The Synchronized Distribution Supply Chain: Best Practices in Truck Transportation Management

About Motorola's Mobile Supply Chain Solutions

Every day, companies all over the world count on Motorola mobility solutions to keep their supply chain operations at peak productivity and profitability. When it comes to supply chain optimization, Motorola's end-to-end supply chain mobility solutions offer the expertise gained through successful proven deployments in many of the world's largest enterprises, a comprehensive and proven enterprises class product portfolio — including wireless infrastructure for seamless 'inside outside' mobility, integrated voice and data devices and best-in-class applications through a world-class partner network — and a complete portfolio of services designed to help you get and keep your mobility solution up and running to ensure peak performance and maximum value.

For more information on how Motorola mobility solutions can streamline your supply chain, please visit motorola.com/supplychainmobility or access our global contact directory at motorola.com/enterprise/contactus

Executive summary

Regardless of whether you utilize your own trucking fleet or contract the services of a third party logistics provider to move product from the warehouse to your customer, many of the pressures are the same. The end goal is to move product through the supply chain as efficiently as possible – the less efficient the product moves, the more it costs — reducing profitability and the ability to offer competitive transportation services. In additional to the many details of organizing the logistics function, today's transportation organizations face a myriad of additional issues that further threaten profitability, from rising fuel costs and a labor shortage to increasing regulatory requirements.

To better manage this function, you need a wealth of information. You need to know where your trucks are, what is in the trucks, which routes are most profitable, when and where shipments need to be delivered, which shipments are running late — and much more. You also need to dramatically reduce the volume of paperwork required in this function to streamline processes for increased productivity.

Mobility enables the application of the lean principles of manufacturing in the transportation function, providing the high levels of automation and visibility required to achieve peak operational efficiencies. This white paper will examine the pain points in this industry, how mobility can become the cornerstone of a comprehensive transportation management

system that addresses these issues — and the many benefits realized in the transportation function as well as throughout the supply chain.

Background

While the transportation function is a critical link in the supply chain, today it remains heavily fraught with manual paper-and-pen based processes. A 2002 survey conducted by The Logistics Institute (TLI) at Georgia Institute of Technology revealed that over 50 percent of the respondents were still using manual processes for key transportation functions, including route planning, load building, dispatching and tracking. Where the warehouse is often automated and connected to other enterprise business systems, transportation frequently remains in a silo, separated from the systems inside the four walls of the enterprise. And this separation translates into inefficiencies within the transportation function, as well as the upstream and downstream areas in the supply chain.

The result is a lack of agility — the inability to rapidly respond to industry pressures and changes. Issues today include heated competition, driven by simultaneous globalization and consolidation. Larger providers need to reduce costs and improve service levels — and smaller organizations are finding it difficult to compete. Other issues include a rapid rise in fuel costs, and increase in government regulations and labor shortages — all amid customer demands for better, faster, less expensive service.

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Mobility is in use in the transportation sector, though in a limited capacity — few transportation organizations have embraced the full capabilities and benefits of mobility. For example, even though this function is heavily burdened with paperwork and forms, the February 2006 Consumer Insight Report reveals that less than 20 percent of the organizations surveyed are utilizing mobile computing for records and document management. The same study also reveals that just over half of all respondents are using some form of mobility in asset management — even visibility into the whereabouts of high dollar assets such as trucks and trailers as well as a wide variety of containers, from small totes to large roll cages and more, is crucial to improving operational efficiencies and controlling costs.

Mobility is the ideal enabler for the transportation industry. Drivers are out on the road nearly 100 percent of the time — but mobility can deliver a level of visibility greater than if the workers were on site. For those involved in the transportation of goods, it is mobility that is the key enabling technology capable of re-inventing the way the transportation business operates. It is mobility that can position the transportation business to manage the challenges of today as well as tomorrow. And it is mobility that can enable transportation to achieve full potential in the synchronization of the supply chain.

Pain points in transportation

In today' transportation operations, there are a number of issues which can be translated into the seven areas of waste in transportation:

1) Lack of real-time visibility of freight and assets

Efficiency is heavily dependent upon real-time visibility of trucks, trailers and containers in transportation. Lack of real-time visibility hinders a wide variety of functions, including:

- **Efficient scheduling of loads:** The inability to schedule loads in the most efficient manner affects the entire transportation operation, translating into excessive mileage, which in turn translates into reduced driver productivity, slower customer service and poor asset utilization.

- **The ability to execute dynamic schedule changes:** Orders continue to arrive throughout the workday, well after work orders have been distributed. The inability to view the location of all trailers seriously hampers the ability to quickly locate the truck that can best accommodate the new order and meet customer expectations — without incurring undue costs.

- **The ability to see asset utilization levels:**
An underutilized fleet rapidly translates into
a large sum of wasted capital and operational
dollars spent on the purchase and maintenance
of trucks and trailers that, in reality, are not
needed. Given proper levels of information,
the enterprise would be able to see that the
fleet is larger than necessary, and take the
appropriate measures to reduce the fleet to
the appropriate size.

- **The ability to control container costs:** Lost
containers can translate into tens or hundreds
of thousands of dollars in needless expenditures.

- **The ability to note exceptions in a timely
manner:** While monitoring a heavily mobile
workforce is not an easy task, the inability
to note instantly at any point in the day,
whenever a driver is in danger of missing the
scheduled delivery day and time threatens
customer service and retention levels.

2) Labor issues

With a critical shortage in labor in this industry,
there is no room for waste: the American
Trucking Association (ATA) reports a current
shortage of 20,000 truckers today, with an
expected increase to 110,000 by 2014 – a 550
percent increase. Yet drivers are forced to spend
a great deal of time managing and completing
paperwork before leaving the dock, while on
the road and upon returning — leading to low
productivity and job satisfaction issues that also
negatively impact hours of service regulations.
In addition, extraordinarily high turnover rates
further erode productivity, as new drivers become
familiar with everything from paperwork to the
actual routes.

3) Rising fuel costs

While the increase in fuel costs cannot be
controlled, unnecessary fuel consumption is a
waste that directly drives the cost of sales up
— and profitability down. Areas of concern are
out-of-route mileage, route efficiency, and driving
habits which can increase fuel consumption.

4) Costly mis-ships

In highly manual processes, the integrity of
the data can easily become a very real concern.
Forms completed by paper and pen must
ultimately be entered into the computer, most
often by administrative staff. This 'double-touch'
of the data (where 'person one' writes the data
down and 'person two' interprets and enters the
data into the computer) significantly increases
the likelihood and frequency of errors. And errors
in this industry can be very costly, such as the
delivery of the right shipment to the wrong
person. This results in additional waste in the
form of the time and costs associated with
shipment back to the depot, and then re-shipping
to the right party.

5) Cash-to-cash cycles times

The many inefficiencies in manual processes
translate into delays in billing and collection.
Time spent processing forms and waiting for
data to be entered into the computer ultimately
translates into the addition of many days to the
already strained cash-to-cash cycle.

6) New compliance regulations

For an organization already overburdened with
manual processes, new government regulations
often mean additional processes, additional
time — and additional cost. And since changing
regulations are a constant in the transportation
industry, the ability to meet new compliance
regulations without adding 'waste' is crucial.

7) Safety

Waste in the management of safety issues can
translate directly into a major increase in costs
for the transportation provider. While speeding
tickets and accidents can result in a significant
rise in insurance rates, accidents can also lead
to major liability. And the ability to monitor driver
safety records and habits is key in managing
to achieve stellar safety records throughout
the fleet.

Beyond transportation: pain points in the supply chain

The transportation management system (TMS) sits in between the yard management system (YMS) and the warehouse management system (WMS). Anything less than full integration between the three systems results in some level of reduced efficiency throughout your supply chain. This domino effect can be seen up and down the supply chain, robbing the enterprise of the benefits of synchronization across these core business functions.

In the warehouse

When transportation operates as a silo, dispatch does not have the visibility required to prepare and schedule loads in the most expeditious manner possible, increasing miles traveled and driver time as well as asset wear and tear.

In the yard

Lack of integration in the yard can translate into an ill-prepared workforce, loads that are not ready when the truck arrives and extended driver wait times. And for enterprises that are using third party logistics providers instead of their own fleet, extended driver wait times can trigger penalty fees from carriers.

The end result from lack of integration of these three business systems is increased labor costs, increased fleet-related costs, and slower service.

Maximizing efficiency in the transportation operations with mobility

Mobility eloquently applies the latest in technology to address the unique pain points in transportation — reducing or eliminating the associated wastes with each through a number of applications.

1) Real-time visibility of freight and assets — complete with performance metrics

Today's transportation providers can leverage GPS and RFID technologies to achieve real-time visibility of the entire transportation operation. This ability to track and trace any asset at any time enables:

- **The creation of the most effective load schedules**. The ability to see and best match available loads with available trucks maximizes asset use and minimizes mileage and fuel costs while ensuring timely arrival at the end destination. And maximum asset utilization enables the more deliveries with the same fleet, providing a path for cost-effective growth.

- **The cost-effective management of dynamic schedule changes.** The ability to locate and direct the right truck to the right location enables the transportation organization to optimize business opportunities without adding expense.

- **Maximum asset utilization.** The ability to see utilization of each vehicle enables significant cost savings. Fleets that are under-burdened can be reduced — reducing capital expenditures for vehicles as well as reducing the labor and parts costs associated with vehicle maintenance. In addition, the ability to marry maintenance records with each truck ensures proactive scheduling of maintenance to ensure trucks are kept in top running condition, eliminating the high cost of downtime.

- **Improved container management.** With RFID, your containers are automatically tracked without human intervention. Granular information allows you to see the whereabouts of your containers — including which customer has which container. Opportunities for theft and loss are greatly reduced, protecting revenues — and profitability.

- **Real-time exception management.** With mobility, you have the performance metrics right at your fingertips to see exceptions in real time. Whenever a load is in danger of late delivery, an alarm can be triggered and sent to appropriate personnel to enable the proper proactive steps to be taken to either avoid the late delivery or to minimally alert the customer to the situation to help minimize the effect on service level perception.

2) Improved driver productivity

There are a number of applications that can significantly improve driver productivity by eliminating much of the need to perform manual

Mobility provides visibility into key performance metrics, improving the ability to monitor and manage the transportation function, and enabling you to easily answer the question: How is your transportation function measuring up?

paperwork, and putting all the information needed throughout the workday right at the fingertips of the driver:

- Electronic Department of Transportation (DOT) logs and trip sheets eliminate paperwork and possible errors. In addition, GPS/locationing can be used in conjunction with remote engine monitoring capabilities to automatically calculate and enter hours of service and mileage on the appropriate electronic forms. Since time in the truck is now considered active driving time, the elimination of the need to manually prepare paperwork means more miles and stops per day per driver — increased throughput with the same workforce. And since all the information needed to calculate fuel tax (mileage and fuel information) is now in your business systems, fuel tax calculations can be performed automatically, again reducing the need for drivers to spend time completing fuel tax forms.

- The ability to electronically download the day's manifests and routes to a driver's handheld computer eliminates the need for dispatch to create paperwork and for drivers to wait in line to retrieve paperwork.

- Expedited recording of OS&D (overages, shortages and damage) keeps drivers on the road and productive instead of completing paperwork and making calls to process those exceptions.

- On-demand address-to-address directions ensure that drivers can always locate the best possible route. Mileage is minimized, and excess miles driven when drivers become lost are eliminated.

3) Reduction in fuel consumption

Mobility assists in reducing fuel consumption in two ways:

- When loads are optimized, the improved efficiency in routing reduces mileage and the associated additional fuel costs.

- Real-time monitoring of engine performance enables the collection of a wide range of metrics that can drive fuel consumption down. Data can include truck speed, RPMs, idling time, torque band compliance and more. This information can then be used to provide instant feedback to a mobile computer in the vehicle to request that drivers monitor their real-time driving behavior to conserve fuel. And a complete audit trail enables you to see which drivers are complying with the computer-driven orders and which are not — enabling better management of your driver workforce.

- On board navigation systems eliminate extra mileage incurred when drivers are lost.

> *When your transportation function is empowered with mobility, your labor force will be able to accomplish more in a day with less effort — maximizing the strained labor pool, improving overall productivity and performance metrics, and improving customer service and retention.*

4) Improved data integrity and reduction in errors

Completion of forms via paper and pen and subsequent entry into a computer at a later date is replaced by electronic forms that are automatically populated with available data whenever possible. The result is a dramatic improvement in data integrity and a reduction in error rates. Errors in mileage or fuel purchase that might have translated into erroneous calculation of taxes due — and errors in the day's manifests could ripple into costly mis-ships.

5) Proof-of-delivery (PoD) for faster cash-to-cash cycles times

When proof-of-delivery moves from paper to mobile computer, proof of delivery information can be transmitted to the office instantly, including time of delivery and the recipient's name — and if the mobile device is equipped with imaging capabilities, drivers can even capture signatures electronically and snap a quick picture to document the condition of the shipment. This information can then be transmitted instantly to the home office, shaving weeks off of the cash-to-cash cycle time.

6) Cost-effective compliance

As government regulations increase in volume as well as complexity, mobile computing keeps compliance simple and cost-effective. With mobile computing, drivers no longer need to complete paperwork and process logs. On-board GPS equipment enables a paperless and automated recording and reporting of data through the ability to automatic collect data for State Fuel Tax forms and DOT logs in the U.S.

7) Pro-active safety management

Mobile computing can be applied to record and transmit engine statistics and on-board events, including sudden acceleration or deceleration, speeds and diagnostic warnings to enable:

- Proactive management of driving habits.

- Reconstruction of an accident or other event based on historical data.

This capability enables transportation organizations to identify and remove drivers who perpetually practice unsafe driving habits, and improve driver safety records to potentially eliminate accidents and reduce insurance and liability.

The enabling technology

There are a number of technologies that enable mobility in transportation functions:

Wireless connectivity

Three types of wireless connections ensure that vehicles and drivers are able to cost-effectively communicate at all times — while on the road and when at the depot.

- WWAN connectivity enables mobile voice and data for drivers on the road.

- WLAN connectivity enables cost-effective voice and data communications via the company's wireless LAN when drivers are in the depot, eliminating the need for high-cost cellular services while at 'home'.

- GPS functionality ensures continual tracking of truck and trailers, continuous collection of a wide range of performance characteristics from the truck's engine (such as speed, RPMs, sudden stops and more) and from the trailer (including tire pressure, reefer temperature and more).

Automated and advanced data capture

Transportation processes require the use of a number of types of data capture, including:

- Permanent hardened RFID tags placed on your assets (trucks and trailers), enabling automated rapid inventory takes, instant identification at the gate, and easy location of a specific trailer or truck or items in a specific shipment.

- Ability to capture images, RFID tags and bar codes to ensure continuity of workflow regardless of the type of data capture that is required.

Rugged mobile devices

Since mobile computing devices utilized in the transportation industry will be utilized beyond the four walls, they must be designed to withstand the elements. These handheld or fixed/vehicle mount devices should offer:

- A full range of wireless connectivity options (VoWWAN/VoWLAN, WWAN/WLAN/WPAN and GPS) to enable flexible and cost-effective voice and data communications inside and outside the enterprise as well as location-based services.

- Comprehensive data capture options for maximum application flexibility, including bar code scanning, image capture and RFID.

Benefits in transportation

When your transportation function is empowered with mobility, your labor force will be able to accomplish more in a day with less effort – maximizing the strained labor pool, improving overall productivity and performance metrics, and improving customer service and retention.

Mobility enables improved monitoring and management of the transportation function through visibility to key performance metrics, enabling you to easily answer the question: How is your transportation function measuring up? Armed with the many data points along the supply chain path from inside and outside of the four walls, issues are easily revealed, enabling prompt action to prevent erosion of customer service — and customer retention rates. And since data can be segmented in just about any fashion, the costs associated with a specific route or even a specific customer are easily analyzed, enabling better strategic decision making in the enterprise — from the location of a planned distribution center to the identification of unprofitable customers. And the ability to gather these metrics into a meaningful report enables the continuous improvement in the transportation function so common in the warehouse and other areas of the enterprise — but typically absent in this function.

The benefits of mobility in the transportation function are many — the following averages were compiled from Motorola's own mobility deployments in transportation:

- Labor costs reduced 20 to 30 percent

- Labor productivity up 10 to 20 percent

- Operating costs 10-15 percent reduction

- Accuracy of shipments – 100 percent

- Completed shipments 100 percent

- Order to cash – days instead of weeks

Benefits beyond transportation

The transportation management system sits in between the yard and the warehouse systems. Anything less than full integration between the three systems results in some level of reduced efficiency throughout your supply chain. This domino effect can be seen up and down the supply chain, robbing the enterprise of the benefits of synchronization across these critical functions.

The effect in the warehouse

In the warehouse, orders filter down for fulfillment and are transferred to dispatch to schedule the right truck to the right dock at the right time. And it is the simultaneous visibility into both order and truck status that allows the synchronization necessary to:

- Properly aggregate loads.
- Develop route plans that maximize efficiency in terms of mileage, driver time and fuel costs.

The effect in the yard

Integration with the yard system ensures that yard workers are expecting and prepared for your vehicles. The result in minimal wait times at the dock — maximizing on-the-road time during shifts. Driver productivity is maximized — key in a workforce with a major shortage. And vehicle utilization is increased — a critical metric given the cost of trucks and trailers.

The mobile transportation operation — a strategic business initiative

Mobility enables the deployment of a content rich Transportation Management System that is capable of streamlining the processes within the transportation function — and maximizing synchronization at the points of contact with other areas in the supply chain. The result is a system that is capable of not only addressing the issues that plague today's transportation companies, but

is also able to adapt to the needs of tomorrow.

Today, the mobility-enabled TMS is not a standalone system, but a strategic supply chain initiative that enables enterprises to:

- Achieve maximum productivity and cost-efficiencies in the transportation function.
- Provide the tight integration with upstream and downstream supply chain contact points (the Warehouse and Yard Management Systems) necessary for further improvements in the timely orchestration of load preparation and pickup.

In addition, this synchronization also enables a new level of service for customers. The improved visibility combines with real-time tracking and tracing data to enable the creation of a real-time self-service portal for customers. Customers enjoy an expansion of service, and the ability to obtain information on the fly simultaneously eliminates the majority of customer calls related to status of shipments. And the enterprise is poised to implement new functionalities that can further increase efficiency and profitability, such as cross-docking and zone skipping.

For more information

For more information on how you can reap the benefits of mobility in your transportation operations, replace all copy after the 'comma' with: please visit us on the web at:

motorola.com/supplychainmobility

or access our global contact directory at:

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