

### TITLE

## MANAGING THE TOTAL COSTS OF GLOBAL SUPPLY CHAINS

### CREDITS

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## MANAGING THE TOTAL COSTS OF GLOBAL SUPPLY CHAINS

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## I. EXECUTIVE SUMMARY

The evolution of supply chains has been dramatic over the past several years, with more and more companies moving to sourcing overseas, distributing finished goods to overseas markets, and increasing their international operations. Seeking low-cost country sourcing, optimizing manufacturing, and exporting products and services have created new challenges to demand forecasting and supply chain planning. Whereas some new supply chain solutions have been developed, financial management for globalization issues and opportunities has not kept pace with management's need to understand the full impacts of globalization, to improve company performance, and to have visibility into what has become widely referred to as "the new 12,000-mile supply chains."

By their very nature, global supply chains add challenges and complexities to developing complete and accurate costing. Long lead times, multiple trading partners and service suppliers, international duties, tariffs, taxation, and increased risks are but a few of the critical factors that must be accounted for and understood. The rapid increases in international trade have occurred faster than the tools and techniques for complete and accurate costing have evolved. While several new software solutions that support international trade and include many costing elements are available, management accountants cannot rely on these alone. Individual companies have different supply chains and different operational strategies. Software can support and enable better decisions, but it cannot manage global supply chains alone.

This SMA suggests guidelines for management accountants and others to improve their understanding of what is involved to accomplish complete and accurate costing of global supply

chains. It also provides the rationale for developing complete and accurate costing to support their companies and management in the improvement of supply chain performance and in managing the inherent risks of sourcing and selling across borders and internationally.

## II. INTRODUCTION

It is widely understood that the world of business is becoming more and more global. In many industries, companies must operate their supply chains on a global scale in order to compete. It is estimated that the current overall value of global trade is approaching \$400 trillion. In fact, world trade (imports and exports) in North America continues to grow at a much faster rate than overall GDP.

Most executives understand the need to both buy (procure) and sell (distribute) in world markets. The rapid growth in the level of offshoring and outsourcing by North American manufacturers, retailers, and distributors has been reported frequently in various media. According to the U.S. Department of Transportation, some 46.3 million TEUs (20-foot equivalent units) passed through U.S. ports in 2006, more than double that of a decade earlier. The number of containers entering the U.S. alone in April 2007 approached 1.4 million, which means that over 35,000 sea containers arrived each day at the nation's global seaports. China alone exported over 12 million TEUs to the United States in 2006. It is estimated that another 10% of this amount of freight arrives on cargo and passenger aircraft.

This remarkable growth in international trade is not likely to end in the foreseeable future. While economic conditions, political events, and other factors may slow the growth in certain countries at certain times, the overall scenario will not like-

ly change. Global sourcing of products and components, combined with the opening of new markets, creates more and more of what are often referred to in international trade as “12,000-mile supply chains.” With these long supply chains come new complexities in how companies deal with the resulting costs, risks, financing, and lead times.

In many industries, markets have truly become global; thus, companies have and will continue to increase their degree of international sourcing and product distribution. The business environment in which most companies operate has changed significantly. Decisions affecting international operations and profitability must be made with accurate, timely, and comprehensive cost information.

In no area of the business is this more important than in Supply Chain Management (SCM). Decisions are being made to “go global” without the benefit of accurate and comprehensive cost information, which can affect profitability and shareholder value in many adverse ways. Global operations can easily add weeks to the value chain, tying up as much as 30% of product price in working capital alone. Moreover, constantly evolving trade regulations, quotas, and tariffs can create additional layers of costs associated with compliance.

Supply Chain Management, broadly defined, is the integration of key business processes from end user through original suppliers that provides products, services, and information for customers and other stakeholders. Within each individual company, this definition will include the processes of source, produce, move and store, deliver, and customer service, as well as planning. While SCM also includes interactions with sales, finance, and other processes, as well as integration with other

trading partners in the supply chain, this SMA does not address cost management methods and practices for those activities.

The accurate definition, measurement, and management of costs for supply chain operations are essential for the successful operations of the business. Since global supply chains can reflect as much as 90% of a company’s cost base, complete knowledge and understanding of these costs are critical for effective business management and company performance. As companies strive to become “lean enterprises” with competitive cost advantages, planning and budgeting for SCM is increasingly value-based. Yet the total risks created by establishing global supply chains are not fully understood, accurately costed, or sufficiently managed.

Finally, full compliance with the Sarbanes-Oxley Act of 2002 (SOX) requires a broad and deep understanding of how to capture, record, control, and report supply chain costs. This is especially important for order-to-cash and procure-to-pay processes, in addition to overall cash management practices.

### III.SCOPE

Supply Chain Management has an enterprise-wide scope that also includes interactions with trading partners. The business processes or functions included in Supply Chain Management are:

- Purchasing, procurement, and sourcing
- Production planning
- Transportation
- Distribution, warehousing, and storage
- Order fulfillment
- Customer service
- Supply chain planning and budgeting
- Supply chain finance and working capital management

### EXHIBIT 1. INTERNATIONAL SUPPLY CHAINS: AN EXAMPLE OF GOODS FLOW

- Short product life cycles
- Global span for a single product

- Multiple origins
- Multiple Destinations
- Multiple Partners
- Multiple Chains

- “Spaghetti” network of partners
- Manual interfaces
- Tremendous amount of variables
- Increasing complexity to manage

- Supply chain gains strategic importance
- Need for End-to-end visibility
- Need for cost savings, shorter lead-times and synergies
- Increased Investments in technology and people



Source: DHL

Exhibit 1 shows a simplified graphical representation of international supply chains.

Earlier SMAs have addressed the costs of domestic logistics (Cost Management for Logistics, integrated supply chain management (Implementing Integrated Supply Chain Management for Competitive Advantage); and the associated tools and techniques (Tools and Techniques for Implementing Integrated Supply Chain Management). These SMAs are all relevant to this topic and provide the basics for supply chain activity-based costing, supply chain/logistics performance measurement, and supply chain/logistics information for cost management.

This SMA addresses the special impacts of global supply chains on cost management and performance management. It also addresses the global financial supply chain and the expanding interest among importers, exporters, logistics service providers, and financial institutions toward it.

This statement also includes a section on managing the total costs once they are identified. Global supply chain costs are more likely to increase relative to revenues than are domestic supply chain costs, thus it is even more important to put cost management processes in place. This section discusses best practices—both for processes and for technology support—for cost control in global chains.

## EXHIBIT 2. SCM VS. TRADITIONAL ACCOUNTING

SCM ACCOUNTING	TRADITIONAL ACCOUNTING
Crosses multiple departmental boundaries	Transaction-oriented, based on functional or vertical activities
Includes costs within organization as well as costs incurred by trading partners and service providers	Only concerned with inter-company facilities
Ongoing	Recognizes costs in a certain place, at a certain time, and in discrete buckets

#### IV. PERFORMANCE MANAGEMENT FOR GLOBAL SUPPLY CHAINS

Accurate and comprehensive cost information for global supply chains is fundamental to the management of performance. Managers who are responsible for the efficiency and effectiveness of global supply chains need to view performance metrics that are timely, complete, and actionable. Thus, global supply chain costing begins with the primary objective of providing appropriate information for management.

The responsiveness required to keep inbound supply chains flowing with materials and products and to keep store shelves filled, for example, is challenging. Effective SCM requires reducing costs, increasing inventory velocity, and compressing cycle time, but these three may not be compatible or consistent. Moreover, the product category can change the relative objectives, as certain products require more speed while others, such as commodities, require lower cost.

SCM flows across the organization, crossing many departmental boundaries, while traditional accounting is oriented toward transactions, with

its focus on identifying functional or vertical activities. SCM extends into trading partners and service providers while accounting stays within the company facilities (for example, supporting global trade requires as many as 25 handoffs and an equal number of supporting documents). Because products are always flowing, SCM is continuous. Accounting, however, recognizes costs in locations, periods, and discrete buckets. See Exhibit 2 for a comparison between SCM and traditional accounting.

These differences can be especially constraining with global supply chains, which by their very nature involve multiple parties, long lead times, continuous flows, and variable costs of up to 50 or more cost elements for each supply chain.

Managers of global supply chains need performance metrics that address supply chain objectives and issues, such as:

- Inventory velocity, turns, and yield
- Total landed and delivered costs
- Cycle times: cash-to-cash, order-to-pay, procure-to-pay, etc.

## EXHIBIT 3. A COST ELEMENT CHECKLIST FOR OFFSHORING

✓ net materials costs	✓ increased information for visibility
✓ planning and contracting	✓ demand planning and forecasting
✓ inventory planning and deployment	✓ international taxes
✓ manufacturing labor	✓ staffing additions for managing the supply chain
✓ manufacturing plant overhead	✓ communications challenges--time zones; interpretations, etc.
✓ bill of material changes	✓ financial risks--over/under payments, duties, compliance, access to working capital; receivable discounting facilities, etc.
✓ fixed plant costs	✓ foreign exchange costs--direct and indirect, local currency costs vs. input costs (i.e., dollars or euros, etc.)
✓ site inspections/certifications	✓ enterprise capital costs
✓ costs of quality and fixing mistakes	✓ transfer pricing
✓ returns and reverse logistics	✓ costs of lost business--duty reductions, free-trade agreements, etc.
✓ scrap	✓ costs of internal controls
✓ warranty recovery	✓ costs of information technology
✓ inventory carrying/working capital	✓ costs of inaccurate data
✓ storage and handling	✓ costs of import/export customs compliance and documentation
✓ response to changing market demands	✓ duty drawback/restitution
✓ changes to production schedules	✓ participation in security programs (e.g., C-TPAT)
✓ expediting	✓ total landed cost
✓ transportation--inbound to supplier	✓ total delivered cost
✓ transportation--outbound to port of origin	✓ supply chain disruptions--labor, weather, etc.
✓ transportation--port to port of destination	✓ cycle time (order to delivery)
✓ transportation--port to storage to plant	✓ time delays in the chain
✓ duties and tariffs (customs)	

- Product and customer profitability, including true total delivered costs
- Capital efficiency: cost of capital, fixed and working capital, and trading partner cost of capital
- Integrated global visibility: a 360 degree view of the company's world in terms of its material and product, information, and financial flows.

These examples of key performance indicators (KPIs) are important for global supply chain performance measurement, and they help form the basis for supply chain excellence. Accurate and comprehensive supply chain costing is core to each metric used to define each of these performance objectives or indicators.

## V. IDENTIFYING COSTS IN GLOBAL SUPPLY CHAINS

Costs are incurred from the start of planning for each global supply chain throughout its execution and, therefore, are incurred along the entire end-to-end chain, from the supplier's supplier to the customer's customer. These basic principles drive the identification of global supply chain costing. When a new supply chain is planned—e.g., the company makes a sourcing decision to procure components from an overseas supplier for a domestic assembly plant—costs are incurred to plan and design how the supply chain will work. The expected amount to be purchased, delivery dates, routing, any storage, whether or not it can be consolidated with other purchases, etc., all have to be planned, costed out, and budgeted. Once this source is in operation, the total operating costs from the source to the consuming point (the assembly plant) must be quantified, controlled, and reported, along with changes that will occur to the plan.

Exhibit 3 is a checklist that identifies the total cost elements that are affected by this decision. All too often these types of offshoring decisions are made without considering many of these costs. Either some are not identified, or they are not readily available or easily measured, and thus they are ignored.

Lower labor costs are but one element of the total delivered cost. While it and a few others will undoubtedly result in lower costs, the vast majority of cost elements will likely increase over those of a domestic source. This is not meant to discourage offshore sourcing, only to highlight that true costs cannot be determined by one element alone. Complexity, risk, and variability exist with any such choice, and they need to be understood and considered.

There are certain costs particularly unique to the nature of global supply chains that are imperative for both performance and cost management. Here are five of the most critical, along with guidelines for identifying and managing them:

**1. Total landed cost:** all the cost elements required to land a product in a destination geography from different origin geographies, taking into account different currency exchange rates. Customs tariffs and VAT taxes, carrier rates, inland transportation at origin and destination, agency fees, logistics service provider fees, and the cost of funds are all included.

Capturing and actively reporting on these costs requires not only full costing of the procurement but all associated logistics and regulatory costs based on both country of origin and final destination.

**2. Total delivered cost:** all the required cost elements above plus the costs of overhead, capital efficiency, allocations, and other costs that are incurred up to point of purchase. Capturing and actively reporting on these costs adds to the complexity of global sourcing, as the costs of overhead, capital efficiency, taxes, allocations, etc., will vary by country, risk factors, supply chain, transit times, and inventory deployment practices.

**3. Working capital:** the cost of trade receivables plus inventory minus accounts payable. This measure of asset efficiency, along with the cash conversion cycle, can be significantly decreased by the global supply chain. New measures of working capital that take into account the cash conversion cycles of the entire supply chain must be considered. Days of working capital, for example, are measured as period-end net working capital divided by sales per day. If inventory

levels increase dramatically, as in the case of long supply chains, then the costs of operations and/or goods sold may be as much as 30% or more higher.

Related working capital costs are measured by:

- Days Sales Outstanding (DSO): Period-end trade receivables net of allowance for doubtful accounts plus financial receivables, divided by net sales per day
- Days Payable Outstanding (DPO): Period-end trade payables divided by sales per day
- Days of Inventory (DIO): Period-end inventories divided by sales per day.

Cash moves according to events that happen in the physical supply chain. Payment terms are triggered by events, then by information, which may be delayed. For example, the announcement that goods are onboard a vessel might come two to three days after the loading, which delays the movement of capital or, in this case, payment. The traditional practice of using Letters of Credit (LOC) to finance international trade has done very little to alleviate such delays. Today, more companies are moving toward an open account with established suppliers. This improves supply chain visibility and, as a result, speeds up cash flow. Eliminating LOCs, however, requires that new forms of financing be substituted for suppliers. Supply chain financing (SCF) is addressed in Section IV.

**4. Cycle Time:** This measure of the total time required from order to delivery is also significantly altered by the global supply chain. The lengthy global supply chain adds substantial lag time between product (or component) procurement to receipt. The time varies by country of origin and destination due to customs clearances, country infrastructure, carrier capacity, etc., but it also varies by the type of commodity, whether it is

shipped by air or sea, containerized or not, and other factors including variables such as late sailings or arrivals, bottlenecks, congestion, disruptions, weather, security delays, or mishandled shipments. Transit times vary by routings. For example, China to Los Angeles/Long Beach by sea followed by an intermodal move to Chicago requires a different transit time than China to Seattle by sea followed by trucking to Chicago. All-sea routes from Asia through the Suez or Panama canals to the east coast of the U.S. require different transit times than routings through west coast ports that then use land transport to the east.

Global carrier (ocean liner) reliability is also an important factor in transit cycle time. A recent survey by Drewry Shipping Consultants reported that, during the first quarter of 2007, less than 50% of container ship arrivals on 20 of the major trade routes were on time. This means that shippers have to build more buffer time into their supply chains to deal with the demanding risk of variability in liner schedules, which translates into higher supply chain costs.

Cycle times can be measured from order to delivery; cash-to-cash; procure-to-cash; plan to execution; in increments of land or sea, or any other feasible measure. Since extra time translates into higher costs and risk mitigation measures (i.e., inventory build-ups), however, it is a significant factor in supply chain costing.

**5. Costs of customs, taxes, and security compliance:** International shipments, or those that cross multiple borders, incur extra costs associated with customs, taxes, and security compliance that do not apply to domestic supply chains. These evolving costs are complex, variable, and transaction-driven. Fortunately, numerous information technology solutions are avail-

able, including ERP systems that enable the planning and tracking of these costs and provide necessary documentation. However, management accountants and supply chain managers should not solely rely on information systems. Shipment routes, transit time, and the quantity of goods moved are decided by supply chain managers, and costs are determined and triggered by these decisions. Furthermore, violations of customs laws governing valuations and tariff classification, country-of-origin declarations, and duty payments can lead to significant cost penalties. The costs of security compliance are likely to increase as governments require more container inspections and other security protections. While scanning and tracking technologies are improving, these will add costs to global supply chains.

The use of a third-party, or logistics, service provider (LSP), in global supply chain management is increasing. As supply chains become more complex and trade volumes increase, it is expected that companies will outsource much of this movement to specialists. The global market for LSPs is estimated to be over \$200 billion, with at least 65% of it for international trade. These companies are also known as freight forwarders, customs brokers, third-party logistics (3PLs), LSPs, and others.

It is important for management accountants and supply chain managers to understand and know the true costs of their global supply chains and not to rely solely on the outsourced providers. While payment terms for logistics outsourcing services differ—e.g., cost plus fixed fee, per unit basis, volumes, etc.—the fact is that each company's supply chain strategies and choices form the basis for their service costs. "Open-book costing" is a good practice for sharing knowledge and information relative to the actual costs of providing the services.

A best practice for identifying global supply chain costs is to "map" the supply chains and develop process models that describe what is taking place in the company's supply chains. Mapping the flows of logistics, information, and cash is very important for planning and management. Moreover, mapping key events, hand-offs, and times, is invaluable for identifying total costs and the opportunities to reduce or control them. These activities can and should be performed with the help of the LSPs for validation and completeness.

## VI. GLOBAL SUPPLY CHAIN FINANCING

It is commonly assumed that certain types of global sourcing and production outsourcing have helped many companies reduce overall operating costs. Plants, equipment, and other capital expenditures in many cases have shifted from the brand owners and original equipment manufacturers (OEMs) to their trading partners, who are increasingly offshore.

As some costs elements are reduced, however, others will increase, including those associated with the capital efficiency of the value chain. For example, inventories often get pushed downstream to suppliers, who often have a higher cost of capital. Global operations can add weeks to the supply chain, tying up as much as 30% of product price in working capital. These factors and their associated risks have given rise to new strategies for financial supply chain management, such as:

- optimize use of working capital
- reduce product unit costs by taking advantage of arbitrage opportunities due to the higher cost of capital in emerging markets
- extend days payables outstanding (DPO)

- Reduce supply base risk by enabling faster and more predictable payments to emerging market suppliers.

The phrase “financial supply chain” refers to the flows of funds associated with the movement and storage of goods throughout the chain. It includes the business processes of exchanging payments, related documents, and information between buyers, sellers, financial institutions, and other involved parties. It also includes the cost of capital structure of the trading partners involved—in that the cost of capital of a given supply chain becomes the weighted cost of capital of all partners.

Supply Chain Finance (SCF) incorporates both operational and financial management related to purchase orders, invoices, chargebacks, settlements, and the financing/credit management between trading partners and their financial institutions. This has given rise to new SCF solution providers who play an intermediary role between buyers and sellers in the supply chain by providing visibility into financial supply chains (for example, purchase order/invoice/payment status) by greater access to capital, by electronic settlements, and through other related services.

Visibility into global supply chains helps both buyers and sellers manage their cash flows. This can reduce excess cash balances and financing costs.

These providers can help reduce or control supply chain costs by focusing on the key metrics discussed above, such as:

- Working capital—extending Days Payables Outstanding (DPO)
- Cost of goods sold—early payment discount program

- Cost of financing—capitalizing on arbitrage opportunities with costs of capital
- Inventory carrying costs—third-party in transit or in storage inventory financing, whether raw materials, work-in-process, or finished goods inventories; it may also include financing of supplier managed inventories

SCF solution providers include banks, investment banks, and technology companies. Technology companies provide improved information to speed up decision making while banks provide financing and payments.

One form of SCF that is gaining momentum is early payment programs. The sale of supplier receivables at the buyer’s lower rate helps alleviate the higher cost of capital of offshore vendors. Many such programs are subject to the credit capacity of the lenders, so it is important to consider scale and capacity. Capital-market-funded programs mitigate this risk, especially for larger companies with significant amounts of direct material spend and payables.

With these new SCF programs, companies no longer need to own their entire supply chains. Instead they can create value and reduce total costs by leveraging the core competencies of their trading partners. While global sourcing, production outsourcing, and distribution complicate value exchange, increasing the quantity, velocity, and complexity of trading partner transactions will also open up opportunities for collaborative win-win arrangements.

A successful SCF strategy and program involves a cross-functional team of finance, purchasing, supply chain, and sales and marketing managers. As with managing the physical and information flows of the supply chain, collaboration with key suppliers and outside service providers

## EXHIBIT 4. ACTION APPAREL SUMMARY INCOME STATEMENT

Revenue	\$2000
COGS	\$1360
Gross profit	\$640
SG&A	\$520
Operating income	\$120

All figures in \$000s

is essential. Knowledge of the true total costs of supply chains is fundamental regardless of the programs adopted. Collaborative processes will help identify the true costs, where and why they occur, and how they can be jointly managed or reduced.

Improved supply chain financing is facilitated by better knowledge and control of accurate supply information on costs, times, and events. The inverse is also true. Through improved trading partner collaboration and integration of financial information with physical supply chain information, the appropriate strategies and methods can be put in place to enable true global supply chain cost management.

### VII. A CASE EXAMPLE

Global supply chain costing excellence will impact key corporate financial measures and shareholder value. The following provides a case example developed by the author and colleagues to illustrate the issues and opportunities in managing global supply chains, along with its impact on company financials. While the name—Action Apparel—is fictitious, the example is based on

real composite information from the apparel industry. The principles and methods are applicable to many industries.

As shown in Exhibit 4, Action Apparel has sales of \$2 billion, a 68% cost of goods sold ratio (\$1.36 billion), SG&A costs of 26% of sales (\$520 million), and net profit from operations of \$120 million, or 6% of sales.

Action Apparel also achieves six inventory turns per year, resulting in an average inventory level of \$226 million, based on inventory cost (\$1.36 billion divided by six). It is assumed that 100% of its products are sourced offshore. It is also assumed that Action Apparel incurs a sourcing overhead of 5% of COGS (an average for the industry), or \$68 million. This amount may increase depending on the degree of regular site visits to the offshore suppliers or the number of employees needed in the countries of origin.

Action Apparel has the opportunity to reduce costs in several critical areas. Estimates for this example are shown in Exhibit 5.

## EXHIBIT 5. ESTIMATED SAVINGS POTENTIAL FOR ACTION APPAREL

COST ELEMENT	% IMPROVEMENT	DOLLAR IMPACT	HOW ACHIEVED
COGS	0.5%	\$6.8 million	Objective total landed cost calculation, reduced transportation, and expediting costs
Inventory reduction	16%	\$32.4 million inventory reduction	Increasing of inventory turns from six to seven per year based on lower buffer inventories due to improved visibility
SG&A Reduction	15%	\$10.2 million	Process improvement and automation of core tasks reduce overhead costs from 5% to 4.25% of COGS

## EXHIBIT 6. COST IMPROVEMENTS

COGS reduction from improved sourcing decisions and processes: <b>\$6.8 million</b>
COGS reduction from reduction in inventories: <b>\$6.15 million</b> ( <i>\$32.4 million in inventory reduction times 19% inventory carrying cost</i> )
SG&A reduction: <b>\$10.2 million</b>
<b>Total operating expense savings: \$23.15 million</b>

## EXHIBIT 7. REVISED ACTION APPAREL SUMMARY INCOME STATEMENT

	CURRENT	WITH GLOBAL SOURCING IMPROVEMENTS
Revenue	\$2000	\$2000
COGS	\$1360	\$1347.05
Gross profit	\$640	\$652.95
SG&A	\$520	\$509.80
Operating income	\$120	\$143.15
Dollar improvement	NA	\$23.15
Percent improvement	NA	19.20%

All figures in \$000s

To calculate the impact of these improvements on company financial and stock performance, assume a real inventory carrying cost of 19%. This number reflects the combination of noncapital inventory costs (warehouse, obsolescence, shrink, damage, taxes, etc.) of 10% and a cost of capital of 9%. While each company calculates its inventory holding costs differently, these numbers reflect current best practice.

The cost improvements are shown in Exhibit 6, and the total impact on the income statement is shown in Exhibit 7.

With a net profit margin of 6%, this \$23.15 million total cost decrease would provide the same improvement in financial performance as an increase of over \$385 million in top-line revenue growth. In addition to the substantial improvements in the bottom line available to Action

Apparel, equally dramatic results can be realized in terms of cash flow and, ultimately, shareholder value.

The impact on cash flow from operational improvements can be calculated, such as increasing inventory turns and reducing the cost of goods. The effect that the improvement in cash flow has on increases in stock valuation can also be measured.

The right investments to improve supply chain costing can generate significant increases in shareholder value, in addition to improvements indicated on the income statement. The improvements in COGS, SG&A, DSO, inventory turns, and payables (working capital), all contribute to free cash flow, which in turn affect market capitalization and thus stock valuation.

## VIII. MANAGING THE TOTAL COSTS

Managing the total costs of global supply chains involves many of the same principles as does managing domestic supply chains. These include activity based costing (ABC), process mapping, operational budgets and spend controls, the use of appropriate technology support, and other. The differences, however, are significant, as has been shown in this statement.

First, there is the issue of completeness. With direct costs, global supply chains involve higher costs and complexities of transportation; longer lead times; extended uses of working capital; customs, duties, and taxes; and other costs of moving and storing goods and inventories. For indirect costs, as exhibit 3 delineates, a host of additional costs are involved that are associated with offshoring.

Second, there is the issue of complexity. Global supply chains are inherently complex, as the end-to-end points of goods flow initiate inland in one country. Thus there are more uncertainties, more parties involved, higher variability, and higher volatility.

Third, there is the issue of risk. Domestic supply chains are highly controllable and predictable, while international supply chains have inherent risks of weather delays; natural disasters; security and customs delays; acts of terrorism, theft, and counterfeiting; labor actions; congestion at logistics hubs; currency fluctuations; and others. This issue also requires more intensive management focus, and improved scenario planning for cost and customer service purposes.

The largest cost of global supply chains is that associated with logistics. Containing international freight spend, contracted freight rates, expe-

ditioned freight, and related costs of moving goods, fortunately, has been facilitated by new and improved technologies and related data quality services.

These new information systems and technologies focus first on visibility and agility; in other words, providing shippers and customers improved views into which shipments are moving through the chains and how, where they are located, and when they are expected to arrive at their intended destinations. Global transportation management systems (TMS) exist that provide much of the capability, along with electronic data interchange (EDI) and web portals as modes of communication with trading partners.

In addition to TMSs and web portals for trading partner information sharing, a new generation of “Global Trade Management (GTM) Systems” has developed.

These systems enable managers to better control import/export costs, reduce risk and exposure to penalties, and comply with the ever changing customs and security regulations in over 150 countries. GTMs also can automate the information exchanges associated with the cross-border movement of goods, such as shipment documentation, customs entry filings, screenings, etc. They also provide necessary audit trails for protection of trade privileges and other financial control purposes.

Recent surveys by Aberdeen Research (see References) indicate that increasing international freight costs are the number one cost pressure, that improved visibility is the first priority to manage costs, and that best-in-class companies are twice as likely as other companies to employ a TMS and/or a GTM for managing international freight and the associated costs. This includes

the capability of tracking “total landed costs”, which was discussed earlier in this statement, as well as the ability to compare these to forecasted or budgeted costs. As more is learned about what actually comprises total landed costs (as described in this statement), it can be expected that these systems will be expanded.

Controlling or containing other costs—such as working capital invested in inventories being moved and stored—is more complex and less automated. This begins with demand-supply balancing (i.e., forecasting what is needed for sale and when) so that purchase orders can be placed for just the right products or components at just the right time. Most ERP systems, and other supply chain solutions, provide support for “sales and operations planning (SOP)”. However, the forecasting process is far from perfect and safety stocks need to be provided, which increases inventories. Moreover, a company’s logistics strategy and network of facilities will determine how goods flow and where they are stored in global supply chains. Many companies—having now recognized the increasing costs of global chains—are re-evaluating their global supply chain strategies and networks, hoping to reduce inventories, order to delivery lead times, and excess costs created by lower inventory turns.

Controlling indirect costs—such as the SG&A expenses associated with strategic sourcing and international distribution—involves employing similar methods as that of domestic supply chains, such as planning and budgeting, activity-based costing, and expense controls. As mentioned, above, however, the complexities are different with international supply chains, as is the need for additional checking and active management.

As more experience is gained with global supply chains, and quantitative performance data and best practices are shared, we can expect benchmarking and best practices services to be more available to companies within industry segments. These will help planners and management accountants compare and contrast cost levels with others.

## IX. SUGGESTED ACTIONS FOR GLOBAL SUPPLY CHAIN COST MANAGERS

Determine which global practices are outsourced in your company and how to improve the managing of costs with the right partners. While most companies outsource anything from the basic processes of freight forwarding/customs brokering to the total logistics of the business, all too often the service providers do not collaborate with their customer enough to provide total landed costs and other necessary information. This should be a standard requirement in outsourcing agreements.

- Perform the process mapping work mentioned previously in this SMA. It is very important to understand how processes work that control what and how much is sourced, how and where it flows, and how it is tracked and managed through international supply chains. Effective process mapping will include who does what, when, and where... as well as the performance metrics that are associated with the process – metrics of cost, time, volumes, and quality (accuracy). After mapping is completed, process models can be defined which delineate the work flows and interactions needed. These process models can then be used for:
  - (1) determining process improvements;
  - (2) resource and training requirements; and
  - (3) defining the business requirements to use for evaluating and selecting technology investments.

- Determine the information technologies and systems most appropriate for your business processes and for collaborating with your trading partners. Regardless of whether your company or your lead logistics provider employ a TMS, you need to have access to its transactions and reports. Furthermore, use of GTM will enable you to better operate cross-border movements. This system is probably more advantageous to have internally, as long as it inter-operates with your service providers.
- Work on data quality. This issue is challenging even when an ERP is employed, due to ever-changing data systems and data exchanging among trading partners, yet it is essential for process improvements, which lead to better cost management.
- Work on total landed costs and total delivered costs. These two cost measures serve as the basis for global strategies as well as supply chain execution. It is critical to adopt the complete template for identifying and tracking these, then plan and forecast them for every supply chain. Compare and contrast these among your product groups, and use outside benchmarking services when available.
- Adopt a performance scorecard for your global supply chains that tracks actual costs against planned and forecasted expenses. This is the only way to achieve true continuous improvement. While plans and budgets can be flexible depending on events, actual expenditures and costs incurred—reported in total—reflect the true costs of international sourcing and distribution. These are essential for considerations in product pricing and capital expenditures, along with work-class cost management.

## X. CONCLUSION

Global supply chains are being recognized more widely as significant generators of higher costs. The continuing increases in international trade,

globalization of sourcing, production, and distribution, along with the inherent longer lead times and complexities, have resulted in serious challenges among financial and management accountants to understand and keep up with the operational changes and their impacts on financial management.

Complete and accurate costing of global supply chains is complex, but it is essential for the planning, budgeting, and control of global supply chains. Complete and accurate costing is fundamental to understanding company operations and to achieve dramatic supply chain improvements.

As presented in this SMA, management accountants should gain an understanding of the company's global supply chains—their purpose, processes, and geographies—and, with the help of supply chain managers and logistics service providers, map performance in terms of volumes, costs, time, and the key activities that drive them. Then management accountants should become familiar with the total costs of global supply chains (as shown in Exhibit 3) and determine how and where to find or estimate these costs. Again, supply chain managers and service providers can be helpful in this process.

Once the total costs are identified, and the key activities that drive them are determined, management accountants can advise company managers on methods to manage and control them. In many cases, improved business processes will be needed to better reflect the completeness and complexities of international operations. Also, in most cases, an interdisciplinary team of management accountants, logistics, supply chain, sales, sourcing and other internal specialist will be needed, and with the assistance of

service providers, to develop a working management model for planning, budgeting, and then managing the total costs.

Improved information technologies are now available that enable better understanding and management of global costs. Management accountants should assist with evaluating these newer solutions and advising on their selection and applications to best meet the business requirements.

Next, management accountants should assess their supply chain financing providers and opportunities in order to complete the total cost profile of the physical, financial, and information chains. Once these actions are completed, new strategies for supply chain cost reduction and profit contribution can be devised.

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