-to-used condition. Data connection inside the companies should be provided. Companies should provide budgets to improve and purchase new technology devices and systems. Steer (1977), Scott (1992), Robgins (1993), and Hodge and Anthony (1994) stated that with the change of economics, many changes occurred to companies as well. Technology was one of them that was always improved. Thus, companies needed to be aware of this condition and have plans for their budgets. If companies had enough and suitable technology systems, internal connection would not be interrupted. The atmosphere of openly communicating was provided. Then the trust among employees and top management could be created. This phenomenon could affect a creative work and responsibility in fulfilling the goal of their own works. Moreover, Office of National Economics and Social Development Board (2013), Álvarez-Gil et al. (2007), Chan, Chan, and Jain (2012), Lau and Wang (2009), and González-Torre et al. (2010) indicated that lacking of efficient information and technology systems, enough resources, and individual factors could have negative effect on revers logistics management. Therefore, companies needed systems that were basic structure and technology in order to appropriately support the change of operation.

Internal environment included two elements that culture and atmosphere. The issues related to culture were a need of companies to create culture of teamwork, employees having their own goal that associated with companies' goal, knowledge transfer among employees, participation in companies' activities and companies promoting employees' ethics and morality. Hence, if companies had all of these issues, internal environment could not be a problem. Reverse logistics management could be successful. Smircich (1983), Schneider (1990) and Luthans (2002) agreed that organizational



culture could affect the effectiveness of organization operation. Organizational culture could promote employees' relationship and had a direct effect on individual behavior and attitude. It could affect management processes on motivation, leadership, decision making, communication, change, control, evaluation and assessment. As a result, top management needed to pay more attention in studying and using organizational culture to gain more benefits on organizational management.

Atmosphere was another element included in internal environment. This element related to building atmosphere in working places that were suitable for different needs of employees. The working places needed to have friendly atmosphere that every employee had good relationship. There no gap among employees in different levels and different ages. Employees should have freedom for creative ideas that stimulate their challenges. From that, companies could have new points of view and methods from different levels of employees. It also could create employees' royalty which reinforced the effectiveness of reverse logistic management.

In fact, every individual in a company needed a working place with good atmospheres, trust from others, communication channels from top-down and bottom-up, fairness, and opportunities for career progress (Cherrington, 1994; Liu et al., 2012; Stringer, 2002). Good atmosphere could affect individual's work and create motivation to complete the companies' goal and satisfy with their own work. Tan and Hosie (2010), Ho et al. (2012), Tan and Hosie (2010) Ho et al. (2012) and Liu et al. (2012) concluded that good atmosphere crated motivation for employees to work, and opportunities for create ideas. The companies would not rely only on a specific method. Finally, all individuals in a company had equal status.

Individual characteristics were the barrier that included two elements. The first one was organizational commitment. The related issues in this element were the confidence of employees to their companies. Companies needed to create employees' loyalty which would make employees feel like they owned the companies. Companies needed to communicate their goals to their employees in order for them to know and understand. Fairness and understand were also important. Steer 91977) and Luthans (2002) addressed that the relationship between commitment and effectiveness of organizations was strong. When employees had their commitment to their company, they would desire to do better. Companies needed to find a way to persuade employees to accept their goal and made employees feel valuable by providing them a clear responsibility that was suitable for their ability. They also should have an opportunity to make some decision that related to their own work. Tan and Hosie (2010), Ho et al. (2012), and Liu et al. (2012) confirmed that employees would commit to a company if a company provided them confidence. Therefore, a company's sincere was a main factor that tided employees to their company.

Personal academic pursue was another element of individual characteristics. From this element, companies needed to build employees that had wider points of view, were ready to search for new knowledge, was able to adapt themselves to changes, and was able to integrate knowledge



to solve problems. Companies should hire employees that were suitable for the job description and plan for human resource development. Training, field trips, and higher level education supports should be provided for the employees. Finnegan (1994) explained that companies that had employees who believed in their own career, they usually paid attention on information and follows social situations. They would join in meeting, training, and seminars in their own departments and/or other departments relating to their work. They would be interested in searching and developing their own work and be able to transfer their knowledge to other employees. This kind of individual would help companies develop effectively. González-Torre et al. (2010), Tan and Hosie (2010), Ho et al. (2012), and Zhu and Geng (2010) pointed out that for reverse logistics, lacking of training and specialists could cause negative effects on the operation and put employees in a problem that could not solve.

The last internal barrier was finance. The important thing was companies should have a transparent control system on budgets that focused on work quality. Resources needed to be used with their full benefits. Budgets needed to manage along with the companies' goal. The budgets could be adapted for appropriateness. Complicated processes should be avoided. Data base systems that provided information between different departments should be provided in order to eliminate limitation of financial activities. Previous studies (e.g., Ravi & Shankar, 2005; González-Torre, 2010; Tan & Hosie, 2010; Abdulrahman, 2013; Ho et al., 2012; Liu et al., 2012) stated that limitation of financial activities could have effects on many other factors such as the numbers of employees, technology, and human resources development. As a result, budget management systems needed to be transparent and suitable for an organizational need. Financial management needed to be smooth, flexible, and free from other parts of management as well as be able to adapt to changes.

In conclusion, the results of this study confirmed that four internal barriers of the effectiveness of reverse logistics management of auto-parts industry companies including organizational structure, internal environment, individual characteristics, and finance. The results also suggested that if companies could manage the internal barriers effectively, it would help strengthen the effectiveness of reverse logistics management and finally, companies could reduce cost and time, and increase companies' reliability.

### **Suggestion for Future Research**

The future research could be done on the external and internal barriers in different industries. It could be done in different regions of Thailand or in different counties. The results of studies would provide industry companies more insight about barriers that they would face with when using reverse logistics. It would also be a tool that helps companies to decide whether reverse logistics is suitable for their companies or not.



## References

- Abdulrahman, M. D., Gunasekaran, A., & Subramanian, N. (2013). Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors. *International Journal of Production Economics*, 147(B), 460-471.
- Álvarez-Gil, M. J., Berrone, P., Husillos, F. J., & Lado, N. (2007). Reverse logistics, stakeholders' influence, organizational slack, and managers' posture. *Journal of Business Research*, 60(5), 463-473.
- Cagno, E., Worrell, E., Trianni, A., & Pugliese, G. (2013). A novel approach for barriers to industrial energy efficiency. *Renewable and Sustainable Energy Reviews*, 19, 290-308 .
- Chan, F. T. S., Chan, H. K., & Jain, V. (2012). A framework of reverse logistics for the automobile industry. *International Journal of Production Research*, 50(5), 1318-1331.
- Cherrington, D. J., (1994). *Organizational Behavior the Management of Individual and Organizational Performance* (2nd ed). Boston, MS: Allyn & Bacon.
- Cronbach, I. J. (1970). *Essentials of Psychological testing* (3<sup>rd</sup> ed). New York, NY: University of Chicago Press.
- Finnegan, R., (1994). "Recovering Academic Community" What Do We mean?. In R. Barnmett (Ed.), *Academic Community Discourse or Discord?: Higher Education Policy Series 20* (pp. 3-20). Bristol, PA: Jessica Kingsley Publisher, Ltd.
- González-Torre, P., Álvarez, M., Sarkis, J., & Adenso-Diaz, B. (2010). Barriers to the implementation of environmentally oriented reverse logistics: Evidence from the automotive industry sector. *British Journal of Management*, 21(4), 889-904.
- Ho, G. T. S., Choy, K. L., Lam, C. H. Y., & Wong, D. W. C. (2012). Factors influencing implementation of reverse logistics: A survey among Hong Kong businesses. *Measuring Business Excellence*, 16(3), 29-46.
- Hodge, B. J., & Anthony, W. P., (1994). *Organization Theory* (4<sup>th</sup> ed.). Boston, MA: Allyn & Bacon.
- Ivancevich, J. M. and Donnelly, J. H. (1973). *Organizational: Structure, Process, Behavior*. Texas: Business Publications, Inc.
- Lau, K. H., & Wang, Y. (2009). Reverse logistics in the electronic industry of China: A case study. *Supply Chain Management: An International Journal*, 14(6), 447-465.
- Liu, X., Yamamoto, R., & Suk, S. (2012). A survey analysis of energy saving activities of industrial companies in Hyogo. *Journal of Cleaner Production Japan*, 66, 288-300.





- Lussier, R. N. (2007). *Organizational climate and human relation in organization: Applications and skill building* (6<sup>th</sup> ed.). New York: McGraw-Hill.
- Luthans, F. (2002). *Organizational Behavior* (9<sup>th</sup> ed.). New York: McGraw-Hill.
- Ministry of Energy. (2011). *20 Year Energy Efficiency Development Plan (2011-2030)*. Retrieved March 25, 2016 from [http://www2.eppo.go.th/encon/ee-20yrs/EEDP\\_Eng.pdf](http://www2.eppo.go.th/encon/ee-20yrs/EEDP_Eng.pdf)
- Ministry of Energy (2015). *Energy Situation January-May 2015*. Retrieved March 25, 2016 from [http://www4.dede.go.th/dede/images/stories/stat\\_dede/sit\\_58/sit\\_jan\\_may.pdf](http://www4.dede.go.th/dede/images/stories/stat_dede/sit_58/sit_jan_may.pdf)
- Office of National Economics and Social Development Board. (2013). *Thailand 2<sup>nd</sup> Logistics Development Strategic Plan (2013-2017)*. Retrieved March 25, 2016 from <http://www.news.mot.go.th/motc/portal/graph/logistic2.pdf>
- Ravi, V., & Shankar, R. (2005). Analysis of interactions among the barriers of reverse logistics. *Technological Forecasting and Social Change*, 72(8), 1011-1029.
- Robbins, S. P., (1993). *Organizational Behavior: Concept, Controversies and Application* (6<sup>th</sup> ed.). New Jersey: Practice-Hall.
- Schneider, B. M. (1990). *Managing Organization Behavior*. New York : John Wiley & Sons.
- Scott, W. R. (1992). *Organizations Rational, Natural and Open System* (3<sup>rd</sup> ed.). New Jersey: Prentice-Hall.
- Smircich, L. (1983). Concept of culture and organizational analysis. *Journal of Administrative Science Quarterly*, 28(3), pp. 339-358
- Steers, R. M., (1977). *The Organizational effectiveness: A behavioral View*. Santa Monica, CA: Goodyear Publishing.
- Stringer, R. (2002). *Leadership and organization climate*. New Jersey: McGraw-Hill
- Tan, A. W. K., & Hosie, P. (2010). Reverse logistics operations in Singapore to support Asia pacific regions. *International Journal of Electronic Customer Relationship Management*, 4(2), 196-208.
- Thailand Automotive Institute, & Ministry of Industry. (2012). *Master Plan for Automotive Industry 2012-2016*. Retrieved March 30, 2016 from [http://www.thaiauto.or.th/2012/backoffice/file\\_upload/research/11125561430391.pdf](http://www.thaiauto.or.th/2012/backoffice/file_upload/research/11125561430391.pdf)
- Vecchio, R. R. (1991). *Organization behavior*. Chicago: The Dryden Press.
- Zhu, Q., & Geng, Y. (2010). Drivers and barriers of extended supply chain practices for energy saving and emission reduction among Chinese manufacturers. *Journal of Cleaner Production*, 40, 6-12.