Measuring the Cash Conversion Cycle in an International Supply Chain[1]

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Abstract

The Cash Conversion Cycle (C2C) is a powerful performance metric for assessing how well a company is managing capital. A company with a lower C2C is more efficient because it turns its working capital over more times per year, and that allows it to generate more sales per money invested. The purpose of this paper is to explore and measure the C2C of an international supply chain, namely the export of frozen shrimps from suppliers of shrimps in Thailand to a major retailer in the United States. In this study, the C2C of each supply chain member will be analysed and discussed as the real key to achieving improvement in the C2C is to take a total supply chain approach. It is therefore important to understand how companies perform on this measurement metric as there are huge variations from company to company within a supply chain.

Keywords: cash-to-cash cycle, metrics, shrimps export, supply chain, Thailand

Introduction

One of the greatest challenges companies face today is delivering a competitive return to shareholders. Customer demands, competition, labour costs, and operating environment volatility drive down return on capital (ROC). Supply chain management (SCM) has the potential to improve the three key drivers of financial performance - growth, profitability, and capital utilisation (Rice & Hoppe, 2001).

Despite the potential of SCM, relatively few companies utilize SCM as a tool to drive financial performance. The cash-conversion-cycle (C2C) metric is an important financial metric as it expresses operational performance in financial terms and can be derived from information readily available in published financial statements (Lambert & Pohlen 2001). The concept of C2C leads to the premise that a reduction in the cash conversion cycle time will lead to financial and operational improvement; however the C2C concept assumes that shortening of cycle time can be achieved without increasing costs or decreasing sales (Soenen, 1993). This assumption has limitations as reducing the terms of credit for receivers would lead to a reduction of the product's attractiveness from a customer's perspective and lead to a reduction in sales volume and revenue; similarly delaying payment to suppliers will not be well received and is likely to lead to an increase in the cost of goods supplied.

The main objective of this paper is to explore the C2C that exists within shrimp export supply chain, where the scope of the supply chain start from shrimp suppliers in Thailand to a major retailer in the United States.

Industry Background: The Shrimp Industry in Thailand

The Thai government has a policy to turn Thailand into the "Kitchen of the World," as well as the world leader in the food industry, with an emphasis on high quality, high standards of Thai food products. The United States is currently Thailand's major shrimp export market, followed by Japan and the European Union. The demand for Thai shrimp increases every year despite the competition from other shrimp exporting nations such as China, Indonesia, India, Bangladesh and Vietnam. In terms of shrimp production, Thailand is the world's largest

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[1] The author would like to acknowledge the help of Paitoon Varadejsatitwong on an earlier version of this paper.

producer of farm-raised shrimps with an output of around a 33% of farm-raised shrimps in the world.

Defining the cash conversion cycle (C2C)

The C2C, or cash conversion cycle, is a composite metric that is considered as a key metric that can drive supply chain performance improvement (Steward, 1995). However, definitions of C2C are not harmonised even though the concept is relatively well understood. Table 1 illustrate existing definitions of C2C.

Source	Definition
Stewart (1995)	A composite metric describing the average days required to turn a dollar invested in raw material into a dollar collected from a customer
Moss and Stine (1993)	Days between accounts payable and *accounts* receivable
Gallinger (1997)	The cash conversion cycle measures the number of days the firm's operating cycle requires costly financing to support it.
Lancaster et al. (1998) Schilling (1996) Soenen (1993)	Inventory days of supply + accounts receivable – accounts payable

Table 1: Definitions of cash to cash

The C2C metric is an important metric from an accounting and supply chain management perspectives. For accounting purpose, the metric can be used to help measure liquidity and organisational valuation. For supply chain management activities, C2C serves as a measurement bridging the processes into and out of the firm within the supply chain. The C2C metric is an important measure as it bridges across inbound material activities with suppliers, through manufacturing operations, and the outbound logistics and sales activities with customers (Farris II and Hutchison, 2002).

Research Methodology

A case study methodology was used in this research. According to Yin (1994), a case-study methodology is deemed ideal for situation where little is previously known, and the purpose of the research is to gain an understanding of the phenomenon being studied. Through this methodology the author was, thus, able to develop a better understanding of how the C2C financial metrics could be used in assessing supply chain performance between members in a particular situation.

The case study

In this research, the cash conversion cycle (C2C) of shrimp export from Thailand to the United States is used as a case study in calculating C2C relationships within a supply chain. The understanding of the overall process from shrimp suppliers to the major retailer in the United States was done through a supply chain mapping approach, which was used to identify the process flow of the shrimp export supply chain, both the physical and information flow (Gardner & Cooper, 2003). The shrimp export supply chain starts from shrimp suppliers in Thailand who bought raised shrimps from farmers along the coastal areas of the country. These suppliers will then sell their shrimps to a Thai shrimp exporters who will have to freeze and pack the shrimps for overseas sales. The importer in the US will buy the shrimps from the Thai exporter and re-sell the shrimps to a major retailer in the States. The major retailer will then sell the Thai frozen shrimps through its outlets across the United States. Figure 1 depicts a conceptual diagram of the supply chain under study.
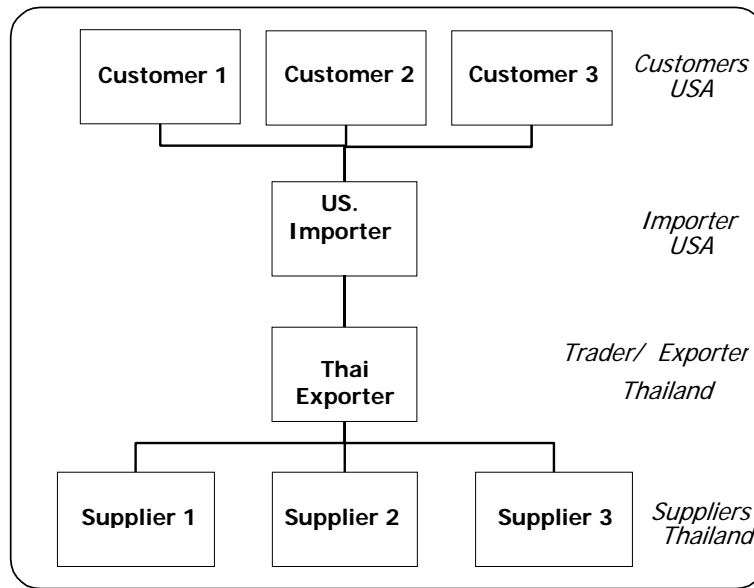
Figure 1: Shrimp export supply chain

Calculating the Cash Conversion Cycle (C2C)

C2C is an important analysis tool that allows the credit analyst to determine more easily why and when the businesses need more cash to operate, and when and how businesses will be able to repay the cash. C2C is also used to distinguish between the customer's stated loan purpose and the borrowing cause. Once the cash conversion cycle for the borrower is mapped, the analyst is then able to judge whether the purpose, repayment source and structure of the loan are the adequate ones. Managing effective cash conversion cycle in favour of the business owner is one of the objectives of supply chain management and techniques such as just in time inventory. The cash conversion cycle represents the number of days it takes a company to purchase raw materials, convert them into finished goods, sell the finished product to a customer and receives payment from the customer/account debtor for the product. The C2C has three components: Account Receivable Turnover Days; Inventory Turnover Days; and Account Payable Turnover Days. At its simplest expression the C2C of a company is defined by the sum of the Account Receivable Turnover Days and the Inventory Turnover Days minus the Account Payables Turnover Days.

$$C2C = A/R + Inv - A/P$$

The C2C can be calculated using the following component:
1. **Account Receivable Turnover in Days**. Measures the average number of days from the sale of goods to collection of resulting receivables. It is obtained by the following formula: (Account Receivable/Sales) * 365
2. **Inventory Turnover**. Measures the length of time on average between the acquisition and sale of merchandise. It is obtained by the following formula: (Inventory/COGS) * 365
3. **Payable Turnover in Days**. Measures the average length of time between purchase of goods and payment for them. It is obtained by the following formula: (Accounts Payable/COGS) * 365

In the case of the shrimp export from Thailand to the United Stated, there are four parties involved in this supply chain. The calculation the C2C cycle for each party in this supply chain can be summarised hereunder:

(1) Main Thai Shrimp Supplier (From 2004 balance sheet)

Revenue	65,012,402 USD
Cost of Goods Sold	60,339,163 USD
Net Receivables	4,550,334 USD
Inventories	16,951,824 USD
Account Payable	3,295,455 USD

Account Receivable Turnover in Days $= $ (Account Receivable/Sales) * 365
$= $ (4,550,334 USD / 65,012,402 USD) * 365
$= $ 25.54 days

Inventory Turnover $= $ (Inventory/COGS) * 365
= (16,951,824 USD/60,339,163 USD) * 365
= 102.54 days

Accounts Payables Turnover in Days = (Account Payable/COGS) * 365
= (3,295,455 USD / 60,339,163 USD) * 365
= 19.93 days

The C2C for Thai shrimp supplier is equal to 108 days (25.54 days + 102.54 days - 19.93 days). This is quite long as the shrimp suppliers have to pay cash to buy the shrimps from the farms but can only sell them on credit to the shrimp exporters. It is an industry practice for shrimp suppliers to bid for farms shrimp output and credit from farmers is not provided.

(2) Thai Shrimp Exporter (From 2004 balance sheet)

Revenue	5,681,818 USD
Cost of Goods Sold	5,517,677 USD
Net Receivables	1,406,818 USD
Inventories	906,237 USD
Accounts Payable	453,283 USD

Accounts Receivable Turnover in Days = (Account Receivable/Sales) * 365
= (1,406,818 USD/5,681,818 USD) * 365
= 90 days

Inventory Turnover = (Inventory/COGS) * 365
= (906,237 USD/5,517,677 USD) * 365
= 60 days

Account Payable Turnover in Days = (Account Payable/COGS) * 365
= (453,283 USD / 5,517,677 USD) * 365
= 30 days

The C2C for the Thai shrimp exporter is equal to 120 days (90 days + 60 days - 30 days). This C2C is the longest in the supply chain under study. However, the shrimp exporters can receive payment for the goods while the goods are still in transit when they sell their L/C to Thailand's Export and Import Bank which is a state-owned enterprise that can advance the money to exporters. This can help in reducing the C2C as a C2C of 120 days is not competitive for the exporting firm. There are currently numerous government initiatives to support the financing of exporters in Thailand.

(3) The US. Importer (From 2004, balance sheet)

Revenue	181,933,000 USD
Cost of Goods Sold	171,629,000 USD
Net Receivables	11,968,000 USD
Inventories	59,846,000 USD
Accounts Payable	94,694,000 USD

Account Receivable Turnover in Days = (Account Receivable/Sales) * 365
= (11,968,000 USD/181,933,000 USD) *365
= 24.01 days
Inventory Turnover = (Inventory /COGS) * 365
= (59,846,000 USD/171,629,000 USD) *365
= 127.27 days
Account Payable Turnover in Days = (Account Payable/COGS) * 365
= (94,694,000 USD/171,629,000 USD) *365
= 201.38 days

The C2C for the US importer is equal to minus 50 days (24.01 days + 127.27 days – 201.38 days). This C2C number is fascinating as this means that the US importer receive payment from the US retailer 50 days before paying its supplier in Thailand. This situation increases firm liquidity and provides use of "other people's money." In terms of supply chain sustainability the US importer is gaining an unfair financial advantage over other supply chain members and this may impact supply chain relationship in the long run.

(4) The major retailer in the US (From 2004, balance sheet)

Revenue	244,524 million USD
Cost of Goods Sold	188,406 million USD
Net Receivables	2,108 million USD
Inventories	24,891 million USD
Accounts Payable	17,140 million USD

Account Receivable Turnover in Days = (Account Receivable/Sales) * 365
= (2,108 million USD / 244,524 million USD) * 365
= 3.14 days
Inventory Turnover = (Inventory / COGS) * 365
= (24,891 million USD / 188,406 million USD) * 365
= 48.22 days
Account Payable Turnover in Days = (Account Payable / COGS) * 365
= (17,140 million USD / 188,406 million USD) * 365
= 33.20 days

The C2C for the customers is equal to 18 days (3.14 days + 48.22 days – 33.20 days). This C2C is an aggregate for the retailer's operation and not specific to just the frozen shrimp products. It is quite possible that on some product line this major retailer also benefits from negative C2C.

Conclusions

The calculation of the supply chain cash conversion cycle is interesting as the results shows a negative C2C cycle of minus 50 days for the US importer. This cash-to-cash cycle demonstrate effective cash management, where receivable turnover (+ 24 days) was less than payable turnover (+ 201 days). The US retailer has a C2C cycle of about +18 days. This C2C is higher than for the US importer but less than the shrimp supplier and the exporter in Thailand. Even though, the US retailers receivable (+ 3 days) was less than its payable (+ 33 days) but the higher inventory turnover (+ 48 days) caused a positive C2C. This means that the US retailer spend a lot of his money in inventory. This is the same as for the Thai shrimp supplier, as their C2C was about + 108 days. This came from its lower payable turnover (+ 20 days) than its receivable (+ 26 days) and inventory (+ 103 days) which caused a positive C2C. Therefore, improvement of US retailer and shrimp supplier C2C must also focus on how to manage their inventory more effectively. Table 2 summarises the C2C of Thai shrimp exports to the United States.

	Thai shrimp suppliers	Thai exporter	US importer	US Customers
Cash-to-cash cycle	+ 108 days	+ 120 days	- 50 days	+ 18 days

Table2: C2C of Thai shrimp export to the United States

The C2C metric is important from an accounting and supply chain management perspectives. For accounting purposes, the metric can be used to help measure liquidity and organisational valuation. For supply chain management activities, it serves as a measurement bridging the processes into and out of the firm. In accounting, firms can use the cash conversion cycle to evaluate changes in circulating capital and thereby assist in the monitoring and control of its components. It is important to invest available resources to yield the greatest economic benefit a proper mix must be achieved between the amount of resources deployed to working capital and the amount deployed to capital investments. Therefore, a company's optimum liquidity position, the minimum level of liquidity necessary to support a given level of business activity, must be identified and regularly assessed (Schilling, 1996).

In the case study, the cash conversion cycle calculation demonstrates that the US importer is the best performer in managing its cash flow in this supply chain (-50 days in C2C). The retailer and the Thai shrimp supplier have the second and third best performance respectively (+18 days and +108 days). The Thai exporter is the worst C2C performer in this supply chain (+120 days). The result of C2C calculation does indicate up to a certain extent that the US importer is the focal company coordinating supply chain activities from point-of-origin to point-of-consumption.

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