

LSP Inland Transportation Cost: A Case Study of Activity-Based Costing and It's Impact on Management

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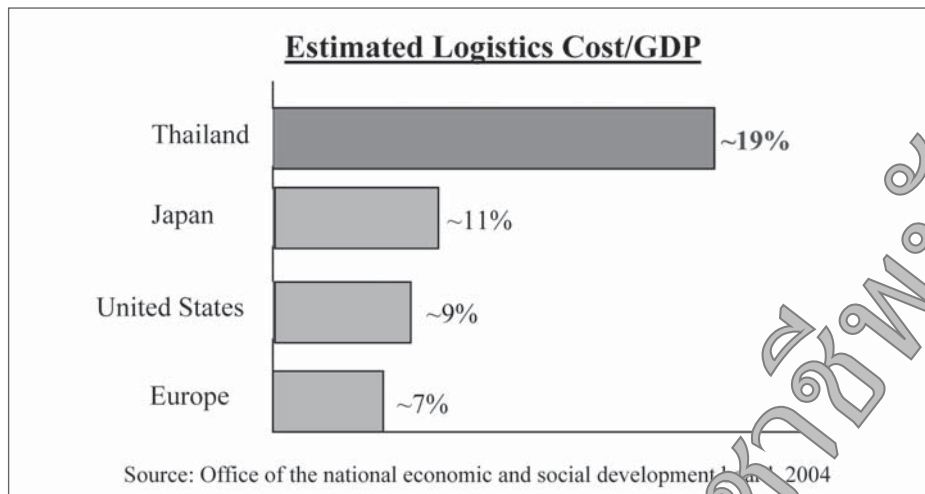
Introduction

Logistic costs became a national issue because Thai government had raised the particular matter in National Logistics Master Plan since December 18th, 2004. The government recognized significant expenses being spent in the logistic transactions as per the following indication.

In the above-mentioned logistics cost indication, there are several potentialities in Thailand's logistic activities and costs improvement as those developed countries: Japan, United States and Europe can keep the costs less in comparison with Thailand. For instance, Thailand may possibly trigger an approximate Baht 300,000 million cost saving in a year if the logistic cost is reduced by 5% of the national GDP. (Office of the national economic and social development board, 2004)

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In the meantime, all of the manufacturers are also aware of the huge expenses derived from the logistic activities. In such a case, most of the manufacturers have been trying to keep the logistic costs at a minimal level. One of the most popular practices is to outsource the logistic functions to those professional logistics service providers abbreviated "LSP" because the manufacturers foresee some advantages on cost optimization whereby the costs can be shared among the LSP customers utilize the same resources and facilities in addition to their specific expertise. Hence, the LSP can employ the same facilities to serve as many customers as possible. Such facilities sharing can contribute among its customers to logistic cost effectiveness.

The growth of the third party logistics services, as a consequence of the incremental market demands, presently stimulates drastically competition in the field. An LSP who can propose the cheapest rates seems successful in the customers' viewpoints. To quote the competitive market rates, the LSP needs to know how efficient its services are. The efficiency would contribute to a

productivity of the services, which can result from the cost effectiveness. Otherwise, an LSP, who proposes an ineffective commercial proposal, will suffer in today's competition environments.

In such circumstances, an accurate determination of costs, which constitute a particular service, is crucial. Most of the LSPs possessed their own pricing models, which are based on the traditional cost accounting method. However, the models may not be realistic for the allocation of costs, as the method focuses on direct material and labor costs, while summarizing all other costs to one or more overhead pools that are then arbitrarily allocated to products or services, typically as a percentage of direct labor or machine hours. In such practices, the LSPs may be led to a wrong interpretation on how efficient the cost is allocated for the same services delivered to different customers in different service levels. Subsequently, the price may not be quoted in a competitive way because of the distortion of the cost allocation (<http://www.theacagroup.com/activitybasedmanagement.htm>).

Besides, such typical cost accounting method cannot identify any productiveness of works in an organization. Thus, it is meaningless to the process analysis for the improvement purposes. The accuracy of the allotment is important to the LSP as it can imply some clues of where the value added processes are located and where a non-value added task is found. This information is fundamental for the process strengthening. In a business perspective, an additional profit may be generated through the improvement of the process because the improvement will contribute to less complication, lead-time shortening and non-value-added cost reduction. The LSP in reverse may not be able to make use of an inaccurate unit cost for the process analysis and betterment.

To improve such deficiency, a method of Activity-based Costing may be more appropriate than the traditional cost accounting method for the cost analysis and assessment. Theoretically, the particular technique assumes that a different customer may have different service requirements, which in return must seek for the necessary resources and facilities in different utilization level to respond to its requirements. In such a case, an individual service rendered to a specific customer is offered in the extent to which the resources are utilized in the different level as compared with a similar service offered to a different customer having the same requirements, but in a different service level. This implies that a level of services may be diversified in accordance with the customers' requirements and expectations. As such, an individual service obviously possesses its own cost accumulation, which may not be identical to the

same service offered to another customer in a different level of services. This implies that a nature of services, which is similar to one another, may possibly acquire different cost ratios.

Hence, Activity-based Costing method is to identify an individual activity-related cost in proportion to the utilization of the resources and facilities for a specific service. The method does not allocate direct and indirect costs based on volume alone; it determines which activities are responsible for these costs and burdens these activities with their respective portion of overhead costs (Bardi, et al., 2004).

Conceptual Framework

In this study, the specified LSP firm provides an inland trucking service for the major automotive manufacturers. The type of fleet is 6-wheel truck with side-opened van. One of its automotive manufacturing customers is chosen as a sample case study in this paper. An initial step that the first activity starts is a receipt of trucking order via the particular customer web based application. Once the LSP acknowledges the trucking order, the other sequential activities will be undertaken in compliance with the standard procedures shown on the following "Inland Trucking Cross-functional Diagram" in order to create the transportation services. The last activity, which will cease to end up a complete transportation service, is the receivable and the payable accounting entries.

In this perspective, a number of resources, which occur along with the consumption of those activities, are meant to Activity-based Cost Management in terms of process analysis and

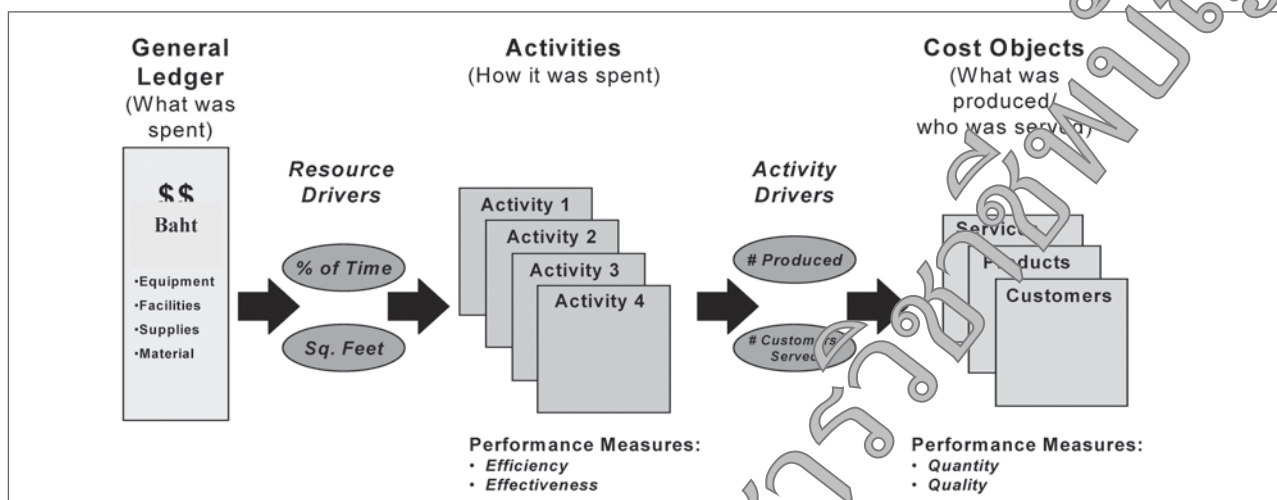
Table 1: Logistic Resources Utilization

Activity Center (Department/Division/Unit)	Main Activity	Sub-activity	Resource
Administration	MOR release & follow-up for pick-up sheet preparation	Trucking order acknowledgement through customer's web-based application	MOR Coordinator
		Pursuant shipments status in terms of Delivery date, Time, Quantity by	
		Act as coordinator to report a supplier's non-compliance issue to customer	
		MOR update in system	
Logistic administration planning	FTL routing plan	Pick-up Sheet Issuance	Fleet Controller
		Pick-up Sheet Sorting	
		Full-truck-load (FTL) routing	
		FTL routing master plan	
Operation	Milk-run routing plan	Milk-run proposed routing master plan	Truck Coordinator
		Milk-run schedule confirmation	
		Milk-run routing master plan issuance	
		Drivers assignment	
Operation	Transportation order preparation	Full-truck-load (FTL) transportation	Drivers
		Milk-run transportation	
		Physical cargoes, pick-up sheets and D/O inspection	
		Further investigation to be taken in case of a problem	
Administration	System update	Incoming inventories updated in system	Truck Coordinator
		Shipments report by D/Os	
		Duplicate pick-up sheets filing	
		Invoicing	
Operation	Billing	Duplicate and signed D/Os returned to suppliers	Accountant
		Transportation allowance and Petty Cash Balance Report	
		Allowance and Petty Cash Reports Verification for entires	

Methodologies

The computation methods are in accordance with the following diagram.

There are three main steps involve in calculating activity-based cost which are



Source: http://www.fws.gov/planning/Documents/What_is_abcm.pdf

Figure 2: Activity-based Costing Concept

Step 1) Listing out relevant expenses of transportation services

The significant costs, which are relevant to the transportation service, are below identified.

Table 2: Expenses Related to Transportation Services

Item No.	Accounting entries		Specific cost weighted for the particular customer referred in this study
	Description	Amount	
1	Salary & Overtime	94,686.32	54,721.32
2	Depreciations for necessary office equipments, furniture, PC and its accessories, and communication devices	55,841.63	13,401.99
3	Administration facility	533,178.84	56,592.85
4	Trucking operation inclusive of all direct costs listed on the accounting entries	1,571,160.50	129,894.04

Step II) Allocation of individual resource driver to specific service

The costing information, which was shown on the representative LSP accounting statement, gathered in March 2007. They were accounted for in the particular month as sum of the costs incurred from services rendered for all of its customer bases. Since the LSP accounting statement identified the overall transportation costs for a monthly undertaken service, rather than specific costs for specific customer account, the amount of the monthly total costs must be weighted in order to reflect particular costs incurred as consequences of specific service provided for a specific customer.

Step III) Computing the activity drivers down to individual sub-activities level

The Activity Driver is the process that transforms resources into a product (or) a service. Such transformation would drive significant costs. The activity driver is applied to allot costs in activity order. Hence, a different activity may (or) may not consume resources in a different level.

Furthermore, the allocation of resources down to sub-activity level being referred to in the following parts was estimated through an interview and observation so called “Estimation allocation” for administration cost, depreciation cost and facility cost whereas the two factors that were applied to allocate individual resource to each activity were the accumulative transportation distances in the matter

of monthly kilometers and the actual express way expenses so called “*estimation allocation and direct charging allocation*” respectively for trucking operation cost elements.

In theoretical perspective, there are three allocation criterions in the allotment of resource Driver and Activity Driver. They are continued below.

1. Direct Charging Allocation: This method is dealing with known amount of resources and/or activities that are directly involved in the production of goods (or) services.

2. Estimation Allocation: This method is involved with statistical estimation as an amount of resources and/or activities are not clearly identified thoroughly by “Direct Charging Allocation”.

3. Arbitrary Allocation: This method is based on what the expert’s judgment. There is no any standard rule in the allocation criterion.

- The following table presented a sample activity driver-based cost allocation after the monthly accounting costs had been filtered for the particular customer driving the costs. Such computation concept must be repetitively applied to calculate the other respective costs:- depreciation cost, facility cost and trucking operation cost.

After the total activity costs had been figured out, a unit cost of each activity by which a specific cost driver activates a specific activity is determined to divide Individually Total Activity Cost as per the following calculation method.

$$\text{Cost Driver Rate} = \frac{\text{Individually Total Activity Cost}}{\text{Specific cost driver}}$$

Activity	Activity driver	Trucking order acknowledgement	Pursuant shipments status by carriers	MOR update in system	Pick-up sheet maintenance

[illegible]

Table 4: Cost Driver Rate Computation

Main activities	Sub-activities	Cost driver details	Cost driver	Total costs	Cost driver rate
MOR Release & Follow-up for pick-up sheet preparation	Trucking order acknowledgement	Number of Pick-up sheets	95	7,122.22	74.77
	Pursuant shipments status by suppliers	Number of Pick-up sheets	95	18,712.22	196.97
	MOR update in system	Number of Pick-up sheets	95	9,938.55	104.62
	Pick-up sheet issuance	Number of Pick-up sheets	95	7,766.81	76.96
FTL routing plan	Pick-up sheets sorting	Number of Pick-up sheets	95	1,805.51	10.85
	FTL routing	Number of FTL Pick-up sheets	22	758.48	10.39
	FTL routing master plan	Number of FTL Pick-up sheets	22	6,288.56	86.14
Milk-run routing plan	Milk-run purposed routing master plan	Number of Milk-run Pick-up sheets	22	1,124.35	51.11
	Milk-run schedule confirmation	Number of Milk-run Pick-up sheets	22	8,765.69	398.44
	Milk-run routing master plan	Number of Milk-run Pick-up sheets	22	6,844.95	311.13
Transportation order preparation	Drivers assignment	Number of Pick-up sheets	95	4,382.49	46.13
Trucking	FTL	Number of FTL parts in cubic meters	1,376.29	112,266.15	81.57
	Milk-run	Number of Milk-run parts in cubic meters	97.26	24,853.53	255.36
Tally	Physical cargoes, pick-up sheets & D/Os inspection	Number of total parts in cubic meters	1,473.55	7,933.24	5.38
System update	incoming inventories updated in system	Number of total parts in cubic meters	1,473.55	7,281.09	4.94
Shipment balance report	Shipments report by D/Os	Number of D/Os	28	10,550.52	376.8
Billing	Duplicate pick-up sheets filing	Number of Pick-up sheets	95	1,805.07	19
	Invoicing	Number of trips	61	6,200.12	101.64
Transaction reporting	Transportation Allowance Report & Petty Cash Balance Report	Number of trips	61	8,822.53	144.63
Accounting entries	Reports Verification for entries	Number of trips	61	2,636.81	43.23
	Total			254,610.21	

Step IV) A further step was to compute cost object, which was an outcome multiplied by between a cost driver rate and a unit/volume count for specific service.

The cost object refers to the costs of a specific product (or) a specific service that focuses on this

study. It derives from which individual cost driver rate multiplies a total unit counted in each activity and subsequently summed up is equal to the Cost Object.

The following table presented how the cost object was computed.

$$\text{Cost Object} = \text{Cost Driver Rate by activity} \times \text{Total Unit Counted by activity} + \dots +$$

Table 5: Individual Routing Activity Costing

Main activities	Sub-activities	Cost driver rate	Cost Driver Unit Count						Individual Routing Activity Cost					
			FTL Route 1	FTL Route 2	FTL Route 3	Milk-run Route 1	Milk-run Route 2		FTL Route 1	FTL Route 2	FTL Route 3	Milk-run Route 1	Milk-run Route 2	
MOR Release & Follow-up for pick-up sheet preparation	Routing order acknowledgement	74.97	65	4	4	8	14		4,873.05	299.88	299.88	599.76	1,049.58	
	Ensuring shipments status by suppliers	196.97	65	4	4	8	14		12,803.05	787.88	787.88	1,575.76	2,757.58	
	MOR update in system	104.62	65	4	4	8	14		6,800.30	418.48	418.48	836.96	1,464.68	
	Pick-up sheet preparation	76.96	65	4	4	8	14		5,002.40	307.84	307.84	615.68	1,077.44	
FTL routing plan	Pick-up sheets sorting	10.85	65	4	4	8	14		705.25	43.40	43.40	86.80	151.90	
	FTL routing	10.39	65	4	4	0	0		675.35	41.56	41.56	—	—	
Milk-run routing plan	FTL routing master plan	86.11	65	4	4	0	0		5,599.10	344.56	344.56	—	—	
	Milk-run purposed routing master plan	54.11	0	0	0	8	14		—	—	—	408.88	715.54	
	Milk-run schedule confirmation	398.44	0	0	0	8	14		—	—	—	3,187.52	5,578.16	
	Milk-run routing master plan	311.13	0	0	0	8	14		—	—	—	2,489.04	4,355.82	
Transportation order preparation	Drivers assignment	46.13	65	4	4	8	14		2,998.45	184.52	184.52	369.04	645.82	
Trucking	FTL	81.57	1,301.98	55.17	19.14	0	0		106,202.47	4,500.54	1,561.00	—	—	
	Milk-run	255.36	0	0	0	62.15	62.15		—	—	—	8,964.74	15,870.90	
Tally	Physical cargoes, pick-up sheets & D/Os inspection	5.38	1,301.98	55.17	19.14	35.11	35.11		7,004.65	296.84	102.96	188.87	334.37	
	incoming inventories updated in system	4.94	1,301.98	55.17	19.14	35.11	35.11		1,421.78	272.56	94.54	173.43	307.03	
Shipment balance report	Shipments report by D/Os	376.8	11	2	4	3	6		4,144.11	753.60	1,507.20	1,130.40	3,014.40	
Billing	Duplicate pick-up sheets filing	19	65	4	4	8	14		1,235.00	76.00	76.00	152.00	266.00	
	Invoicing	101.64	50	2	4	1	4		5,082.00	307.28	106.56	101.64	406.56	
Transaction reporting	Transportation Allowance Report & Petty Cash Balance Report	144.63	50	2	4	1	4		7,231.50	289.26	178.52	44.63	578.52	
Accounting entries	Reports Verification for entries	43.23	50	2	4	1	4		2,161.50	86.46	172.32	43.23	172.92	
Total									178,950.65	8,906.66	6,927.82	2,106.38	3,217.24	

Step V) A final step was to compute a unit cost.

The computation of a unit cost is based on the following calculation formula.

$$\text{Unit Cost} = \frac{\text{Total Transportation Cost in Baht}}{\text{Total Volume Transported in cubic meters}}$$

The following table presented a method that the Unit Cost was computed.

Table 6: Unit Cost Calculation

Description	FTL Route 1	FTL Route 2	FTL Route 3	Milk-run Route 1	Milk-run Route 2	Total
Total transportation cost @ Baht	178,950.65	8,906.66	6,927.82	21,068.34	38,747.22	254,600.73
Total volume transported @ M ³	1,301.98	55.17	19.14	35.11	62.15	1,473.55
Cost per M ³	137.45	161.43	362.01	600.13	623.44	172.78

Remark: There is no returned part in March

Actual Unit Charge and Transportation Revenue

Description	Route ID					Total	Release & Material Follow-up Fee	Grand total
	FTL Route 1	FTL Route 2	FTL Route 3	Milk-run Route 1	Milk-run Route 2			
Quotation rate @ Baht/M ³	107.69	153.57	112.00	82.86	300			
Total volume transported @ M ³	1,301.98	55.17	19.14	35.11	62.15	1,473.55		
Actual revenue in March 2007	140,210.17	8,476.07	21,433.33	2,908.91	18,645.33	191,670.81	113,220.80	304,891.61
ABC Cost	178,957.08	8,906.64	6,927.75	21,068.34	38,747.48	254,607.40	—	254,607.40
Profit/Loss	38,746.91	433.67	14,505.58	18,159.44	20,102.15	62,936.59	Profit/Loss	50,284.21

Remark: There is no returned part in March

Analysis

To show how difference costing method affect LSP pricing strategy as well as business performance, the above-computed unit cost can be compared with its existing revenue in March 2007 as per the following table:

The table showed the LSP could generate an approximate profit of Baht 50,284.21 in March. While the expected profit margin from pricing method based on traditional costing is approximately 35%. The profit margin the company could generate from pricing method based on Activity-based Costing was

only 16.49% which is lower than the 35% of the expected return as determined on top of the costs through Traditional Cost Accounting. Thus, the LSP company may conclude that this specific transportation service offered to its specific customer had not accomplished its objective yet.

A further analysis was proceeded to examine individual route performance. Most of the routes, other than FTL Route 3, generated losses in business as illustrated in the following table: - Profit/Loss @ Baht and Percentage

Profit/Loss @ Baht and Percentage

Route	FTL Route 1	FTL Route 2	FTL Route 3	Milk-run Route 1	Milk-run Route 2
ABC Cost	137.45	161.43	362.01	600.13	623.44
Transportation charge	107.69	153.57	1120.00	82.86	300.00
Profit/Loss					
@ Baht	-29.76	-7.84	757.99	-517.27	-323.44
@ Percentage	-21.65	-4.87	209.38	-86.19	-51.88

is not capable of reflecting a hierarchical cost structure once the resources flow from one activity to another activity. Such hierarchical cost reflection is the most powerful data for the management to roll out Activity-based Management in respects of process analysis and improvement, cost controlling and budgeting, resource allocation and betterment as well as pricing strategy.

In conclusion, Activity-based Costing method would be able to overcome the above-mentioned weaknesses the Traditional Cost Accounting method has. Furthermore, the Activity-based Cost technique is also an initial stage applicable for Activity-based

In this point of view, it is a considerable matter that the particular LSP should alter its pricing model from Traditional Cost Accounting Method to Activity-based Cost Method because the Traditional Cost Accounting Method, which was applied for this particular pricing, could not thoroughly extract all necessary overhead costs on each activity. Besides, it has never acknowledged the differences in activities required for Full-truck-load (FTL) and Milk-run transportation services as identified on the above "Logistic Resources Utilization". Moreover, it

Management. The management can refer to the Activity-based Cost related information for further analysis of the process and subsequently improvement of the process. This improvement will contribute to a reduction of the costs at the end.

Finally, this study would propose that the LSP should apply Activity-based Cost technique to its pricing strategy as the method would assist the management to deliberate of what alternative pricing options are available and what the most appropriate pricing solution for its potential customer's requirement and expectation.

Limitation

There is a limitation in this study in terms of such “Annual Transportation Records and other necessarily data” as: - Accumulative kilometers transported, Total trip numbers, maintenance data, etc. this study, therefore, was based on monthly information being made available in March 2007.

Hence, the result may be more or less adjusted if the annual data is applied instead of the monthly data. Nevertheless, this study can be referred to in depth as “Sample Activity-based Cost Model” for the inland transportation cost analysis and pricing.

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