Manly Terminal: A Global Transportation Hub in Rural Iowa
CAB CS 08.5

Abstract

This case study explores transportation issues faced by a fictional company, Midwest Ag Processing (MAP). The shipper is battling rising transportation costs, declining delivery service levels and the resulting unhappy customers. As MAP employees search for solutions, they make two discoveries. First, the U.S. transportation system is operating near capacity, leading to concerns about congestion on the nation’s transportation infrastructure. Second, they discover Manly Terminal LLC, a biofuels-based storage and transloading facility located in rural Iowa. Manly Terminal LLC gives MAP management hope and leads them to rethink their transportation options. This case illustrates the key challenges facing Midwestern agricultural shippers and encourages a candid discussion about practical solutions for an impending transportation capacity crisis.

Scenario

When Stanley opened MAP 20 years ago, he never imagined exporting 50 percent of his production to Asia. From the 1990s through 2004, transportation costs were flat or falling, and modal decision-making was easy. Trucks were used for time-sensitive deliveries, while rail or barge saved cost on the remaining shipments.

Because transportation costs were reasonable and service dependable, Stanley implemented a demand management program, which included collaborative demand forecasting with key customers. The initiative reduced total inventories (MAP and customer) by nearly 30 percent. On-time service levels were nearly always more than 95
percent, and customer stock-out situations were non-existent. When his transportation manager retired in 2001, Stanley placed transportation in the logistics department because he was so impressed with the improvements in profitability by managing the supply chain, as opposed to transportation. Demand management and customer service became MAP’s competitive advantages and enabled it to expand internationally.

Approximately three years ago, MAP first encountered increasing transportation rates accompanied with falling service levels. MAP’s transportation costs as a percent of cost of goods sold rose from 11 to 19 percent. Of course, high fuel prices contributed to the increase, but the whole transportation system seemed to change overnight. At one time, shipping product to domestic markets on single railcars offered savings of 10 percent compared to truckload shipments. However, today MAP’s ton-mile costs for single railcar shipments are nearly as costly as ton-mile costs for truckload shipments. International shipping prices by container are also escalating, in part because of increased demand for containers, higher fuel costs and traffic congestion.

Even more disturbing to Stanley is the abrupt drop off in ontime transportation service. The demand management program is falling apart. Last month, Stanley received multiple calls from customers complaining about late shipments for both truck and rail delays. The delays were measured in days, not hours. Railcar delivery windows increased from two to seven days, and overall truckload service levels fell to less than 85 percent ontime. Two international intermodal shipments even missed trains for the West Coast and ultimately missed their steamship connections. This caused a mess of paperwork, not to mention some extremely upset Chinese customers.

The transportation problems led to a demand by MAP’s largest domestic customer that MAP either place supplier-owned inventory in a nearby storage facility or lose 100 percent of its business. Inventory was quickly placed in a nearby public warehouse, but to Stanley this was not a reasonable long-term solution.

Stanley is convinced that MAP must regain control of its transportation costs and service. At a monthly planning meeting, Stanley suggests that it is time for MAP to closely examine its transportation. However, he is dismayed to discover that none of the bright young stars on his supply chain team know much about transportation. Instead, they bring skills inventory management, production scheduling and demand management backgrounds. When Stanley first asks the team if the transportation
market were changing, he was reminded that it’s important to manage the supply chain and not worry about one aspect of it, such as transportation. Besides, one of the youngsters replied, transportation is a mature industry, dependent on shippers.

“Come on Stan, you can’t possibly want to go back to the 80s,” he said.

Despite his staff’s resistance, Stanley decides to re-evaluate MAP’s transportation network, including modal options of truck, rail and barge. Believing that a service-cost balance must exist, Stanley asks his sales manager, Mark, and supply chain manager, Mary, to be part of the project. As a first step, he asks them to attend the Midwest Transportation Symposium to learn about current transportation issues and return with suggestions. Ultimately, Stanley hopes to share their recommendations with his customers, much like he did with the demand management program in the 90s.

Midwest Transportation Symposium Report

Two weeks later, Stanley meets with Mary and Mark to discuss the symposium and next steps. Mark takes the lead, presenting a written summary of the symposium. Before the meeting, Stanley reads through Mark’s summary.

Midwest Transportation Summary Report

Demands on our nation’s roads, rails and waterway systems are pushing up against infrastructure capacity. By 2020, freight tonnage moving through the U.S. infrastructure network is expected to increase by more than 50 percent (Smith, 2002). At the heart of the U.S. freight infrastructure issue is the upper Midwest, where all major U.S. railroads intersect (Chicago), major interstates (I-80, I-90, I-94, I-35, I-69, I-71 and I-75) connecting the country, and ports on the Illinois, Ohio, Mississippi and Missouri rivers providing access to Gulf ports.

In addition to linking the East and West coasts, the upper Midwest (Minnesota, Iowa, Wisconsin, Michigan, Illinois, Indiana and Ohio) accounts for 27 percent of the nation’s manufacturing jobs and the production of most of the nation’s corn, soybean and now ethanol. In all, 30 percent of U.S. freight either originates or terminates in the upper Midwest (Midwest Regional University Transportation Center, 2007). Midwestern transportation is also important because it is the trade corridor for both U.S. and European trade with China. Intermodal container shipments are the largest
revenue source for Class I railroads, accounting for nearly 25 percent of total revenue (AAR, 2006). West Coast port container loadings increased from 14.2 million containers in 2001 to 22.6 million in 2006, since the United States is now a “land bridge” for shipments moving from Asia to Europe (Transportation Research Board, 2007).

Trucks haul more than 70 percent of the upper Midwest’s freight. With projections that freight volumes will double from nine billion tons to 17 billion tons by 2020, highway systems will be stressed (Schrank and Lomax, 2005). From 1980 to 2003, vehicle miles traveled (VMT) increased by 88 percent, while miles of roadway only expanded by five percent (Federal Highway Administration, 2007).

The combination of increased demand for transportation and stagnant lane-mile growth has resulted in severe traffic congestion on 54 percent of roadways (Schrank and Lomax, 2005). The cost associated with road congestion is expected to be more than $90 billion in 2009 (Schrank and Lomax, 2007). In the Midwest, “rural links (interstate highways) that connect the major business centers of the region are nearly all operating at or near capacity.” (Wittwer, 2007)

In addition to the congested highway system, the projected growth in truck freight volumes will aggravate the decade-old truck driver shortage problem. Rail freight accounts for more than 40 percent of the total Midwestern ton-miles shipped. As freight volumes have increased, railroads have sought ways to move more freight over its constrained networks. Traffic density has increased from 3.6 million ton-miles per track-mile in 1985 to more than 10 million ton-miles per track-mile in 2005 (AAR, 2006).

Railroads have improved traffic density by selling or abandoning low-volume track (primarily in the 80s and early 90s). Railroads have also focused on hauling coal, grain and containers, thereby increasing revenue ton-miles by concentrating on shipments of 80 or 100 cars, called unit trains, which move long distances. However, this practice has forced many smaller Midwestern shippers to use the higher-cost truckload mode.

There is no evidence to suggest that Class I railroads plan to shift away from pricing that favors large-volume, long-haul shipments. Rail track capacity is at or approaching capacity for at least portions of the Class I track system in the Midwest (Exhibit 1) (Wittwer, 2007). The red lines on Exhibit 1 are operating at capacity, while the yellow lines are near capacity. The Exhibit only considers rail capacity. Other constraints, such
as those associated with terminals and switching, could further limit capacity. In particular, switching yards in Chicago are known as a choke point for rail transportation.

Traffic through our inland and coastal waterways is also straining current capacity. The Marine Transportation System (MTS) Task Force estimates that domestic marine freight will double by 2020, with the container segment likely seeing the greatest increases (Transportation Research Board, 2004). The MTS Task Force suggests the increased demand will “necessitate new physical infrastructure, which will take many years to complete.” (Transportation Research Board, 2004).

The current U.S. lock and dam system was constructed in the 1930s to handle 600-foot-long barges. However, today’s barge sizes have doubled to 1,200 feet. The aging locks are also prone to mechanical problems. This closes locks for days at a time and results in serious capacity constraints and service interruptions (Yastine, 2007). Congress has approved limited appropriations for some lock upgrades, but the construction process takes time and adds to congestion until projects are completed.

In summary, the presenters at the Midwest Transportation Symposium have convincingly documented that our nation’s transportation system is approaching a critical
juncture. Congestion will become more common and costly as increased transportation demand strains the capacity limits on our highways, railways and waterways. Therefore, MAP’s network plan must include provisions for higher freight costs and lower transportation service levels. Given that MAP must maintain high customer service levels, plans to place additional inventory near major customers must be investigated.

Stanley looks at Mark and Mary and asks if they truly believe that our nation’s transportation system is approaching some type of capacity constraint. Mark replies first, saying the facts seem clear. Mark believes that serving MAP’s customers in the future will likely depend on strategically positioning inventory around the globe because increased congestion will continue to raise transportation costs and reduce service.

Mary then says, “I agree that transportation congestion will be a major issue for the future, but renting warehouse space and increasing inventories must be a last resort.”

She continues, explaining that even a 10 percent increase in inventory levels would reduce ROA from 13.7 to 9.1 percent. MAP’s inventory investment is 22 percent of total assets and inventory carrying costs are nearing 27 percent of inventory value, both of which are consistent with manufacturing industry norms (Stock and Lambert, 2001).

Mary has Stanley’s attention, so she continues. She suggests that MAP should team with other Midwest shippers to better utilize the existing transportation infrastructure. Mary adds that she has already talked to several local manufacturers and shippers, and all are interested in collaborating on potential logistics solutions.

After the symposium, Mary meets several other Midwestern shippers in the lounge and learns that, although their businesses are different, all are experiencing similar transportation cost and service issues. Mary tells Stanley and Mark about one ethanol shipper from Iowa who shared how Manly Terminal LLC had helped them reduce transportation costs and improve service. The shipper later e-mailed Mary an article about Manly Terminal. Mary hands a copy of the article to Stanley and Mark. Stanley agrees to read the article and suggests a future meeting.

**Manly Terminal: Developing Ethanol’s Supply Chain**

Manly is a small farming town in North Central Iowa with a population less than
For Manly residents, the rapid expansion of ethanol production that began in 2002 was a sign of new hope. But, little did they realize just how the location might shape the community’s future and the biofuels supply chain. Fortunately, a few Iowa business leaders recognized Manly as the perfect spot for a regional transportation hub.

During biofuel’s rapid expansion, ethanol plants were built throughout the Corn Belt. The plants were near ethanol’s single most important raw material, corn, but far from ethanol markets. Little attention was given to ethanol’s byproduct, dried distillers grains with solubles (DDGS). In the early days of ethanol’s expansion, most DDGS was trucked to local feedlots. However, with the rapid expansion in capacity, local feed markets soon became saturated. Today, the ethanol industry is plagued with supply chain inefficiencies and transportation bottlenecks.

Leaders from three Iowa companies, Kiewiet Group Companies, Iowa Northern Railway Company and KAG Ethanol Logistics, were among the first to recognize many of today’s biofuel supply chain inefficiencies. These companies partnered to combine expertise in truckload and rail transportation services and storage. They devised a plan to provide truly unique ethanol supply chain solutions. To service the supply chain needs of the ethanol industry, the partnership formed Manly Terminal LLC and broke ground on an ethanol and DDGS storage and reload facility on October 27, 2006.

Today, Manly Terminal LLC operates with 20 million gallons of liquid storage capacity and unit train loading capabilities on 100 acres. It plans to be “the premier hub for storage, marketing, distribution and trading of ethanol in the United States.” This is a lofty goal, but the terminal’s location might be perfect to make the goal a reality.

**Manly Terminal’s Location**

Manly Terminal LLC was strategically placed in North Central Iowa for two reasons. First, it is in the midst of the Corn Belt where 97 percent of total ethanol production capacity is located. Daniel Sabin, president of Iowa Northern Railway Company, estimates that the terminal is situated within 300 miles of more than half of all U.S. ethanol production, which may reach 13.2 billion gallons by the end of 2009 (Ethanol Producer Magazine, 2008). Plus, dried distiller grain production is estimated to rise to 38.8 million tons by the end of 2009. Exhibit 2 shows Manly Terminal LLC’s location in relationship to biorefinery locations and general transportation flows to markets.
A second factor that makes Manly, Iowa, an outstanding location is its access to all seven Class I railroads. Manly Terminal LLC is located on the Iowa Northern Railway Company. It has direct tariff access to the Union Pacific, Canadian National, Cedar Rapids & Iowa City, and Iowa, Chicago & Eastern railroads. Via trackage rights, it is also connected to the Burlington Northern Santa Fe, Kansas City Southern, CSXT, Norfolk Southern and Canadian Pacific railroads. Thus, Manly Terminal LLC has direct tariff access to all destinations across the United States and Canada, or approximately 160,000 miles of track (Association of American Railroads, 2008). Its ability to competitively ship to all U.S. markets by rail gives them access that individual ethanol shippers do not have. This lowers the shipping costs by five to 10 cents per gallon.

Creating a More Efficient Biofuels Supply Chain

Manly Terminal’s business model strives to reduce shipping costs and improve market access for its customers. Four factors allow it to cut ethanol and DDGS shipping costs. These include shifting from truck to rail, unit train pricing, better railcar asset utilization, and access to all seven Class I railroads for competitive rates and timely shipments. First, Manly Terminal LLC enables modal shifts from more expensive truck transportation to less expensive rail transportation. Shifting modes from truck to rail can reduce ethanol and DDGS transportation costs as much as 50 percent. Trucks are
typically used to haul ethanol short distances (less than 250 miles), beyond which truck transportation becomes cost prohibitive. Manly Terminal LLC offers customers opportunities to shift from truck to rail modes, both at the terminal and at rail sidings along the Iowa Northern Railway Company’s 163 miles of track.

Second, Manly Terminal LLC allows shippers to utilize lower-cost unit train shipments. Since deregulation, the industry has encouraged trainload consignments of 80–100 cars, called unit trains. Unit train quantities allow the industry to be more productive, reduce stops and car switches and improve reliability. On a per-ton basis, cost savings for a unit train shipment are at least 25 percent less than the cost of shipping a single railcar. Therefore, shippers have a significant incentive to ship in unit train quantities. Although unit train pricing encourages shippers to ship unit train quantities, economies of size and storage requirement at ethanol plants often prohibit full unit train shipments. In 2007, the average ethanol plant capacity was 59 million gallons per year (Renewable Fuels Association, 2008). This equates to roughly 35 rail tanker carloads of ethanol and 36 jumbo hopper carloads of DDGS per week. It also suggests that plants would need three weeks of stored ethanol and DDGS production to fill a unit train if the plant shipped all of its production by rail. Many ethanol plants cannot afford to build adequate storage to fill unit trains. Others need to sell product as it is produced to meet cash flow requirements.

At Manly Terminal LLC, ethanol plants collectively fill unit trains, reaping the benefits of reduced transportation costs, while keeping production inventories low. Ethanol plants ship truckloads of production to Manly Terminal LLC where storage capacity and transloading facilities are utilized to create unit train shipments. The Iowa Northern Railway Company also picks up single railcars from plants along its railway and consolidates the single cars into unit train shipments for Class I shipping discounts.

Third, Manly Terminal has access to all regions of the United States and all major U.S. water ports for export. Access to all seven U.S. Class I railroads encourages rate competition and helps shippers avoid traffic congestion or regional bottlenecks. In turn, this assures deliveries are made in a timely fashion, ultimately increasing customer service for ethanol and DDGS markets.

Finally, railcar asset utilization is improved. Manly Terminal LLC is able to build timely unit trains and manage connections with Class I railroad carriers. This gives Manly
Terminal the ability to better manage railcar utilization, which could otherwise be as low as 12 turns per year (Denicoff, 2007). Manly Terminal LLC works with railroad car leasing companies to maintain an efficient inventory of tank cars. This high level of asset utilization and management ultimately reduces shipping costs.

Manly Terminal LLC can also improve marketing opportunities for ethanol and DDGS by allowing producers to store product and capitalize on inter-regional price fluctuations. It also operates a trading floor that acts as a safety valve for portions of ethanol supply otherwise subject to significant buyer discounts. Manly Terminal LLC’s ability to store large volumes of ethanol creates enough liquidity for a trading market to operate, with the terminal becoming the single delivery and clearing point for futures trading. Therefore, ethanol can be purchased, sold and traded while it’s in holding tanks. The terminal’s operators plan to have the trading floor operational soon.

Next Steps

Stanley wonders if Manly Terminal is the solution to his transportation problems. It offers ethanol producers opportunities to better utilize a highly congested transportation system, even in a newly developed industry. Stanley knows there must be opportunities for MAP to do the same, ultimately keeping costs low and service levels high. He crafts an e-mail with four questions for his next meeting with Mary and Mark:

1. Does MAP have an understanding of its transportation needs? How important is transportation to supply chain management?

2. Manly Terminal LLC offers the ethanol industry exciting supply chain solutions. Are the ethanol industry’s transportation needs similar to any other agricultural sectors? Could Manly Terminal expand to serve other industries? Which sectors should they target?

3. Agricultural commodities and products from the Midwest are shipped to locations around the globe. If global demand continues to grow, how will different transportation modes (rail, truck and barge) be affected?

4. Location seems key to Manly Terminal LLC’s success. Is its location essential to its success? Do other Midwestern locations with similar characteristics exist?
Table 1. Distribution of Corn and Ethanol Production, by Census Region, 2004-2007

<table>
<thead>
<tr>
<th>Census Region</th>
<th>States</th>
<th>Corn Production¹</th>
<th>Ethanol Production²</th>
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<tr>
<td>1</td>
<td>CT, MA, ME, NH, RI, VT</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>2</td>
<td>NJ, NY, PA</td>
<td>1.7%</td>
<td>0.0%</td>
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<tr>
<td>3</td>
<td>IL, IN, MI, OH, WI</td>
<td>34.4%</td>
<td>24.2%</td>
</tr>
<tr>
<td>4</td>
<td>IA, KS, MN, MO, ND, NE, SD</td>
<td>53.3%</td>
<td>72.8%</td>
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<tr>
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<td>DE, FL, GA, MD, NC, SC, VA, WV</td>
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<td>0.0%</td>
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<td>6</td>
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<td>0.7%</td>
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<td>0.2%</td>
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<td>AZ, CO, ID, MT, NM, NV, UT, WY</td>
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<td>1.2%</td>
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<td>CA, OR, WA</td>
<td>0.4%</td>
<td>0.9%</td>
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<tr>
<td>USA</td>
<td></td>
<td>100.0%</td>
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Notes


