Export Service Center, Hybrid Logistics Model to Strengthen Export Competitiveness

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Abstract

SCG Logistics (SCG-L), a third-party logistics provider in Thailand, redesigned the export model to support almost 70% export growth of a customer and to manage the operation under limitations of operating hours of container yards, containers shortage, and highly fluctuated daily export volume. Changing from the direct transport to Export Service Center (ESC) model which none of 3PLs in Thailand had done, SCG-L could not only overcome the limitations but also improve logistics efficiency and quality.

The ESC, as a warehouse and container yard, is strategically located in Laem Chabang (LCB) port where trucks can load 2 TEUs while outside, from the plant to the LCB, cannot due to weight limitation. Truck utilization also increases by using backhaul model. Further, the ESC is used as buffer area to smoothen product dispatching from the plant and product loading into containers, overcoming the container-related constraints. Working collaboratively with the customer, SCG-L could do pre-loading at the ESC, resulted in higher loading capacity and warehouse efficiency. Moreover, IT system has invested to create visibility in the export chain for better quality management.

From H2-2008 to 2010, SCG-L could successfully support 83% growth in the customer's export. Consequently, from 2010 to 2014, the whole ESC dispatching volume has grown approximately 11% per annum.

The ESC model reflects the Win-Win-Win business philosophy of SCG Logistics, mutual benefits among related parties in the supply chain: enhance the customers' competitiveness in both cost and quality aspects and improve asset utilization for the carriers, leading to sustainable growth.

Key words: Logistics and supply chain management, FMEA, Export model

1. Introduction

SCG Logistics Management (SCG-L) is a third party logistics service provider (3PL) under SCG conglomerate group, mainly services in domestic market of Thailand. SCG-L provides a variety of logistics services covering transportation, warehousing, and importing and exporting functions to several business groups of customers, handling products approximately 30,000 SKUs.

Chemicals business, one of SCG business unit, had a capacity expansion plan from 1.06 in 2007 to 1.58 million tons per year in 2010. The product is plastic resin pellets, considered as commodity product. Its price is highly sensitive to crude oil and naphtha prices. Therefore, the demand of the product is highly fluctuated; an order might be canceled during the downward price trend. Hence, ability to serve the export demand is crucial to the plastic resin pellets producer, the customer of SCG-L.

2. Background of the Problem

The plants of the customer are located in Map Ta Phut (MTP) industrial estate, Rayong province, similar to other major plastic resin pellets producers in Thailand. The export product is shipped out at Laem Chabang (LCB) port, 85 kilometers away from the MTP. The product is packed in to a bag and then stuffed / loaded into a 20-foot container. Generally, a truck would go pick a loaded (i.e. laden) container from the plant at the MTP to the LCB port. On the way back, the truck would pick 2 empty containers from a container yard of a shipping liner for stuffing the product at the plant. This model is widely used because it is not complicate to manage.

Figure 1. Map of Thailand, indicating the MTP and the LCB port

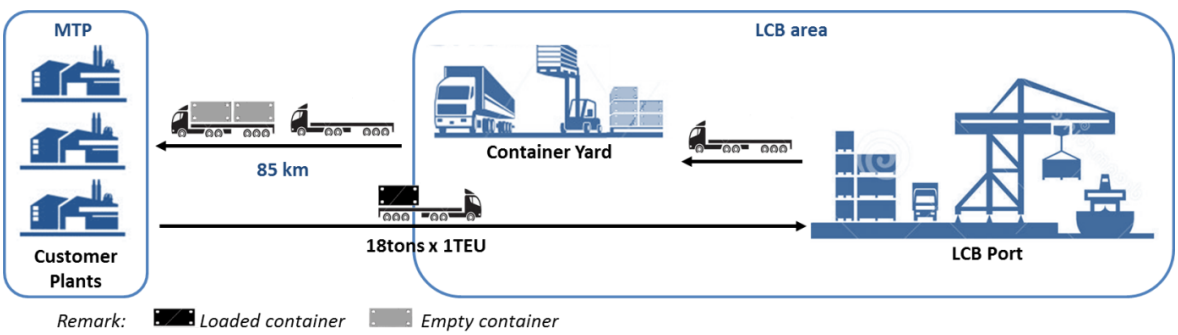

Figure 2. Transportation model for export the product from the MTP to the LCB port

In late 2007, the customer announced to build a new plant, valued more than 300 million USD, and would be ready to operate in 2010. According to the production capacity expansion plan, the export sales of plastic resin pellets would grow from 0.45 to 0.76 million tons per year in 2010. With existing logistics facilities and model at that time, SCG-L would not be able to serve the customer efficiently.

3. Goal Statement

To provide an export logistics model for the plastic resin pellets from the MTP plants to the LCB port that could serve the growth of the customer at a competitive price and be abided by the law

4. Observation

4.1 Export Volume Pattern

The export volume was highly fluctuated in monthly, weekly, and daily basis. As shown in Figure 2, half of the volume was on Thursday and Friday, 6 times higher than the day with the lowest volume. This demand pattern causes inefficiency in trucks, labors, and warehouse management.

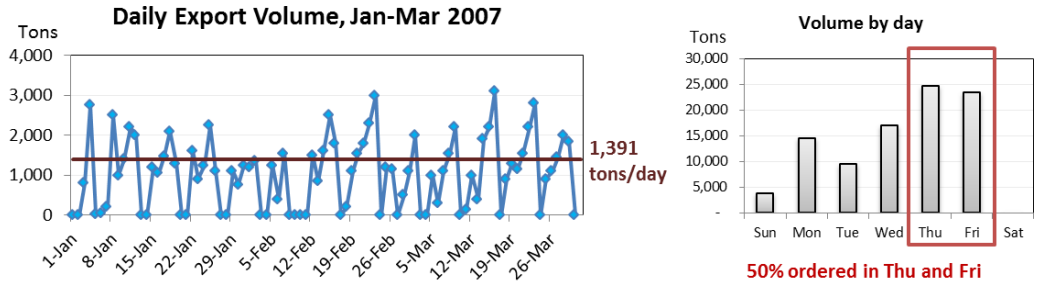

Figure 3. Daily transportation of the export product, January – March 2007

4.2 Nature of Containers and Container Yards

Empty containers are stored at container yards, waiting for trucks come to pick up for loading products and for shipping liners to ship out. The container yards in or around the MTP area do not operate 24 hours a day. Due to the limited operating time, the trucks could do few round trips and the numbers of the trucks arriving at the plant could not be uniformly. The plants would face difficulty in managing labors for stuffing with the products into the containers due to peak and off-peak time truck incoming.

Table 1. Operating hours of the container yards located in the MTP area

Operating Time	Container Yard Name
08:00 - 17:00	CDS, SIGHAMAS, EANGONG, HAST, KERRY, MODERN
08:00 - 20:00 to 22:00	99 DEPOT, KRC
08:00 - 24:00	TIPSCD, ECD

Sometimes, the container yards did not have enough empty containers. Additional expenses incurred from compensating waste time of the truck or from picking empty containers from farther container yards. Even worse, the customer and the trucks might not be able to send the stuffed containers to the MTP within a closing time.

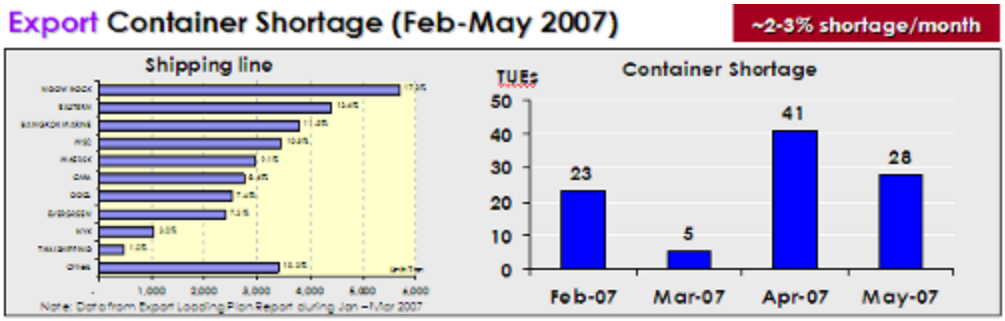

Figure 4. Container shortage, January – May 2007

4.3 Regulation on Truck Weight

According to regulations of the Department of Highways, the allowed load of a semi-trailer truck transport on Thailand highways is 53 tons; it means a maximum net weight of products on a semi-trailer truck is 33 tons. One manual-stuffed laden container weighs 20.5 to 21 tons, net weight of the product is 18 tons. This is why the truck can carry only 1 loaded container while it still has space. However, in the LCB port area, the truck is allowed to carry 2 laden containers.

In practice, many producers and transportation providers violate the law; 2 laden containers are transported on one truck all over Thailand so as to save their transportation costs. This ruins road condition, costs budget of the country around a billion a year.

5. Analysis

5.1 Model Evaluation

In order to serve the growth in export demand, there were 4 possible alternatives.

1) Direct model with more truck supply
2) Direct model, using B-double truck
3) Train model
4) Cross-docking / Warehouse buffer model

Table 2. Alternative evaluation

Alternative	Effectiveness	Efficiency	Timeliness	Possibility
1) Direct model with more truck supply	H	L	M	M
2) Direct model, using B-double truck	H	H	M	L
3) Train model	H	L	M	M
4) Cross-docking / Warehouse buffer model	H	H	M	M

For the 1) alternative, the operation process and estimated cost per container would not change. However, truck supply and capacity management of the plants would become more complex due to demand fluctuation. If ensuring the peak volume, the trucks and facilities at the plants would be underutilized in other periods; in order to reach minimum monthly revenue of the trucks, the costs per container would be raised.

The 2) alternative uses the same transportation model as the 1) alternative, but uses a new truck model. The B-double truck is a semi-trailer truck, up to 25 meter long. This truck type could carry 1 20-foot container together with 40-foot container because it has more axles. Though using the B-double truck could increase truck utilization and reduce total number of trucks required in the system, it was quite hard to implement. First, infrastructure and most facilities in Thailand were not appropriate with the truck size, leading to safety concern. For example, this truck needs larger turning circle radius. The route between the MTP and the LCB port was 3-lane road in some parts and passed community. Since this

truck type was still under study, most people did not get used to it and not recognize that needed to leave more space for the driving of this truck. Further, only a limited number of truck garages could maintain it. In addition, since the transportation model still the same, it would face traffic jam problem, same as the existing model.

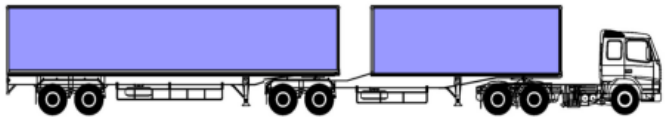

Figure 5. B-Double truck

The train model in the 3) alternative was actually effective since it could carry more containers in one time. However, it was hard to manage the train schedule since the train schedule was managed solely by the State Railway of Thailand. There might be no available train when approaching a closing time. Moreover, it required large investment for tapping train track from the provided train station to the customer plants. If not, the cost would increase from double handing cost: truck from the plants to train.

The 4) alternative would lessen pressure from demand fluctuation on the truck supply and capacity of the plants. Generally, total costs of this model are higher than the direct model due to warehouse and double handling costs. However, in this case, the truck was underutilized. As mentioned before about the regulations of the truck weight, the truck could not carry 2 laden containers outside the LCB area. If we could find a warehouse located in the LCB area and redesign the transportation model to increase the truck utilization, cost saving could be generated. Further, this model could be used together with the 1) alternative if the export demand is temporarily high.

In addition, we applied the Failure Modes and Effect Analysis (FMEA) to mitigate risks. Consequently, we decided to choose the alternative 4).

Table 3. FMEA analysis on the export process

Failure Mode and Effect Analysis (FMEA)										After Action			
Part/Process function & its requirement	Potential Failure Mode	Potential Effect(s) of Failure	(A)Severity (out of 10 = most severe)	Potential Cause(s)/Mechanism(s) of Failure	(B)Occurence (out of 10 = highest)	Current process Controls-Detection/Prevention	(C)Detectability (out of 10 = cannot detect)	Risk Priority Number (RPN) A*B*C	Recommended action	(A)Severity (out of 10)	(B)Occurence (out of 10)	(C)Detectability (out of 10)	Risk Priority Number (RPN) A*B*C
Pick empty container	not enough empty container	demurrage	10	export-import seasonality	2	no prevention	9	180	store empty containers at warehouse	10	1	5	50
Load product into container	cannot stuff product into container within time	demurrage	10	fluctuate demand with fixed loading facility and staff	4	check with the plants to extend working hours	5	200	preload	10	2	2	40
Deliver to port	truck with loaded container could not arrive LCB port before closing time	demurrage	10	1) traffic jam 2) fluctuate demand with fixed capability	7	call truck driver to check status and, if required, negotiate with liners	4	280	shorten distance for loaded truck	10	2	2	40
Pick empty container	container not in good condition	product damage	6	container condition required differs among users; container yard staff judge on their own criteria	5	truck drivers check container condition before receiving from container yard	4	120	inspect by own staff with defined criteria	6	3	3	54

5.2 Warehouse Location Selection

The critical factor of the new model implementation is the warehouse location and its functions. The warehouse should provide the following benefits:

i) The truck is allowed to carry 2 laden containers, leading to better truck utilization and cost effectiveness

ii) The risk of demurrage from not being able to return containers, both laden and empty, within a closing time reduces. This is because the distance shortens from 85 to less than 10 kilometers.

iii) The risk of demurrage from container shortage reduces since there are a lot of container yards around the LCB port area.

We surveyed to find the warehouse location around the LCB port area. From Table 4 below, the ESC would be able to answer the requirements above and have enough capacity to serve the customer.

Therefore, we chose the ESC location.

Table 4. Warehouse selection

	Distance from	Remark	Service					Facility				
Location	LCB Port (km.)		WH	Transport	Distribution	Dock	CY	WH size (sq.m.)	No. of WH	No. of Dock	Dock size	Floor load
ESC	3-5		✓	✓	✓	✓	✓	30,000	1	10	2 TEU	5
Location A	2-3		✓	✓	✓	✓		27,000	4	5	2 TEU	3.5
Location B	6		✓		✓	✓		28,836	6	2	1 TEU	3
Location C	6	truck weight limitation area	✓	✓	✓			80,000	22	-	1 TEU	3
Location D	10-11		✓	✓	✓			35,000	2	-	1 TEU	3.5
Location E	inside LCB port	for export only	✓	✓	✓	✓		15,000				

Figure 6. Map of the LCB port area, indicating the warehouse of the SCG-L

5.3 Model Design

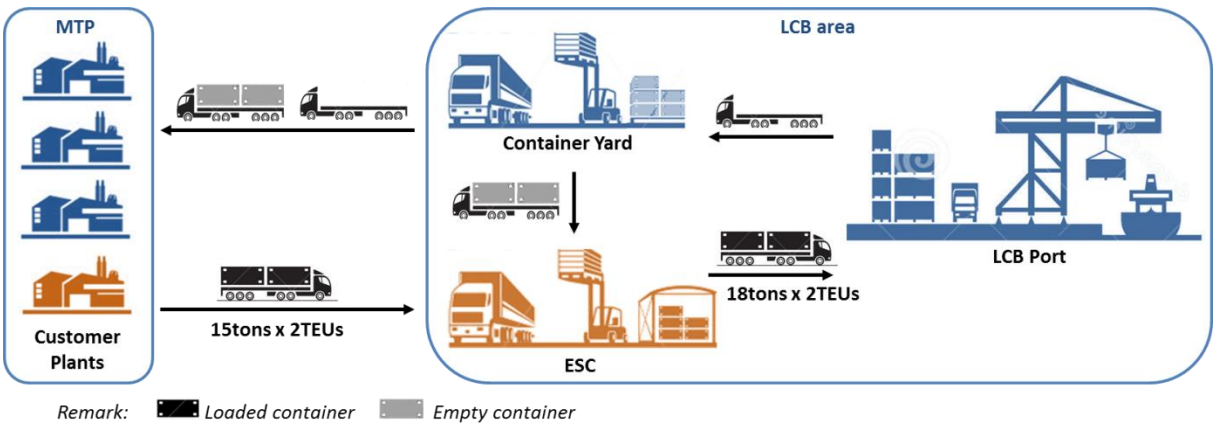

Figure 7. New transportation model for export the product from the MTP to the LCB port

From the plants to the LCB area, since the product would be double handled at the new warehouse / cross-docking area, we changed product loading method from loose bag (i.e. manual stuffing) to palletization. One palletized loaded container weighs 15 tons. Hence, the truck could carry 2 palletized laden containers from the plant to the LCB area. The total weight of one fully utilized truck would still be under the regulation.

From the warehouse to the LCB port, a semi-trailer truck would pick up 2 manual-stuffed laden containers from the warehouse and drive to the LCB port. After delivering the cargo, the empty truck would go to the container yards to pick up 2 empty containers back to the warehouse for storing, loading, and preloading.

SCG-L designed this model to be a one-stop service for customers who wanted to export their products; therefore, we named this logistics model and this warehouse as Export Service Center or ESC.

The service scope at the ESC would extent to warehouse and container yard services. The container yard function: store, inspect, repair, clean and lift on and off containers, would mitigate the risk of

container shortage. Also, the truck utilization would be better since the trucks would not have to run to a container yard and wait for picking up or return containers.

6. Implementation

Table 5. Project timeline

	Key Activity	2007 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2008 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	2009	2010
1	Model design																						
2	Warehouse location selection																						
3	Warehouse bidding / rental																						
4	Warehouse construction contractor selection																						
5	Warehouse design and submit for construction permission																						
6	Study working process of the customer																						
7	Working process & KPIs design																						
8	Warehouse construction																						
9	IT system preparation																						
10	Staff training																						
11	Test Run																						
12	Implement																						

6.1 Work Process

SCG-L, together with the customer, redesigned the process, in both planning and daily operation levels, in order to ensure smooth operation and mitigate the risk of demand fluctuation.

The daily operation process contains 5 main stages as followed:

1) Create Load: the customer creates Loading Plan in their system. Then, the information would be transferred to SCG-L for creating Job Order to carriers

2) Load Response / Receiving: Carriers of SCG-L would operate as assigned: pick up empty containers from assigned container yards and contact with Thai Customs Department for getting customs invoice

3) Loading: the ESC receives and checks physical condition of the empty containers whether ready for loading or not. Then, weigh the empty containers, put them at the assigned loading area for loading the product. Afterward, seal the loaded containers, weigh them again to confirm volume of the product before loading to trucks for delivery to the LCB port.

4) Delivery: Trucks pick up laden containers and related documents and deliver to the LCB port

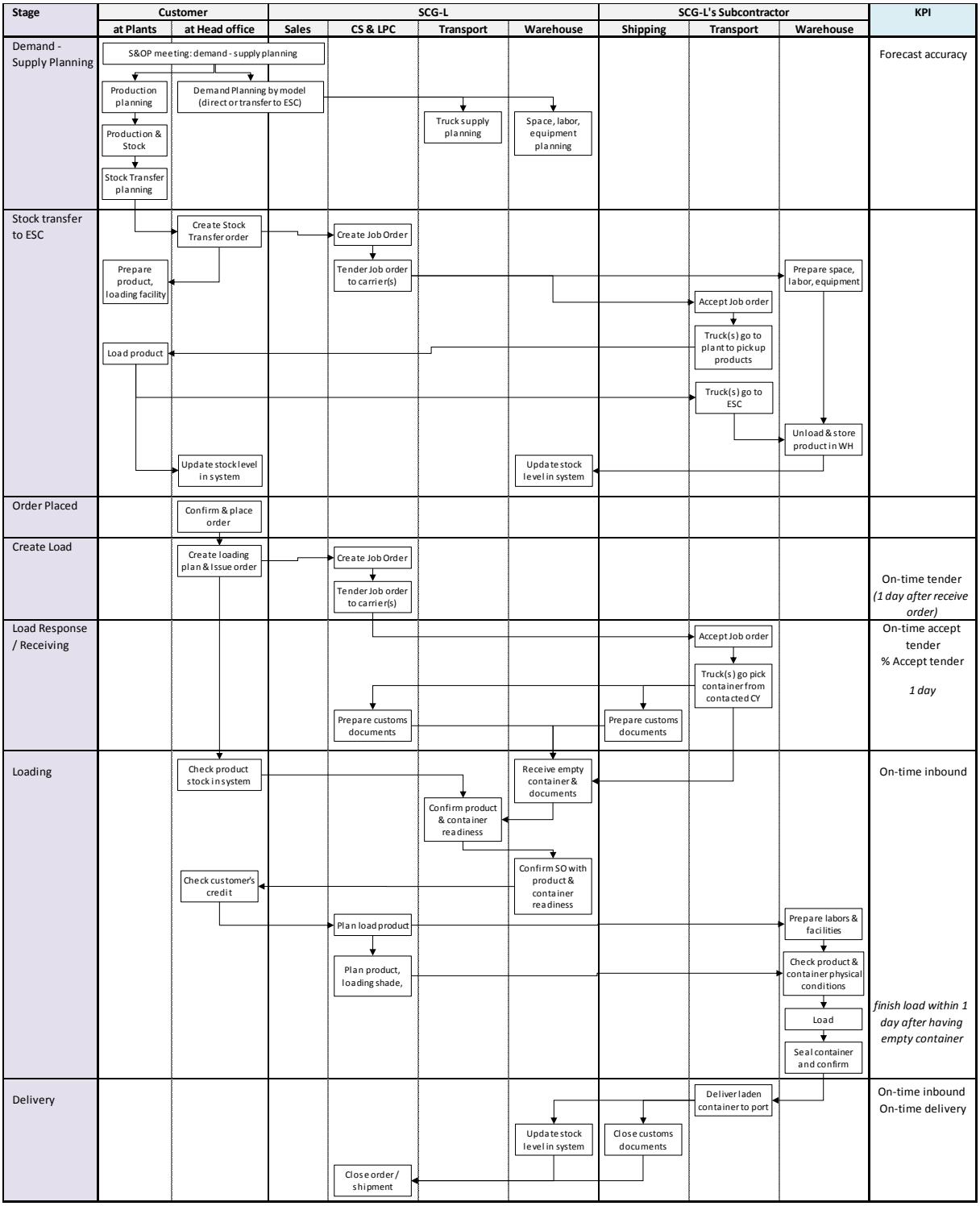

Figure 8. Process flow of the ESC, focus on the ESC logistics model

So as to lessen the pressure of the volatile demand on the capacity at the plants, the customer would create a stock transfer order so that the product could be delivered to and stocked at the ESC. SCG-L at the ESC warehouse could load the products into a container, shorten both transportation distance and time and waiting time at the plants. For the not-frequently-sell or no-stock SKUs, the product would just be cross-docked at the warehouse or be directly shipped from the plants to the LCB port.

6.2 ICT System

The ICT integration, called Enterprise Resource Planning or ERP system, between the system of SCG-L and of the customer, the existing ones and the new ones had been designed to increase visibility and efficiency in this export chain.

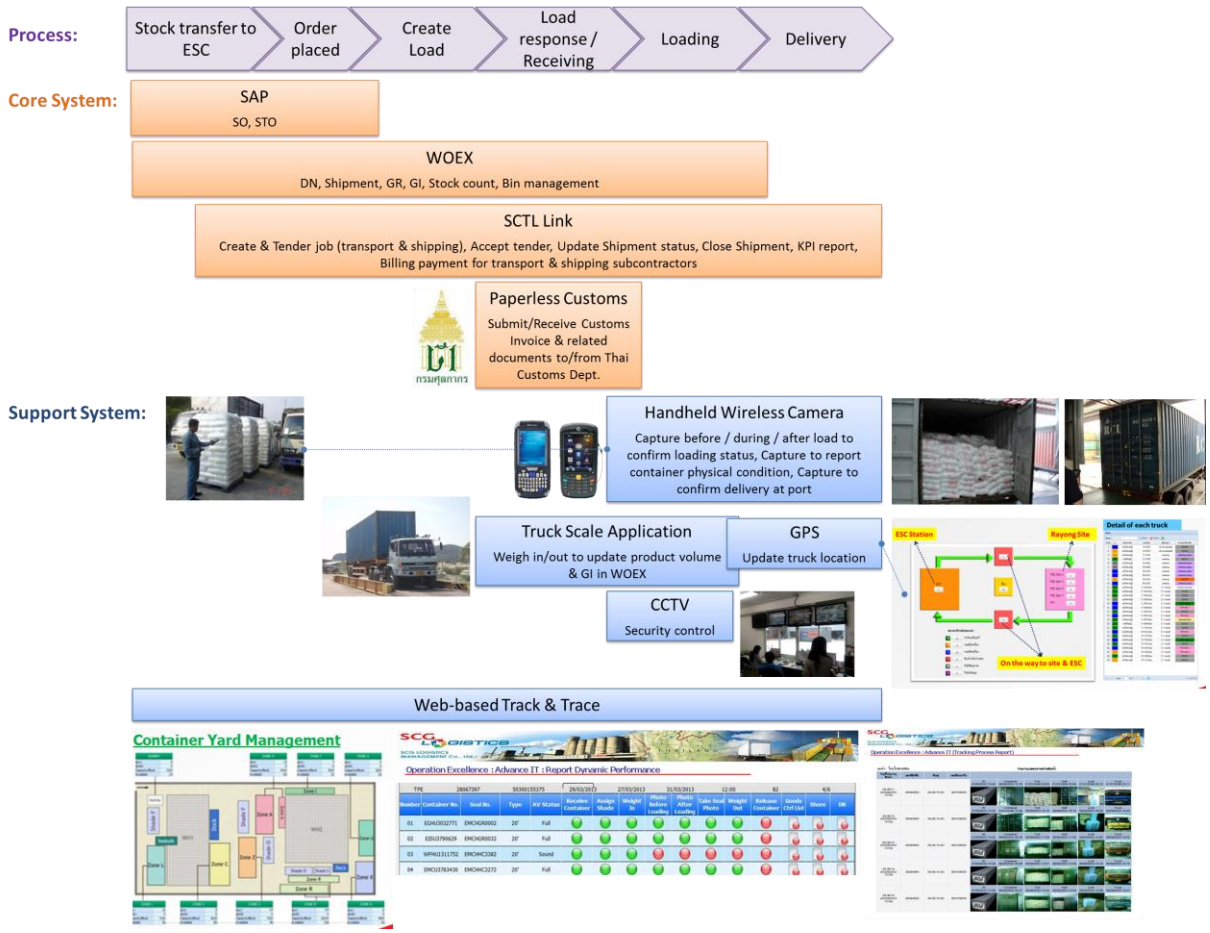

Figure 9. Overall framework of ERP system

7. Result Confirmation

The overall export volume of the customer grew around 85% from 2008 to 2009; the volume using the ESC model increased from around 17,500 tons monthly in the first half of 2008 to 31,650 tons in the second half and 32,000 tons in 2009. This logistics model could respond to the demand fluctuation as shown in Figure 10. The ESC model is not only able to serve the rise in the volatile export volume, but also generate cost saving approximately 15% comparing to total costs of the direct model or of using other service providers; the lower costs was according to the better truck utilization, together with economy of scope from SCG-L.

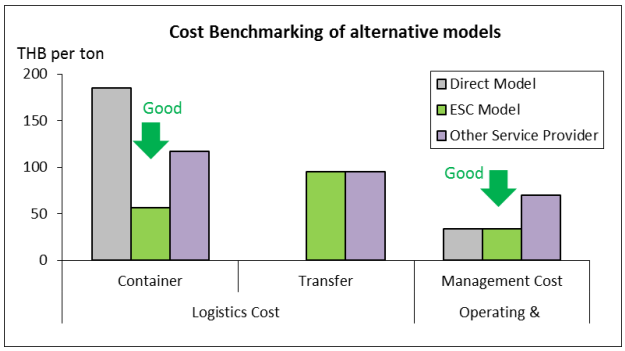

Figure 10. Total transportation costs of the ESC model, comparing to of the direct model

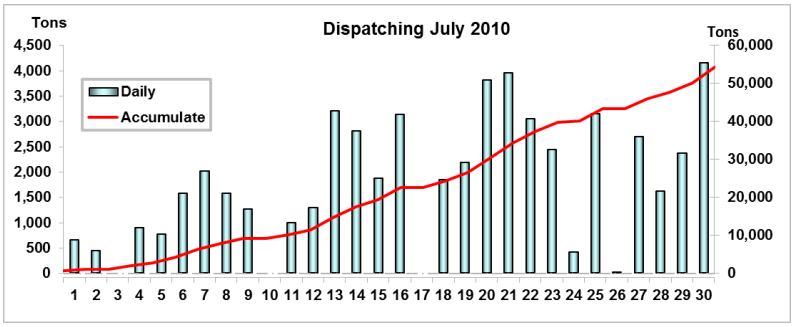

Figure 11. Daily export volume through the ESC model in July 2010

SCG-L decided to expand the ESC model in order to serve growth of the customer and acquire new customers. The customer decided to push more volume through the ESC model, as shown in Figure 12. As of now, the ESC model has 4 phases, helping SCG-L to be able to acquire new customers. Most of the new customers are agricultural product manufactures that are located in northeastern region of Thailand, 300 – 400 kilometers far from the LCB port. The ESC model also provides them the cost efficiency that abided by the law and the ability to response to fluctuated or unplanned export demand. The success of the ESC model is shown in Figure 13. In addition to cost and flexibility aspects, the ESC model provides quality of service: on-time delivery and the declining in product damage (Figure 14).

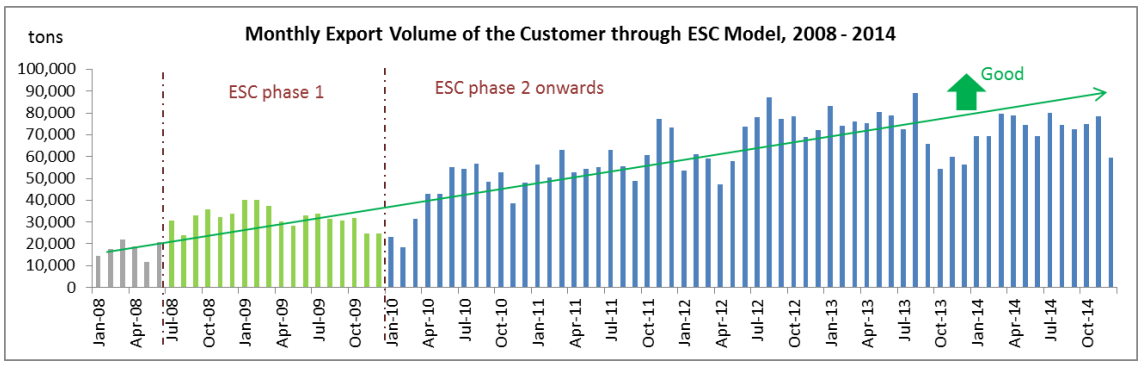

Figure 12. Total export volume of the customer using the ESC model

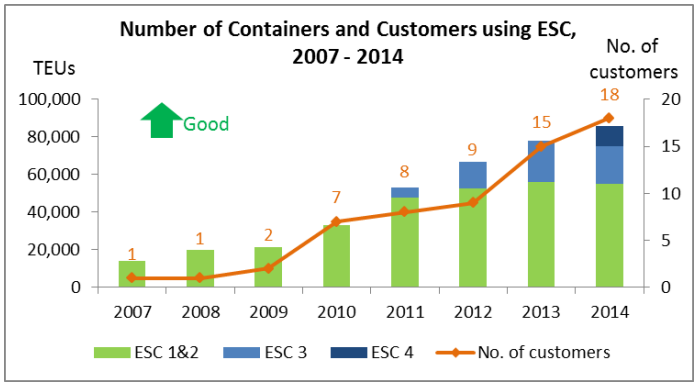

Figure 13. Number of dispatching containers and customers using the ESC model from 2007 to 2014

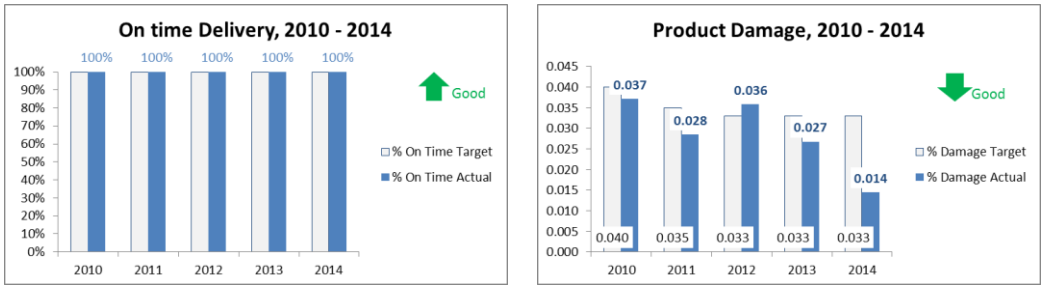

Figure 14. On-time delivery and Product Damage rate of the ESC model from 2010 to 2014

8. Standardization

From many PDCA cycles, the updated processes are registered as process flow and work instructions in ISO system of SCG-L and are applied for many customers in many warehouse locations.

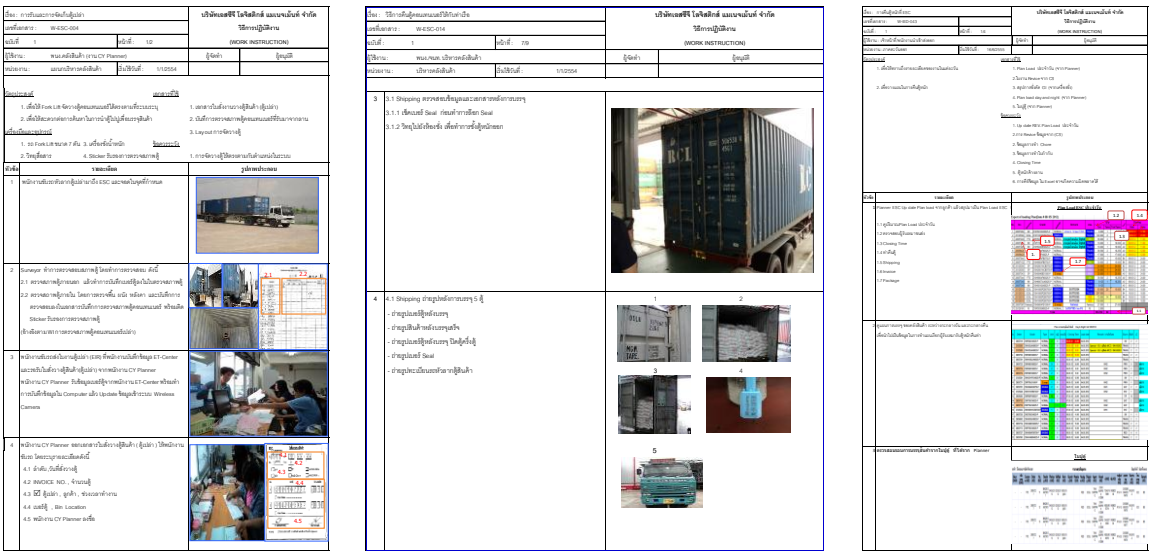

Figure 14. Examples of the ESC Working Instructions registered in ISO system of SCG-L

9. Conclusion

The success of the ESC model is not only because of cost efficiency, but also the improvement in supply chain visibility and service quality. The FMEA helps us understand the customer need and the

potential risks more. SCG-L strongly believes in Win-Win-Win business philosophy: the business could have sustainable growth only if every stakeholder gains benefits fairly. The appropriate philosophy, together with the TQM tools, helps us to be able to deliver this logistic model for the export that not only be financially beneficial to the company, the subcontractors and the customers, but also to the community by abiding by the law.

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