Impact of State Funding on Rail System and Agricultural Cooperatives in Wisconsin

by

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ABSTRACT

Since the introduction of railroad systems to the United States in the early- to mid-1800s, agricultural producers – particularly those in the grain, fertilizer and fuel industries – have benefitted from increased access to national and global markets.

This study is designed to examine the Wisconsin 2017-2019 Biennium Budget as an indication of the state's political desire to fund the state's rail system and address the implications related to cooperative performance and competitive advantage in the agricultural markets. The objective is to collect data from Wisconsin cooperatives and: 1) determine cooperatives' current use of rail; 2) estimate the average rail transportation cost for cooperatives; and 3) discuss whether cooperatives should evaluate (if not consider) switching from rail to another mode of transportation.

When reviewing the participants' current use of rail, the research findings suggest that a number of organizations use this method of transportation for both inbound and outbound business. In addition, the majority surveyed indicated competitors and/or customers also use rail as a mode of transportation.

The research findings suggest that agricultural cooperatives in Wisconsin should independently evaluate the costs and/or benefits of switching from rail to another mode of transportation and the impact a change of this nature would have on the cooperatives' input suppliers as well as end customers. The implications might impact future profitability or financial viability of the cooperative.

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Finally, special thanks to the MAB Class of 2018 for their support, encouragement and most importantly, their unwavering sense of humor. #MABLUV

DEDICATION

This thesis is dedicated to the author's grandparents, Herbert & Valeria Schoenborn and Mark & Rita Schneider, and parents, Richard & Linda Schoenborn. Thank you will never be enough.

CHAPTER I: INTRODUCTION

Since the introduction of railroad systems to the United States in the early- to mid-1800s, agricultural producers – particularly those in the grain, fertilizer and fuel industries – have benefitted from increased access to national and global markets. According to the Wisconsin Economic Development Institute, Inc., "Wisconsin's 10 railroads last year carried more than 2.7 million carloads of freight weighing in at nearly 164 million tons" (Wisconsin Economic Development Institute, Inc. n.d.). The same source notes that 13 percent of the products originating in Wisconsin and travelling by rail are farm products with an additional 11 percent being food products and 14 percent pulp and paper products. Of those products terminating (being delivered to) in Wisconsin, 7 percent are pulp and paper products and 5 percent are farm products.

The 2017-2019 Wisconsin Biennium Budget passed 11 weeks past its due date, with 99 partial vetoes from the governor. One of the major areas of contention and discussion in the budget negotiations was that of transportation – including railway infrastructure. With increases in the demand of food products needed to meet the world's growing population, agricultural cooperatives rely heavily on timely and reliable methods of transportation. The funding provided by state budgets in Wisconsin impacts the affordability and safety of these products for inter and intra state transportation. Without the necessary maintenance and investment in railroad infrastructure, agricultural cooperatives will likely experience a competitive disadvantage when transporting food and agricultural products.

At an informational hearing on the proposed Wisconsin Department of Transportation 2017-2019 Biennial Budget Proposal on Dec. 6, 2016, Rob Richard, Senior

Director of Governmental Relations with the Wisconsin Farm Bureau Federation noted the following: “Agriculture is an $88 billion industry in Wisconsin. Four hundred thirteen thousand five hundred jobs are directly linked to agriculture that comprises nearly 12 percent of all employment in the state. Its economic impact is felt in every village, city, town and county. Agriculture is heavily dependent on a good infrastructure of roadways and bridges to move farm equipment for the planting and harvesting of crops, and then to ultimately move the harvest efficiently to grain facilities and food processing plants located throughout the state. From there, we rely on an intermodal system of trucks, freight rail and barges to move vegetables, fruits, dairy, meat, grains, etc. around the globe” (Transportation Informational Hearing on 2017-19 WisDOT Biennial Budget Proposal: Testimony 2016).

Given the state’s dependence on agriculture and the potential for under investment in a functional transportation system, should Wisconsin cooperatives view the dissolution of railroad infrastructure as a viable concern for their organizations?

This study will consider the Wisconsin 2017-2019 Biennium Budget as an indication of the state’s desire to fund the state’s rail system and address the implications related to cooperatives’ performance and competitive advantage in the agricultural markets. The objective is to collect data from Wisconsin cooperatives and: 1) determine cooperatives current use of rail; 2) estimate the average cost for cooperatives; and 3) discuss whether cooperatives should evaluate (if not consider) switching from rail to another mode of transportation.

This issue is important to the state’s agricultural economy, which depends on rail, truck and waterway as methods of transportation for their products. According to the

Association of American Railroads, “One train can carry as much freight as several hundred trucks. It would take approximately 11.9 million additional trucks to handle the 213.6 million tons of freight that originated in, terminated in, or moved through Wisconsin by rail in 2014” (Association of American Railroads 2017). Of that freight, the source notes 20,500 carloads of grain (6 percent of the year’s originating rail traffic) originated in Wisconsin in 2015 and 31,500 carloads (5 percent) of the rail traffic terminated in Wisconsin in the same year.

As the global population continues to grow, Wisconsin cooperatives need to meet the demand of food, fiber, and feedstuffs, while continuing to maintain a comparable level of competition among cooperatives and other organizations following non-cooperative business models. Transportation and logistics play an important role in matching the demand of agricultural products with a reliable and uninterrupted supply of transportation services. This thesis provides important information for cooperatives to consider when developing long-term logistics plans. The data analysis could help determine the continued use of the railway system. In addition, the data analysis provided could be presented to legislators to aid in describing the value in and importance of maintaining and potentially growing Wisconsin’s railway system.

CHAPTER II: LITERATURE REVIEW

2.1 Literature Introduction

While there currently is no research analyzing the Wisconsin state budget and its impact on the rail system used by agricultural cooperatives, there is information available relating to rural transportation issues, the impact of rail transportation on agriculture and transportation of grain across the United States.

2.2 The Impact of Access to Rail Transportation on Agricultural Improvement

"During the 1850s, the amount of farm land in the United States increased by 40 million hectares (100 million acres) or more than one-third" (Atack and Margo 2011). Using geographic information systems, the authors of the study calculated the impact of increased rail access in the United States on agricultural improvements. According to the authors, "slightly more than two-thirds of the growth in improved farmland [was attributed] to the spread of the railroad" (Atack and Margo 2011). Further, they note that when considering all of the possible factors responsible for the clearing of land for crop and livestock during this time period, "it is likely that no other single factor was as important as the potential gains from trade deriving from the coming of the railroad" (Atack and Margo 2011).

2.3 The Importance of Transportation to Agriculture

According to a presentation by Bruce Blanton, "agriculture is [the] largest sector user of freight" (2017). He noted that agricultural products accounted for 22 percent of the commodities shipped by rail in 2012 followed by coal at 9 percent. The remaining 69 percent was comprised of "other commodities".

Blanton cited *Transportation of U.S. Grains: A Modal Share Analysis* (Transportation & Marketing Programs/AMS/USDA 2015) when discussing the comparison of transportation methods for U.S. grains, as shown in Figure 2.1.

Table 2.1: Percentage of Modal Share of Grain Transportation, 2009-2013 Average

Mode	Exports	Domestic	Total
Rail	45%	23%	29%
Barge	45%	1%	13%
Truck	10%	76%	58%

Source: Transportation & Marketing Programs/AMS/USDA

Rail transport (Table 2.1) accounts for 29 percent of the total U.S. grain transportation for 2009-2013, with barges and trucks accounting for 13 and 58 percent, respectively. Blanton also reviewed some of the areas of concern such as "service, high rates, switching limitations/restricted interchange and effectiveness of the rate challenge process" (Blanton 2017). As there is no modal share data available specific to multiple methods of grain transport in the state of Wisconsin, this data is conveyed to provide context. According to Prater et al. (2013), Wisconsin's rail market share of grain transportation for 2007-2010 was 22 percent, comparable to Blanton's national rating of 29 percent.

2.4 Shipments of Grain by Rail in Wisconsin

When considering grain transport in Wisconsin, a January 2014 report noted the state ranked 12th in the nation for grain and oilseed production, with an average export for each year (2006-2010) of 1.8 million metric tons (Prater 2014). The same report stated "Railroad originations of grain and oilseeds had an average market share of 21.6 percent during the crop marketing years from 2007 to 2010, an increase from the 2001 to 2004

average of 14.6 percent" (Prater 2014). Finally, it was found that average tariff rail rates increased by 62 percent between 2005 and 2010.

2.5 Rural Transportation Issues

Rail transportation is crucial to agriculture grain transport in both Wisconsin and the United States at large. The *Study of Rural Transportation Issues* highlights the importance of this mode to more rural areas, where most agricultural shipping facilities receive the majority of its inputs. "Transportation is critical to U.S. agriculture, which raises the food for America and feeds a hungry world with its abundance. Our transportation system moves food from farms to our tables, and to ports for export to foreign markets. The four major modes work together in a seamless network, cooperating and competing with one another in a balanced and flexible system that delivers products efficiently and economically in an ever-changing market" (Casavant, et al. 2010). This study notes that agriculture accounted for 31 percent of the ton-miles of U.S. freight transport in 2007, with the majority of that product destined for international markets. When considering possible hindrances for shippers, transportation cost and direct access to end markets are listed as the top two. Casavant, et al. noted economic trends predict an increased demand for rail services – particularly from the agriculture sector.

2.6 Further Testimony

According to testimony provided by then-Secretary of the Wisconsin Department of Transportation Mark Gottlieb, the Department's 2017-2019 budget request was formed based on the following directives from Governor Scott Walker:

1. No increase in transportation taxes or fees;
2. A responsible level of bonding;

3. A highway program that emphasizes maintenance, safety and system preservation; and
4. An increase in local aids (Transportation Informational Hearing on 2017-19 WisDOT Biennial Budget Proposal: Testimony 2016).

Peter Kammer of the Wisconsin Railroad Association called Wisconsin railroads "a deregulation success story," noting that since the Staggers Rail Act in 1980, railroads have spent hundreds of billions of dollars on track and equipment maintenance, with capital expenditures actually tripling since 1990 (Transportation Informational Hearing on 2017-19 WisDOT Biennial Budget Proposal: Testimony 2016).

Also with the Wisconsin Railroad Association and representing Wisconsin & Southern Railroad, Ken Lucht highlighted the importance of rail to the state – and agriculture in particular. "By 2030, freight rail demand here in Wisconsin is forecasted to double. Whether it's sugar or corn used for making syrup, or grain and sand used for producing renewable energy sources, rail plays a big role in moving commodities across our state's transportation network, safely and efficiently. More importantly here today, rail plays a big role in freeing up capacity on our federal, state and local roads, by having over 200 million tons of freight moving on our railroads each and every year. Additional capacity on our roads means safer roads, less deteriorated roads, and overall better roads for Wisconsinites to travel each year" (Transportation Informational Hearing on 2017-19 WisDOT Biennial Budget Proposal: Testimony 2016).

Lucht continued, commenting on specific portions of the proposed budget, highlighting the Freight Railroad Preservation Program (FRPP), a freight rail assistance program that provides grants to local entities for rail preservation and rehabilitation. Lucht

noted that there are over $130 million worth of projects needed for the present rail system. The budget as proposed provided $12 million, which was a decrease from the previous $35 million allotment.

While there was no submitted testimony directly debating the value of rail or its funding allocation in the budget, representatives of a number of trade groups and organizations did convey the importance of other projects, such as highway and bridge maintenance and improvements. In fact, then-Secretary Gottlieb outlined a $65 million increase across several aid programs, including local road and bridge improvement programs.

Craig Thompson, Executive Director of the Transportation Development Association testified that Wisconsin is failing – and this problem did not happen overnight. The state, he said, has the third roughest roads in the nation and a report released in January 2013 "concluded Wisconsin is over $1 billion short annually of the revenue needed to simply keep transportation services, conditions, and traffic congestion at current (2013) levels" (Transportation Informational Hearing on 2017-19 WisDOT Biennial Budget Proposal: Testimony 2016). "While there is a difference of opinion over the proper size and scope of government, one of the most fundamental responsibilities of government, no matter how limited, is providing and maintaining a transportation network" (Transportation Informational Hearing on 2017-19 WisDOT Biennial Budget Proposal: Testimony 2016).

CHAPTER III: THEORY

3.1 Theory

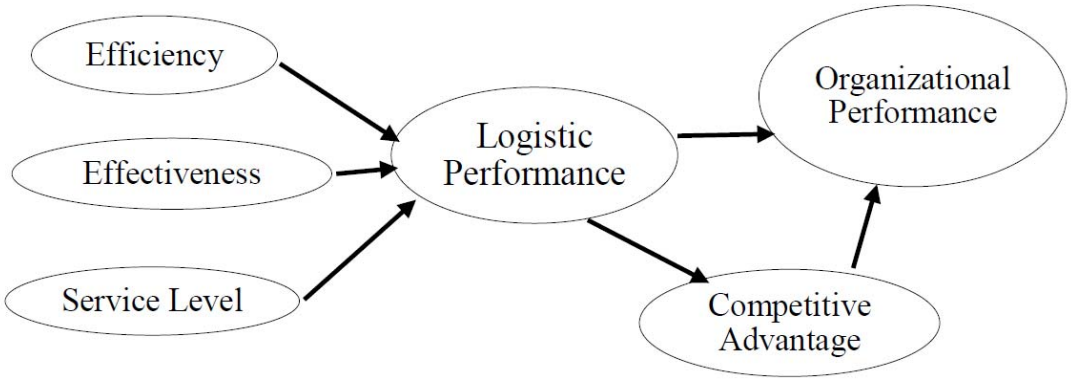
This thesis will examine the potential impact of state funding for rail on logistical performance and competitive advantage for agricultural cooperatives. The data analysis is based on a conceptual model developed by Mansidão and Coelho (2014) while also drawing comparisons to the Pareto principle as presented by Just, Hueth and Schmitz (2004).

3.2 Conceptual Model

The conceptual model presented by Mansidão and Coelho (2014) is based on the idea that "there is a positive correlation between logistics performance and organizational performance" and is "built on three basic elements: organizational performance, competitive advantage and logistics performance, which are grounded in the dimensions of efficiency, effectiveness and service level."

The model is a combination of models by Aramyan, et al. (2007) and Fugate, et al. (2010) with supplemental research concepts provided by Töyli, et al. (2008). It assumes that logistics performance is influenced by a number of factors (e.g. – efficiency, differentiation, quality, service level, etc.) and therefore, those factors can have a direct impact on the performance of the organization. The model establishes efficiency, effectiveness and service level as being related to the dimensions of logistics performance, with the resulting output being organizational performance in the manner of overall business objectives and financial management, including budget expectations.

Figure 3.1: Conceptual Model



(Mansidão and Coelho 2014)

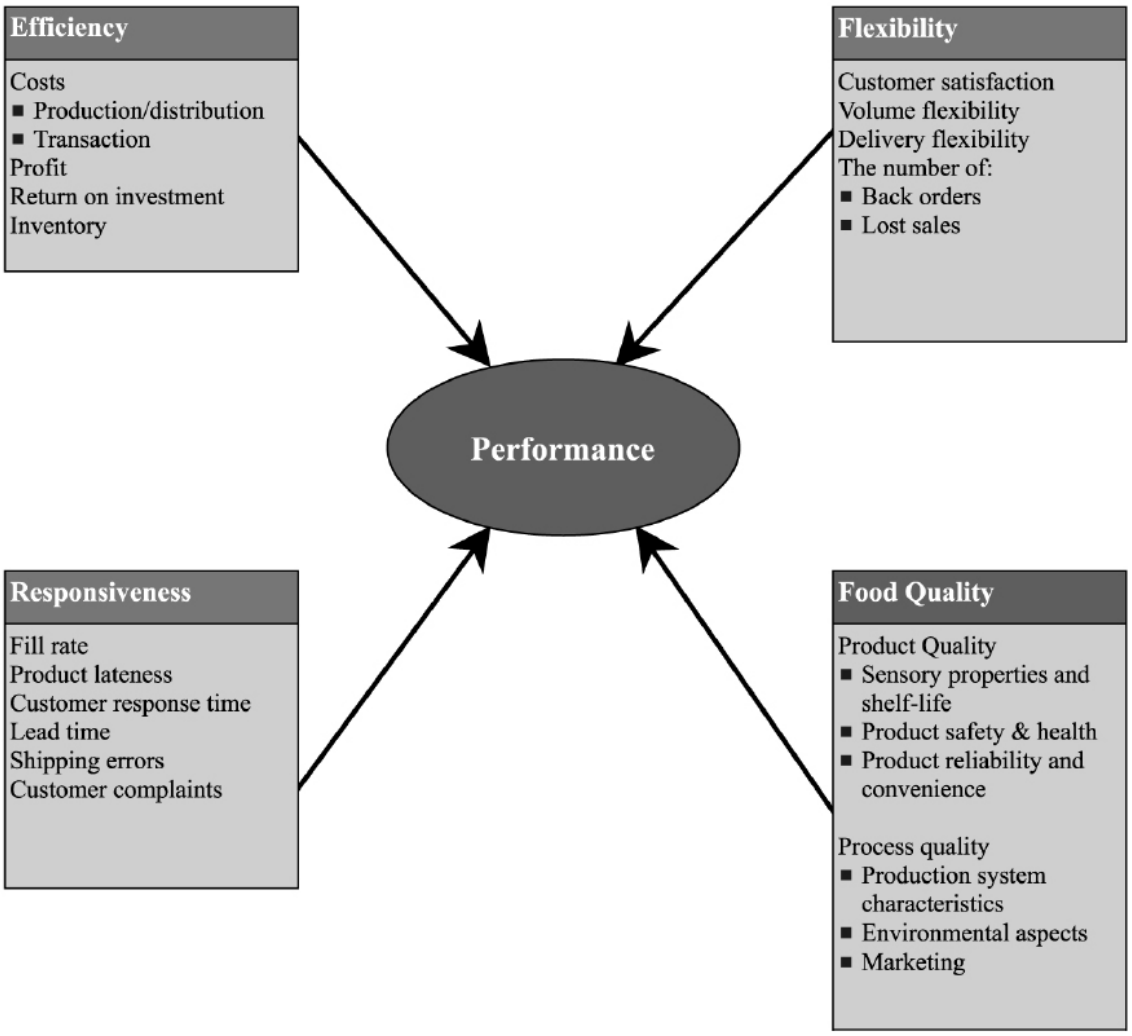
"In a highly competitive environment where companies are faced with intense competition, lack of resources and unfavorable economic conditions, performance analysis combined with a culture of competitiveness are assumed to be crucial factors for survival and business success" (Mansidão and Coelho 2014).The models used to generate the conceptual model are shown in Figures 3.2, 3.3 and 3.4.

The Aramyan Model (Figure 3.2) evaluates the agri-food supply chain based on logistics performance. It divides the evaluation into four categories: efficiency, flexibility, responsiveness and food quality.

Using the model in Figure 3.2, each section of the supply chain is able to be evaluated by using the same four consistent key performance indicators. Granted, each section may opt to use additional indicators to meet the established goals and objectives, but this framework "allows supply chain members to develop a clear view on performance of the entire supply chain, as well as on the different aspects of the performance of their own organization, which allows them to make tradeoffs between different aspects of

performance (e.g. increased costs, but higher quality products)" (Aramyan, et al. 12/4 (2007)).

Figure 3.2: Aramyan Model

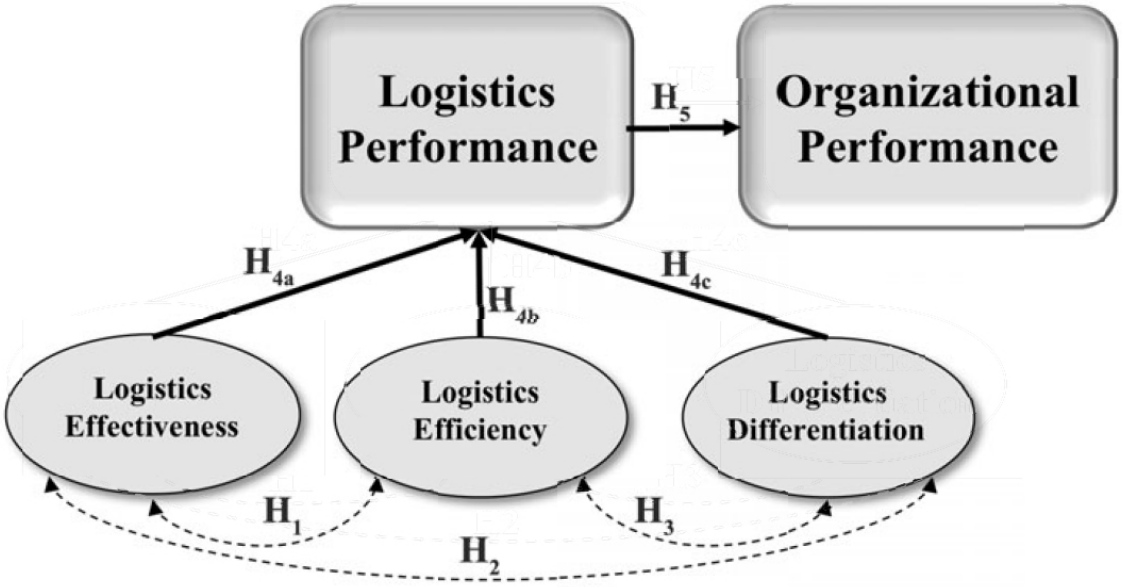


(Aramyan, et al. 12/4 (2007))

Fugate, et al. found that while previous assumptions have pointed to an "either-or" relationship between efficiency, effectiveness and differentiation, they actually can – and perhaps should – operate simultaneously, providing for greater innovation and strategic planning (Figure 3.3).

In fact, they note "…firms that select properties from efficient and responsive supply chains achieve higher financial performance than their competitors that select properties from one or the other" (Fugate, Mentzer and Stank Vol. 31, No. 1, 2010). In addition, they note that to remain competitive, organizations must provide their customers with the best comparative net value.

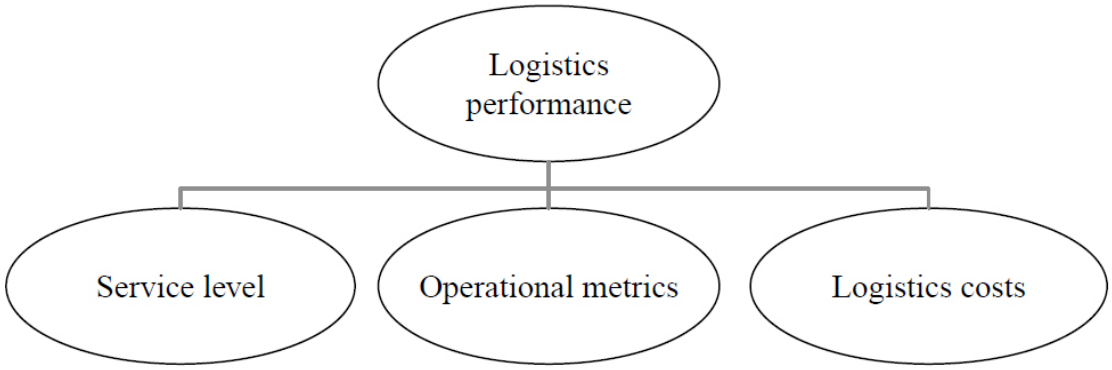
Figure 3.3: Fugate Model



(Fugate, Mentzer and Stank Vol. 31, No. 1, 2010)

One conclusion in the study by Töyli, et al. (2008) was that at least in the short-term, it is feasible for small and medium-sized enterprises to achieve a more competitive advantage by putting greater focus on logistics performance (Figure 3.4). They note "High-logistics performance is associated with efficient and reliable operations, which imply overall cost efficiency and high-asset productivity" (Töyli, et al. Vol. 38 No. 1, 2008).

Figure 3.4: Töyli Model



(Töyli, et al. Vol. 38 No. 1, 2008)

Based on the variables outlined in the three models above, Mansidão and Coelho developed their conceptual model with the objective of analyzing the impact of logistics performance on the organization and its competitive advantage.

When evaluating the objective of this thesis, it is clear that an organization's ability to operative with high levels efficiency, effectiveness and service level in terms of logistics performance can all be influenced by the state's investment in new and maintenance-oriented projects related to rail systems in the state of Wisconsin. That influence, as shown in Figure 3.1, will directly impact a cooperative's logistics performance, competitive advantage and overall organizational performance.

3.3 Economic Welfare Considerations

Because the organization's overall performance in this instance is dependent on the decisions of others outside the organization (state legislators), it is important to consider a theory directly related to public policy.

Historically, there has been significant discussion and debate about the economic impact of policy decisions in local, state and federal government. Just, et al. (2004) note that this struggle has developed from the "inability to decide on purely economic grounds how the goods and services produced in an economy should be distributed among

individuals" (2004). They explain that the issues of supply and fairness are not merely economic concerns – they are political and moral as well. The controversy this discussion may incite has provoked many economists to avoid subjective statements or value judgements, that ultimately led to the creation of the Pareto principle.

Italian economist Vilfredo Pareto introduced the criterion in the nineteenth century. "By this criterion, a policy change is socially desirable if, by the change, everyone can be made better off, or at least some are made better off, while no one is made worse off. If there are any who lose, the criterion is not met" (Just, Hueth and Schmitz 2004).

Pareto Principle is Pareto Optimality, which is a state in which it is simply impossible to make one party better situated or positioned without making another party less so. This is often the reality of policy discussions relating to budget decisions. When resources are limited, it must be determined who will benefit and who will have to wait for another chance during the next cycle.

3.4 Theory Summary

In summary, research supports the importance of efficient and effective logistics on the overall productivity and success of the state and national economies. The conceptual method provided by Mansidão and Coelho (2014) allows for a cooperative to analyze the impact of rail system investment on their own logistics efficiency, effectiveness and service level, and thereby their organizational perfomance. Combining the theoretical approach of Mansidão and Coelho with that of the Pareto Principle, one can determine what impact – if any – decreased funding in a Wisconsin State Bienium Budget would have on an agricultural cooperative's performance, profitability and therefore, competitive advantage.

CHAPTER IV: METHODOLOGY

4.1 Methodology Introduction

This study uses a survey as a system to collect information from and about the cooperatives to describe, compare and explain their knowledge, attitudes and behavior surrounding transportation, particularly railroads, in Wisconsin. The study collected information by asking direct questions and examining the responses related to the current and future use of railroads.

Questions were developed using concepts from Mansidão and Coelho (2014) to evaluate organizational performance and to forecast performance should state funding invested in railroad assets decrease moving forward. Specifically, questions drew on on Mansidão and Coelho's model shown in Figure 3.1. In addition to determining the cooperatives' current use of rail for both inbound and outbound business, it is important to evaluate the reasons for doing so (e.g. – service, cost, reliability, etc.). Should the data reflect a moderate use of rail, coupled with a motivation to do so based on service and reliability, then a decrease in rail funding from the state will clearly show an impact on a cooperative's logistics performance, competitive advantage and overall organizational performance.

Evaluation of the data and resulting conclusions will factor in the Pareto Principle and the likelihood of continued investment by the state at current funding levels.

The data analyzed for this thesis was collected from a questionnaire administered to agricultural cooperatives in Wisconsin. Surveys responses were voluntary and distributed electronically with the use of online software from Survey Monkey, with analysis and comparisons drawn using Microsoft Excel.

4.2 Survey Development

Using the United States Department of Agriculture (USDA)'s Directory of Farmer Cooperatives (United States Department of Agriculture 2016), a list of agricultural cooperatives in the state of Wisconsin was compiled. The list was last updated in September 2016, so comparisons were made with data sets provided by the University of Wisconsin Center for Cooperatives and Cooperative Network, a trade organization representing cooperatives in Wisconsin and Minnesota. Information gathered from the latter two sources helped ensure that any mergers of cooperatives that occurred since the last date of publication of the USDA's directory are accounted for and that all relevant contacts have been updated accordingly.

A test survey was administered to four voluntary participants to determine ease of use, clarity of questions and data generation. The questions included in the survey are reported in Appendix A. No test survey results were included in the final data set of the thesis.

Survey questions were developed to collect data about the participant (e.g. – type of cooperative, size, etc.), their current transportation use and dependence on rail and their perceived value of rail and its impact on their cooperative. Of the 16 questions presented in the test survey, two were a single textbox, six multiple choice, three comment boxes, two checkboxes and three multiple textboxes.

Questions were designed so that the data collected would inform the research questions and provide qualitative and quantitative evidence related to the use and importance of rail to agricultural cooperatives in Wisconsin.

Upon completion of the test questionnaire, the participants' responses were evaluated and the survey instrument was edited based on the following feedback:

- In response to the counties of operation question: “Will they know this is a WI survey? Should that be specified in the question? Could it be helpful (make it easier on them) to have a check all list?”
- In response to the service area in square miles: “This could be a very challenging question to answer. If you're covering more than a few counties, that'll be very hard to quantify.”
- In response to any additional information: “Test of efficiency of survey. I completed this on an IPad and found it to be very user friendly and easy to complete.” And “Ease of use, layout, design, etc. are all great.”

One respondent emailed the author with the following feedback:

- “Very well worded. I don’t think there will be any confusion of how to answer.
- I liked the multiple response options.
- Given our difference from your audience, it’s hard for me to say that counties and some of the larger potential response questions are realistic to easily answer or not.
- I think that your prep e-mail giving a heads up to info you will be requesting will be helpful. This will allow for them to give some thought to who to seek out if they need assistance with an answer.
- It took me very little time to do this, but I wasn’t researching info. Someone that needs accurate info may have to research causing more time to respond. Something to consider for due date and time to complete estimate.”

In response to the feedback provided, several questions were edited to allow for greater clarity and ease of response. For example, rather than providing a comment box and asking in which counties the cooperative operates, the survey was updated to include a Wisconsin Department of Transportation map, with specified zones. Participants were then asked to check which of the four zones their cooperative operates in. The same map was then used when asking in which zone(s) the cooperative generates the majority of their revenue, rather than requesting their service area in square miles – a much more difficult number to know. Finally, instead of a simple multiple textboxes format asking for the portion of inbound (and then outbound) business using different modes of transportation (e.g. – truck, rail, barge, etc.), participants were asked to provide a percentage of their inbound/outbound business using those methods of transportation, with the combined total required to equal 100 percent.

Of the final 16 questions presented in the survey, two were single textbox, five multiple choice, one comment box, five checkboxes and three multiple textboxes. The questions administered to the final survey group are outlined in Appendix B.

Prior to launching the survey, an introductory email was sent to all 74 Wisconsin-based agricultural cooperatives introducing the survey, its purpose and notification that they would receive the invitation and link to participate in two days. Participants were instructed that the survey was voluntary, all individual answers to the survey would remain confidential and that only statistical analysis of the aggregate data set would be made public. It should be noted that respondents were assigned the numbers one through 23 to allow for data analysis while maintaining confidentiality. Following the initial survey

launch, it was noted that four of the cooperatives listed had merged with other cooperatives and therefore, the total number of cooperatives was 70.

Email reminders were distributed via Survey Monkey five days, eight days and 12 days after the initial invitation. In some instances, personalized email and phone reminders were also distributed, as well as invitations to alternate contacts, when needed.

CHAPTER V: DATA AND RESULTS

5.1 Data Introduction

In total, 23 cooperatives (24 individuals) responded to the survey, for a return rate of 32.9 percent. One cooperative had two individuals respond, who shared comparable responses, with the exception of the following notable differences:

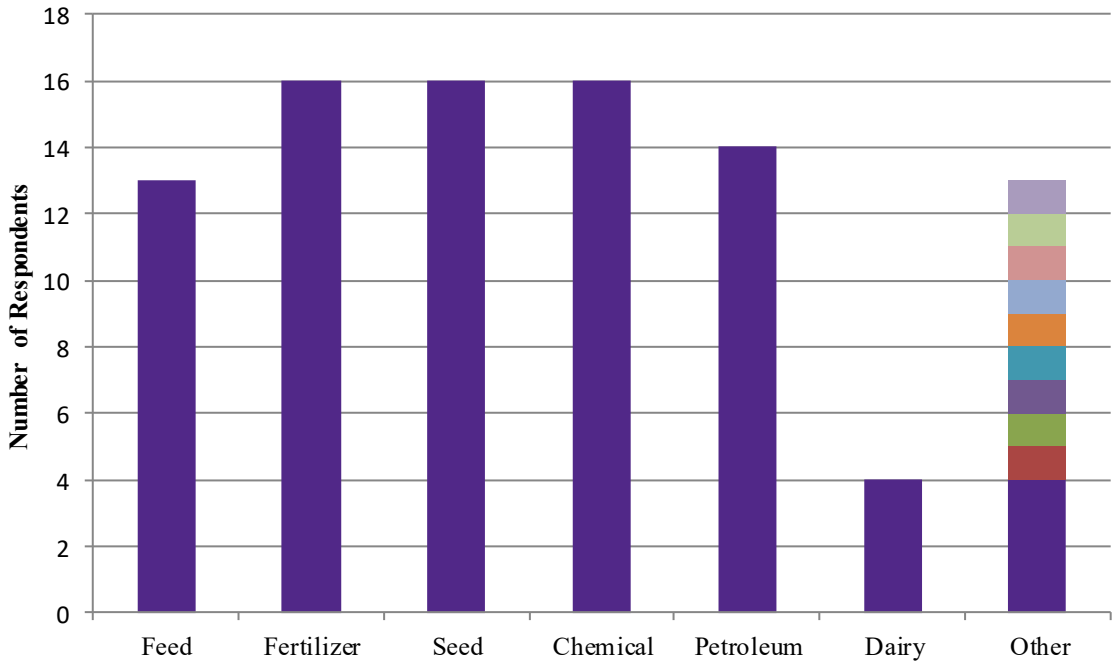
- One participant indicated the cooperative uses 75 percent truck and 25 percent rail for both inbound and outbound business while the other noted 90/10 and 85/15 percent, respectively.
- The second participant also noted an additional zone of revenue and skipped the questions relating to: average annual cost of transportation services and average annual cost of transportation services, by type, indicating the information was not readily available.

Given that the second participant's survey is incomplete, only the first questionnaire will be used for the data analysis.

5.2 Respondent Key Demographics

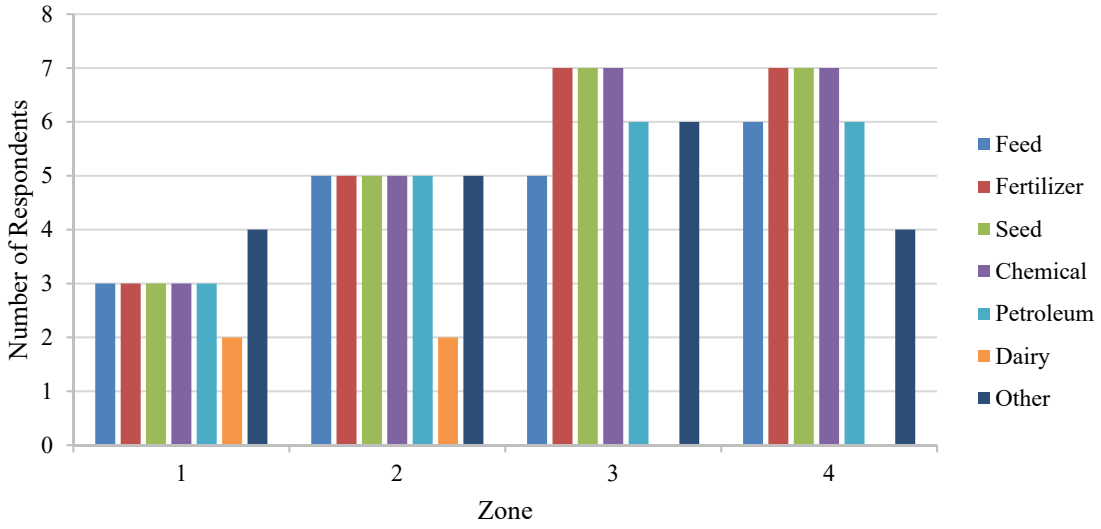
Figure 5.1 portrays the responses of participants regarding agricultural commodities and specialties. A number of responses included the organization having business divisions in more than one commodity/service specialty area. Over 69 percent of respondents specialized in fertilizer, seed and/or chemical, while over 56 percent of participants selected the "Other (please specify)" option and indicated service divisions including: grain, grain marketing, livestock genetics, cheese, livestock, organic grain and organic grass-fed beef, liquid propane and bovine genetics and herd information services.

Figure 5.1: Commodity/Service Specialty



When comparing the commodity/specialty areas based on the cooperatives' geographic locations (as determined by Figure 5.4), it is evident that each of the four zones has a diverse collection of cooperatives. This breakdown is presented in Figure 5.2. As shown, in Zone I, the primary commodity/specialty area is represented as "Other". Zone II has no individual primary commodity/specialty with five cooperatives indicating Feed, Fertilizer, Seed, Chemical, Petroleum and Other. Zones III and IV each have three primary commodities/specialties with seven each of Fertilizer, Seed and Chemical.

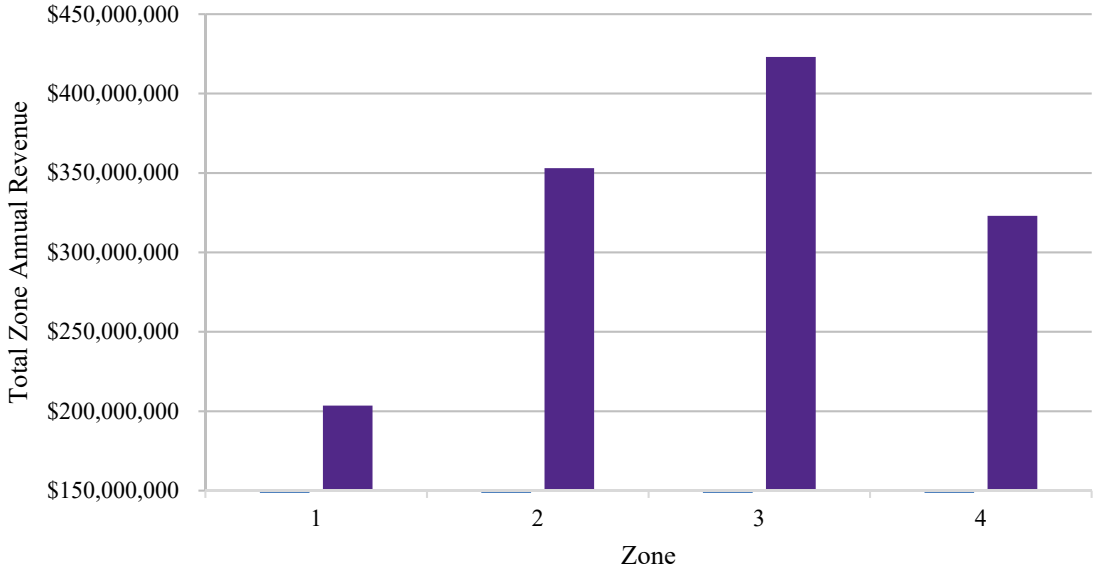
Figure 5.2: Commodity/Service Specialty, by Zone



Of the respondents, 65.2 percent have 5,000 or more members, with the remaining participants distributed as follows: 1-499 members: three respondents, 1,000-2,499 members: one respondent, 2,500-3,499 members: two respondents and 3,500-4,999 members: two respondents. As for cooperative size based on revenue, 82.6 percent of participants have revenue of $50,000,000 or greater. Remaining revenues include one respondent each for $500,000 - $999,999 and $1 million to $4,999,999; and two respondents with $15 million to $24,999,999.

These revenue results can also be evaluated based on the geographic zones presented in Figure 5.4. Figure 5.3 indicates that of the four zones, Zone III has the highest revenue with $423 million. Zone I has the smallest revenue total with $203.5 million. Zones II and IV have total revenues of $353 million and $323 million, respectively.

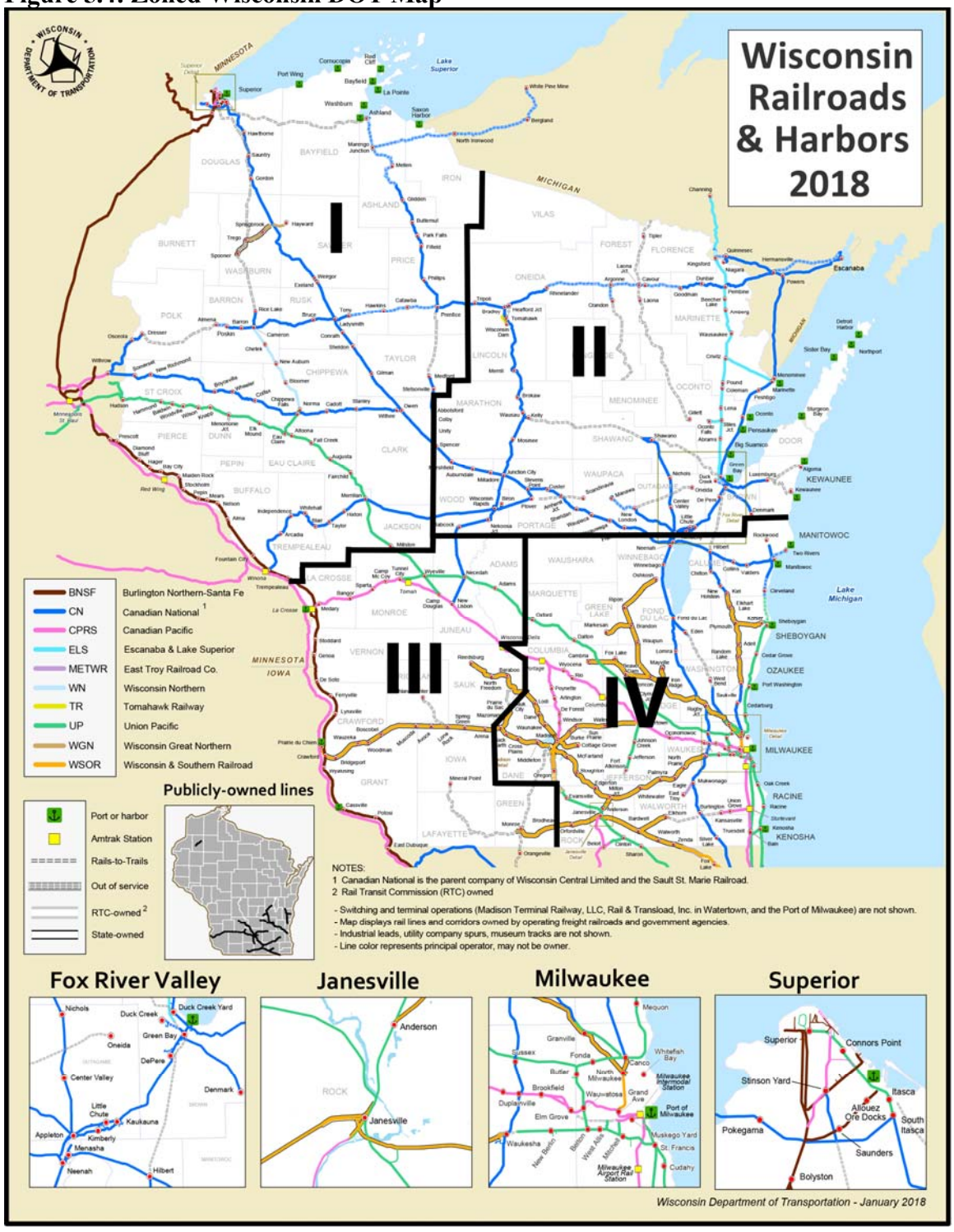
Figure 5.3: Total Revenue, by Zone



Wisconsin-based cooperatives accounted for 82.6 percent of the respondents, with the remaining headquartered in Minnesota and Illinois (three and one cooperatives, respectively).

Respondents were provided with a copy of a zoned Wisconsin DOT map (See Figure 5.4) and asked to indicate in which zone(s) their cooperative operates and in which zone(s) their cooperative generates the majority of its revenue. In response to operation location, Zone I had 11 respondents, as did Zones II and III. Zone IV had 12 respondents. When evaluating the zone(s) in which their cooperative generated the majority of its revenue, the results were as follows: Zone I – six respondents, Zone II – eight respondents, Zone III – 10 respondents and Zone IV – eight respondents.

Figure 5.4: Zoned Wisconsin DOT Map



5.3 Respondent Rail Utilization

Over 60 percent of respondents indicated that their competitors and/or customer use rail services, with 17.4 percent being unsure. The remaining 21.7 percent conveyed their competitors and/or customers do not use rail.

When asked to provide the percentage of inbound business (e.g. – raw materials, etc.) that uses truck, rail, barge or other methods of transportation, all 23 respondents indicated the use of trucks. As shown in Table 5.1, the mean percentage of truck use is 85.2. Thirteen respondents use rail for their inbound transport with a mean of 11.3 percent. Barge and Other have means of 1.3 and 2.2 percent, respectively.

Table 5.1: Transportation Methods for Inbound Business, in Percent

	Transportation Method (%)			
Respondent	**Truck**	**Rail**	**Barge**	**Other**
1	99	0	1	0
2	90	10	0	0
3	80	15	5	0
4	75	25	0	0
5	100	0	0	0
6	40	10	0	50
7	50	50	0	0
8	90	10	0	0
9	85	15	0	0
10	95	5	0	0
11	100	0	0	0
12	100	0	0	0
13	80	20	0	0
14	100	0	0	0
15	90	10	0	0
16	100	0	0	0
17	100	0	0	0
18	85	15	0	0
19	50	50	0	0
20	100	0	0	0
21	100	0	0	0
22	50	25	25	0
23	100	0	0	0
Minimum	40.0	0.0	0.0	0.0
Maximum	100.0	50.0	25.0	50.0
Mean	85.2	11.3	1.3	2.2
Std. Dev.	18.9	14.5	5.1	10.2

Table 5.2 shows all 23 respondents indicated the use of trucks for outbound business (e.g. – finished materials, etc.). The mean percentage of truck use was 88.3 percent. The number of respondents using rail for their outbound transport was seven, with a mean of 7.8 percent. Barge and Other use each equaled a mean use of 0.4 and 3.5 percent, respectively, with one cooperative indicating barge use and two cooperatives selecting other.

Table 5.2: Transportation Methods for Outbound Business, in Percent

	Transportation Method (%)			
Respondent	**Truck**	**Rail**	**Barge**	**Other**
1	100	0	0	0
2	70	30	0	0
3	100	0	0	0
4	75	25	0	0
5	100	0	0	0
6	70	20	10	0
7	40	60	0	0
8	100	0	0	0
9	70	30	0	0
10	100	0	0	0
11	100	0	0	0
12	100	0	0	0
13	90	10	0	0
14	95	5	0	0
15	100	0	0	0
16	100	0	0	0
17	100	0	0	0
18	100	0	0	0
19	100	0	0	0
20	50	0	0	50
21	100	0	0	0
22	100	0	0	0
23	70	0	0	30
Minimum	40.0	0.0	0.0	0.0
Maximum	100.0	60.0	10.0	50.0
Mean	88.3	7.8	0.4	3.5
Std. Dev.	17.8	15.0	2.0	11.7

5.4 Transportation Cost

Thirteen participants chose or were able to provide their cooperative's average annual cost of transportation services. The full data set is available in Table 5.3. The minimum value for the data is $46,000, the maximum value is $20 million and the mean value is $4,114,307.69 over a 12-month period of time.

Table 5.3: Average Annual Cost of Transportation Services

	$	4,000,000
	$	2,000,000
	$	12,000,000
	$	20,000,000
	$	250,000
	$	46,000
	$	2,000,000
	$	3,000,000
	$	400,000
	$	400,000
	$	140,000
	$	8,000,000
	$	1,250,000
Minimum	$	46,000.00
Maximum	$	20,000,000.00
Mean	$	4,114,307.69
Std. Dev.	$	5,703,634.84

Participants were then asked to provide an average annual cost of transportation services by type: truck, rail, barge and other. As shown in Table 5.4, for the 11 respondents the minimum cost of truck transportation was $46,000, with a maximum of $8,000,000 and a mean of $1,946,000. Rail use shows the following values: minimum is $0, maximum is $4,000,000 and mean is $489,090.91. Supplied cost of barge use was valued at zero for all survey respondents and one indicated a cost of $500,000 for the "Other" option. One response error was found in the questionnaire. A participant's response to question #13 required elimination from the analytical portion of the study. The answers for annual cost of both rail and truck transportation cost were submitted as $50. Based on the researcher's understanding of organizational transportation cost, it is unlikely an accurate cost estimation. As such, it is deemed to be a response error and disregarded.

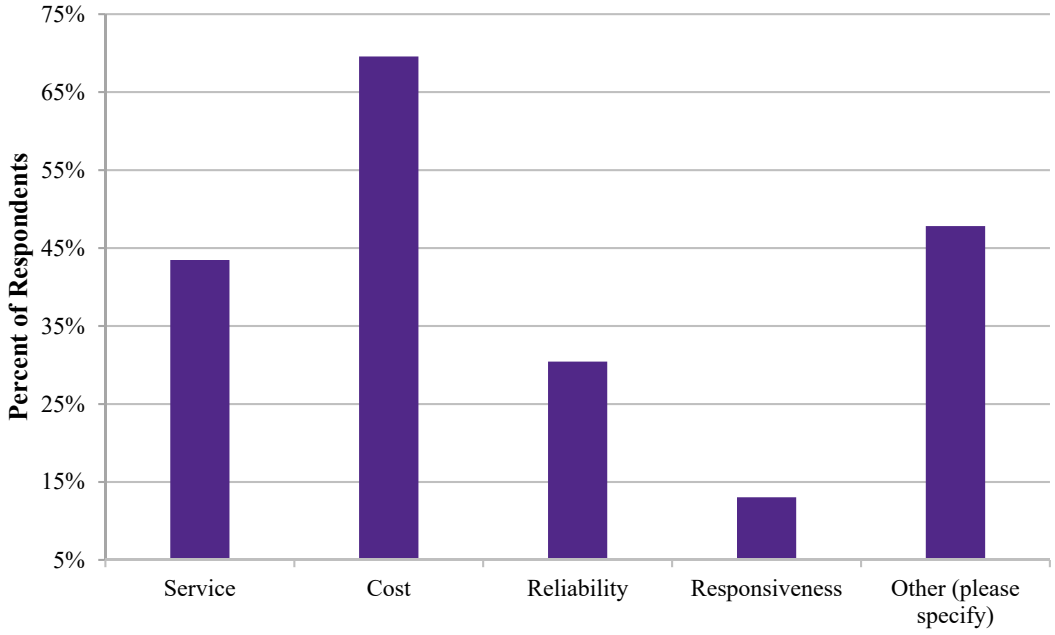
Table 5.4: Average Annual Cost of Transportation Services, By Type

	Transportation Method			
	Truck	**Rail**	**Barge**	**Other**
	$ 3,950,000	$ 50,000	$ -	$ -
	$ 1,200,000	$ 800,000	$ -	$ -
	$ 8,000,000	$ 4,000,000	$ -	$ -
	$ 220,000	$ 30,000	$ -	$ -
	$ 46,000	$ -	$ -	$ -
	$ 1,700,000	$ 300,000	$ -	$ -
	$ 3,000,000	$ -	$ -	$ -
	$ 400,000	$ -	$ -	$ -
	$ 2,000,000	$ 200,000	$ -	$ -
	$ 140,000	$ -	$ -	$ -
	$ 750,000	$ -	$ -	$ 500,000
Minimum	$ 46,000.00	$ -	$ -	$ -
Maximum	$ 8,000,000.00	$4,000,000.00	$ -	$ 500,000.00
Mean	$ 1,946,000.00	$ 489,090.91	$ -	$ 45,454.55
Std. Dev.	$ 2,257,694.72	$1,133,862.70	$ -	$ 143,739.89

5.5 Perceived Value

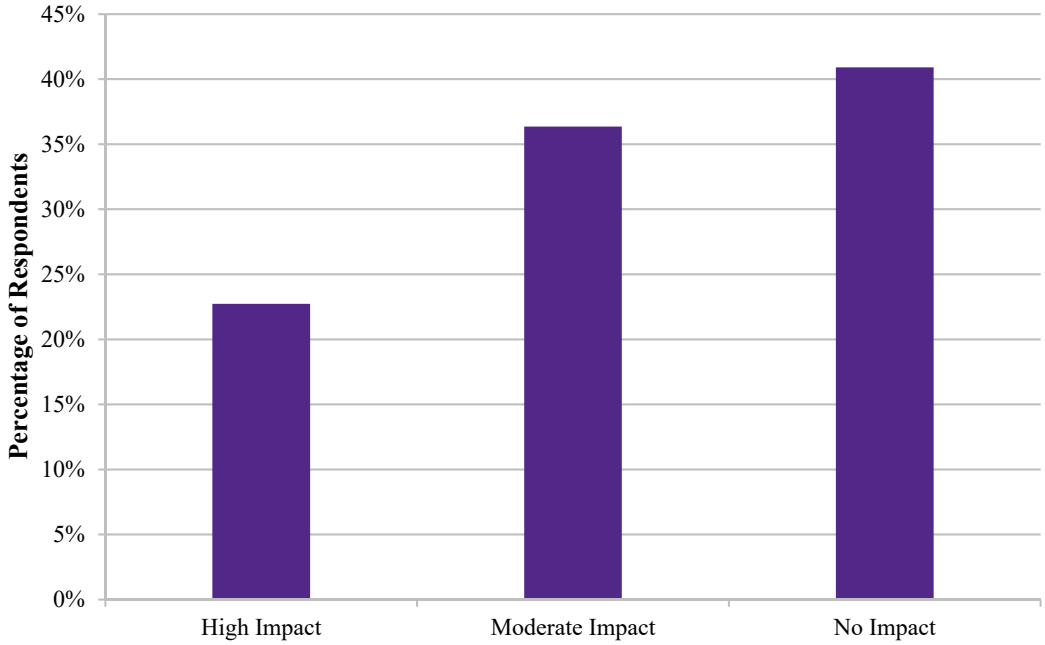
Figure 5.5 indicates the value participants find in rail services. Respondents were allowed to select all options that applied. Cost is the leading factor, with 69.6 percent of the total. “Other (please specify)” followed with 47.8 percent. Those respondents selecting this option indicate expanded answers including: exports, storage, access to markets, consistency and competitiveness and “we do not utilize rail service”.

Figure 5.5: Value in Rail Services



Participants responded to a question related to whether a decline in the state's support of rail would impact its business. Figure 5.6 indicates that slightly more than 59 percent of respondents believe that a decrease in rail funding would either moderately or highly impact the cooperative and nearly 41 percent indicated there would be no impact on the business.

Figure 5.6: Perceived Impact of Decline in Rail Support



Participants were given the opportunity to comment to provide supplemental insight that may not be quantitative, but would be considered important to evaluation of the objective. The total results were as follows:

- Agriculture and logging are greatly impacted
- We need more investment in rail
- Impact would be focused on our grain business only
- Rail is becoming more important with recent changes in trucking regulations.
- This is not accurate, we use a truck/ rail / boat which is not listed
- Probably not much

Finally, respondents were provided with a comment box to supply any additional information they found relevant to the study. Complete feedback for this question is as follows:

- We export in excess of 2,500 containers per year with products our customers produce for us. Just started in 2013 and growing and expanding.
- Our cooperative was involved with the movement of approximately 8,000 rail cars to move inputs and commodity to markets.
- Cooperative just merged with another cooperative.
- We are not a commodity business so do not use rail for either inbound or outbound product. All international business is by air shipments.

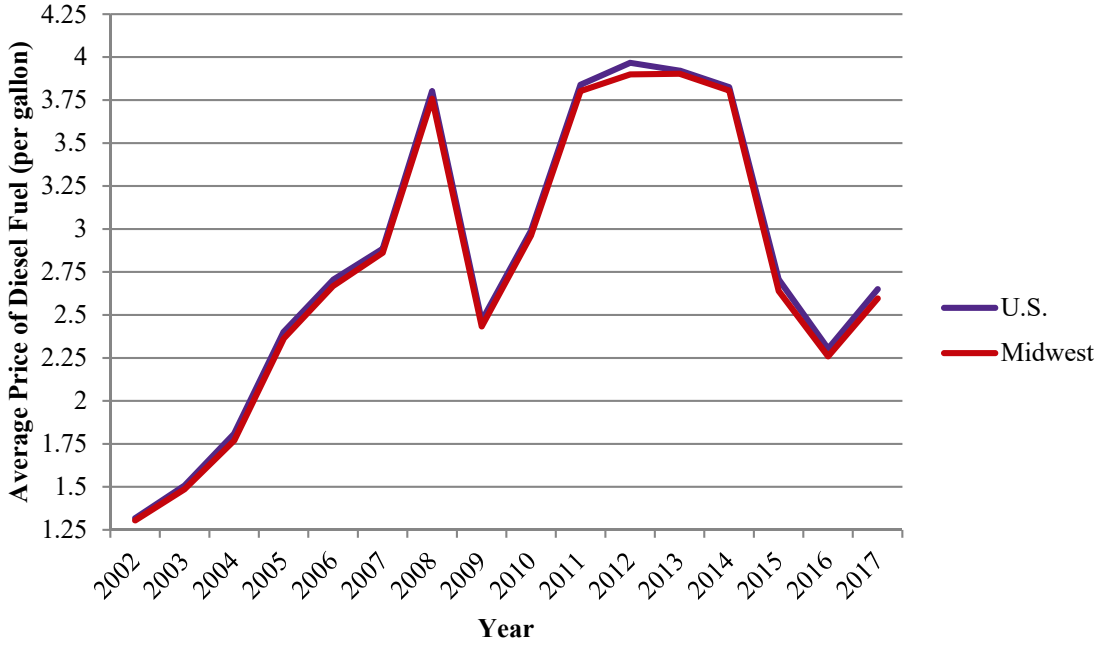
5.6 Data Comparisons

Given the wide range of variable costs associated with operating trucks, particularly national fuel and maintenance costs, there is no consistent method by which the cost per ton mile can be compared. For the purposes of this study, the approach introduced by Richard Torian (2012) is used.

Torian calculated the cost per ton mile for four shipping modes (truck, rail, air and water) using data from 2002 provided by the U.S. Department of Transportation. He estimated the costs per ton mile to be as follows: Truck $0.37, Rail $0.03, Air $4.63 and Water $0.10.

To account for variability, it is important to consider the annual average price of diesel fuel as shown in Figure 5.7 (U.S. Energy Information Administration 2018). On average, the difference between the U.S. and Midwest prices is $0.037 per gallon.

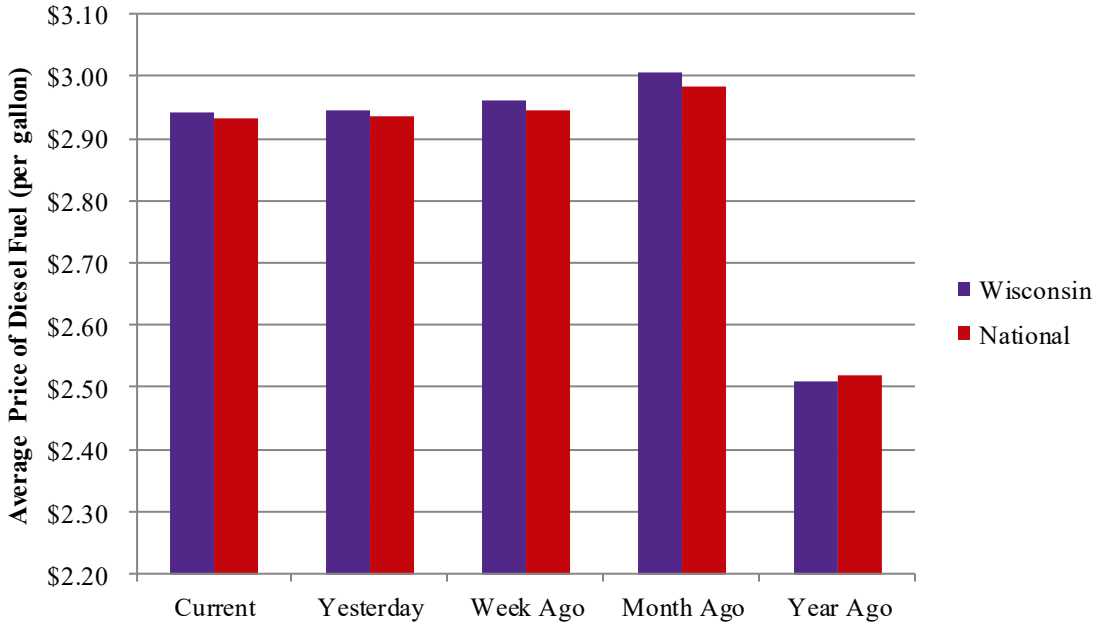
Figure 5.7: Diesel Price Comparison – Midwest and National



While averages specific to Wisconsin are not available from the U.S. Energy Information Administration, the site did note that more than three-quarters of the state's petroleum consumption is from the transportation sector (U.S. Energy Information Administration 2017).

As shown in Figure 5.8, the American Automobile Association (AAA®) reports the Wisconsin diesel average on March 14, 2018 to be approximately one cent per gallon higher than National average prices currently and 0.009 cents per gallon lower than the National rate this time last year (March 2017).

Figure 5.8: Diesel Price Comparison – Wisconsin and National



Source: (AAA n.d.)

Given the information provided by both the U.S. Energy Information Administration and AAA®, it can be assumed that the correlation of costs per ton mile as outlined by Torian, is comparable to 2018 values. Therefore, using the per ton mile costs of $0.37 for truck and $0.03 for rail, the following calculation can be made given the average annual cost of rail service provided by the respondents:

$448,337.50 for rail service * $0.37 / $0.03 = $5,529,495.83 for truck service

As shown in the calculation, respondents could expect to spend $5,529,495.83 for the same amount of product being moved by truck rather than rail.

CHAPTER VI: CONCLUSIONS

This study is designed to consider the Wisconsin 2017-2019 Biennium Budget as an indication of the state's political desire to fund the state's rail system and address the implications related to cooperative performance and competitive advantage in the agricultural markets. The objective is to collect data from Wisconsin cooperatives and: 1) determine cooperatives' current use of rail; 2) estimate the average rail transportation cost for cooperatives; and 3) discuss whether cooperatives should evaluate (if not consider) switching from rail to another mode of transportation. The objective of this study was completed using information provided by survey participants.

When reviewing the participants' current use of rail, the research findings suggest that a number of organizations (56.5 percent for inbound and 30.4 percent for outbound) use this method of transportation for both inbound and outbound business. The majority surveyed – more than 60 percent – also indicated its competitors and/or customers also use rail and a mode of transportation.

Regarding the average rail transportation cost, respondents indicated an average annual rail transportation budget of $489,090.91 with minimum and maximum values of $0 and $4,000,000, respectively.

Respondents were asked how the state's decision to allocate fewer capital resources would affect their cooperatives, slightly more than 59 percent of respondents believed it would have a moderate or high impact on their business. Furthermore, when provided the opportunity to comment on this possibility, participants responded with comments such as "Agriculture and logging are greatly impacted" and "We need more investment in rail".

These findings – rail use and transportation cost assessment – suggest that agricultural cooperatives in Wisconsin should independently evaluate the costs and/or benefits of switching from rail to another mode of transportation and its impact on suppliers of inputs and customers. The implications might impact future profitability or financial viability of the cooperative.

Unfortunately, based on the data provided by Torian and AAA®, it is clear that transitioning inbound and outbound commodities from rail to truck would be more costly to the cooperative. Truck use, while less expensive for shorter-distance travel, is a more expensive form of transportation for long distances due to both maintenance and fuel costs. However, while trucks may be a more expensive mode of transportation, the change is one that can be planned for when developing an organizational budget. If agricultural cooperatives in Wisconsin do not evaluate an alternative transportation method option, they run the risk of logistics inefficiency, ineffectiveness and a decreased level of support from its suppliers and customers as rail lines deteriorate. In addition, any transport delay caused by a last-minute or poorly-planned transition from one transportation methods to the other could prove to be quite costly.

The conceptual model as outlined by Mansidão and Coelho shows a positive correlation between logistics performance and organizational performance, and would lend support to the decision to assess current transportation and logistics practices to determine the best course of action moving forward. Should rail funding and therefore, maintenance and reliable use decline, an organization's ability to operative with high levels of efficiency, effectiveness and service level in terms of logistical performance, would be

impacted. Using the Mansidão and Coelho model (2014), the results indicate a negative impact on the cooperative's overall performance and subsequent competitive advantage.

When considering Pareto Optimality, one can assume the Wisconsin Legislature will continue to prioritize high-priority projects – particularly those related to highway maintenance – over the maintenance and growth of rail, given the parameters established by the governor. Namely, there is an emphasis on maintaining current funding levels (no increases in taxes and fees) while focusing on highway-specific projects as well as local aid. In many cases, the argument could be made that those projects, while perhaps just as important, have a greater direct impact on a broader number of people across the state.

Should cooperatives choose to actively engage with the Wisconsin Legislature to attempt to strengthen the argument for additional rail funding, quantitative information such as that provided in Figures 5.2 and 5.3 could have relevance. The diversity of agricultural cooperatives and total revenue across the respective zones, let alone the state, would provide policymakers with a set of data more specified to their own representative districts. There is potential in being able to convey the importance of this transportation level not merely at the state-level but also in those geographical zones more closely tied to the policymaker's voting districts.

Unfortunately for the state of Wisconsin, which as presented by Craig Thompson, Executive Director of the Transportation Development Association at the information hearing, is recognized as having the third roughest roads in the country, an increase in truck traffic resulting from cooperatives transitioning from rail service to truck, would further deteriorate road conditions.

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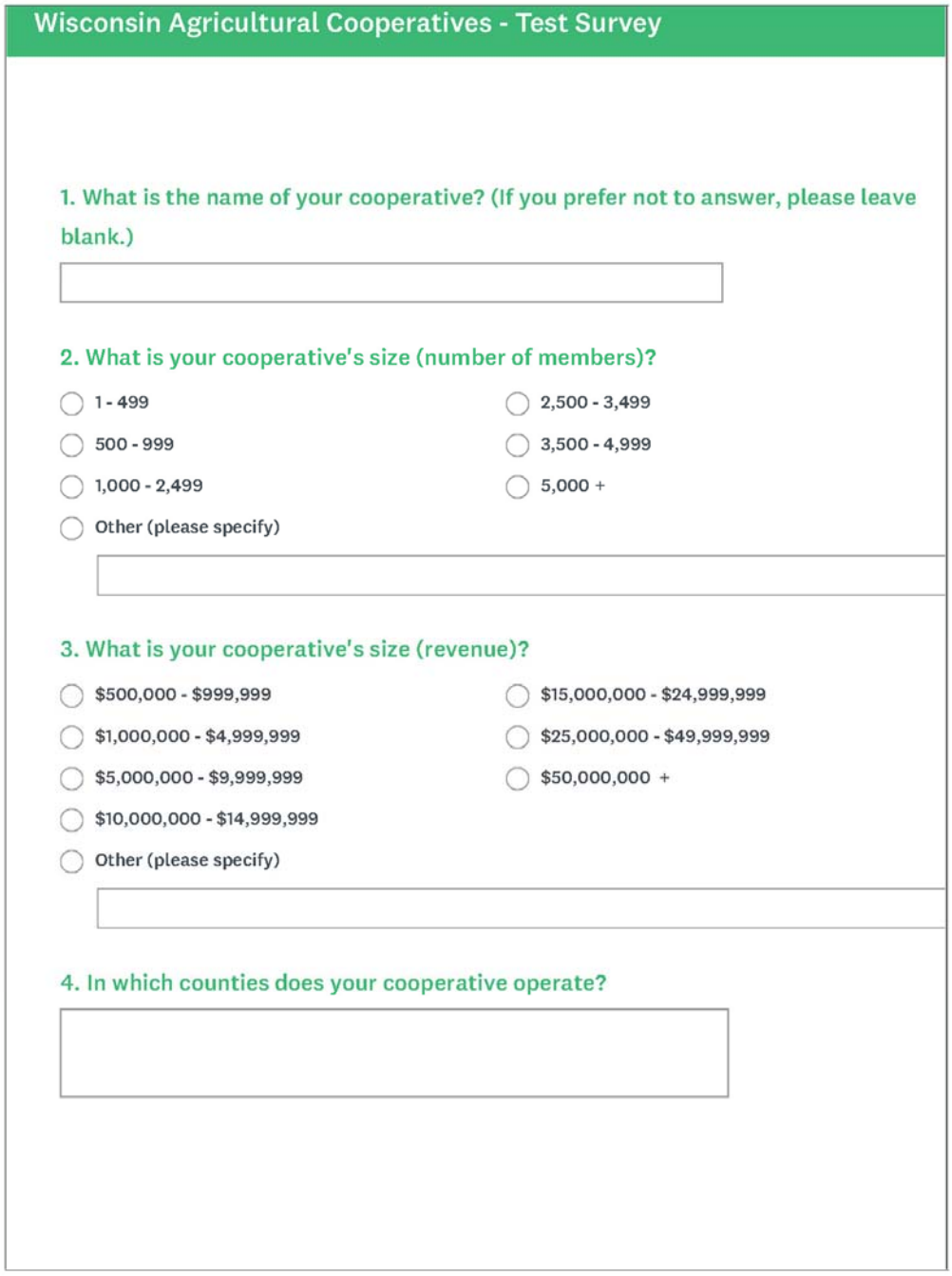
APPENDIX A



Wisconsin Agricultural Cooperatives - Test Survey

1. What is the name of your cooperative? (If you prefer not to answer, please leave blank.)

2. What is your cooperative's size (number of members)?

- 1 - 499
- 500 - 999
- 1,000 - 2,499
- 2,500 - 3,499
- 3,500 - 4,999
- 5,000 +
- Other (please specify)

3. What is your cooperative's size (revenue)?

- $500,000 - $999,999
- $1,000,000 - $4,999,999
- $5,000,000 - $9,999,999
- $10,000,000 - $14,999,999
- $15,000,000 - $24,999,999
- $25,000,000 - $49,999,999
- $50,000,000 +
- Other (please specify)

4. In which counties does your cooperative operate?

5. What is your commodity/service specialty? Please check all that apply.

- [ ] Feed
- [ ] Chemical
- [ ] Fertilizer
- [ ] Petroleum
- [ ] Seed
- [ ] Dairy
- [ ] Other (please specify)

6. Is your cooperative headquartered in Wisconsin?

- ◯ Yes
- ◯ No. (Please indicate in which state your cooperative is headquartered.)

7. In square miles, what is the size of your service area?

8. What portion of your inbound business utilizes the following methods of transportation:

Truck	
Rail	
Barge	
Other	

9. What portion of your outbound business utilizes the following methods of transportation:

Truck	
Rail	
Barge	
Other	

10. What is your average annual cost of transportation services?

11. What is your average annual cost of transportation services, by type?

Truck	
Rail	
Barge	
Other	

12. Do your competitors and/or consumers utilize rail services?

- ◯ Yes
- ◯ No
- ◯ I don't know.

13. Do you find value in rail services?

- ◯ Yes
- ◯ No
- ◯ Other (please specify)

14. If state support of rail decline, how would this impact your business?

- ◯ Highly Impact
- ◯ Moderately Impact
- ◯ No Impact

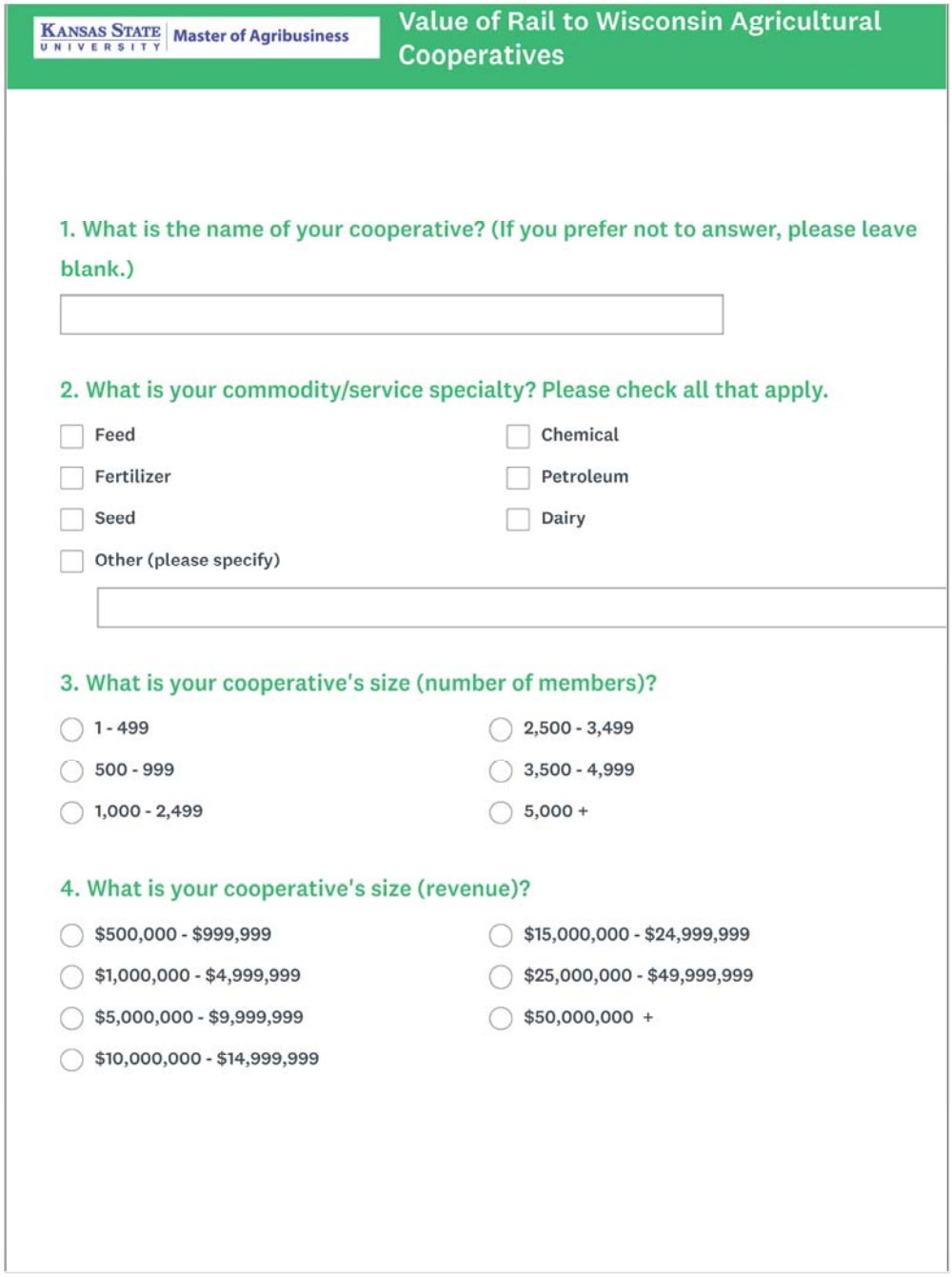
Additional Comments

15. Please indicate your role with the cooperative.

- [ ] General Manager
- [ ] President & CEO
- [ ] Board Member
- [ ] Other (please specify)

16. Any additional information you would like to provide.

APPENDIX B



KANSAS STATE UNIVERSITY | Master of Agribusiness

Value of Rail to Wisconsin Agricultural Cooperatives

1. What is the name of your cooperative? (If you prefer not to answer, please leave blank.)

2. What is your commodity/service specialty? Please check all that apply.

- [ ] Feed
- [ ] Chemical
- [ ] Fertilizer
- [ ] Petroleum
- [ ] Seed
- [ ] Dairy
- [ ] Other (please specify)

3. What is your cooperative's size (number of members)?

- ◯ 1 - 499
- ◯ 500 - 999
- ◯ 1,000 - 2,499
- ◯ 2,500 - 3,499
- ◯ 3,500 - 4,999
- ◯ 5,000 +

4. What is your cooperative's size (revenue)?

- ◯ $500,000 - $999,999
- ◯ $1,000,000 - $4,999,999
- ◯ $5,000,000 - $9,999,999
- ◯ $10,000,000 - $14,999,999
- ◯ $15,000,000 - $24,999,999
- ◯ $25,000,000 - $49,999,999
- ◯ $50,000,000 +

5. Is your cooperative headquartered in Wisconsin?

- ◯ Yes
- ◯ No. (Please indicate in which state your cooperative is headquartered.)

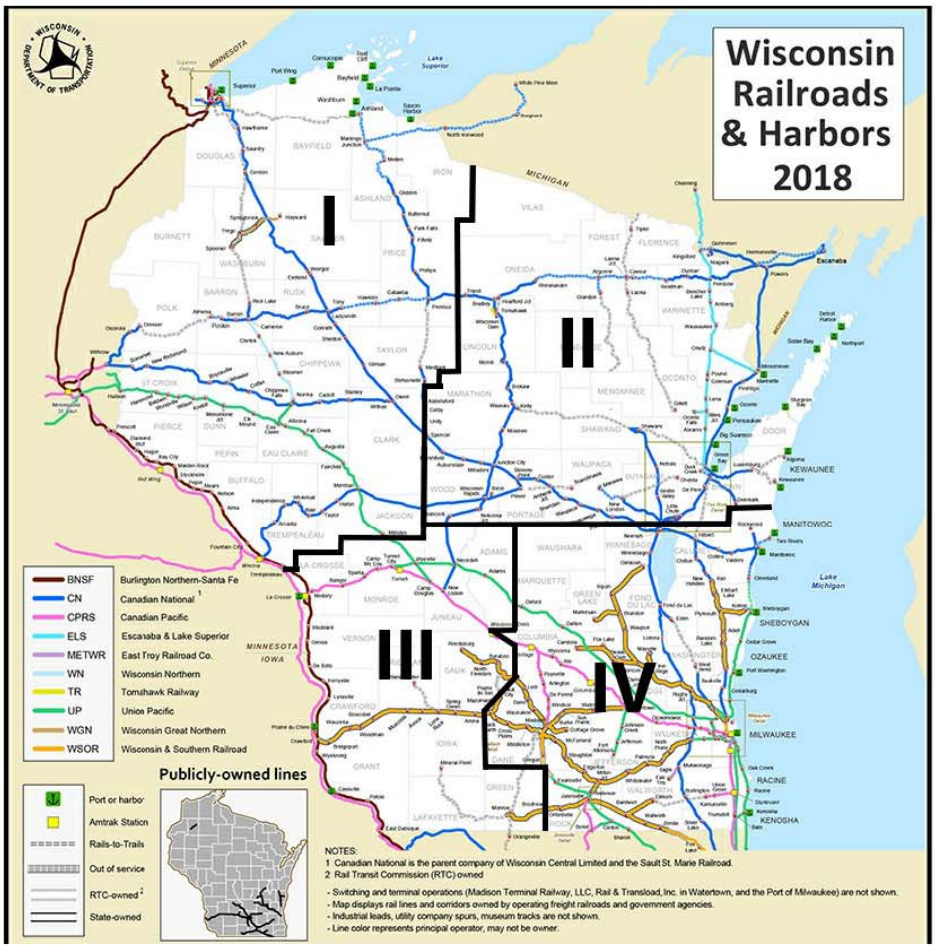
6. What value do you find in rail services? (Please check all that apply.)

- ☐ Service
- ☐ Cost
- ☐ Reliability
- ☐ Responsiveness
- ☐ Other (please specify)

7. Do your competitors and/or customers utilize rail services?

- ◯ Yes
- ◯ No
- ◯ I don't know.

Wisconsin DOT Map - Zoned



8. Using the WI DOT map above, in which zone(s) does your cooperative operate?

- [ ] I
- [ ] II
- [ ] III
- [ ] IV

9. Using the WI DOT map above, in which zone(s) does your cooperative generate the majority of your revenue?

- [ ] I
- [ ] II
- [ ] III
- [ ] IV

10. What percentage of your inbound business (e.g. - raw materials) utilizes the following methods of transportation (please note: answers must be numerical and total 100):

Truck	
Rail	
Barge	
Other	

11. What percentage of your outbound business (e.g. - finished product) utilizes the following methods of transportation (please note: answers must be numerical and total 100):

Truck	
Rail	
Barge	
Other	

12. What is your average annual cost of transportation services?

13. What is your average annual cost of transportation services, by type?

Truck

Rail

Barge

Other

14. If state support of rail decline, how would this impact your business?

- ◯ Highly Impact
- ◯ Moderately Impact
- ◯ No Impact

Additional Comments

15. Please indicate your role with the cooperative.

- ☐ General Manager
- ☐ President & CEO
- ☐ Board Member
- ☐ Other (please specify)

16. Any additional information you would like to provide.