SAP White Paper
mySAP SCM

TRANSPORTATION MANAGEMENT AND THE ADAPTIVE SUPPLY CHAIN NETWORK

Keeping Pace with Innovation and Globalization

CONTENTS

EXECUTIVE SUMMARY

Supply chain management has come to the forefront of every company's business agenda. Responding to the demands of today's highly competitive global environment, traditional linear supply chains with their sequential processes are evolving into complex, global ecosystems that are highly responsive to customer needs.

These "pull" (demand-driven) environments that work in conjunction with traditional push environments are known as adaptive supply chain networks (ASCNs). ASCNs allow all stakeholders in the supply chain, both within and outside the enterprise, to share knowledge, make collaborative decisions, and sense and respond immediately to changing conditions. An ASCN allows companies to restore order to a chaotic supply chain for higher profits.

Key elements of the ASCN process are supply chain execution and planning, and they are the responsibility of planning professionals. Surprisingly, these two seemingly different responsibilities are based on a common goal – profitability through supply chain economics.

When execution and planning processes are used to cut costs without considering their effects on the business as a whole, the economics of the supply chain may be ignored. An ASCN provides the framework for a high level of economic responsiveness. Within the context of a fully integrated enterprise resource planning (ERP) system, an ASCN can lead to profitable growth that a company could not previously achieve.

An ASCN is the catalyst for enhancing a company's financial position and improving its supply chain economics. Without an ASCN, the potential for growth is limited to improving linear processes and optimizing single points within the network. These benefits rarely, if ever, improve the business ecosystem as a whole.

In today's global economy, all or portions of a company's supply chain may be outsourced. Products flow in many directions and in multiple modes. The lines between trading partners are blurring. Part of the movement to globalization is the desire to minimize costs. But the idea that rising transportations costs can offset all supply chain economic gains has been highlighted in the Gartner report "Higher Freight Costs Increase Need for Transportation Management Solutions" (C. Dwight Klappich, January 11, 2006), which stated, "Transportation budgets worldwide could increase by as much as 25 percent during the next few years, unless companies find ways to minimize the impact of freight cost increases."

Transportation capacity planning took on a new urgency when the Federal Motor Carrier Safety Administration enacted hours of service (HOS) changes in October 2005. These HOS modifications created an immediate decrease in logistics service provider (LSP) capacity and increased overall driver personnel costs by limiting the number of hours a driver can work. Numerous articles have noted the issue of driver shortages, and the situation is expected to plague the industry well into the future.

These challenges have raised the profile of transportation management in the boardroom as companies strive to maximize capacity, minimize costs, and still meet customer and shareholder demands for service and on-time deliveries.

KEEPING PACE WITH TODAY'S TRANSPORTATION INDUSTRY

Commercial transportation has become a very complex process. Raw materials and parts as well as finished goods must move from point to point along a supply chain of logistics service providers and business partners.

Companies in the huge transportation industry must have fast, streamlined, and profitable business processes to satisfy their demanding customers. These processes, supported by new transportation and distribution strategies, feature real-time visibility of transportation events and integrated business and logistical activities. Transportation companies must adapt to external trends such as deliveries tracked on the Internet, global trade, and offshore manufacturing.

Today companies are aggressively looking to expand their ability to reach their customers profitably and efficiently beyond their existing ecosystems. They are exploring expanding to other geographic areas, becoming third-party logistics providers, better utilizing their own fleet, and sharing traffic with other companies. Any of these changes truly requires the ability to be adaptive.

A common thread that weaves all of these capabilities together is an ASCN. Adaptive business processes enable companies to sense and respond to real-time transportation events and disruptions. An ASCN can connect better with the information chain for improved collaboration with partners, suppliers, and customers than a traditional, linear supply chain can. This connection

- Single-channel supply chains are no longer the norm.
- All or portions of your supply chain may be outsourced.
- Product flows in numerous directions in multiple modes.
- Change in trading partners is constant.
- Lines between trading partners are blurring.
- Each local node needs both to be self-aware and to collaborate across nodes.

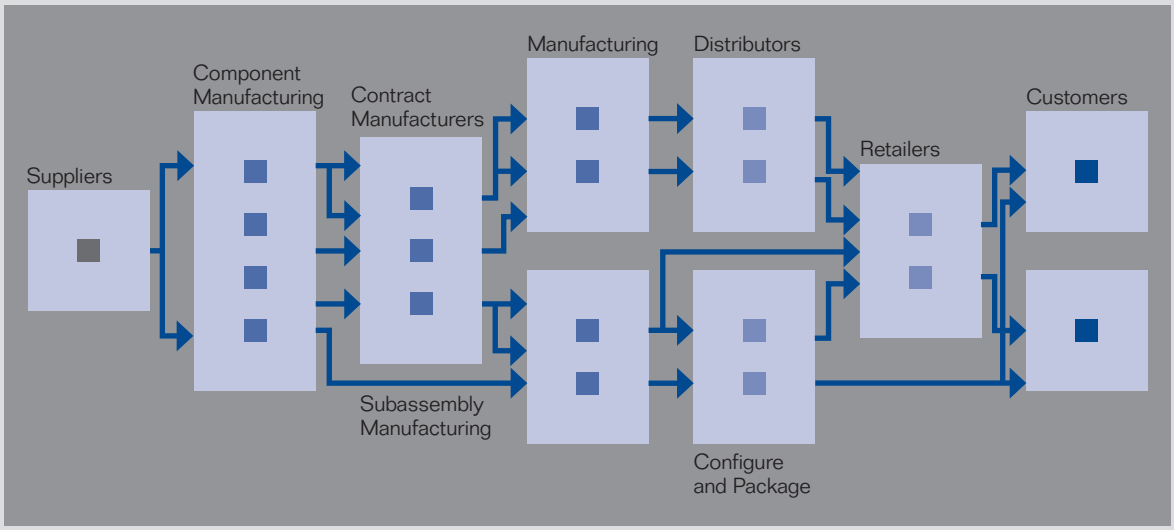

Figure 1: Transportation in the Adaptive Supply Chain

can include cutting-edge technologies such as radio frequency identification (RFID), wireless fidelity (Wi-Fi), global positioning system (GPS), cellular, and ultra-wideband to provide global visibility and help managers make profitable business decisions in real time. For example, ASCNs often facilitate pull-based material flows, which match shipment frequency with end-user consumption. As transportation costs continue to increase, this process needs to be managed closely, because pull-based logistics often increases the total number of shipments. This process also requires precise inbound and outbound shipment tracking.

Transportation is fast becoming a key factor in determining the difference between profit and loss. It is the essential link between the extraction of natural resources; the fabrication of industrial, commercial, and consumer products; and the final distribution of goods to wholesalers, retailers, and end users.

Historically, in a linear supply chain, commercial transportation was a fairly simple activity: goods and materials were taken directly from the manufacturer to the customer. But today within an ASCN, transportation is a complex procedure performed by a widespread, often global network of partners and LSPs. Partnerships help shippers minimize inventory and manage more sophisticated practices such as flow through and merge in transit. This puts transportation efficiency and visibility at center stage in a company's supply chain efforts.

In addition to being complex, transportation is a big business that has produced a sprawling global transportation landscape. When companies navigate today's transportation system, they have a smaller margin for error than ever before. To meet customer demands, companies must deliver goods to their destinations in an economical and timely manner. To survive, companies need a transportation organization that has fast, streamlined business processes, works efficiently with network partners, and makes timely, profitable decisions. Companies are responding to these demands by focusing on improving speed, service, and flexibility while reducing costs.

TRANSPORTATION BUSINESS PROCESSES: ACHIEVING INDUSTRY-LEADING CAPABILITIES

A company seeking to achieve more efficient transportation and greater profitability must make significant changes in the way it performs every phase of the transportation process. It is important to implement new transportation and distribution strategies to improve carrier capacity utilization in a time of constrained supply. A company must work efficiently with network partners to take advantage of last-minute opportunities and react in real time by having real-world visibility of transportation events. The goal is to improve productivity by having process decision support, total visibility, access to process metrics such as costs or profitability, and performance scorecards.

An ASCN relies on a tightly integrated and transparent transportation process to handle many elements such as managing freight procurement, forecasting shipment volumes, planning and executing shipments, careful handling and monitoring of transportation spend, and having visibility to all activities through key performance indicators (KPIs), scorecards, and other important analytical tools.

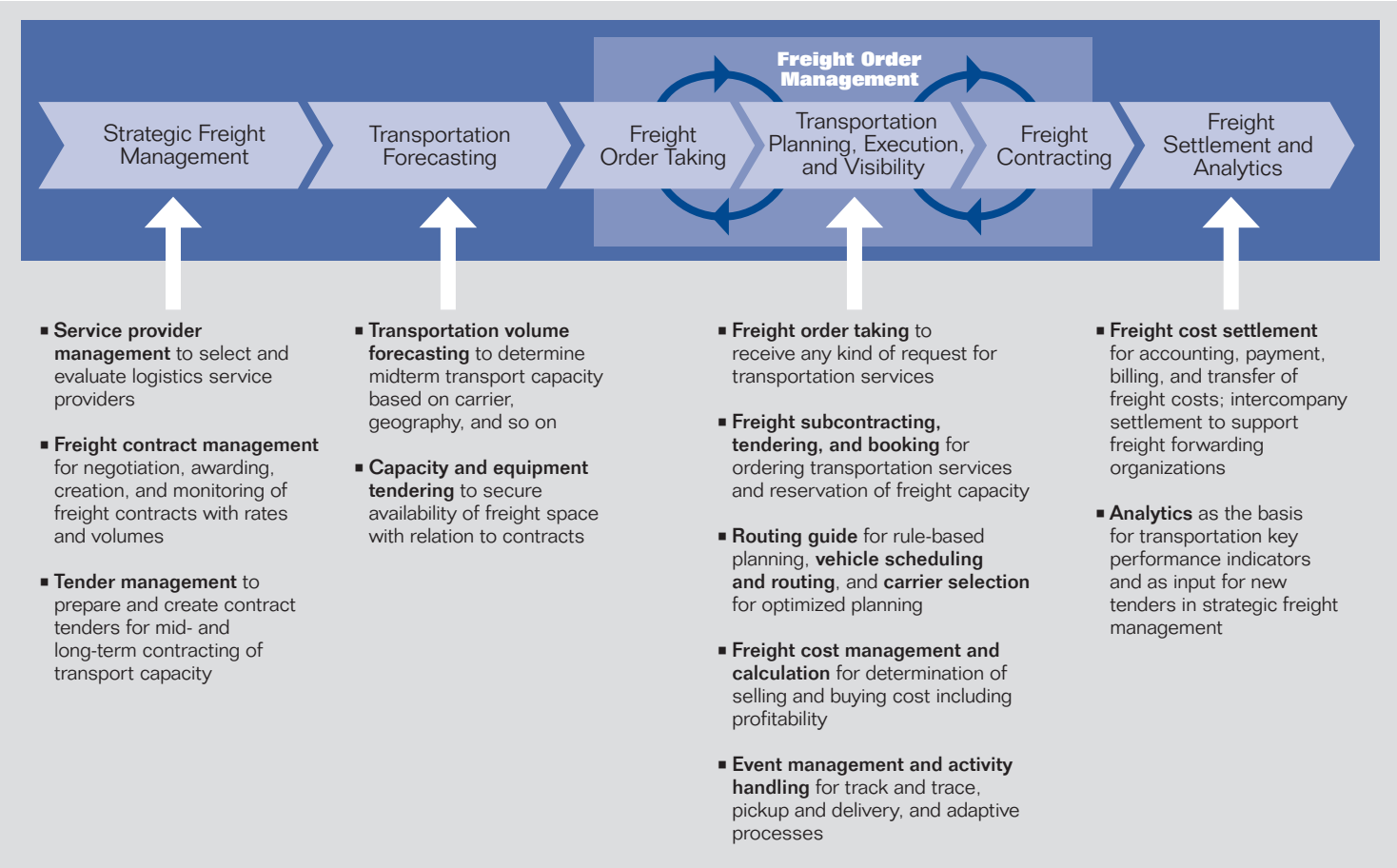

Figure 2: Transportation Management Process Life Cycle

Freight Procurement

To fully support the freight-procurement process, companies must meet requirements for contract management, bid preparation, bid proposals, bid responses, contract award, and contract creation. These capabilities structure the relationship between shipper and LSP by streamlining the contract-negotiation process.

The greatest benefit a freight-procurement solution can provide is the ability to set expectations by channel and lane for the expected transportation spend. LSPs are constantly competing for freight, and it is challenging to manage their expectations and volumes while trying to achieve the best service levels at the lowest cost. A freight-procurement solution can provide a centralized tool to manage this.

As a company's supply chain evolves, so do relationships with partners such as LSPs. An enterprise may want to renegotiate existing contracts to include new business while changing the way shipment volumes are divided among LSPs. The contract contains rates, terms of agreement, and other freight-related charges such as accessorials, detention, and minimum charges. These charges provide information for the optimizer to make logistics decisions based on costs, including decisions about equipment allocations.

Today successful companies are actively managing the freight-procurement process by looking at the large expenditure on an annual or semiannual basis. Companies must control their freight spend beginning with a freight-procurement process. Once they do, the ability to take advantage of leakages in freight spend become more easily apparent and, frankly, obvious. For example, inbound transportation costs are buried in the cost of goods when freight is prepaid. By moving to an inbound collect model, companies can actively see and manage transportation costs as a portion of the supply chain; costs are no longer invisible and uncontrollable. Savings as high as 25% can be achieved by moving from a prepaid to a collect freight model for inbound transportation.

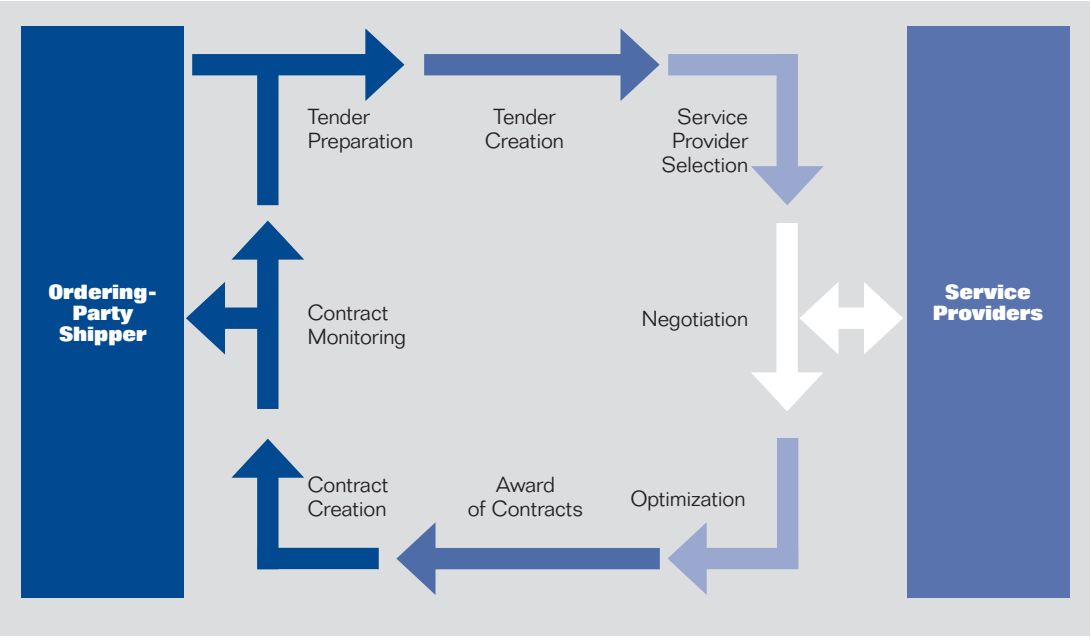

Figure 3: Strategic Freight Management

Transportation Planning: Network Order Fulfillment and Visibility

Everything starts with the order, whether it is a customer order, purchase order, return order, or stock-transfer order. The faster a company decides on the best way to get the order to its final destination, the more successful it will be at satisfying the customer. To be competitive, a company cannot afford to manage its transportation function in a vacuum; it must manage orders in concert with other operations such as manufacturing, warehouse management, and export and import.

In a pull-driven environment the ultimate source of demand is the customer. Profitability can be realized by considering the speed of consumption and monitoring the rate of return. Companies must balance their supply chains based on a new set of push and pull dynamics. They must anticipate their customers' requirements and improve responsiveness to their demands by bringing high-quality, value-added products to market faster than the competition.

The business processes supporting transportation operations need to be adaptable. Innovation that takes into account customer expectations can yield a profitable and responsive ASCN.

Consider how fast the world is changing due to Internet-based selling models and the need to ship any product anywhere within 24 hours. How quickly a company can respond and ship product can dictate its competitive position in a marketplace. Without complete real-time visibility of the status of every order, there is no way to maximize cost savings or revenue potential from order-fulfillment solutions – this can only be accomplished through a completely integrated enterprise solution.

Strategic Freight Management

Through strategic freight management, companies can develop an optimized, dedicated capacity and cost framework for transportation management that includes the following:

- Strategic collaboration and contract planning with logistics service providers (LSPs) to adjust proposed equipment allocation and freight agreements
- Analytics to prepare bids based on historical data and adjust future contracts
- Support for Web-based interaction with LSPs to maintain address and service profiles and respond to bids
- Support for requests for quotation for ocean and land transportation processed via the Web. These are easy to use (for example, with Microsoft Excel spreadsheets), help maintain rates, and let you attach other office documents for the bid process.
- Support for scenario-driven evaluation and optimal LSP awards by region, mode, channel, or lane level
- Automatic document downloads for freight and tariffs for billing and operations

Network Routing Optimization

Products and materials can move into and out of companies at all hours, every day, anywhere in the world. Companies need the visibility to know when orders are being produced, stored, and shipped.

For years, transportation was managed facility by facility, and each shipment was planned independently. This method can hamper a company's efficiency. Leading-edge companies have moved from this model to the service-centric approach of coordinated route planning across the enterprise that uses resources as they move products and materials along the supply chain. This approach also entails a high level of visibility that lets companies support cost-saving transport methods such as continuous moves, parcel zone skipping, multimode, and merge-in-transit planning. Such visibility also enables them to prepare for the move from cost center to profit center.

One of the most important aspects of a system-wide routing-optimization solution is the ability to fully address the unique demands of customers and suppliers when making fulfillment decisions. Companies need to be connected to the sources of this ever-changing information when making real-time fulfillment decisions. For example, a customer-service representative (CSR) must have complete visibility of fulfillment (for example, shipping options, costs, and routing possibilities) in a single system to make the best decisions on how to satisfy an order.

Routing Guide

CSRs make decisions that can impact service and costs. They need a routing guide to determine transportation routing at the time of order entry based on freight costs, the availability of transportation resources, and schedules. For example, a CSR can make suggestions for increasing order size to minimize transportation costs or identify cost options for various modes of transportation. For rush or last-minute orders, the ability to automatically create a shipment from an order is key in further reducing total cycle time from the time the order is taken to the time it is loaded on the truck.

Customers change orders at the last minute, and sometimes suppliers don't give companies total visibility into what is arriving in the receiving area. With a network-fulfillment solution, companies have immediate, total visibility so they can include their customers' last-minute changes on the next shipment or take advantage of lower-cost and continuous-move opportunities.

Routing is a highly complex decision-making process in which many variables, including those discussed below, must be considered.

Customer Delivery Requirements

Customers place many constraints that must be considered when developing a solid network-routing plan. These include delivery appointments, equipment requirements, managing large orders and small parcels, special equipment such as multicompartment trucks, special handling requirements, and ship-with orders.

Product Availability
Understanding when and where the product will be available in an inventory-strained environment is one of the most important elements for meeting a customer's request on time and at the lowest total cost. Companies must have solutions that coordinate network-fulfillment activities seamlessly across their network. Solutions that provide total visibility of warehouses and manufacturing operations enable companies to take advantage of efficiencies such as cross-docking and direct trailer loading.

Routing Decisions and the Cost of Doing Business
Transportation costs come off the bottom line, but they are a by-product of getting products to market. These days, costs are increasing and so is demand, while supply is decreasing. The speed of delivery is more important than ever. Taking advantage of every opportunity to lower costs while getting the product to its destination on time means having access to every possible routing option. This requires a sophisticated planning tool that can create viable shipment plans by consolidating orders to optimal shipment sizes, using the advantages of various transportation modes, taking into account potential multistop and hub location options, and staying within the constraints of the real world.

Network Routes, Equipment Availability, and LSPs
Making shipments from point A to point B can be simple or complex; it all depends upon real-world constraints. Equipment-availability constraints are becoming more prevalent as resources are divided due to huge demand. Having a good relationship with LSPs can help solve these problems through managed contract commitments, automated forecasting and planning, smooth shipment-tender processes, and maximizing the use of equipment. With network routing software, companies and LSPs can find the optimal solution to these situations.

Shipping and Receiving Facility Constraints
The facilities of companies and their customers can become constrained. It is common for drivers to wait more than an hour to load or unload their vehicles due to dock constraints. Careful planning and execution can reduce the time shipments wait in line and help the LSP's drivers manage their HOS. With a total view of the network, companies can plan based on shipping and receiving capacities, appointment schedules, and delivery windows. At the same time, yard management software can enable plan execution and equipment visibility at all times.

International Transportation
Shipping across borders adds another level of complexity and legal regulation. Shipments leaving and entering the country are checked and monitored in many ways. Letters of credit, sanctioned party lists, certificates of origin, and shipper's export declarations are critical pieces of information for complying with government and financial regulations. Solutions that provide easy access to and management of these documents can help companies handle compliance regulations efficiently.

In the end, the goal is to reduce costs while maintaining a high level of service. By considering real-world constraints, network routing minimizes delivery backlogs and the cost of the entire transportation plan.

Transportation Execution: An Integral Part of a Fulfillment Solution

Planning and execution go hand in hand. Orders are received throughout the day that often must be shipped as soon as possible. Complete control from planning to execution is crucial in supporting this demanding environment. Companies need to get shipments sent on time and with the right documentation, as well as with accurate LSP and customer communications. At the same time, automatic processing of inventory status, order and transportation costs, accounting, and important order events are monitored and updated. A transportation management solution can provide the control and monitoring needed to manage high volumes of diverse transportation services.

LSP Collaboration

Collaborative transportation planning between shippers and their LSPs allows both partners to streamline work processes and benefit from reduced handling costs and greater transparency and efficiency. Shippers and LSPs can share information about their shipment plans and resource availability. LSPs can share their resource availability, which allows shippers to develop plans based on delivering a lowest-total-cost solution. At the time of tendering, further collaboration is possible to meet real-world constraints such as delivery appointments and last-minute changes in an LSP's resource availability. For example, an LSP can suggest an alternate pickup or delivery date and time. A transportation management solution can support communication through standard communication methods such as electronic data interchange (EDI), e-mail, or XML.

Reducing Workload by Using Automation and Control

The shipping process can be very task-intensive. Workers have to pick products, stage deliveries, load trucks, print documentation, bill the shipment, and remove the inventory from the system. Often, all of these tasks are performed manually, but they can all be controlled and automated based on a company's business-process needs.

Companies need the ability to automatically carry out activities such as posting goods issue for the deliveries in the shipment, creating billing documents for deliveries in shipment, and printing key documents and lists. At the user level, they need to provide information such as the name of the driver at check-in, seal and container numbers, and data validation.

Companies also need solutions to perform everything from checks on dangerous goods to printing of shipment documents. They need to create a close connection between transportation execution, warehouse management, and foreign trade so that goods issues or receipts, international documentation, and controls can all be coordinated with the transportation plan. All of these complicated processes can be made easier with automated, Web-enabled collaborative functionalities.

Managing the Shipment Process

Companies need a variety of information to get shipments out of the dock doors and to their destinations. Shipment processing should easily support the ability to do the following:

- Create shipments to various customers, transfer locations such as cross-docks, and port or customs locations
- Quickly adjust the transportation plan by changing the mode of transport, the LSP, and even the route if necessary
- Define the packaging of goods and how they are loaded into vehicles
- Manage hazardous-materials requirements
- Specify, update, and track planned transportation deadlines
- Print and transmit critical documents required for transportation such as bills of lading, material safety data sheets, and certificates of origin
- Show shipment-specific text messages such as delivery instructions and contact information
- Manage both inbound and outbound shipment documentation

Transporting Dangerous Goods

Transporting substances and products that may be a risk to public safety has special requirements. To fulfill the statutory requirements for shipment of dangerous goods, it is necessary to

check whether shipments containing these goods are permitted in agreements made with the countries in which the shipments take place. Therefore dangerous-goods checks should be centrally defined in software for environmental health and safety. Dangerous-goods checks need to be integrated into transportation processes and ensure that dangerous-goods master data is complete, the mode of transport is suitable, and the dangerous goods are marked correctly.

Freight Costs

Companies must manage the determination of freight cost for all types of shipments. In many countries, almost all the freight costs are derived from negotiated freight rates between the shipper and the LSP. These rates come in hundreds, if not thousands, of forms and methods of calculation. Companies need the ability to not only calculate freight costs precisely but also settle them to the correct accounts.

They also need the ability to calculate profitability across the enterprise or even within a specific channel, product group, or industry. Freight costs must be tied back to the right sales order line item, and the correct representation for each freight cost item must appear in the general ledger.

At the same time, the ability to minimize expensive processes is a key goal. The freight bill payment process can be streamlined with self-billing (or electronic receivable services) functionality, which allows companies to pay the service agent without receiving an invoice. In this situation, invoice verification is carried out by the service agent. Companies never see the thousands of freight bills that ordinarily would have been generated and manually processed.

Analytics

Analytics play an essential role in helping a company sense and respond to important changes in the market. To make the right decisions promptly based upon a complete, accurate view of their business, companies must align execution with business strategy. Throughout a company, employees must be able to find answers to problems quickly when KPIs fall outside acceptable ranges or objectives are not met. Managers must have the tools to track business activities to ensure that they are in line with overall strategies. Clear metrics are required to achieve these goals.

Having centralized control and easy, role-based access to essential data is critically important in supply chain management. Predefined analytical applications delivered through a user-friendly Web interface can give users at all levels secure, filtered access to key information on supply chain activities and processes. When this occurs, business intelligence is combined with operational data that relates to business process, producing a "one-stop-shopping" synergy of analysis and action. For example, LSP performance metrics help identify the causes of service failures and cost overruns by using scorecards and analytics of internal and business-partner processes. With such analytical applications, companies can monitor and control the ways that LSPs provide their services.

Network Visibility

With the fast pace of business today, companies must be able to prepare for the unpredictable. Disruptive events caused by natural crises can have a widespread effect on capabilities across an extended supply chain. For example, during Hurricane Katrina in 2005, a global chemical manufacturer required real-time information about goods and materials on ships scheduled to dock in the Gulf of Mexico. A primary concern was the potential risk to the environment should shipments in the area become lost at sea. It was also important for companies to address the needs of customers by providing alternate shipments through unaffected ports. This illustrates the importance of process visibility – in particular, visibility into order status and disposition.

Companies need fast, accurate information and specific details about orders. They need the visibility to plan their resource needs and revise plans based on business objectives. And they must reduce their time to action when responding to an unplanned event or crisis by having real-time visibility across the supply chain.

In many cases, this means companies must move from managing expected outcomes of business processes to managing by exception. This shift allows them to focus resources on the areas that need the most attention instead of managing processes that are working well. To have an overview of supply chain events, companies need the ability to do the following:

- **Monitor** supply chain activities and compare plans and forecasts with actual results
- **Notify** the proper employees about process deviations in real time
- **Simulate** the consequences of an event, which provides guidance for decision making
- **Control** the process throughout the adjustment of various parameters such as process time and mode of transport
- **Measure** performance based on user-specific performance criteria

Financial operations include more than the execution tasks of freight, auditing, and payment. Executives need decision-support tools that enable them to sense real-world disruption, as well as financial and logistical tools to make informed, timely, and profitable decisions. To achieve this, companies must have the ability to integrate the financial chain into transportation activities via accurate, real-time, activity-based costing, billing, and freight auditing. It's also important that companies adapt to external trends such as the increase in Internet-sourced and tracked deliveries, growing global trade, offshore manufacturing, and the economy's shift from heavy industry and low-value-added products to consumer services and high-value-added products.

That's quite a list of capabilities to acquire, and analysts believe that the strategy to achieve "superefficiency" in transportation can yield high rewards. "Globalization, outsourcing, and shrinking cycle times are adding risk, cost, and complexity to transportation operations," says Adrian Gonzalez, director of the Logistic Executive Council, ARC Advisory Group. "Companies that take an end-to-end, process-centric perspective will achieve greater financial and operational success. Companies must recognize that transportation management does not exist in a vacuum; it's a process that interfaces with a variety of other business functions, including order management, purchasing, warehouse management, customer service, and financials."

Companies need adaptable business processes that are easy to manage. Such processes enable a company to establish its own unique way of doing things. Adaptable processes can also connect with the information chain (for example, supply chain event management, freight costing, and scorecards of compliance with service-level agreements) for improved, automated collaboration with partners, suppliers, and customers. They can enable global capabilities via multimode planning of activities for air, ocean, rail, road, parcel, and postal transportation modes.

In addition, companies need to integrate the financial chain and transportation in order to have adaptable business processes. Through this integration, companies can provide the best, most differentiated services by quickly activating the latest technologies such as collaboration, RFID, and voice recognition. Companies also must have automated decision-making capability in real time to connect the logistics chain, financial chain, and information chain for improved, automated collaboration with partners, suppliers, and customers outside of the enterprise.

SAP DELIVERS THE GOODS

SAP addresses the core dilemma of transportation – how to meet the unique delivery requirements of customers while still achieving profitability – by providing software that gives companies a competitive advantage. With SAP® software, business processes across the entire enterprise and extended transportation network are integrated with flexibility. The software enables managers to perform continuous route optimization based on real-time events, identify revenue opportunities, and improve asset utilization. Embedded analytics help managers increase profitability by calculating net gains during the entire process from bidding to delivery.

The mySAP™ Supply Chain Management (mySAP SCM) application contains functionalities that are designed for the transportation industry. Powered by the SAP NetWeaver® platform, mySAP SCM leverages emerging technologies and "real-world-aware" practices to transform traditional supply chains from linear, sequential steps into ASCNs. In these networks, communities of customer-focused companies share knowledge and resources and adjust intelligently and profitably to changing market conditions.

To Learn More

For more information about how SAP software can help your transportation organization transform and integrate its IT systems for flexible, streamlined business processes, call your SAP representative today or visit us on the Web at **www.sap.com/scm**.

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