CSCMP EXPLORES...

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How to Talk Transportation Budgets to Non-Transportation Professionals

Your carriers honored their rates. So why are you over your transportation budget? Many decisions and influences within the breadth of supply chain affect transportation. While some are simply unintended and unnecessary expenses, others may bring meaningful net value to the business.

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Executive Summary

Imagine that a company makes a strategic change in its supply chain. Sales and profits increase nicely as a direct result, but transportation spending increases much faster than sales. Despite the transportation cost increases, this was likely a good move for the organization. However, the executive in charge of transportation must still explain why he is significantly over budget. And often, he must deliver this explanation to someone who may not have a transportation background.

Difficult though this conversation may be, it is well worth having. It introduces a wider discussion about how businesses can weigh anticipated benefits of a business decision against potential transportation cost increases, and decide whether this tradeoff is worth it, before the decision is made.

This issue of *CSCMP Explores…* serves as a starting point for that discussion. It presents certain drivers that are specific to transportation budgets, beyond the broader transportation market. Key to a deeper understanding of these drivers is the need to monitor and manage transportation using a transportation management system (TMS) and robust business analytic tools. This paper will introduce some common metrics and tools that are essential to detecting the drivers of transportation budget variance.

Introduction

Ask a senior executive how he or she views the transportation budget, and he is likely to say, “It’s X% of sales.” After all, it seems logical that purchasing transportation is similar to buying raw materials: there are contracts, so it should be fairly straightforward to budget for it, plus or minus some variation for fuel.

Unfortunately, such simplified definitions lead to deep confusion when transportation budgets significantly underperform. Underperformance tends to be caused by five major drivers that are not typically seen with other commodities. These drivers may be set in motion by decisions made beyond the transportation function:

- **Shipment size.** The larger the units in which the company ships, the lower the cost per pound or unit.
- **Changing networks.** Supplier and customer networks change constantly; these changes can adversely affect the attributes that affect transportation pricing.
- **Product mix.** Not all products are created equal when it comes to transportation. Density has a significant effect on the cost per pound.
- **Fuel surcharges.** Unlike most commodities, transportation contracts often have built-in escalators to cover increases and decreases in fuel costs.
- **Truckload’s unique shipper/carrier contract.** While we will talk about all modes of transportation, we will place special emphasis on truckload, since it represents more than 70% of total transportation spend for most companies.

As we review the drivers of failed transportation budgets, we will also explore the measurements that can be used to identify the causes of failure and then manage them.

Section 1: Drivers to transportation budget variance and their effects on different modes of transportation

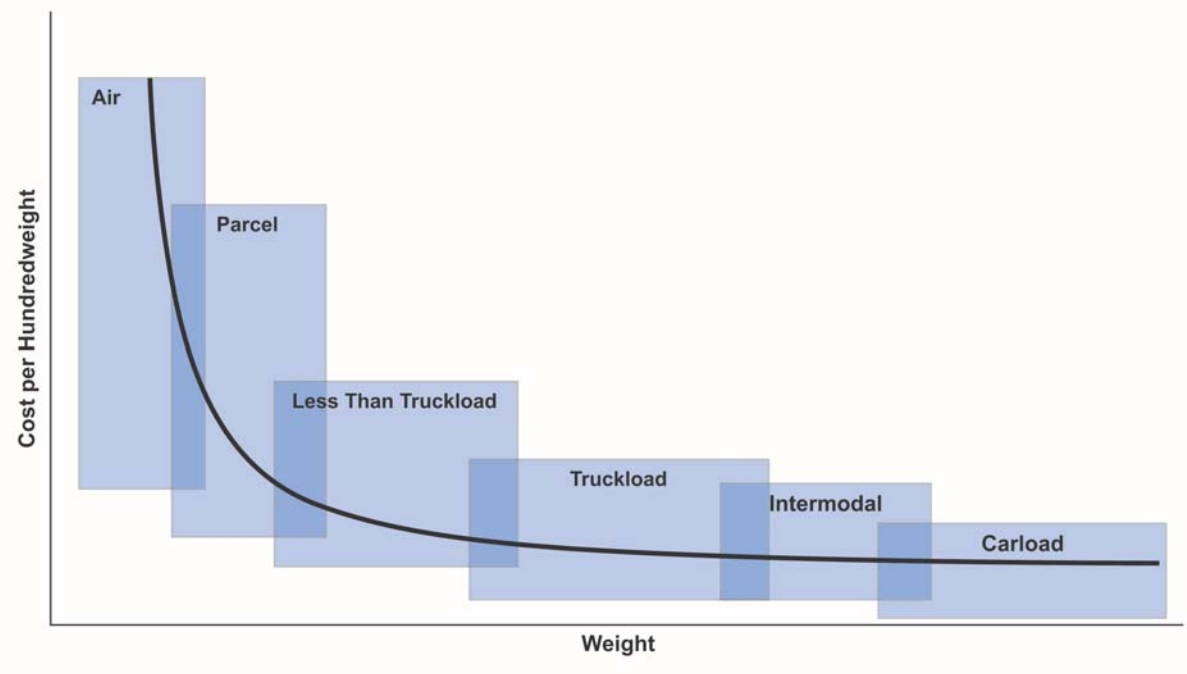
Transportation is the vital link between supply and demand. To the same degree as supply and demand are dynamic and variable, the transportation link must respond to those changes and even has an obligation to collaborate with the broader supply chain. As such, transportation is required to be nimble, and its realized expense may be more than budgeted. Likewise, as transportation takes on some unbudgeted expenses, other supply chain functions may find the opportunity to lower their expenses.

Given the interconnectedness of supply, demand, and transportation, companies gain an advantage when they understand how their decisions in any one of these areas will impact the others—before they implement the decisions. They can weigh the gains expected from the decision against the corresponding transportation costs and decide whether any resulting variance from the budget will accrue an overall benefit to the business and supply chain.

Shipment Size

Changing shipment sizes can have a devastating effect on transportation budgets. Figure 1 shows that different shipment sizes tend to move in different modes, and those modes can have radically different cost structures. To see the effect in action, consider two examples: one domestic and one international.

FIGURE 1: COST PER HUNDREDWEIGHT (CWT) COMPARISON BY MODE



Start by looking at a movement from Chicago to Minneapolis. Widgetmaster ships a single truckload (44,000 pounds) each week to Big Box Retailer's distribution center. Each truckload costs $900 or $2.05 per hundredweight, or CWT, for purposes of this example.

Then, Widgetmaster adds Specialty Retailer in the Minneapolis market. The addition is significant for Widgetmaster, which expects to double its sales by gaining this customer. Specialty Retailer also receives 44,000 pounds per week, but wants Widgetmaster to ship 1,000 pounds per week directly to each of its 44 retail stores. Widgetmaster now has 44 new less-than-truckload (LTL) shipments, each costing $141, or $14.10 per CWT.

While sales doubled for the Minneapolis market and profits rose significantly, transportation costs increased almost seven fold (see Table 1).

TABLE 1: HOW CHANGES IN SHIPMENT SIZE ALSO CHANGE MODE AND COST STRUCTURE

	Big Box Retailer	Specialty Retailer	Big Box and Specialty Retailer
Widget Sales	$100,000	$100,000	$200,000
Transportation Cost	$900	$6,204	$7,104
Increase in Sales			100%
Increase In Transportation Costs			689%
Transportation as a Percent of Sales	0.9%	6.2%	3.6%

This clearly looks like a budget out of control to the non-transportation professional, such as someone in corporate finance who only looks at cost as a percentage of sales. This common metric doesn't capture the change in shipment size and the resulting change in mode and cost structure.

As a result, the true cost per CWT to serve the Minneapolis market across both customers has shifted from the budgeted $2.05 per CWT for Big Box Retailer to $8.07 per CWT for Big Box Retailer and Specialty Retailer. This cost may be acceptable and planned. Key to this situation is the awareness of the cost to serve for each customer and building the respective costs into the budgeting process.

TABLE 2: MODE-BASED BUDGETING

	Big Box Retailer	Specialty Retailer	Big Box and Specialty Retailer
Truckload Cost	$900		$900
Truckload Shipments	1		1
Truckload Shipment Size Pounds	44,000		44,000
Truckload CWT	$2.05		$2.05
Less-Than-Truckload Shipment Cost		$141	
Less-Than-Truckload Shipments		44	44
Less-Than-Truckload Shipment Size Pounds		1,000	1,000
Total Less-Than-Truckload Cost		$6,204	$6,204
Less-Than-Truckload CWT		$14.10	$14.10
Average Shipment Size	44,000	1,000	1,956
Total Cost	$900	$6,204	$7,104
Total CWT			$8.07
Weight Increase			100%
Cost Increase			689%
Decrease in Average Shipment Size			-96%
Increase in CWT			295%

The same phenomenon occurs with modal changes in international trade if a shipper moves from a full container load (FCL) to less-than-container load (LCL). In this example, a company has been shipping an FCL each week. Now, because of a slowdown in sales, the company ships only half a container a week by LCL. There was basically a 74% increase per pound in total cost as outlined in Table 3.

TABLE 3: FULL CONTAINER LOAD TO LESS-THAN-CONTAINER LOAD

Hong Kong to Los Angeles	FCL	LCL
Container Cost	$2,000	
Container Shipments	1	
Container Size Pounds	44,000	
Container Cost per CWT	$4.55	
LCL Cost		$1,740
LCL Shipments		1
Cubic Meters per Shipment		29
LCL Shipment Size Pounds		22,000
Total LCL Cost		$1,740
LCL Cost per CWT		$7.91
Average Shipment Size	44,000	22,000
Total Cost	$2,000	$1,740
Cost Increase		-13%
Decrease in Average Shipment Size		-50%
Increase in Cost per CWT		74%

It isn't even necessary to change modes to experience this effect on the budget. Consider the situation where a receiving customer has a pallet rack environment that has changed after moving into a highly automated and efficient new distribution center (DC) (see sidebar: The Collaborative Supply Chain). He can no longer take ten layers of product, so he now requires the shipper to transport pallets with nine layers. The shipper can no longer weigh out a truck. He has already used all of its available pallet locations. (By law, trucks are limited to a maximum weight; with dense product, trucks typically weigh out before they cube out.) The net result is an 11.1% increase in cost per unit, while the truckload costs have not changed at all (Table 4). This type of change can wreak havoc on a budget.

TABLE 4: HOW CHANGING PALLET RACKS CAN IMPACT TRANSPORTATION COSTS

	Original Pallet Configuration	Revised Pallet Configuration
Truckload Cost	$900.00	$900.00
Shipments	1	1
Pallets	26	26
Layers per Pallet	10	9
Pallet Weight	1,692	1,523
Truckload Shipment Size Pounds	44,000	39,600
Truckload CWT	$2.045	$2.273
Increase in Cost per CWT		11.1%
Increase in Cost per Load		0%
Decrease in Average Shipment Size		-10%

Each of these changes may make rational sense for the company as a whole, increasing sales, reacting to a slowdown in sales, or potentially helping a customer optimize the total supply chain. However, when looking at a macro-budgeting metric like transportation as a percent of sales, they can each adversely affect that metric.

The Collaborative Supply Chain

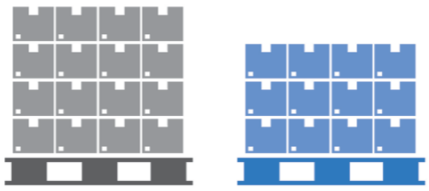
Up and down a company's supply chain, participants make decisions that can affect the transportation budget. Whether by choice or by accident, independent activity across the supply chain can shift how transportation operates, serves customers, and allocates costs:

- Various business units may change volumes, cycles, product densities, and more—any of which can materially influence a transportation plan.
- Buyers can construct, manage, and enforce relationships and replenishment processes that represent untapped opportunities for inbound transportation expense management.
- Sales and account management can positively and negatively impact how profitable a customer is through independent efforts, from pallet construction to economic order quantity (EOQ) enforcement to quarter-end pushes.

When constituents collaborate across the business and supply chain functions and consider the cascading effect of decisions and behaviors, companies can realize expected results from a transportation plan.

Companies would do well to consider the net impact of a change in any single function. Transportation expenses can and do rise because of changes that have been made outside of transportation's control. Sometimes, the net benefit to the business may still be positive. By collaborating, addressing functional performance, and structuring compensation incentives appropriately, the entire supply chain can focus on the overall net benefit to the business—not the benefit to a single functional area within the business.

FIGURE 2: PRODUCT/PALLET SPECIFICATION CHANGES



Cause: The end customer cannot fit a supplier's pallet in their racking system. The production team changes specifications for this customer by removing one layer of cases off the top of the pallets.

Effect: More trucks are needed to ship the same number of cases. Changes in products, cases, and pallets can affect actual weight and pallet counts, which impacts LTL budgets.

FIGURE 3: CHANGE ORDERS

Cause: Customer orders are tendered to transportation providers two or more days in advance. To compete, the shipper will allow customers to make order changes up to four hours before ship time.

Effect: This can result in a higher tender rejection rate, cancelled acceptances, and routing guide bleed.

Changing Networks

Networks of suppliers, customers, shippers, and carriers constantly change. With each network change, the transportation budget can be impacted. Sometimes, it's for the better. Just as often, it's for the worse.

To see why, consider that Widgetmaster has suddenly experienced exploding demand for its new, extra-special red widget (ESRW). The current ESRW supplier is only 100 miles from the company's warehouse and the cost per load is $500, but it has no more capacity for production. Now, Widgetmaster's production department has found a supplier that is 500 miles away; it can make all the ESRWs the company needs, at the same price as the current supplier. There is only one problem: the company must provide the transportation, and it costs $1,000 a truckload. In this case, the cost of transportation per ESRW has doubled (Table 5).

TABLE 5: HOW ADDING A NEW SUPPLIER INCREASES TOTAL LANDED COSTS

	ESRW Supplier A	ESRW Supplier B
Truckload Cost	$500	$1,000
ESRWs per Truck	200	200
Transportation Cost per ESRW	$2.50	$5.00
Increase in Transportation Cost per WSRW		100%
ESRW Cost	$238.00	$238.00
Total Landed ESRW Cost	$240.50	$243.00
Transportation as a Percentage of Landed Cost	1.1%	2.1%

Since ESRW has a retail markup of more than 50% and Widgetmaster can fit $47,600 worth of product at cost in a trailer, this appears to be a good decision. So while the mode and the shipment size didn't change, the shipping location did, raising the transportation percentage of landed cost from 1.1% to 2.1%. Once again, a macro-budgeting approach to landed cost fails to understand the bigger transportation picture.

It's not only new suppliers who can cause this effect on the budget. Consider the case in which Acme Anvil Company has a warehouse located on the East Coast. From there, Acme ships 80% of its customer volume on the East Coast and 20% of its customer volume on the West Coast. Then, Acme adds a new customer on the West Coast, which changes the East Coast/West Coast volume split to 50/50. Shipments for customers on the East Coast cost approximately $800 each, while shipments to West Coast customers cost about $3,000 each. The table below shows an increase of 53% in the total all-in cost per anvil, including transportation.

TABLE 6: VOLUME SHIFTS

Acme Anvil	80% East/ 20% West	50% East/ 50% West
East Coast Transportation Cost	$800	$800
East Coast Shipments	8	5
West Coast Transportation Cost	$3,000	$3,000
West Coast Shipments	2	5
Total Truck Cost	$12,400	$19,000
Average Truck Cost	$1,240	$1,900
Anvils per Shipment	500	500
Cost per Anvil	$2.48	$3.80
Increase in Cost per Anvil		53%
Increase in Cost per Shipment		53%

Also consider the case of Barley Brothers Brewing, which ships out of St. Louis. The company just lost a customer in Phoenix, Arizona, that represented 10% of its sales, but replaced them with a similarly-sized customer in Bangor, Maine. At first glance, this seems like a good thing; Bangor is only 1,382 miles away, compared to Phoenix at 1,457 miles, a decline of 75 miles (0.5%). An outside observer might conclude that overall transportation spend should also decline as a result of this change.

Unfortunately for Barley Brothers Brewing, Phoenix is a more balanced market for truckload service than Bangor. In Phoenix, carriers are more likely to be able to get another load out without deadheading (moving empty to their next load). Because Bangor is a less desirable market for carriers (more freight is going into Bangor than is coming out), they will likely charge a higher rate per mile to serve this location. The result for Barley Brothers Brewing is higher transportation costs (Table 7).

TABLE 7: CUSTOMERS LOST AND GAINED, WITH INCREASED TRANSPORTATION COSTS

	Phoenix	Bangor
Truck Cost	$2,900	$3,800
Miles	1,457	1,382
Mileage Reduction		75
Cost Increase		$900
Increase per Load		31%

This explains why it's not just the size of the shipment and the mode involved that have to be part of the budgeting equation, but also distance and location.

Product Mix

When budgeting transportation, how much the product weighs and cubic space it takes up, as well as its density, affect costs. Frequently, density is overlooked in this equation. Each mode of transportation has its own ideal shipping density.

Consider two food products from Snacks R Us: bottled water and potato chips. Both are typically shipped by the full truckload because of the relatively high cost of transportation versus the value of the product itself.

Bottled water will weigh out the trailer—that is, the water is so dense that it reaches the maximum legal payload of the trailer before the entire trailer can be filled. On the other hand, the less dense potato chips will cube out on a trailer—they will consume the maximum trailer space long before they approach anything close to the legal weight limit.

Most customers buy both products. Based on historical sales, Snacks R Us typically ships a mix that maximizes the weight and cube so the products can be transported at a significantly reduced cost per unit.

When there is a special promotion on water, Snacks R Us no longer ships an ideal mix of product. Some trailers will have only water in them, resulting in a significantly higher cost per unit. Table 8 shows a broad illustration of how this might work.

TABLE 8: THE STRUGGLE TO MAXIMIZE VEHICLE SPACE

	Bottled Water	Potato Chips	Mix Load
Unit Weight	26.4	1	
Unit Cube	0.75	0.5	
Cases per Trailer Water	1,600		1,430
Cases per Trailer Potato Chips		6,600	4,460
Trailer Weight	42,240	6,600	42,212
Trailer Cube	1,200	3,300	3,303
Cost per Load	$1,000	$1,000	$1,000
Cost per Unit	$0.63	$0.15	$0.17
Cost per CWT	$2.37	$15.15	$2.37
Percent Full Load Water			89%
Percent Full Load Chips			68%
Total			157%

The mix that Snacks R Us normally ships takes three pallets of water off the trailer and loads 4,400 pounds of potato chips in its place. The trailer now contains 89% of a full load of water and 68% of a full load of chips. The cost per truck remains $1,000, whether the loads are of one product only or are mixed. But the price per unit has fallen from an average of $.2439 for the single products to $.17 for the mixed load. From this example, it's easy to see that there will be a significant impact on the transportation budget if the optimized mix does not occur.

Sometimes the product mix doesn't change, but the packaging does. For example, the brand management group at Primo Pizza didn't want to take a price increase on frozen pizza, even with the cost of product up 25%. Instead, they decided to ship a slightly smaller pizza in the same sized box.

Unfortunately for Primo Pizza's transportation manager, pizza cubes out a trailer. The same number of boxes ship, but the brand management decision adversely affects the transportation budget when it comes to cost per CWT by 33% (see Table 9). At the same time, the cost per unit has not changed, nor has the total transportation cost. In theory, if Primo Pizza went to a slightly smaller box, more boxes could be loaded in the trailer, thus creating a lower transportation cost per unit.

TABLE 9: CHANGES TO PRODUCT WEIGHT, BUT NOT PACKAGING

Marco's Macaroni	Original Pizza	New Pizza
Pizza Weight in Ounces	16	12
Pizzas per Intermodal Container	40,000	40,000
Container Weight	40,000	30,000
Cost per Container	$2,600	$2,600
Cost per Pizza	$0.07	$0.07
Cost per CWT	$6.50	$8.67
Increase in Cost per CWT		33.3%

While product density issues have always been real, they are currently getting prime time attention now that both FedEx and UPS have announced new pricing for 2015 that uses a density or dimensional weight factor as part of their pricing.

Fuel Surcharges

While not as unique as some of the other drivers of transportation budget failures, shippers should understand that fuel surcharges nevertheless play an important role. Fuel is a relatively large component of the total cost of all modes of transportation.

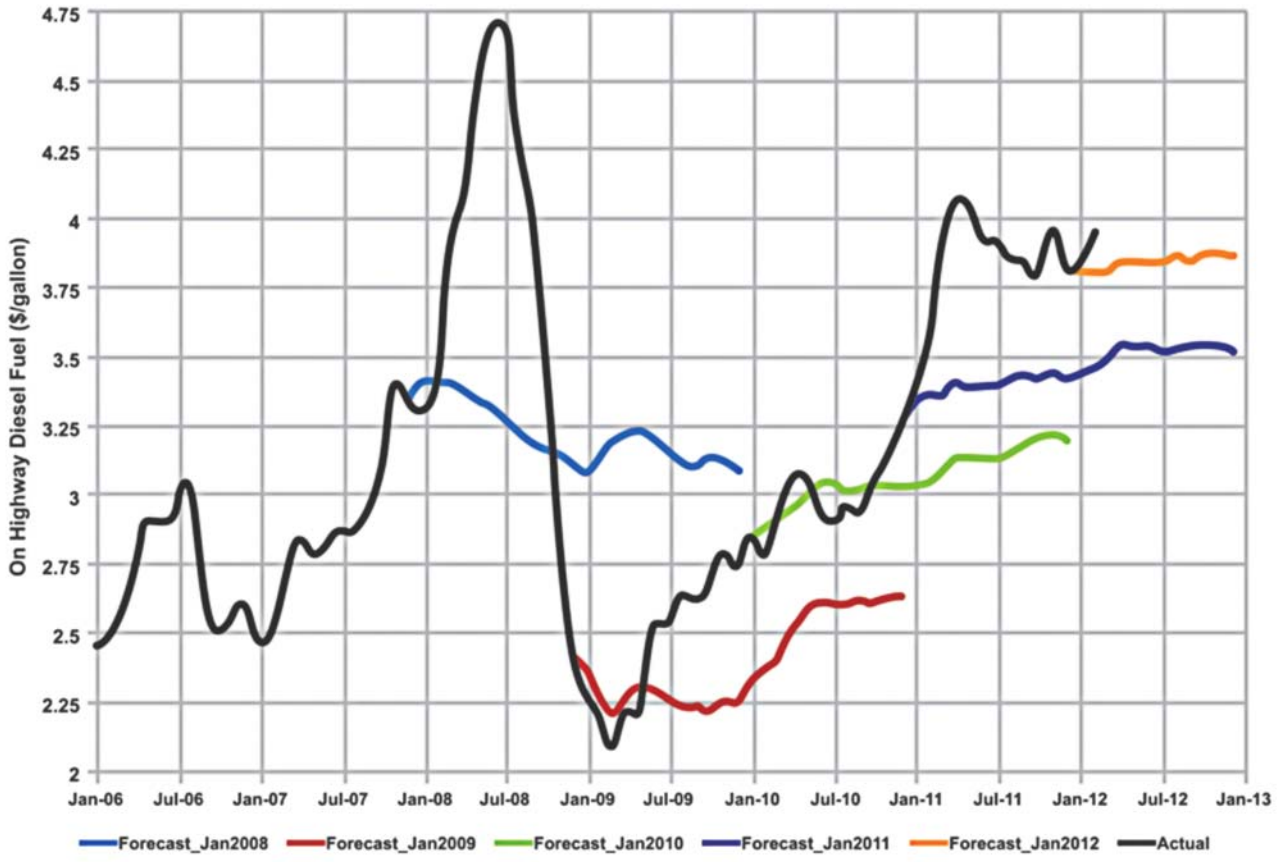
TABLE 10: FUEL AS A PERCENT OF TRANSPORTATION COSTS

Mode of Transport	Percent of Transportation Rate Paid That is Associated to Fuel[†]
Rail Carload	15%
Intermodal	20%
Ocean	30%
LTL	20%
Truckload	30%

[†] Of the total rate paid by the shipper to transportation providers, these percentages represent roughly how much of the total charge is fuel. Truckload, intermodal, and rail carload percentages used by permission, courtesy of Noël Perry, Truck and Transportation Expert, FTR Transportation Intelligence, May 6, 2014. LTL statistic from a respected LTL carrier; fuel surcharge is not calculated in the empty route lanes and/or partially loaded pickup and delivery line haul routes.

Changes in fuel costs are also notoriously hard to predict, and budgets are very susceptible to adverse events. Those who buy transportation have no control over these events; they are endemic to the market itself as the supply-demand equation fluctuates. As this graph demonstrates, forecasts offered at each point in time (colored lines) were proven incorrect every time. While it is difficult to forecast fuel costs, it is important to understand the influence they can have on a transportation budget.

FIGURE 4: VOLATILITY OF FUEL PRICES



*Source: Chris Caplice, Executive Director, Center for Transportation & Logistics, MIT, from data at the Department of Energy's Energy Information Administration site (**http://www.eia.gov/**).*

Truckload's Unique Shipper/Carrier Contract

With 77% of United States freight moving via trucks, this mode of transport is central to the economy. It is a highly fragmented market that is largely balanced, from a supply and demand perspective. As such, it is very important for shippers and transportation providers to truly collaborate through the procurement and award process. This can minimize unplanned variance and help ensure a truckload route guide performs to plan and a transportation budget is actually realized.

TABLE 11: THE US BUSINESS LOGISTICS SYSTEM COST IS THE EQUIVALENT OF 8.2% OF CURRENT GDP IN 2013

	$ Billions
Carrying Costs - $2.459 Trillion All Business Inventory	
Interest	2
Taxes, Obsolescence, Depreciation, Insurance	330
Warehousing	137
Subtotal	**469**
Transportation Costs	
Motor Carriers	
Truck – Intercity	*453*
Truck – Local	*204*
Subtotal	**657**
Other Carriers	
Railroads	*74*
Water (International 30, Domestic 7)	*37*
Oil Pipelines	*13*
Air (International 13, Domestic 20)	*33*
Forwarders	*38*
Subtotal	**195**
Shipper-Related Costs	10
Logistics Administration	53
TOTAL LOGISTICS COST	**1,385**

Up 2.8%

Up 2.0%

Up 2.3%

Source: CSCMP's Annual "State of Logistics Report®"

Shippers cannot always predict accurately what their customers may order. As a result, their projected inbound and outbound volumes may be lower or higher than expected, and their transportation requirements will fluctuate in response.

Carriers understand this. However, carriers also know the shipper's changes will have to be balanced against the rest of their service networks. Carrier service networks are dynamic, with synergies created between their customers. When disruptions in those synergies occur—lanes are lost, volume is lost or added, or customers are lost—the entire network can be thrown off balance through no fault of the carrier or shipper, with more rejected tenders resulting. More rejected tenders send shippers deeper into their routing guides to higher-priced carriers, with a subsequent impact on the transportation budget.

The “contract” between carriers and shippers commonly contains language as outlined below:

- Shippers do not actually commit to freight volumes.
- Carriers do not actually commit to accept tenders.
- Both parties have a 30- or 60-day “out” for any reason.

The important thing to realize is that these are not binding contracts with firm commitments. Shippers *intend* to tender the volume they published, and carriers *intend* to accept the tenders. Both parties accept these agreements because they want to accommodate consistency and flexibility in their operations. But there is a boundary for the shipper and the carrier. When either party tries to expand beyond that comfort zone, misunderstanding can result.

Section 2: Key Metrics for Managing Budgets

It should be clear by now that there are many drivers besides volume, carrier load acceptance, and the wider marketplace for transportation that can influence a transportation budget and create variance. But understanding what is driving the variance requires indicators that show exactly what is happening to the transportation budget—as it happens. For most companies, this means a strong TMS and a good analytical suite. This makes it possible to monitor unexpected shifts in transportation costs and discover the source of the shifts. This section examines the best metrics for identifying specific variances.

Shipment Size

Shipment size can show itself in various ways. Larger or smaller shipments may necessitate a modal change. In other cases, where cost of a movement is fixed, shipment size doesn’t affect the transportation spend, but can adversely affect the unit cost—for better or worse.

- **Modal Mix.** It is not as strange as it might seem to focus on modal mix first when checking shipment size. Refer to Figure 1 to see that different modes inherently have different shipment sizes. Table 12 shows how improvements in one mode can hide problems in another. In the simplified example, the average shipment size remains the same. But the mix between transportation modes and the average shipment size in each mode changes. When 4,000 pounds are moved from truckload to LTL, notice how the cost per CWT increases on truckload. This is because of the fixed nature of truckload cost per CWT. On the LTL side, while the cost per shipment has increased, the cost per CWT has actually decreased slightly. The net result for this modal mix is an overall price increase of 7.3%.

TABLE 12: BUDGET TO ACTUAL COST: MODAL MIX

	Budget	Actual
Truckload Budget		
Costs	$900	$900
Shipments	1	1
Average Weight	44,000	40,000
Total Weight	44,000	40,000
CWT	$2.05	$2.25
LTL Budget		
Costs	$5,720	$6,204
Shipments	44	44
Average Weight	1,000	1,091
Total Weight	44,000	48,000
CWT	$13.00	$12.93
Total Budget		
Costs	$6,620	$7,104
Shipments	45	45
Average Weight	1,956	1,956
Total Weight	88,000	88,000
CWT	$7.52	$8.07
Over Budget		$484
Percent Over Budget		7.3%

Widgetmaster's experience in Section 1 shows how crucial it is to dig into the modes that are being used. Modes such as truckload, intermodal, ocean, and rail have fixed costs, but LTL, parcel, and airfreight are variable cost modes. Checking to see if there has been a shift from the planned modal mix should be considered a first stop when dissecting the effects of shipment size.

- **Shipment Weight.** After looking at the mix of modes, the next step is to understand what is happening within each mode. Is the average shipment weight changing within a mode?

  While this is a very crude measurement and certainly not the last word on the subject, shippers can generally assume that if the average shipment size is going down, the cost per CWT will be going up. But with modes like LTL, air, LCL, and parcel where costs are variable based on the amount being shipped, it's essential to look not only at the average weight, but also at the mix of shipment sizes.

In Table 13, the average weight doesn't change, but the mix of LTL shipments does. Compared to budget, this shipper moved significantly more minimum charge shipments than planned. The result is a higher total cost and cost per CWT.

TABLE 13: COSTS AND SHIPMENT WEIGHT

	Budget			
	Shipments	**Average Weight**	**Total Cost**	**CWT**
Minimums	15	150	$1,125	$50.00
< 500	10	450	$1,000	$22.22
< 1,000	10	855	$1,300	$15.20
< 2,000	4	1,700	$800	$11.76
< 5,000	2	3,900	$600	$7.69
< 10,000	3	4,700	$1,200	$8.51
TOTAL	**44**	**1,000**	**$6,025**	**$13.69**
	Actual			
	Shipments	**Average Weight**	**Total Cost**	**CWT**
Minimums	22	132	$1,650	$56.82
< 500	11	499	$1,320	$24.05
< 1,000	4	995	$600	$15.08
< 2,000	3	1,929	$660	$11.40
< 5,000	2	4,500	$800	$8.89
< 10,000	2	8,420	$1,400	$8.31
TOTAL	**44**	**1,000**	**$6,430**	**$14.61**
Over Budget			$405	
Percent Over Budget			6.7%	

In summary, checking shipment size requires analysis of both the modal mix and the mix of shipment sizes within a mode. Consider monitoring this metric by mode, location, supplier, customer, or family of stock-keeping units (SKUs). Each of these breakouts could be useful in providing different transportation insights.

Changing Networks

While shipment size changes are relatively easy to track down with the right reporting, changes to the network can be more difficult to find. The evolving supply chain on page ten provides several examples that illustrate this.

Once again, a hierarchy of metrics can reveal patterns, as well as departures from plan down to individual lane level. This information provides essential details for improved budget management:

- **Average length of haul.** While this has its limitations, it is likely that if length of haul is increasing, so are transportation costs (remember the extra special red widget supplier example on page ten). Most people associate this metric only with truckload. But it can be useful with LTL, parcel, and other modes to quickly understand changes in the network. Managers must dive deeper to explain variations to management. This measurement can be refined by business unit, product line, or major shipping or receiving location to gain further understanding of budget variances.
- **Total weight and cost by origin, by mode.** Total weight and cost by origin is most effective when studied within each mode to see if the mix of freight by origin has changed. The company may have closed a factory or changed a supplier, moving that volume to another, higher-cost shipping location; the total weight shipped hasn't changed, just the mix of origins. In such a case, the company can be executing exactly as planned at each origin, but still be above budget because of unplanned shifts in volume. This type of reporting would start to identify the type of situation that occurred for Acme Anvil Company, discussed on page ten.
- **Total weight and cost by destination, by mode.** This is the same metric as above, only looking at the destination instead of origin.
- **Individual lane reporting.** At this most detailed level, individual lane reporting by mode is the most finite measurement in the hierarchy. This metric, which shows what is driving changes at both the origin and destination, would explain what is happening in the Barley Brothers Brewing example on page 11.

Product Mix

Product mix drives the cost per SKU. This metric can reveal whether the mix of products has changed, and whether that change is affecting the budget. Recall the Snacks R Us example with its optimum mix of bottled water and potato chips. The cost per unit for bottled water is significantly higher when it is not shipped with the optimal mix of potato chips. Even a slight decrease in potato chip sales will have a significant impact on bottled water costs. Once again, simple metrics are not enough. Shippers should not only look at the cost by SKU, but must also understand the mix of SKUs and what effect it has on total costs.

Fuel Surcharges

Fuel surcharges are relatively easy to track by comparing historical and plan to what is actually happening with fuel surcharge expense. One may also want to compare this change to that of the most appropriate fuel index for a given mode:

- Diesel fuel[1]
- Bunker fuel[2]
- Diesel fuel, rail car, and intermodal[3]

[1] US Department of Energy (DOE) National Average Index, http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp
[2] Calculations of bunker fuel is based on size of the vessel, speed, routing. http://www.tsacarriers.org/calc_bunker.html
[3] US Department of Energy (DOE) National Average Index, http://tonto.eia.doe.gov/oog/info/gdu/gasdiesel.asp

Truckload's Unique Shipper/Carrier Contract

While changes in shipment size, suppliers, customers, and mode are often outside of the control of transportation departments, routing guides are not. Here, the metrics are pretty straightforward: was the intended carrier in the plan used?

- **Depth of Tender.** The best metric for answering this question is depth of tender. If across-the-board increases in depth of tender surface for a mode, it is a good indication that the market has tightened and prices have shifted. But if increases only occur on individual lanes, it is more likely that there is a carrier performance issue that needs to be addressed.

  Depth of tender = number of tenders divided by number of loads

- **Average Lead Time** works in tandem with depth of tender and cost. If there is a decrease in the average lead time (i.e., between the time a shipment is tendered to a carrier to when it is actually picked up), there is a measurable effect on depth of tender. In tight markets, the effect is even larger. This phenomenon has been quantified by Erik Caldwell and Bryan Fisher in their thesis paper, "The Impact of Lead Time on Truckload Transportation Rates."

Conclusion

This issue of *CSCMP Explores…* strives to introduce the many intentional and unintentional business decisions that can influence transportation spend. The interdependence of supply chain functions requires all supply chain participants—within a company, as well as vendors and customers—to be mindful of the cascading influence of their strategies and actions. Good intentions and single-minded perspectives can be highly influential to successful transportation operations and budgets.

We have introduced that there are many metrics or indicators that aid discernment to the drivers of transportation spend, and that business processes, data capture, execution, and analysis are aided with the use of a TMS. Identifying and monitoring variances to transportation budgets is often a blend of good analytical review and collaborative discovery.

A final point on procurement. This issue is not addressing best in class transportation procurement strategies, discussed in greater detail in another issue of *CSCMP Explores*…, "Deriving Strategic Advantage from Truckload Procurement" (2011). But it is worth noting that the US transportation market is far more sophisticated than just a few years ago. As such, a sophisticated approach to the market, award strategies with transportation providers, and use of a TMS will increase the likelihood of realizing a transportation budget, and will most certainly afford the data insights required to manage and improve.