Utah State University
DigitalCommons@USU

All Graduate Theses and Dissertations | Graduate Studies

12-2009

Defining and Meeting the Demand For Agricultural Machinery in China: A Case Study of John Deere

Garrett W. Davis
Utah State University

Follow this and additional works at: https://digitalcommons.usu.edu/etd

 Part of the Agricultural and Resource Economics Commons, and the Business Administration, Management, and Operations Commons

Recommended Citation

Davis, Garrett W., "Defining and Meeting the Demand For Agricultural Machinery in China: A Case Study of John Deere" (2009). *All Graduate Theses and Dissertations*. 277.
https://digitalcommons.usu.edu/etd/277

This Thesis is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Theses and Dissertations by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.



DEFINING AND MEETING THE DEMAND FOR AGRICULTURAL MACHINERY IN CHINA: A CASE STUDY OF JOHN DEERE

by

Garrett W. Davis

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF BUSINESS ADMINISTRATION

in

International Food and Agribusiness

Awarded by the Royal Agricultural College
In cooperation with Utah State University

Approved:

DeeVon Bailey Major Professor	Katherine M. Chudoba Committee Member
Christopher Fawson Committee Member	Byron R. Burnham Dean of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

2009

DEFINING AND MEETING THE DEMAND FOR AGRICULTURAL MACHINERY IN CHINA: CASE STUDY OF JOHN DEERE

by

GARRETT W. DAVIS

This dissertation is submitted in part fulfillment
of the requirements for the Masters Degree
in International Food and Agribusiness of the
Royal Agricultural College at
Cirencester, England, 2009

COPYRIGHT DECLARATION

The copyright of this dissertation belongs to the author under the terms of the United Kingdom Copyright Acts. Due acknowledgement must always be made of the use of any material contained in, or derived from, this dissertation.

I declare that this dissertation embodies the results of my own research or advanced studies and that it has been composed by myself. Where appropriate, I have made acknowledgement to the work of others.

Signed,

Garrett W. Davis
Dated April 24, 2009

ABSTRACT

DEFINING AND MEETING THE DEMAND FOR AGRICULTURAL MACHINERY IN CHINA: A CASE STUDY OF JOHN DEERE

by

Garrett W. Davis, Master of Business Administration

Utah State University, 2009

Major Professor: Dr. DeeVon Bailey
Department: Applied Economics

There has been little research conducted regarding the agricultural machinery market in China. However, current data suggest that this demand is dramatically increasing. This dissertation endeavors to generally define the current demand of the agricultural machinery market in China. There has been research conducted on multiple factors of the agricultural machinery market in China, such as land tenure rights, rural migration, government agricultural policies, and others. Through the use of limited quantitative data, market demand is analyzed and defined. By means of a qualitative case study of a successful multi-national corporation, Deere & Co., how the demand is being met for agricultural machinery in China is also discussed. This case study also contributes to defining market demand for agricultural machinery in China. Through the use of this mixed-method research, key components of the Chinese agricultural machinery market are identified and analyzed. Challenges within this market are discussed, along with how Deere & Co.'s Chinese operations have dealt with these challenges. This corporation's experience in the Chinese market brings benefit to any company seeking to better understand the workings of the agricultural machinery market in China.

(163 pages)

ACKNOWLEDGEMENTS

It is hard to list everyone and everything that has contributed to the work of this dissertation. However, some very necessary acknowledgements need to be given to particular individuals who have contributed a great deal and to whom I am very indebted and owe gratitude.

First, I would like to thank my major professor and advisor, Dr. DeeVon Bailey. Through his great generosity of sharing many years of experience and a lot of patience with me, I have learned a great deal from what he has taught and from who he is as a person. His character is something I would like to exemplify and look up to, especially in the kindness he has shown to others. Without his constant support and help, this dissertation would never have been the quality and scope it is.

Also, very special thanks are given to Dr. Katherine Chudoba and Dr. Chris Fawson. They have contributed much insight, time, and resources into the completion of this dissertation. I have learned a great deal about things I never knew were a part of research.

I am very grateful to Dr. J.B. Penn at Deere & Co. for facilitating the opportunity of researching their Chinese operations. I am also very grateful to Mr. Doug Roberts and others at John Deere's China operations who gave a lot of their time and effort to enable this case study to be possible. Also I am grateful for their kindness and hospitality during the research process.

Besides those listed from Utah State University, there have been many others at that institution who have contributed a great deal of their time and expertise in the completion of this research. I am also grateful to those who have been helpful at the Royal Agricultural College of England.

Finally, I will always be grateful for the love, support, patience, late nights, and sweet smiles of my wife, Joanne, my children, and extended family members who have helped in so many ways. I am also ever grateful to God for the help, support, and opportunities to learn and grow through these experiences.

The views expressed and the conclusions and recommendations reached are solely those of the author and hereby absolve anyone referred to from any responsibility.

Garrett W. Davis

CONTENTS

Page

COPYRIGHT DECLARATION ii

ABSTRACT iii

ACKNOWLEDGMENTS iv

LIST OF TABLES viii

LIST OF FIGURES ix

LIST OF ACRONYMS x

CHAPTER

1. INTRODUCTION 1

1.1 Introduction 1
1.2 Research Question 2
1.3 Aims and Objectives 2
1.4 Topic Justification 4
1.5 Ethical Considerations 6
1.6 Scope and Limitations 6

2. LITERATURE REVIEW 8

2.1 Introduction 8
2.2 Agricultural Machinery in China 8
2.3 Average Chinese Farm/Farmer Situation 10
2.4 Chinese Agricultural Policies 13
2.5 Global and National Trends Affecting Chinese Agriculture 18
2.6 Shift of Labor to Urban Areas 21
2.7 Agricultural Credit Availability 25
2.8 Conclusion 27

3. METHODOLOGY 28

3.1 Introduction 28
3.2 Research Question and Aims and Objectives 28

3.3 Overall Objective and Reasons Demand for Farm Machinery Would Be Expected to Be Expanding in China 29
3.4 Determinants of Demand for Agricultural Machinery 33
3.5 Available Data Sources 39
3.6 Research Approach (Qualitative vs. Quantitative) 40
3.7 Case Study Method 45
3.8 Post Visit 53
3.9 Conclusion 55

4. RESULTS AND ANALYSIS 57

4.1 Introduction 57
4.2 Quantitative Results 57
4.3 History of John Deere in China 64
4.4 Intellectual Property Rights 67
4.5 Government Relations 70
4.6 Legal Environment 77

4.6.1 Legislation 77
4.6.2 Subsidies 78
4.6.3 M&A/JV 84

4.7 Supplier Relations 89
4.8 Fast and Growing Market 97
4.9 Chinese Agricultural Machinery Market and JDCI's Marketing 101
4.10 Order Fulfillment Process 114
4.11 Conclusion 118

5. CONCLUSIONS 120

5.1 Introduction 120
5.2 Implications 120
5.3 Future Research 122
5.4 Practice 123

6. SELF REFLECTION 125

REFERENCES 127

APPENDICES 133

Appendix A: Summary of Land Tenure Development in China 134
Appendix B: Summary of WTO Policy Agreements 139
Appendix C: Summary of Rural Credit Sources in China 140

Appendix D: Initial Questions to John Deere 143
Appendix E: Interview Questions..... 145

LIST OF TABLES

Table		Page
2.1	Comparison of Average Land per Farmer in Selected Countries	11
2.2	Summary of New Chinese Agricultural Policies	15
3.1	List of Interviewed Individuals	50
3.2	Codification of Interviews	54
4.1	Chinese Government Relations JDCI Most Frequently Deals With	76

LIST OF FIGURES

Figure		Page
2.1	Chinese Rural Income Growth Factors	17
2.2	Change in China Population Composition	22
2.3	Changes in China Population Rates	25
2.4	Changes in China's Agricultural Lending	26
3.1	Growth of the Chinese Economy from 1978-2006	30
3.2	Average Area of Cultivated Land Under Management per Farmer	31
3.3	Per Capita GDP of China	32
3.4	Depiction of Impact of Increases in Technology on a Production Function	34
3.5	Changes in Proportions of Inputs as Costs for One Input Changes	36
3.6	Relevant Situations for Different Research Strategies	42
3.7	Basic Types of Designs for Case Studies	43
3.8	Interview Questions to Large Chinese Farming Contractors	51
4.1	Agricultural Machinery Quantities in China	58
4.2	FAO Agricultural Machinery Quantities in China	59
4.3	Machinery Data Comparison	60
4.4	Employees on China State Farms	62
4.5	China State Farms Trends	63
4.6	Agricultural Machinery Use on China State Farms	63
4.7	John Deere in China Timeline	66
4.8	Chinese Government Subsidy Levels	81
4.9	Chinese Government Rural Investment	83
4.10	Chinese Agricultural Machinery Market Share Breakdown	103

LIST OF ACRONYMS

1. ABC – Agricultural Bank of China
2. ADBC – Agricultural Development Bank of China
3. ATP – Availability to Promise
4. CAYB – China Agriculture Yearbook
5. CEO – Chief Executive Officer
6. CFT – China First Tractor Co.
7. CPC – Communist Party of China
8. FDI – Foreign Direct Investment
9. GDP – Gross Domestic Product
10. HP – Horsepower
11. HRS – Housing Responsibility System
12. IP – Intellectual Property
13. IPR – Intellectual Property Rights
14. IRB – Institutional Review Board
15. JDCI – John Deere China Investment Co.
16. JDJW – John Deere Jialian Harvester Co. Ltd.
17. JDT – John Deere Tiantuo Co. Ltd.
18. JDTW – John Deere Tianjin Co. Ltd.
19. JV – Joint Venture
20. M&A – Merger or Acquisition
21. MNC – Multi-National Corporation
22. MOA – Ministry of Agriculture
23. NBCS – National Bureau of Chinese Statistics
24. OECD – Organisation for Economic Cooperation and Development
25. PRC – People's Republic of China
26. RCC – Rural Credit Cooperative
27. RDI – Rural Development Institute
28. RLCL – Rural Land Contracting Law
29. SOE – State- Owned Enterprise
30. TEDA – Tianjin Economic Development Area
31. TFP – Total Factor Productivity
32. USDA – United States Department of Agriculture
33. WOFE – Wholly Owned Foreign Enterprise
34. WTO – World Trade Organization

CHAPTER 1

INTRODUCTION

1.1 Introduction

China's economy has been growing rapidly during the past two decades and, as a result, China is now receiving more international attention than ever before. As a result of this rapid economic growth, China is facing a surge in demand for food products at a time when labor is being bid away from rural areas into urban centers. With current high grain prices and stress on agriculture worldwide, China is now subsidizing rather than taxing agriculture as one method for attempting to increase agricultural production. The need to increase agricultural production will have profound and lasting impacts on the sectors providing inputs to Chinese agriculture. One of these key sectors is the agricultural machinery industry.

Currently, there is minimal machinery usage in rural China, but with the movement of labor into more industrialized urban areas, there is an emerging need to replace that labor through farm mechanization. China also wants to increase its production efficiency in agriculture. Mechanization will play a key role in accomplishing this goal. How China will implement more capital inputs, such as farm machinery, into agricultural production is a question not yet fully answered.

Defining what current and future demands are for agricultural machinery is a challenge given the limited secondary data available on the machinery market in China. Proposing ways for industry to meet the

increasing demand for agricultural machinery in China is another challenge. There should be opportunities for foreign direct investment (FDI) to help China achieve its goal of increased mechanization in agriculture. U.S. industry players such as John Deere, Case, and Caterpillar could potentially benefit through participation in this emerging market, along with other investors from the United States and other countries. The Chinese agricultural economy can also be a large beneficiary, together with Chinese consumers, as agricultural productivity in China increases. The purpose of this dissertation is to identify and analyze the demand for agricultural machinery in China and to identify potential ways and methods to meet that demand.

1.2 Research Question

What is the demand in China for agricultural machinery, and how could agribusiness firms potentially meet that demand?

1.3 Aims and Objectives

This research inquires into the current demand in China for agricultural machinery to better understand ways in which agribusiness firms may meet that demand. Once the state of agricultural machinery demand is identified, it can be analyzed and used to better understand historical trends and how future demand for mechanization in Chinese agriculture may evolve. This type of information can also be used to help establish effective ways businesses can respond to this demand.

The demand analysis presented in this research will have a quantitative focus; however, the majority of the research will have a qualitative orientation. The reason for this is the lack of publicly available information about agricultural machinery markets in China. Consequently, much of the analysis must rely on expert opinion, including a case study as well as the limited amount of secondary data that are available. Therefore, a case study of John Deere, Inc.'s (John Deere) China operations will be performed to obtain expert opinion, experience, and information that will contribute to the major qualitative portion of this research.

The main tasks to be accomplished to achieve the objectives of this inquiry and analysis are as follows:

- Review the recent literature regarding issues relating to Chinese agricultural machinery demand.
- Identify and assess Chinese agricultural policy and its impact on agricultural machinery markets.
- Determine the economic and policy factors affecting Chinese farmers' purchasing decisions and machinery use.
- Obtain and analyze Chinese national statistical data regarding historical agricultural machinery trends.
- Assess and analyze this information to determine the potential and current agricultural machinery demand.
- Conduct a case study of John Deere operations in China, including interviews with key players in the business.

- Analyze John Deere's business strategy, and identify key elements used in meeting agricultural machinery demand in China.
- Edit, critique, and improve the final analysis, results, and implications in answering the inquiry.

1.4 Topic Justification

This research strives to answer many questions that previously have not been fully addressed, at least in the public literature. It will draw upon data that can provide added insight into the state of Chinese agriculture and how the market for agricultural equipment in China is emerging in the dynamic economic environment that exists in China. As the Chinese economy continues to grow, additional infrastructure and investment in capital will be needed in all industries. This would be expected in any developing economy growing as fast as China's. What is less clear is how an agribusiness should position itself to participate in this rapid growth given the complex nature of policy, politics, and economics in China.

As the Chinese people improve their living standards, their diet will demand increasing levels of protein. In turn, this will increase the need for more efficient agriculture to meet the needs of consumers without greatly increased food prices. In addition to diet and living standard improvements, the increasing demand for alternative energy through biofuels is increasing demand for grain to be used in producing biofuels. This results in higher world grain prices than would have existed without the increasing demand for biofuels but also provides greater opportunity for Chinese farmers to meet the

local and international demands for grain, especially if they are able to improve yields. In order to improve yields, economics suggests that either more labor or more mechanization is required.

Currently, there are increasing opportunities for Chinese labor to move to cities from rural areas to take jobs in manufacturing industries because of the higher wages found there compared to agricultural jobs. As the rural labor force in China moves out of the country and into the urban population, a labor shortage is being created in rural areas that will likely be compensated for through increased mechanization of farming practices. Because of the labor methods used historically in Chinese farming, there are inadequate amounts of machinery available, and the demand for agricultural machinery is increasing.

Another question is how the demand for agricultural machinery can be effectively met in the current political, social, and economical environments in China. Meeting this demand could provide potential opportunities for agribusiness that will help international markets and the Chinese economy. It will especially be beneficial to the Chinese agriculture industry and, thus, a large portion of the Chinese population, because China is still primarily a rural country.

The exploration and analysis of these inquiries will bring a change to the current understanding of businesses and academics. Others who wish to conduct further studies on particular topics of this dissertation may also find this exploration to be of assistance to their efforts. Chinese agricultural

machinery and its business implications are something that is already seeing an enormous change. These inquiries may clarify and answer much of the speculation which is present.

1.5 Ethical Considerations

One main ethical consideration is regarding the businesses that have contributed information to this study. Because these businesses have willingly shared what could be considered sensitive and proprietary information, these details must be carefully handled to protect the sources. All information provided by John Deere will be kept confidential. Only after John Deere has reviewed and approved the information used in the results will the approved information be made available as public information.

1.6 Scope and Limitations

The scope of this project includes focusing on China as a nation. Even though a particular province approach may give more tailored solutions, by using all of China gives a more comprehensive picture of what is needed in terms of defining and meeting the nation's agricultural machinery demand. Another reason for this approach is the availability and accuracy of data which are lacking at the provincial level but are present at the national level. However, some provincial information is used in assessing geographical portions of business strategy recommendations.

Because of the vast diversity that the word machinery evokes, tractors are used as the main focus, or proxy, to represent the majority of agricultural

machinery. Most agricultural machinery is tailored with the tractor being the main piece of capital and smaller implements being complimentary to it.

Access to detailed Chinese government information has been a limitation to this project as there is a limited amount of relevant information that is public information. There is adequate information, but some useful details are not available that would otherwise give more insights into these issues. Included in this limitation is what is lost in translation of particular Chinese documents. Some information is only available in Chinese and therefore limits the amount that can be translated and used in the timeframe of this project.

The reliability of Chinese statistical data is also a limitation to this project. Chinese statistical recording methods have evolved over time and have seemed to increase in technique accuracy and consistency within the past few decades. However, Chinese data reliability is something that is difficult to measure and, where possible, multiple sources of statistical data have been used to help increase the validity of this study (see Gale 2002).

As this dissertation is being completed mostly in the United States, another limitation is the time and resources available to personally conduct any large surveys or extensive on-site inspections of Chinese agriculture operations. However, a brief observational visit to China is part of the qualitative case study analysis. This limitation has been overcome through the use of historical data, expert experience and opinion, and qualitative assessment of the case study company.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The topic of the demand for agricultural machinery in China is one that has not previously been researched or analyzed by many scholars. This is due to the extensive lack of data available for study. Chinese officials have only recently begun to open up more information to the public. There is related research on topics such as agricultural inputs, commodities, and policy. These related topics lay the foundation for the discussion of Chinese demand for agricultural machinery presented in this dissertation. This dissertation relies heavily on economic and business theory and a case study to explain the features of the emerging market for agricultural machinery in China. This chapter presents the relevant literature that provides the appropriate setting for this study.

2.2 Agricultural Machinery in China

There have been a few research studies performed regarding how technology has affected agricultural production in China (see Fan 1991; Huang and Rozelle 1994; Jin et al. 2002; Van den Berg et al. 2007). Jin et al.'s (2002) research focused mainly on new crop variety technologies and agricultural extension work in China. They illustrate with survey data and econometrics that technology is a key factor in increasing total factor productivity (TFP).

Fan (1991) strives to define and determine differences in inputs, institutional reform, and technological changes on production growth in China's agriculture. He concludes that all three contribute to production growth but technological inputs (especially modern technology such as machinery and chemical fertilizer) account for 57.7% of production growth between 1965 and 1985. Machinery alone accounted for 18.8% of production growth.

Huang and Rozelle (1994) also support the importance of technology in increasing production, and they show that contrary to previous research such as Lin (1992), it has had an even greater effect than the implementation of the household responsibility system (HRS).[1] This study mentions little regarding technological inputs such as agricultural machinery. However, it supports the relevance and importance of technology in increasing agricultural production in China.

Van den Berg et al. (2007) use a county in China's Zhejiang province as a case study in determining impacts of increasing farm size and mechanization on rice production and rural income. They concluded that as farm size increases, rice production with increased mechanization becomes the best way to concurrently increase grain production and rural incomes. Increasing grain production and rural incomes are two emphasized agricultural policies in China. With very small farm sizes, these policies seem to contradict each other as farmers have more incentive to grow high value,

[1] The HRS is the government system for Chinese agriculture that left local villages and townships in control of land allocation to each family.

labor-intensive specialty crops than to grow more grain. Most specialty crops are also challenging to mechanize and thus more challenging to increase production yields through the use of manual labor.

However, these studies have chosen not to address the demand for agricultural technology in China. The reason for this is likely because open markets are just emerging within the country and because publicly available data are limited and scarce. This dissertation focuses on one area of agricultural technology—agricultural machinery. The reasoning for this includes empirical evidence suggesting that large investments in farm machinery are taking place in China. There are several reasons for this and each will be discussed. However, there seems to be very little prior research that defines Chinese demand of agricultural machinery. Therefore, in order to fully understand this phenomenon, we must understand the elements of agricultural machinery demand and the economic setting that exists in China.

2.3 Average Chinese Farm/Farmer Situation

One determinant of agricultural machinery is farm size. Economies of scale infer that machinery will only be used if there is a large enough farm area to spread its cost over the asset's useful life. According to the *2006 Chinese Agricultural Yearbook*, the average Chinese farm is 2.08 *mu*[2] per farmer, which is equivalent to 0.34 acres. This is very small in terms of farm size worldwide (see Table 2.1).

[2] A *mu* is the Chinese unit of land measurement. 15 *mu*=1 hectare or 6.07*mu*=1 acre.

Table 2.1. Comparison of Average Land per Farmer in Selected Countries

Table M-1—Agricultural labor force share and land per worker, selected countries and regions, 1999

Country/region	Agricultural share of labor force	Land per agricultural worker[1]
	Percent	*Hectares*
Laos	76	.44
Cambodia	70	.82
Vietnam	67	.21
Africa - developing	60	.83
India	60	.61
Thailand	56	.70
Bangladesh	56	.21
Indonesia	48	.36
Pakistan	47	.87
China[2]	47	.39
Sri Lanka	46	.23
Philippines	40	.45
Mexico	21	2.84
Latin America and Caribbean	20	3.02
Malaysia	19	1.03
South Korea	10	.71
Europe	9	9.36
Taiwan[2]	8	1.10
Australia	5	107.34
Japan	4	1.63
Canada	2	116.82
United States	2	58.46

[1] Arable/cultivated land divided by agricultural employment.
[2] Computed from statistical yearbook data. China agricultural employment reported in FAOSTAT is much higher than reported in *China Statistical Yearbook*.

Source: ERS calculations based on data from United Nations Food and Agriculture Organization, FAOSTAT database, except where noted.

Source: Gale, Somwaru, and Diao 2002 : 44.

This small farm size is due to the dissolution of the collective system that took place in 1978-84 when the (HRS) was implemented. The HRS placed local townships and villages in charge of land allocation to farmers and rural residents (Lohmar, Somwaru, and Wiebe 2002).

Land tenure rights affect farmers' capital purchasing decisions. As farmers perceive less risk of their tenure assignments changing (or in other words, increased stability), they are more willing to invest in capital goods (see Feder et al. 1992). Because of how the HRS is structured, all land is still

owned by the "collective" village or township but is utilized by the farmers. Farmers have the right to grow crops and implement farm practices basically unrestricted and, after taxes, may keep or sell any excess. In rare exceptions, particular crop assignments are made by local officials. These land tenure rights were first established for a 15-year contract period and later extended to a 30-year period. After the expiration of this contract period, it may be renewed or possibly reallocated by local officials. More recently in 2002, the Rural Land Contracting Law (RLCL) was passed that spelled out in more detail how this 30-year land rights tenure was to be protected from political, frequent reallocations by local governments. It also strives to ensure fair compensation to farmers when reallocation does occur. However, there seem to be points of ambiguity in the literature as to what extent this is enforced on a national scale (see RDI 2007; Li 2003). Therefore, further clarification still needs to be accomplished through government legislation. (For a summary of land tenure development in China, see Appendix A.)

Average farmer income is an essential part of agricultural machinery demand. As farmers' income increases, their ability to purchase and invest in capital also increases. The average Chinese farmer's income has steadily increased over time and consists not only of on-farm income but rural household businesses and off-farm remittances. In 2008, annual farmer net income was expected to reach 4,000 yuan ($540), while it was only 2,253.42 yuan ($272.5[3]) at the end of 2000 (*China Daily* 2007a; National Bureau of Statistics of China 2006). In early 2009, China reported that farmer's per

[3] Calculated from International Monetary Fund Archive Dec. 2000 Exchange Rate of 8.27 yuan = $1.

capita income actually increased to 4,761 yuan ($697) during 2008, which was higher than estimated. It was also reported that this was the sixth consecutive year of an increase greater than 6% (*China Daily* 2009). This more than doubling of farmers' income nationwide makes the possibility of agricultural machinery purchases even more feasible for many more Chinese farmers. Also during the 2008 17th communist party congress, the goal was set of doubling again Chinese farmers' income by 2020 (*China Daily* 2008b). This is another indication of further increasing Chinese farmers' capabilities of investing in agricultural machinery in the future.

2.4 Chinese Agricultural Policies

The Communist Party of China (CPC) has seemed to continue its trend of privatizing more of its state-controlled industries to reap the benefits of a market economy for its people. It has given more control over key industries to the private business sector while maintaining a portion of the previous state-owned enterprises (SOE) (Shane and Gale 2004). This is seen in agricultural machinery, dairy, and other industries throughout China. Not only does this trend give rise to more efficient markets, it also allows for and encourages FDI in these industries.

China has taxed agriculture for many generations as it has previously been the most wide-spread occupation and the largest tax revenue generator. However, in 2004 for the first time, China implemented agricultural subsidies in light of the more industrialized economy where agriculture now contributes

roughly only 15% of the nation's gross domestic product (GDP) (Gale, Lohmar, and Tuan 2005).

Another main reason for the Chinese government to implement these changes in their agricultural policies is due to the increasing income gap between rural and urban residents (*China Daily* 2007b; Shane and Gale 2004; Gale and Park 2002). These new policies support one of the government's main goals of raising rural incomes to help narrow this gap (*China Daily* 2007a). In October 2008, China also stated a goal of doubling farmer incomes from the 2008 average by the year 2020 (*China Daily* 2008b). As these goals continue to be supported by Chinese officials, it will give farmers greater purchasing power to invest in yield-improving technologies, including agricultural machinery.

The recent changes in China's agricultural policies include tax elimination and subsidies for grain production, high quality seed varieties, and agricultural machinery, as well as increased investment in rural and agricultural infrastructure (i.e., roads, power plants, irrigation, research parks). These policy changes are aimed at increasing agricultural productivity and to support farmers in implementing more efficient farm practices and agricultural inputs. A summary of these new policies is in Table 2.2. Grain subsidies included rice (various types), wheat, corn, and rapeseed. These subsidies varied by region and province and were funded mostly through national

Table 2.2. Summary of New Chinese Agricultural Policies

Policy *Estimated cost*[1]	Description	Probable effects
Grain subsidies *$1.4 billion*	Direct payments of roughly $7.33 per acre planted in grain.	Modest income gains for farmers. Effect on grain production is uncertain.
Agricultural tax reduction *$5-7 billion*	Elimination of agricultural tax within 5 years. Elimination of tax on specialty crops (except for tobacco).	Modest income gains for farmers. May encourage planting of specialty crops, somewhat offsetting effect of grain subsidy.
Seed subsidies *$193 million*	Subsidies for high-quality grain and soybean seeds of $7-$10 per acre planted.	May encourage planting of certain crop varieties.
Machinery subsidies *$5 million*	Subsidies for purchase of machinery in targeted areas.	Increased mechanization but little effect on output. Frees labor for off-farm work.
Rural infrastructure spending *$18 billion*	Improvement of irrigation facilities, electricity generation, roads, testing facilities, other rural infrastructure.	Improve productivity and marketing efficiency.

[1]The Chinese currency is the *renminbi* (RMB) or *yuan*. Dollar values throughout this report are calculated using the official exchange rate, currently fixed at RMB 8.28 = U.S.$1. See Shane and Gale for a discussion of Chinese exchange rates.
Source: Various news reports.

Source: Gale, Lohmar, and Tuan 2005 : 3.

revenues, but some provincial funding was added. After high media exposure, subsidies were given directly to farmers mainly based on planted area. Even though grain subsidies were implemented, they account for “less than 2 percent of the gross value of grain production” (Gale, Lohmar, and Tuan 2005 : 5), thus giving little added incentive to plant grain. “Inducing farmers to plant more grain conflicts with the goal of increasing rural income because grain earns little income, compared with cotton, vegetables, fruit orchards, and other specialty crops”(Gale, Lohmar, & Tuan 2005 : 14). However, the trend regarding subsidy implementation infers the Chinese government’s increased desire to support and sustain agriculture, ensure food security, and encourage more productive farming methods. Therefore, they are likely to increase these subsidies in the future to see that their policy goals are met.

Subsidies for agricultural machinery obviously will contribute to increased demand for these products. This new policy, available to farmers in 16 provinces in 2004, makes agricultural machinery available at the subsidized price which can compensate up to 30% of the original price. Dealers will collect subsidies from provincial governments (Gale, Lohmar, and Tuan 2005). In this way, additional assurance is given that farmers will receive the subsidized price of agricultural machinery and that subsidy investments are being used for what they are intended.

Eventual agricultural tax elimination has taken place faster than planned. During 2005, 25 of 31 provinces/regions in China had no agricultural tax. This policy change, along with subsidy implementation, currently has had only marginal effects on overall average farmer incomes (see Figure 2.1) (Gale, Lohmar, and Tuan 2005).

However, it is an important change in direction for Chinese agricultural policy. The importance of agriculture to the Chinese people is increasing, and this new policy will continue to accelerate increases in farmer incomes and their incentives for investment in agricultural inputs including agricultural machinery.

Agricultural policies have focused on rural economic improvement and increasing farmer incomes. Another goal of these policies is national food security. There have been a number of studies done that debate the topic of China's food consumption and their ability to feed the nation.

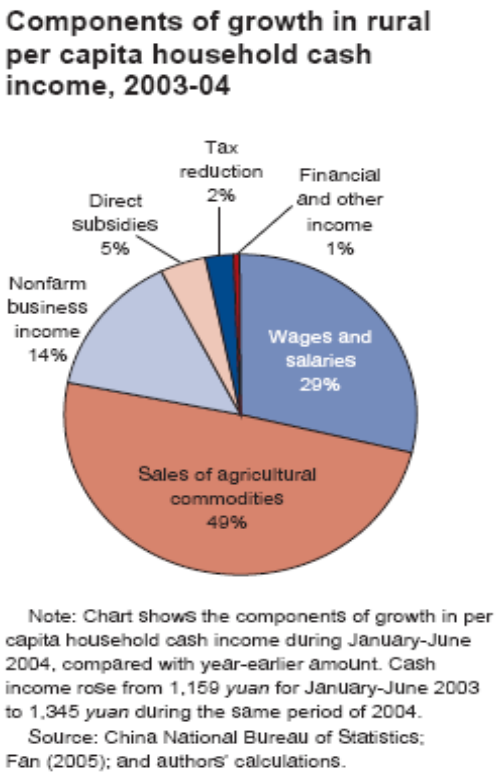


Figure 2.1. Chinese Rural Income Growth Factors
Source: Gale, Lohmar, and Tuan 2005 : 9.

The range of predictions about China's food economy in the 21st century vary even more greatly. Some Chinese economists have forecast that China will be a major exporter (Chen and Buckwell 1991; Mei, 1995). Other analysts project that China's imports will soar in the near future, and that China will become the largest importer in the world (Garnaut and Ma 1992; Carter and Zhong 199l). Brown (1995) takes the most extreme position, claiming that China's grain production will fall in absolute terms while demand will rise, creating a shortfall of more than 200 million metric tons by 2030 (cited by Rozelle and Rosegrant 1997 : 192).

China has deemed food security a priority and it is evident through their new agricultural polices that essential crop self-sufficiency is a goal they are moving towards. One food security goal is to ensure adequate land is preserved for food production use. China has set an arable land minimum level of 120 million hectares (296.5 million acres). China currently has grain production output goals that will help them accomplish their estimated food security needs. In 2006, grain production was 500 million tons. China wants to reach and maintain an annual grain output level of 551 million tons until 2010, then to reach 595 million tons by 2020 (*China Daily* 2008a). As agricultural productivity becomes a priority, improving agricultural inputs and their availability to farmers becomes a main focus.

Something that has caused Chinese officials to adjust how some policies are formed and implemented is the accession of China to the World Trade Organization (WTO). In Dec 2001, China acceded to the WTO after years of striving to do so. Becoming a WTO member is aimed at reducing trade-distorting practices and increasing free market competition in the global marketplace. As China's policies transition to be compliant with WTO standards, agriculture is one sector that will be greatly affected (Crook 2002). For a summary of China's WTO agricultural commitments made as part of joining the WTO, see Appendix B.

2.5 Global and National Trends Affecting Chinese Agriculture

With economies of nations becoming more globally connected in their

markets, policies, and relations, many world economy factors affect China's agriculture and, therefore, the nation's demand for agricultural machinery. Trends and issues within China also can greatly influence agricultural machinery demands as they increase or decrease the need for agricultural products or the cost of production.

Chinese consumers are demanding protein-rich diets more than ever before. The work that has previously been accomplished in defining change in diet demands is well documented (Hsu, Chern, and Gale 2002; Pingali 2006). As the demand for protein-rich foods such as beef, poultry, and pork increases, the demand for grains to be used in livestock feed also increases. While it is true that grains for consumer consumption will decrease as protein increases, the efficiency at which livestock convert grain feeds is much less than grain itself (Fuller, Tuan, and Wailes 2002). As current Chinese policies stand, this increasing grain requirement will continue to drive increased efficiency in agricultural production to meet that demand.

Pingali (2006) shows that there is an increasing trend of Asian diets becoming more westernized with increased protein, temperate fruits, wheat, and wheat-based product consumption. The movement of the Chinese labor force into more urbanized areas also has an effect on their diet trends (Huang and David 1993). All of these changes in Asian diets will have a great effect on grain consumption by animals and humans. This, in turn, will have a large impact on the need and priority of improving agriculture in China.

The Chinese population is not only increasing its protein consumption but also its dairy consumption (Chen 2003). In 2000, 8,274,000 tons of milk were produced, and in 2005, 31,934,000 tons of milk were produced showing milk production almost quadrupling in six years (National Bureau of Statistics of China 2007b). Milk production, especially high-yielding production practices, also requires grains as inputs and therefore will continue to increase China's demand for grains.

Wheat prices have risen to record highs within the last five years and have given added profits to farmers worldwide. Multiple global factors have contributed to these prices. Droughts in Australia have greatly diminished their supply to offer to world markets and as supply decreases for a product in demand, the price of that product increases (BBC News 2008). Ethanol production, which was mandated in the Unites States in 2005, has consumed a large portion of excess grain produced for world markets and is continuing to contribute to higher grain prices (Kirchhoff 2008a). Recent flooding in the midwestern United States also has contributed to increased grain prices (Kirchhoff 2008b). Even though year-to-year events vary and fluctuations in grain prices are no guarantee, growing trends are highlighting the importance of food security for China and will give further incentives to farmers and the government to efficiently increase production.

Rising oil prices are affecting many industries throughout the world. Chinese agriculture is also being affected. Transportation costs as well as production costs increase as the price of fuel increases. This will decrease

the incentives for using and purchasing farm machinery. Chinese officials are working to increase their oil supply through foreign oil investments (CNN 2008b; Karadsheh 2008). Also, China currently heavily subsidizes their oil prices to allow their economy to continue to grow. Again, the continuation of high oil prices in the short run is hard to predict. However, because of lengthy periods of high-priced oil, most governments are now increasing efforts in planning for more long term sustainability. As the cost of oil subsidy to the government continues to rise, Chinese government policies will have to adjust. These adjustments will affect how they continue to subsidize agricultural mechanization. Fuel efficiency is a part of this. China will probably be more likely to support and encourage subsidization of more fuel-efficient models, which will affect what the agricultural machinery industry will do to meet this potential demand.

2.6 Shift of Labor to Urban Areas

China's population has many dynamic aspects that influence various social and economic factors of agricultural machinery demand. As the quantity of an input (labor) decreases, the price or demand of that input increases. With the rapid economic growth that China has experienced in the past few decades, more opportunities are available to its population to work in manufacturing, service, and other industries besides agriculture. The larger portion of FDI has been in urban areas, where more infrastructure, skilled labor force, and developing markets are found (Weersink and Rozelle 1997; Rozelle, Pray, and Huang 1999). The majority of these employment

opportunities are located in urban areas and offer wages much higher than rural employment. Therefore, China has seen an increase in migration of labor from rural areas into urban centers (see Figure 2.2).

This has been a large factor toward increased rural labor wages as labor has become less available for full-time farming. Farmers can more readily justify capital purchases to replace the more expensive and migrant work force. These new economic opportunities and this labor migration cause many changes to rural and urban areas, which affect demand for agricultural machinery.

One change in rural areas is the increased incentive for those farmers who desire to seek urban employment to rent their allocated land rights to farmers who wish to increase their production and take advantage of

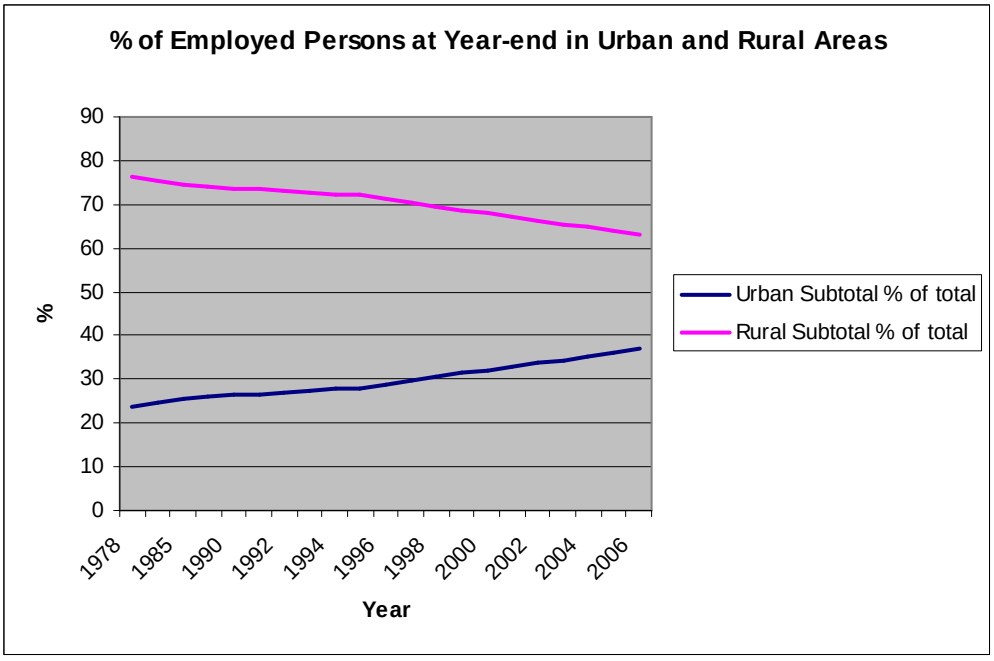


Figure 2.2. Change in China Population Composition.
Data Source: National Bureau of Statistics of China 2007.

economies of scale. As this occurs, investing in agricultural machinery becomes more economical as the cost of capital is spread over larger land areas. As farms become larger, labor-intensive crops become less practical and mechanization is not only more affordable but much more productive (Van den Berg et al. 2007). According to Zhang, Ma, and Xu (2004 : 1071):

> The Labour-transfer process here is initiated and regulated by the demand for labour in the off-farm sector. This demand-regulated labour transfer creates the subsequent supply-driven dynamics in land rental markets: when the demand in off-farm labour markets increases, more labourers leave agriculture and relinquish their land rights, creating the supply that spurs land rental transactions.

As urban employment opportunities and wages increase, more farmers are willing to take the opportunity costs of renting their allocated land rights to farmers who want to grow their rural operations and income. As farm size increases, so does farmer income and again an increased potential to invest in farm capital (Rozelle, Huang, and Zhang 2002).

Another change affecting urban and rural areas is the transfer of cultivated land to industrial uses. Even though there is legislation that restricts agricultural land conversion, it is still taking place with village and township approval. As urban investments have increased, farm land has been converted to urban industry or residential areas for the increased labor force. Deng et al. (2006) have researched the effects of this conversion on agricultural production from 1986 to 2000 and conclude that it has had very

little effect on overall food production levels. They also mention that cultivated land areas actually have increased during this time period due to conversion of other land types. Therefore, this trend has not hindered the increase in farm size and appears to not be a barrier to increasing economical farm mechanization.

The urban and rural labor forces have also been affected by China's one-child policy. This policy was implemented in the late 1970s as China's method of population control. It gives exceptions to minority groups and allows rural residents to have two children, and some variability exists between provinces. Those who have more children are given heavy fines, and, thus, the Chinese government uses financial and other incentives to encourage this policy (Kane and Choi 1999). China has announced that this policy will continue for the next ten years (CNN 2008a). This will continue to limit the growth of the rural and urban labor forces to some extent (see Figure 2.3). Therefore, agricultural mechanization will more likely be used to meet the rural labor demand, especially as higher urban incomes and increased urban employment opportunities continue to draw down rural labor supply.

One limiting factor to rural-urban migration is the household registration system, also known as the hukou (▪ □) system. This has had various effects on migration and has not fully deterred rural residents from working in higher paying urban employment as they live in city slums, even though their official hukou status is rural (Chan and Buckingham 2008).

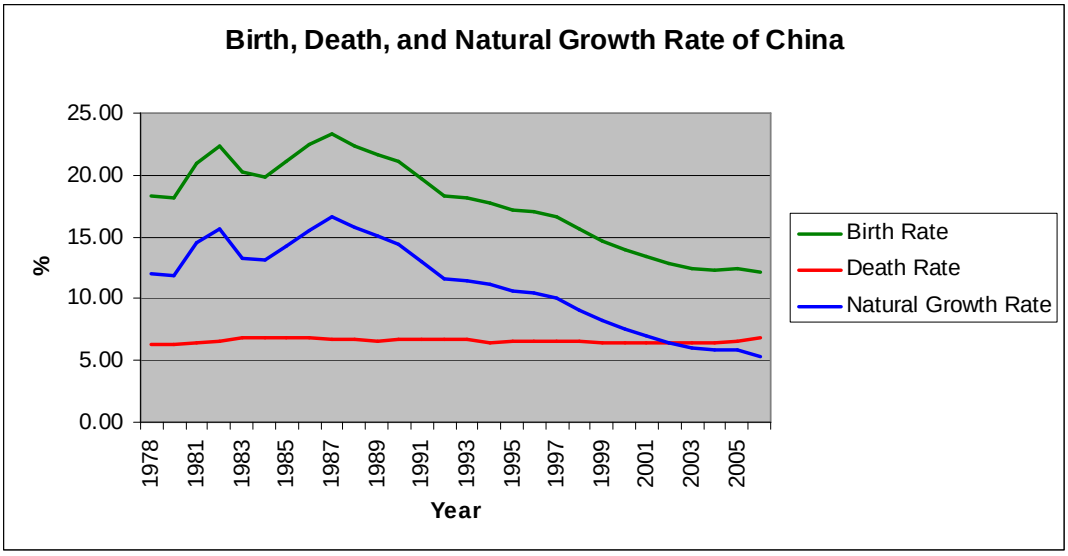


Figure 2.3. Changes in China Population Rates.
Data Source: National Bureau of Statistics of China 2007.

2.7 Agricultural Credit Availability

As credit opportunities are more readily available, capital investments tend to occur at an increased rate. Rural credit channels and availability have developed in many ways over the past few decades and have just recently undergone large reform measures. Since the late 1970s, the majority of agricultural loans were obtained from the state-owned Agricultural Bank of China (ABC). But, in 2001, a political push to increase rural credit to small farmers caused a reform of China's Rural Credit Cooperatives (RCCs). These institutions now provide more than 80% of China's official agricultural credit. Because of these recent reforms, along with changes in agricultural policy initiatives regarding rural credit, lending to farmers has more than doubled between 2001 and 2005. (Gale and Collender 2006) (see Figure 2.4).

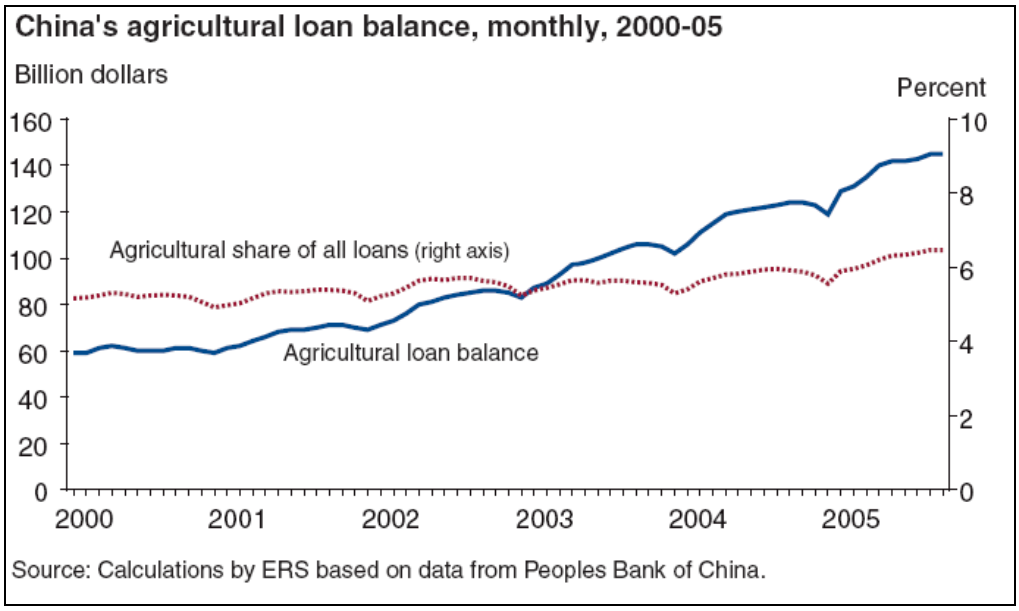


Figure 2.4. Changes in China's Agricultural Lending.
Source: Gale and Collender 2006.

Many local RCCs have been merged to now operate on the county and provincial levels. They previously were reluctant to lend to the agricultural community as they have had high default rates (40-50%) and their credit worthiness has been difficult to validate. Interest rates were also capped by government policy, preventing high-risk related rates to be charged. However, as reforms have gone forward, these limitations have been compensated for through national support. Therefore, these institutions are still largely policy driven and are slowly developing market characteristics (Gale and Collender 2006).

RCCs are not the only source of credit to farmers. There are also sources of informal credit as farmers cooperate with family and friends to receive needed capital. Other national banks provide credit for small loans and rural infrastructure investments (Gale and Collender 2006). See

Appendix C for a summarized list of current rural credit sources. These recent credit increases allow further investment in agricultural fixed assets and capital inputs.

2.8 Conclusion

There are many factors that affect the demand for agricultural machinery in China. Only the main factors have been discussed in this section. This gives a broad understanding of the key components of agricultural machinery demand in the Chinese market. By presenting issues that the average Chinese farmer is facing, better analyses and research of agricultural machinery demand in China can be performed. These issues also support that Chinese demand for agricultural machinery is increasing. This research will build upon these issues to determine what is occurring in the Chinese agricultural machinery market and how businesses are meeting this demand.

CHAPTER 3

METHODOLOGY

3.1 Introduction

There are a number of possible research methods that could be used to address the research question in this dissertation. This chapter will clarify and define the different possible methodological approaches and methods that could be used to identify agricultural machinery demand in China and how businesses can meet that demand. An explanation of which approach was actually taken to answer this question will also be given. The setup and application of a case study method are described.

3.2 Research Question and Aims and Objectives

The specific research question to be addressed by the research described in this dissertation is the following: "What is the demand for agricultural machinery in China, and how could agribusiness firms potentially meet that demand?"

The specific objectives of the research pursued for this dissertation (also indicated in Chapter 1) are the following:

- Review the recent literature regarding issues relating to Chinese agricultural machinery demand.
- Identify and assess Chinese agricultural policy and its impact on agricultural machinery markets.
- Determine the economic and political factors affecting Chinese

farmers' purchasing decisions and machinery use.

- Obtain and analyze Chinese national statistical data regarding historical agricultural machinery trends and other relevant agricultural input and output trends.
- Assess and analyze this information to determine the potential and current agricultural machinery demand.
- Conduct a case study of John Deere operations in China including interviews with key players in the business.
- Analyze John Deere's business strategy, and formulate key elements used in meeting agricultural machinery demand in China.
- Edit, critique, and improve the final analysis, results, and implications in answering the inquiry.

3.3 Overall Objective and Reasons Demand for Farm Machinery Would Be Expected to Be Expanding in China

The overall objective of this dissertation is to characterize the market for agricultural machinery in China and to attempt to formalize an assessment of the demand for agricultural machinery in China. There are several factors that would suggest that the demand for farm machinery is growing in China, and, as a result, opportunities for foreign agribusiness firms to market agricultural machinery in China are expanding.

The primary reason one would expect the market for agricultural machinery in China to be growing is the rapid growth of the Chinese economy from a relatively low base (see Figure 3.1).

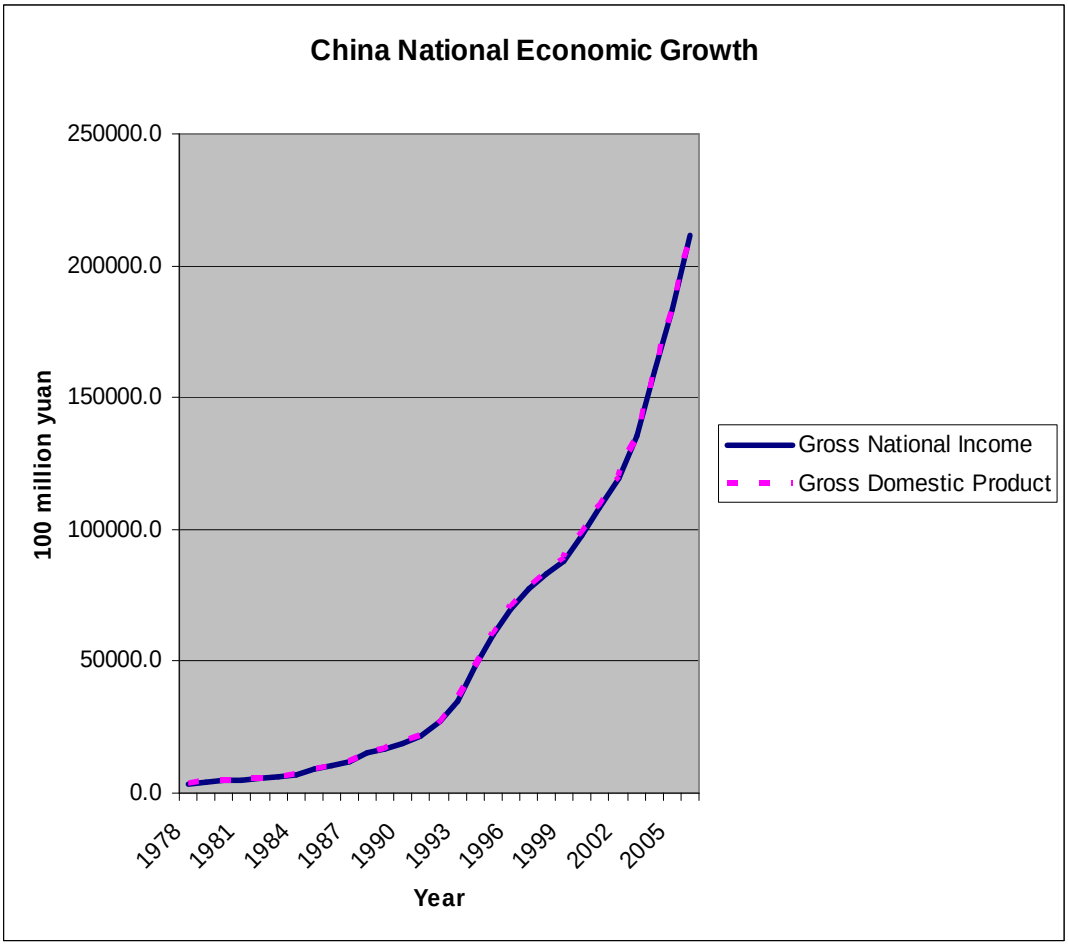


Figure 3.1. Growth of the Chinese Economy from 1978-2006.
Data Source: National Bureau of Statistics of China 2007.

Chinese agriculture has been characterized by small farms that are very labor intensive (see Figure 3.2). However, the growth in the Chinese economy has provided off-farm job opportunities for many Chinese individuals in the cities, which tend to offer higher salaries than on-farm activities. The resulting decrease in the rural labor force exacerbated by China's one-child policy would be expected to drive up the wage rates relative to other agricultural inputs, resulting in an increasing demand for capital inputs such as farm machinery.

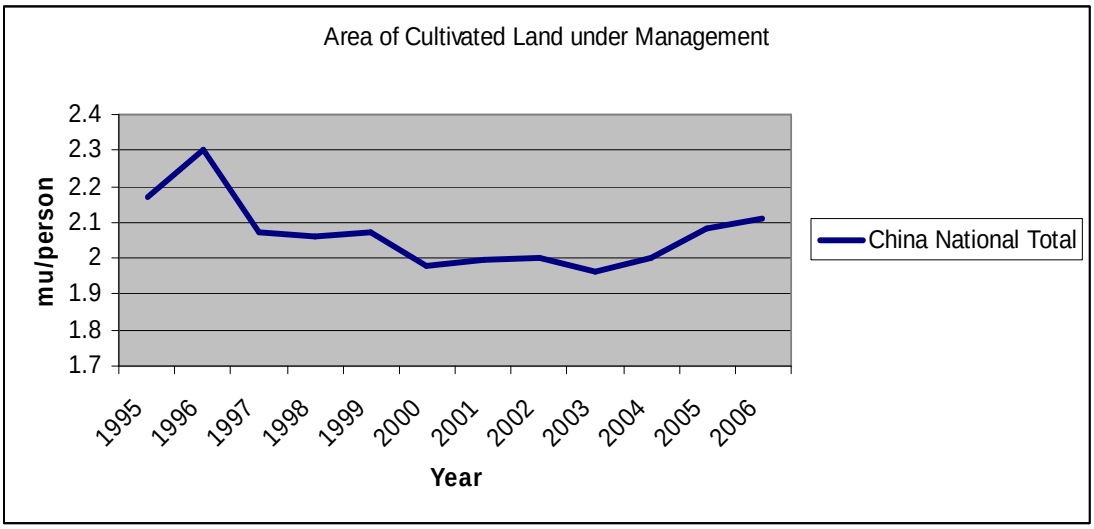


Figure 3.2. Average Area of Cultivated Land Under Management per Farmer. Data Source: National Bureau of Statistics of China 2007.

China's land policy has also been liberalized, making it easier for farmers to rent or lease property to others, thus allowing farm sizes to increase—a necessary characteristic for many capital inputs with relatively high fixed costs and economies of size. This may also make it more economical for farmers to invest in farm equipment because they can spread costs over more hectares, on the average, than they could previously.

China's economic growth has provided the opportunity for Chinese consumers to incorporate more protein into their diets (see Figure 3.3). Protein is often provided by animal-based products, such as dairy and meat products, which tend to require more inputs than grain-based products. The result is an increasing demand for agricultural and food products in China. Growing demand suggests higher prices for agricultural and food products, which provides incentives for increasing output and also the efficiency of

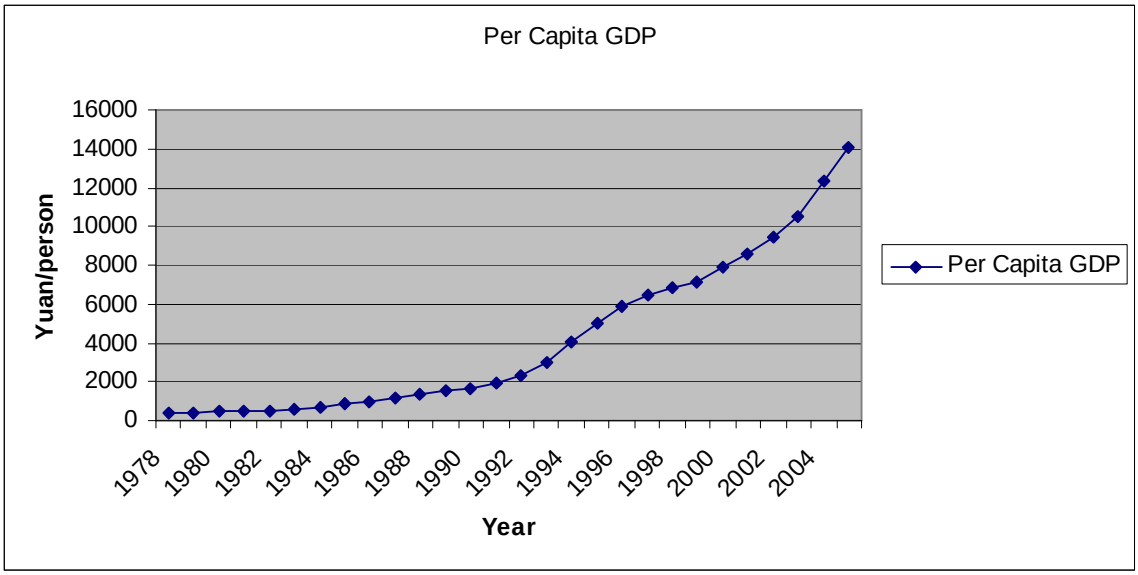


Figure 3.3. Per Capita GDP of China.
Data Source: National Bureau of Statistics of China 2007.

output in the agricultural sector. Capital investments are a popular method for increasing output and the efficiency of output. This also provides some evidence of a growing demand for equipment in the agricultural and food segments of the Chinese economy.

These factors all suggest that the demand for agricultural equipment is expanding in China, and this is the hypothesis of this dissertation. However, attempting to formally characterize the market for farm equipment in China is complicated by a lack of publicly available information on this market that could be used in a model of supply and demand of farm equipment in China. This lack of data and the fact that China has only relatively recently liberalized its market atmosphere to allow outside investment and entrepreneurship in the agricultural and food sectors make it almost impossible to explain the factors affecting the demand for agricultural machinery in China through the

use of econometric methods. As a result, econometrics is not used to describe machinery demand in China, but rather available data are used to provide a description of recent and current conditions in this market. A case study of an American machinery manufacturer (John Deere) is then used to provide a detailed description of the opportunities and challenges related to selling agricultural machinery in China.

This research examines the current demand in China for agricultural machinery to better understand ways in which agribusiness firms can meet that demand. In establishing this demand, a description of the supply-demand system relationships for agricultural machinery aids in the understanding of how this market is evolving in China.

3.4 Determinants of Demand for Agricultural Machinery

The demand for agricultural machinery can be described using the economic theory for the demand for inputs in production. A production function maps the relationship between the use of an input and an output. A common specification for a production function is characterized by the Cobb-Douglas function which is:

(1) $Y = C^{\alpha} L^{\beta} Z^{\infty}$,

where *Y* is output, *C* is capital, *L* is labor, and *Z* are other inputs such as land. The parameters, α, β, and ∞ sum to one for constant returns to scale and are greater than one for increasing returns to scale. Under Cobb-Douglas technology, one would expect the relationship between capital (*C*) and output

(*Y*) to be depicted similar to that shown in Figure 3.4, where increasing *C* from zero initially increases *Y* and *Y* eventually reaches a maximum associated with adding units of *C* and can actually decrease if additional units of capital continue to be added. Because the change in *Y* associated with changes in *C* are not constant, the marginal physical product ($\frac{\partial Y}{\partial C}$) or MPP_c can be used to describe the relationship between *Y* and *C*. MPP_c is positive and increasing initially, is positive but decreasing at the inflexion point, becomes zero at the flat portion of the curve, and then becomes negative to the right of the flat portion of the curve.

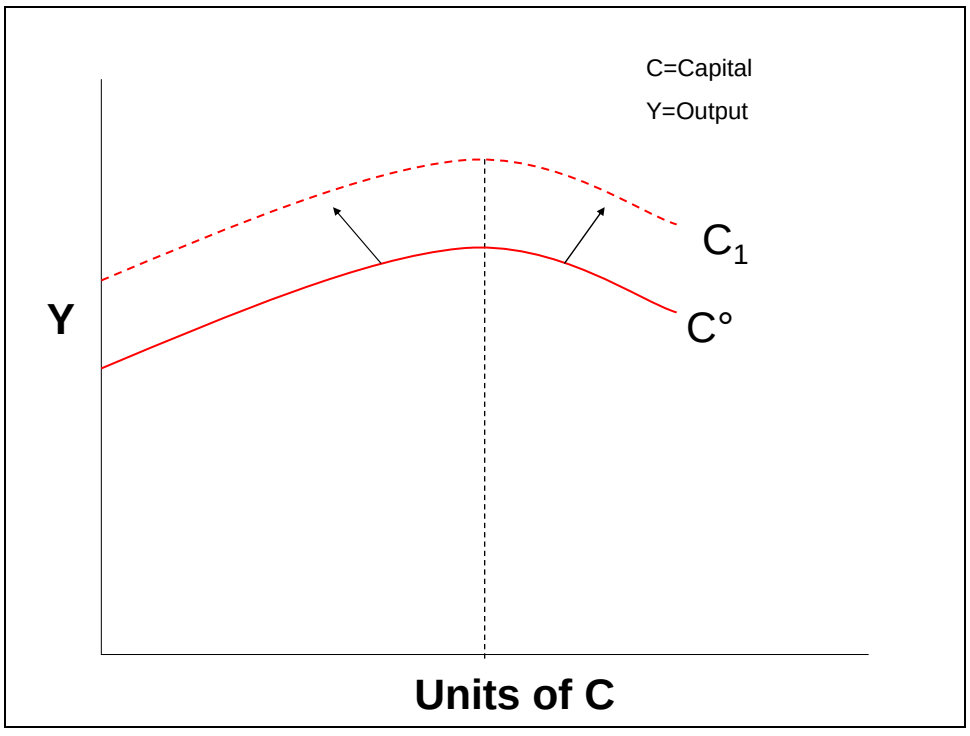


Figure 3.4. Depiction of Impact of Increases in Technology on a Production Function.

Improvements in technology related to *C* will tend to shift the curve (C^0) upward and also shift the MPP^0 to the right (becomes C^1 is Figure 3.4). Or, in other words, increases in the technology of capital lead to increasing levels of output but also increases the MPP_c.

Economic theory suggests that firms will invest in an input (in this case capital) to the point where the value of its marginal product, defined as the price of output *Y* multiplied by the ($VMP_c = P_y MPP_c$), is equal to the price of the input (P_c). This suggests that the equilibrium demand for the input can be expressed as the following:

(2) $MPP_c = \frac{P_c}{P_y}$ or $P_c = P_y\, MPP_c$.

This implies that the demand for *C* is a function of the physical relationship between *Y* and *C* (essentially the level of technology that *C* lends to output), the price of *C*, and the price of *Y*.

The choice of other inputs, such as *L* and *Z*, also affect the choice of the level of *C* because they are economic substitutes for *C*, where mathematically this means that $\frac{\partial C}{\partial L} < 0$. For example, in Figure 3.5, the isoquant, Y_0, depicts all of the potential combinations of *C* and *L* that could be used to produce a single level of output. The solid straight line between the x and the y axes (R_0) shows all of the possible combinations of *C* and *L* that could be purchased given a firm's budget constraint and the current prices for units of *C* (r_0) and *L* (w_0). The slope of this line is the ratio of r_0 and w_0. The tangency of Y_0 and R_0 identifies the optimum bundle of *C* and *L* to produce Y_0 (L_0 and C_0). Now, if the price of *L* increases, then R_0 shifts to R_1 and a new

tangency identifies a new bundle of inputs (L_1 and C_1). This demonstrates that as the price of one substitute input increases relative to the other input, the demand for the input whose price increased will decrease while the demand for the other input will increase.

This suggests that the inverse demand function for farm machinery (P_c) can be explained by the relative MPPs, prices of other inputs, $MPP_{c,}$ and the price of agricultural outputs such as crops or livestock enterprises. The reduction in the rural labor force would suggest that the wage rate or price of labor is increasing in China. Agricultural land cannot actually be purchased in China, but if rental and lease agreements are used as a proxy for the price of land, one would expect that the cost of such arrangements has been

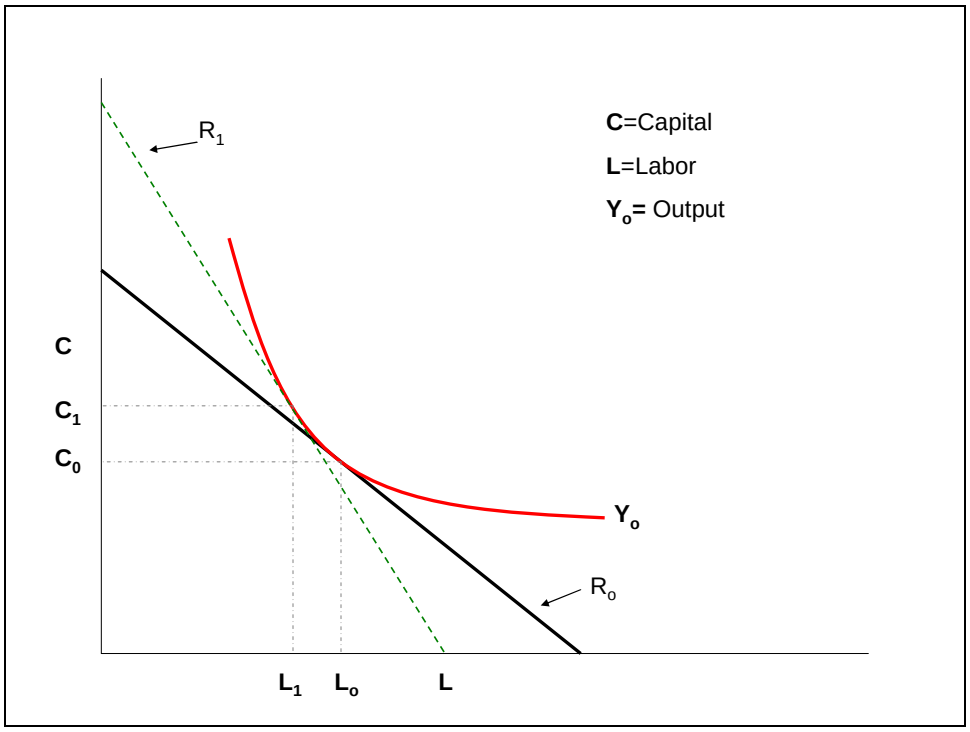


Figure 3.5. Changes in Proportions of Inputs as Costs for One Input Changes.

increasing with the liberalization of markets and the increasing demand for agricultural products.

As the demand for agricultural products has increased (probably driven by increases in consumer income in China and other locations), the price for agricultural products and commodities has likely increased (Figure 3.5), indicating that, in general, P_y, has been increasing. The case study will demonstrate that John Deere has been working to match and improve its technology to fit conditions in China, such as the existence of relatively small farms compared to other locations in the world. These efforts are likely resulting in increasing MPPs for agricultural equipment offered by John Deere and other machinery manufacturers in China. Each of these conditions (price of competing inputs, price of agricultural products, and an increasing MPP for equipment) suggest that the market for agricultural equipment in China should be increasing.

A very simple model of the supply and demand for agricultural machinery in China might be specified similar to the following:

(3) $Q_{Mt}^{D} = f(P_{Mt}, P_{SUBt}, P_{Yt})$

(4) $Q_{Mt}^{S} = f(P_{Mt}, CS_t, TN_t)$

(5) $Q_{Mt}^{D} = Q_{Mt}^{S}$,

where Q_{Mt}^{D} and Q_{Mt}^{S} are the demand and supply of machinery at time *t*, respectively. P_{Mt} is the price of machinery, P_{SUBt} is the price of substitute inputs such as labor or land, P_{Yt} is the price of the agricultural output such as

wheat, CS_t is the costs firms incur in manufacturing agricultural machinery, and TN_t is a variable capturing changes in technology over time.

Equations (3)-(5) present a simple theoretical relationship representing a possible economic explanation for the determinants of the market for agricultural machinery. The parameters of the model depicted in equations (3)-(5), or any other similar model, could be estimated econometrically to achieve a statistically valid if not full explanation of what has driven the demand for farm machinery in China in the past. An econometric model of this type requires a complete time series for each of the variables indicated in the model. This would be difficult in most situations, but is especially difficult in China because a complete time series for each variable is not publicly available for China. An econometric model, while providing explanations of the past demand for agricultural machinery, does not necessarily provide all the information necessary for developing future strategies to address the market.

Other approaches such as strategic planning, business theory/models, and case studies may be the best methods for developing strategies and finding how to meet agricultural machinery demand. In the current instance, publicly available data are not available to estimate the parameters of an econometric model similar to the one specified in equations (3)-(5). Data limitations in China are explained in more detail in the following section. Other sections of this chapter will also explain the selection of an alternative

method, a case study, which was selected as the basis of analysis to determine the demand for agricultural machinery in China.

3.5 Available Data Sources

The National Bureau of Statistics of China (NBSC) publishes an annual *China Statistical Yearbook* that contains general Chinese statistics from 1985 to present. They also publish a *China Agriculture Yearbook* (CAYB) focusing on agricultural-related statistics covering the same years. However, some of these statistics were started at later dates and may not include numbers for all years from 1985 to present. These statistics include only a basic overview of China with annual aggregated provincial and national numbers. Much of the general statistics are now available online through the NBSC's website at http://www.stats.gov.cn/english/.

The NBSC has completed only two agricultural censuses: one in 1996, and another in 2006. Therefore, these data, while providing a helpful benchmark, would not be sufficient to do a valid econometric analysis. The data do, however, give a snapshot view of China's rural inventory, and, with the second agricultural census now available, a comparison over the ten years can give some indication to the nation's rural trends.

There are some provincial data publicly available, but these data are difficult to access, do not appear to be standardized from province to province (though improvements in standardization seem to be occurring), and most provincial data are published only in Chinese. Due to the speed of change in the Chinese economy, these available data do not give a good representation

of what is currently occurring in the Chinese agricultural machinery market. Given the scope of this research, these data challenges have contributed to the decision of taking a more aggregate and holistic approach in analyzing China's agricultural machinery demand rather than estimating an econometric model. However, available data are used to provide current benchmark information about Chinese agriculture. These data are also used as a source of supporting evidence to the case study method that will be described later in this chapter.

3.6 Research Approach (Qualitative vs. Quantitative)

One method that is useful in analyzing how a multi-national corporation (MNC) can effectively meet agricultural machinery demand in China is to look at a successful U.S. business in China that is already meeting this demand. This business has many experiences and examples of applied business theory in meeting agricultural machinery demand. Real-life insights about the future of agribusiness in China, its agricultural machinery market, and strategies used to address that market, can all be gained through this analysis. This type of analysis is included in the case study research method.

According to Yin (1994 : 13):

1. A case study is an empirical inquiry that

- investigates a contemporary phenomenon within its real-life context, especially when

- the boundaries between phenomenon and context are not clearly evident."

2. The case study inquiry

- Copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result
- Relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result
- Benefits from the prior development of theoretical propositions to guide data collection and analysis.

These criteria fit the objective of this dissertation to examine how businesses can successfully meet demand for agricultural machinery in China. This is a contemporary phenomenon occurring every day in the real marketplace. It also has many variables that are combined in a company's overall success. Available secondary data analysis, multiple interviews, and observational evidence can be combined to identify and confirm emergent themes.

Using a case study as a research method is very beneficial when certain circumstances arise. These include situations such as when it is unrealistic, impractical, or impossible to use surveys, historical data, or other forms of sampling that can be analyzed using statistical tools, or when these methods alone are not adequate to justify an argument. Another example is when one is asking a "how" or "why" question about contemporary events that one cannot feasibly manipulate (Yin 1994 : 10): "The case study, like the

experiment, does not represent a “sample,” and the investigator’s goal is to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalization).”

Manipulating a successful business in a contemporary Chinese market is unrealistic. We can only observe and learn from their experiences in order to understand how agricultural machinery demand is currently being met. Another reason that a case study is essential in answering the proposed question is the limited time and resources that are available in doing this research. Because of this, other methods of research are impractical and inappropriate (see Figure 3.6). These other methods would not allow detailed, in-depth results that are needed to understand how businesses in China are meeting agricultural machinery demand. They would only provide numbers or a very limited qualitative response.

strategy	form of research question	requires control over behavioral events?	focuses on contemporary events?
experiment	how, why	yes	yes
survey	who, what, where, how many, how much	no	yes
archival analysis	who, what, where, how many, how much	no	yes/no
history	how, why	no	no
case study	how, why	no	yes

Figure 3.6. Relevant Situations for Different Research Strategies.
Source: Yin 1994 : 6.

Knowing that a case study is the main method used to address this research, we now need to discuss the different types of case studies that are available. Case studies can use qualitative as well as quantitative data. A single case or multiple cases can be used in case study research. Case studies can also be holistic or embedded in nature (see Figure 3.7).

A single-case study is appropriate when resources and time are such that only a single case can be studied feasibly. It is also necessary when dealing with exceptions to the norm which cannot be duplicated. A single revelatory case study can also be used when a phenomenon has not previously been studied.

	Single-case designs	Multiple-case designs
Holistic (single unit of analysis)	TYPE 1	TYPE 3
Embedded (multiple units of analysis)	TYPE 2	TYPE 4

Figure 3.7. Basic Types of Designs for Case Studies.
Source: Yin 1994 : 39.

A multiple-case study is beneficial when more than one case is available for research. These multiple cases are not viewed as multiple samples. They are used as a replication tool, just as an experiment would be replicated to strengthen its validity. More than one case can be used to strengthen the common themes that emerge.

When using either a single- or multiple-case study, it also must be decided whether an embedded or holistic approach will be used. An embedded case study design includes more than one unit of analysis. These may be different projects in an organization or other units of analysis that can be sampled or clustered in their analysis. A holistic case study design only has a single unit of analysis and is used when an overall understanding is being sought. Also, when no realistic unit of analysis can be determined, holistic-type theories are, in general, used throughout the case study.

The case study design that is appropriate in addressing this dissertation's research question is a holistic, single-case study. Reasoning for this includes time and resource limitations. It is not feasible to do an in-depth investigation of more than one company in China. Also, it is difficult to gain high-level access to multiple MNCs. Because of Chinese government control, access to SOEs or private Chinese corporations is not highly feasible. Therefore, a single U.S.-based MNC will be used as the case study company.

The main source of primary data comes from interviews with experts in the Chinese agricultural economics and machinery fields. These expert opinions bring qualitative viewpoints, insights, solutions, and information to

the dissertation. It allows the rich experience of professionals in industry to share their observations, challenges, and solutions. Where direct contact is unavailable, this information is supplemented with published information regarding the proposed topic that includes previous interviews or otherwise documented expert opinion.

The reason for this more qualitative approach is due to the lack of substantial secondary data in China relating to the components of demand for agricultural machinery and how businesses have met that demand. The company's overall strategies of successfully meeting Chinese agricultural machinery demand are what are being observed and analyzed. This question cannot be fully answered with the use of quantitative data. Instead it will be observed and discovered through qualitative analysis of the company.

The company which the case study will focus on is John Deere China Investment Co., Ltd. (JDCI). This is the Chinese branch of John Deere, Inc. As will be described in Chapter 4, other U.S.-based companies are not as established in China or do not have a large Chinese market share compared with John Deere. John Deere has had a presence in China since 1976. Therefore, this company's history, experience, and presence in China will give more representative data and a broader view of the current dealings in the Chinese agricultural machinery market compared to other corporations.

3.7 Case Study Method

Having decided the type of case study to perform and the company on which to focus, initial efforts were made to contact John Deere to seek

approval for this research. Through a contact, I was referred to the chief economist at John Deere, Dr. J. B. Penn. Dr. Penn reviewed the research proposal and helped to seek approval from his superiors for the research. I was then referred to the president of JDCI, Mr. Douglas Roberts, for his review and support in the project.

Once approval was given, Mr. Roberts asked for clarifications about the specific information that was being requested from John Deere. A general set of questions was prepared and provided to John Deere about information that would be needed for the case study. This included questions regarding John Deere's history, background, and other questions eliciting information needed to help in the preparation for the interviews. These questions and the answers provided by John Deere also helped in the development of additional questions used in the interviews (see Appendix D).

Along with the answers to these initial questions came an invitation to visit John Deere's Chinese operations to obtain added insights through a first-hand experience. I was also invited to conduct interviews with key individuals in John Deere's China operations to gather additional qualitative information for the case study. Arrangements were then made for the visit to occur during the week of October 19-25, 2008.

Answers to the initial set of questions were then reviewed for any new insights that could be gained in preparation for the interviews with John Deere management and other industry individuals in China. Some of the responses to the initial set of questions raised additional questions, especially regarding

specific details of the organizational workings in China. For example, one initial question was: “How have current Chinese agricultural policies affected John Deere tractors in China?” The response mentioned farm machinery subsidy policy in China that was a major consideration affecting relationships between John Deere and tractor and implement dealers in China. From this response, it was determined that knowing how JDCI was dealing with this situation would increase the quality and depth of this study. Therefore, more specific questions about subsidy policies in China were included in the interview questions.

The correspondence with and responses from JDCI also helped to clarify which individuals in JDCI’s Chinese supply chain should be interviewed (with JDCI’s approval). The initial questions were addressed to Mr. Roberts. Mr. Roberts then distributed these questions to individuals within his organization who he believed would be best to answer each question. From the responses received, these individuals included people such as JDCI’s marketing director. Identifying these individuals also allowed for the development of a more targeted set of interview questions. It also helped to determine the members of JDCI who should be interviewed. That is, this allowed questions to be focused on specific areas of the supply chain.

In preparation for the visit, case study data collection methods were reviewed and selected through additional research. Other case study method resources, including textbooks and professors in the Jon M. Huntsman School of Business and the College of Agriculture were consulted for any

additional input and review. I originally requested to meet with multiple individuals at different points in the supply chain at JDCI: multiple tractor dealers, a state farm customer, and local Chinese farmers. However, due to time and resource constraints, it was impractical to visit every location originally requested. The decision was made to interview key individuals in JDCI's operations, along with a John Deere Chinese dealer, and some of their typical Chinese customers.

The individuals to be interviewed were at different locations in China. Therefore, a schedule was created to meet with as many people as possible, given the time and resources available. The majority of the individuals from JDCI were located at the Beijing corporate office, while others were located at the Tianjin Economic Development Area (TEDA). The John Deere dealership was located just outside of Beijing in northern Hebei province as were the Chinese farmers who were to be interviewed.

Interviews were scheduled to last about one hour to show consideration for the interviewee's time constraints but which still allowed adequate time for elaboration of answers and issues. The interviews were conducted in English unless, due to language barriers, Chinese needed to be used. If this was the case, the interviewer (myself) or other bilingual individuals helped translate. Interviews were voice-recorded to ensure later that the responses could be recalled accurately. After explaining the study to interviewees, the interviewer requested permission to record the interview. I explained that the recording would not be shared with others and would be

used for reference purposes only. Notes were also taken as the interviews took place.

The individuals selected to be interviewed at JDCI were those who were most critical in helping to understand how JDCI has met Chinese agricultural machinery demand. This was determined by focusing on individuals who play a key part in the decision and management process at JDCI. JDCI also helped to facilitate a meeting with one of its independent dealers in northern Hebei. This dealership was chosen based on JDCI's recommendation that it was a good representation of a typical Chinese agricultural equipment dealership. The dealership owner also asked four of their local farmer customers to participate in this study. With JDCI's approval and the individuals' time availability being considered, arrangements were made to visit with these individuals.

Some of these individuals were recommended by JDCI after my arrival in China to help me obtain a more complete picture of their operations. For example, a meeting was arranged, which was not originally planned, with the director of engineering because JDCI believed that this was an important part of their business. Current engineering program directors were also suggested. Through these individuals, a more detailed understanding of JDCI's challenges was obtained. This also added additional expertise in describing how JDCI has successfully met demand in the Chinese market. It gave specific insight into general issues initially described by JDCI.

As the interviews progressed and questions were answered, individuals who were interviewed at JDCI also referred me to others in the company who could add more detail. One example was when the supply chain director referred me to JDCI's legal counsel to help answer how JDCI deals with non-compliant suppliers in China. The government relations manager and business planning and development manager were also referred to me in a similar manner. Listed in Table 3.1 are the individuals interviewed and their role in JDCI's supply chain.

The interviews were conducted one-on-one. The only exception was the interview with the Chinese farmers. Because of time and availability constraints, the dealership brought all four farmers together to be interviewed at the same time. In this case, the questions were posed to the group and then the replies of each individual farmer were recorded.

Table 3.1. List of Interviewed Individuals

John Deere China Investment Inc.	**John Deere Dealer**
President	Northern Hebei Tractor Dealer
Order Fulfillment Specialist	
Director, Supply Management Strategic Sourcing, Supplier Development	
General Counsel (Legal)	**Chinese Farmers**
Director, Sales and Customer Support (Marketing)	Farmer 1
Director, Engineering	Farmer 2
Apollo Tractor Program Manager	Farmer 3
GT5 Transmission Program Manager	Farmer 4
Government Relations Manager	
Director, Manufacturing (Operations)	
Manager, Business Planning and Development	

In developing the questions for these interviews, the person being interviewed and the role they played in the Chinese agricultural machinery industry were considered. For example, the questions directed to the Chinese farmers (agricultural machinery consumers) focused on how they viewed agricultural machinery and products with which they had experience, not on the details of JDCI's operations they would most likely not understand (see Figure 3.8).

Interview questions were developed that were considered to be free of bias, appropriate for the audience for which they were intended, and to give an opportunity for individual input (or in other words, somewhat open-ended). The questions did not directly seek any proprietary information. The issues and information shared by JDCI in their responses to the initial set of questions were a focus of the inquiries. This was done to aid in achieving a richer understanding of these issues, to add detail, and to clarify JDCI's

1. Why did you buy John Deere equipment? What equipment did you purchase?
2. To you, what is the most important reason that you wanted to use agricultural machinery?
3. Why not hire more labor instead?
4. How long have you used John Deere machinery?
5. How do you believe it has benefited your operations and its efficiency?
6. Do you believe other farmers would like to implement machinery in their operations? Would you encourage them to do so? Why or why not?
7. Any other information regarding John Deere, machinery in general, that you believe is important?

Figure 3.8. Interview Questions to Large Chinese Farming Contractors.

dealings in the Chinese market. The issues seen in previous research (see Chapter 2) were also a focus of these interview questions. The questions focused on identifying what needed to be done in the Chinese market to successfully meet the demand for agricultural machinery, how industry players perceived the market, and how challenges of the market (i.e., rural income, land rights, etc.) have been dealt with. For a complete list of the interview questions used, see Appendix E.

After each interview was completed, the participants were thanked for their time and cooperation with the case study. Then I recorded on paper any additional thoughts I had about the interview. This included, when relevant, observations relating to the interview location which could add qualitative description of the Chinese agricultural machinery market and industry.

Part of the initial preparation for the visit to China was to address the issue of confidentiality. Obviously, the information and access given to me by JDCI was done based on trust. Therefore, to help ensure confidentiality for those involved in the case study, I explicitly discussed what the study entailed and that the details shared would only be used with their permission. JDCI was informed that the final results of the study would be shared and verified with them before they were made public. This received JDCI's consent. Care was also taken to safeguard any information which JDCI provided for the study until their approval to include it in the final product was received. JDCI's requests that certain information be omitted or generalized for proprietary purposes were also honored.

3.8 Post Visit

After the visit to JDCI, the information gathered was compiled into a more complete and organized form. The interview notes and recordings were used to create a detailed description of each interview. Key ideas and words being communicated by the interviewees were used. The main ideas and details were used to report answers to the questions regarding the Chinese agricultural machinery market. Thus, the compilation and summary of what was obtained from the interviews was much more effective than a direct transcript of the interview. This summary resulted in 70 pages of information obtained from the interviews which could be more easily analyzed, understood, and communicated in written format than direct transcripts of the interviews.

After compiling the summaries of these interviews, each interview was codified for easier reference purposes (see Table 3.2). This allowed easier referencing of exemplar quotations or other information when used in the dissertation. For example, when information from the interview with the order fulfillment specialist was used, the code “JDOFS” would follow, to allow the reader to identify from where the information came.

Each interview was analyzed separately for its main points. These main points focused on how JDCI has met the demand for agricultural machinery in China, how they perceive the market, and their experiences within this market. Some practices that JDCI have implemented were

Table 3.2. Codification of Interviews

Interview	**Code**
President Oct. 20	JDP20
President Oct. 21	JDP21
Order Fulfillment Specialist	JDOFS
Director, Supply Management Strategic Sourcing, Supplier Development	JDSCM
General Counsel (Legal)	JDLC
Director, Sales and Customer Support (Marketing)	JDM
Director, Engineering	JDE
Apollo Tractor Program Manager	JDAPM
GT5 Transmission Program Manager	JDTPM
Government Relations Manager	JDGRM
Director, Manufacturing (Operations)	JDO
Manager, Business Planning and Development	JDBPD
Northern Hebei Tractor Dealer	TD
Chinese Farmer 1	CF1
Chinese Farmer 2	CF2
Chinese Farmer 3	CF3
Chinese Farmer 4	CF4

standard throughout their world-wide operations. However, particular attention was made to highlight points that were unique to the Chinese market. In the case of the tractor dealer and Chinese farmers, their views of the Chinese agricultural machinery market were highlighted together with their perceptions of how industry players viewed JDCI's approaches to meeting agricultural machinery demand. Each individual interviewed also had many important points of information that were also noted pertaining to their specific place in JDCI or the agricultural machinery market.

Once the main points of each interview had been identified, multiple interviews were then compared to identify common themes across interviews. Identifying common themes with multiple sources strengthens the validity of

these themes. Slight differences and additions of information to these themes were noted and added to their description in the case study. Not every point of information within a theme was mentioned by multiple individuals. However, the main ideas within a theme usually had multiple individuals who validated these main ideas. When a main point was mentioned by only one individual, it was added only if it was believed to be an essential part of understanding the agricultural machinery market in China or of meeting that market's demands.

When available and relevant, sources other than the visit to JDCI were also used to add validity to the themes identified. Through the use of multiple sources, data triangulation was achieved. These additional sources included published secondary data and information such as found in national statistical databases, news articles, and organizational publications. Time series statistical data was analyzed for relevant trends that supported or contradicted findings from the JDCI visit. This contributed to a more complete and valid picture and description of these themes.

After the common themes and important points of the case study were determined and analyzed for relevance in answering the questions of this research, they were compiled into Chapter 4 as the results of the case study.

3.9 Conclusion

There are many quantitative research methods that can be used in defining demand for a product. However, due to inadequate data and the scope of this dissertation, available quantitative data were used as supporting

evidence to a more qualitative approach. Also, in answering how a business can meet agricultural machinery demand in China, the use of a case study is the most appropriate method. The case study of John Deere is a good representation of how a corporation has met agricultural machinery demand in China.

CHAPTER 4

RESULTS AND ANALYSIS

4.1 Introduction

This dissertation endeavors to identify, in general terms, the demand for agricultural machinery in China and also uses a case study of JDCI to examine how a specific company is meeting this demand. This chapter presents the results of the research completed to address these issues and the analyses of these results.

First, trends in the Chinese agricultural machinery market were discussed along with other relevant quantitative data. By analyzing available secondary data, some important points regarding how the agricultural machinery market has evolved over time were understood. This understanding helps one to project how this market may continue to evolve in the future. The results of the case study analysis were then presented and explained. The case study was organized along the lines of major themes relating to the business environment and JDCI's decisions and strategies. The case study includes data from sources other than the JDCI interviews in China that were used to support particular points in the case study.

4.2 Quantitative Results

The number of tractors used in China and the change in the quantity of tractors in China over time were graphed to identify trends in the market (Figure 4.1). CAYB data were used to develop this illustration. FAO data

were also graphed to compare multiple data sources to validate these trends (Figure 4.2). Different sources may use different methodologies in obtaining the data. This is especially true in China where secondary data have been difficult to obtain. But general trends should still be identifiable, even if figures are different from different sources.

As seen in Figure 4.1, there has been a strong upward trend in agricultural tractors in China during the past 25 years, and especially during the last decade. Even though Figure 4.2 shows a more aggregated description of agricultural machinery totals and for more years than Figure 4.1, Figure 4.2 verifies that there has been a significant upward trend in the amount of agricultural machinery inventory in China during the past two decades.

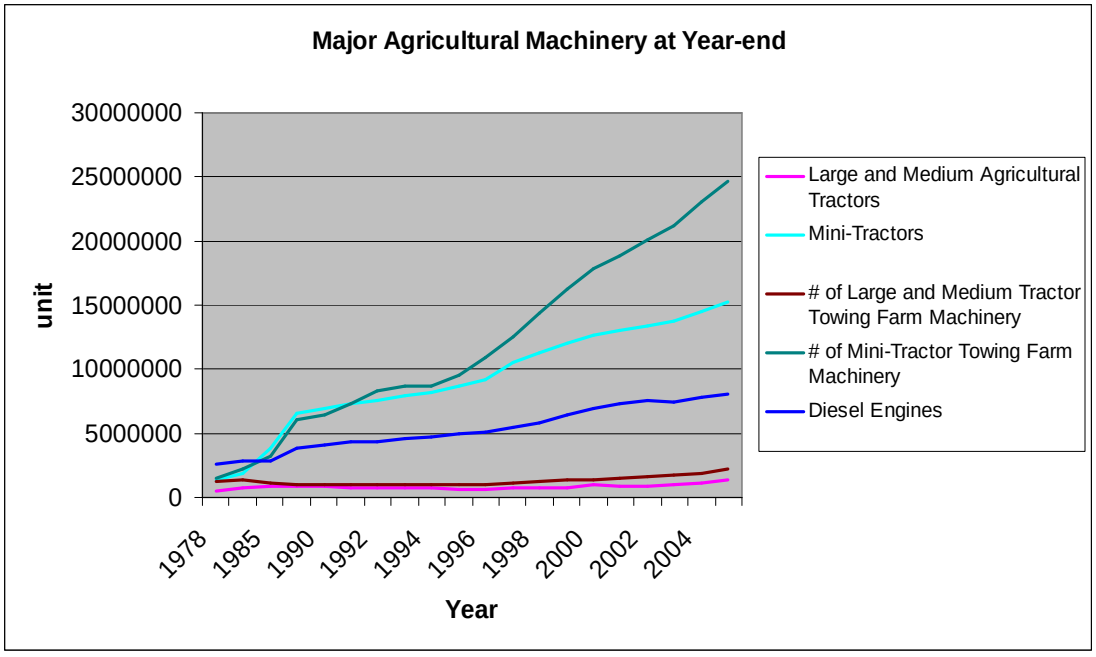


Figure 4.1. Agricultural Machinery Quantities in China.
Data Source: National Bureau of Statistics of China 2007b.

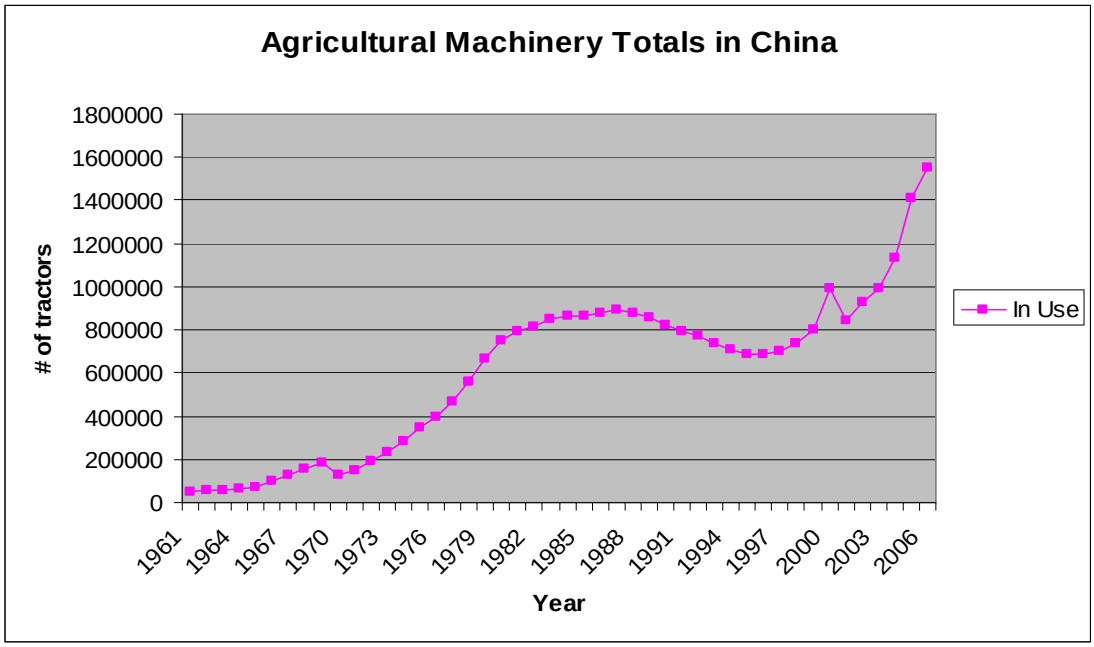


Figure 4.2. FAO Agricultural Machinery Quantities in China.
Data Source: FAO 2009.

Since 1985, there has been a much larger increase in the number of small tractors than large- and medium-sized tractors. This makes sense because of the relatively small size of farms in China. To help reinforce this point, data from the recently completed Chinese agricultural census were also graphed (Figure 4.3). Most farmers able to purchase machinery do not need large or medium tractors because of small farm size, but the growing number of tractors in China suggests that capital is being substituted for labor in an increasing fashion.

Figure 4.3 also indicates that the number of implements for small tractors increased at a faster rate than implements for large tractors. This was expected due to implements being complementary goods of tractors and being purchased to match the size of tractors. Consequently, an increasing

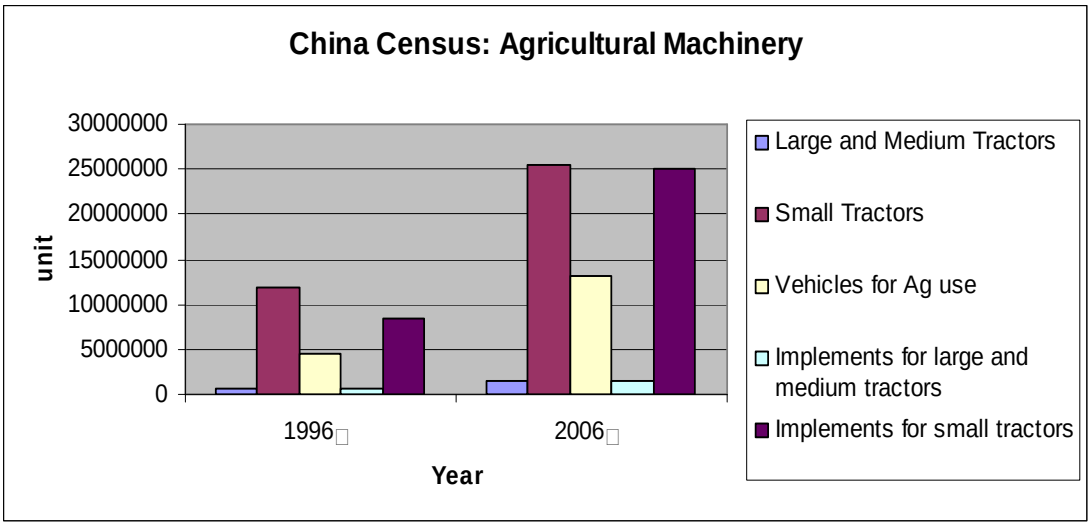


Figure 4.3. Machinery Data Comparison.
Data Source: National Bureau of Statistics of China (1997; 2007a).

inventory of smaller tractors would be expected to coincide with an increasing inventory of correspondingly small implements. Vehicles for agricultural use also experienced a greater increase than large machinery during this same time period.

Another factor in the larger number of small tractors in China than large tractors is that most Chinese farmers have not used agricultural machinery before. Because most consumers are risk-averse, when he/she tries a new product, he/she is likely to invest in tractors or implements requiring less capital outlays and risk than large equipment (Friedman and Savage 1948). Therefore, for most Chinese consumers who are inexperienced with agricultural machinery, their first machinery purchase will likely be one with less economic risk than a big purchase. Smaller tractors, implements, and vehicles for agricultural use all represent smaller investments than larger machinery and related implements.

Not only would most Chinese farmers be expected to want to limit risk when purchasing machinery, but most of them cannot afford to make large investments. The average income per farmer in China in 2008 was 4,761 yuan ($697). Although this figure is double what average farm income was in 2000, its level still limits the ability of the average Chinese farmer to invest in large tractors.

Data from state farms in China also contain additional insights regarding agricultural machinery trends. Cultivated land on China state farms represents roughly only about 3% of all cultivated land in China. This figure (3%) was calculated by dividing total state cultivated farmland reported in CAYB by national cultivated area.

However, even though only a relatively small part of all cultivated land in China is in state-operated farms, because state farms are government controlled and managed, policies and practices used on state farms would likely be good indicators of future trends in government policy. The policies and practices on state farms are government supported, and as government priorities change, they will most likely be implemented first in government-controlled entities, and then government policies and legislation would be implemented on a more nationwide level. Therefore, by analyzing the trends in practices and policies related to China state farms, future trends in nationwide policy related to agriculture may possibly be identified.

Over the past few decades, a trend of increasing mechanization in agriculture is implied by a number of factors. First, as seen in Figure 4.4, the

number of employees on Chinese state farms has decreased. Next, the number of Chinese state farms has also decreased but the area of cultivated land in state-operated farms has increased (see Figure 4.5). This implies that the use of agricultural machinery is more efficient on larger state farms than on smaller farms. As can be seen in Figure 4.6, actual agricultural machinery use on state farms increased dramatically between 1993 and 2006.

These indicators imply that the Chinese government will continue to support the use of agricultural machinery throughout China as policies are implemented that favor the use of more machinery. It is also implied that legislation that will help farmers increase farm size and agricultural machinery use will probably be supported, thus making the use of farm machinery more economical and widespread.

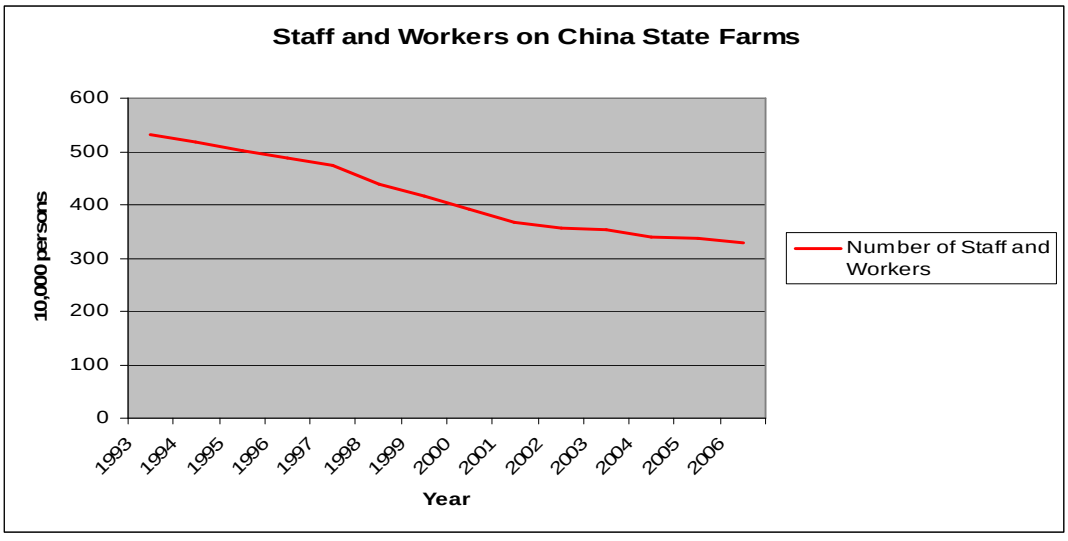


Figure 4.4. Employees on China State Farms.
Data Source: National Bureau of Statistics of China 2007b.

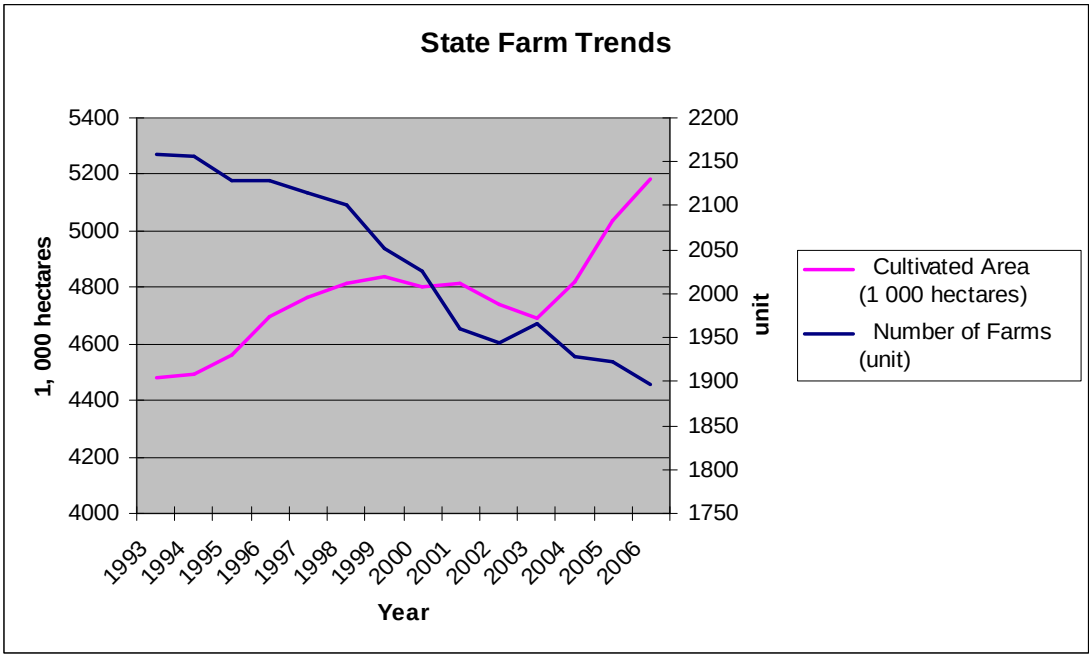


Figure 4.5. China State Farm Trends.
Data Source: National Bureau of Statistics of China 2007b.

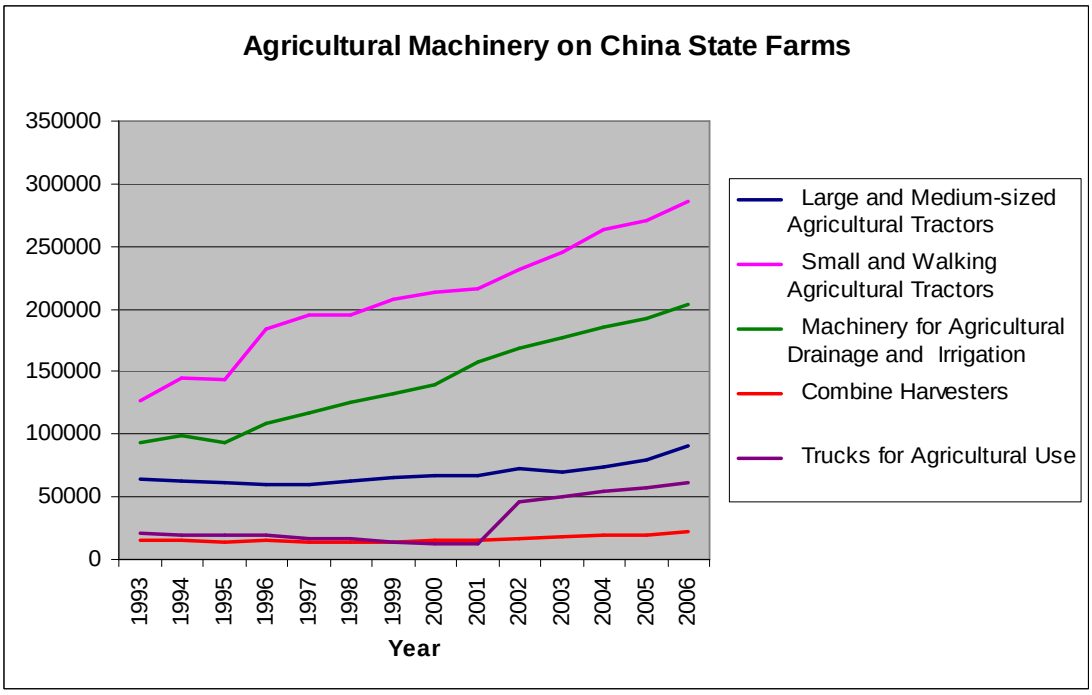


Figure 4.6. Agricultural Machinery Use on China State Farms.
Data Source: National Bureau of Statistics of China 2007b.

4.3 History of John Deere in China

The first visit to China by John Deere executives occurred in 1976. This visit was made by former CEO William Hewitt, who headed the U.S.-China Business Council that was then visiting China. Two years later, John Deere was invited by Chinese officials to participate in "Friendship Farms" where John Deere provided some tractors and combines to China.

> In 1982 the Ministry of Agriculture (MOA) and the Ministry of Mining and Engineering Industries (MMEI) approached Deere to enter into five 'Tech Transfer' relationships with Jiamusi and Keifang (combines) plus Shenyang, Tianjin, and Changchun (tractors). Deere saw this as an opportunity to become further entrenched in the market with one or two generation older technology. After ten years (1991), these tech transfer relationships were suspended with only Shenyang and Jiamusi actually having succeeded in adopting more than just Deere cosmetics into their own Soviet rooted designs (Doug Roberts, JDCI President).

The first joint venture for John Deere in China was set up in Jiamusi in 1997 and later became a Wholly Owned Foreign Enterprise (WOFE) in 2004 under the name John Deere Jialian Harvester Co. Ltd. (JDJW). Another joint venture, John Deere Tiantuo Co. Ltd. (JDT), was formed with Tianjin Tractor Manufacturing Co. Ltd. in 2000. This was done in part to gain further market share in the smaller horsepower tractors and to gain greater access to the Chinese agricultural machinery market. In 2005, John Deere opened a new

transmission factory in the Tianjin Economic Development area (TEDA) named John Deere Tianjin Co. Ltd. (JDTW). The most recent addition to JDCI is the acquisition of Ningbo Benye Tractor Co. Ltd. in August of 2007. Again, this joint venture gave greater capabilities to JDCI in producing low horsepower tractors and increasing market access. John Deere's history in China has spanned many decades and JDCI is continuing to grow. A timeline of John Deere in China is presented as Figure 4.7.

The case study of JDCI focuses on how this U.S.-based company has met the growing demand for agricultural machinery in China. As the study progressed, certain overarching themes were identified which emanated from multiple interviews. Some of these themes were of a general nature, such as standardized practices throughout the global industry. But most of the overarching themes were specific to the Chinese market. Those themes specific to China were used to help answer the inquiries of this dissertation. The themes identified were:

- Intellectual Property Rights (IPR)
- Government Relations
- Legal Environment
- Supplier Relations
- Fast and Growing Market
- Chinese Agricultural Machinery Market and JDCI's Marketing
- Order Fulfillment Process

I will now examine each theme in detail.



JOHN DEERE IN C

1912 San Francisco branch manager tours China in effort to establish trade relationships.

1972 U.S. President Richard Nixon visits China, establishing groundwork for economic relations. Deere begins cultivating business ties in China.

1973 Deere & Company CEO William Hewitt participates in first visit in 24 years to Peking by broadly represented American business delegation.

1975 Hewitt hosts Chinese delegation in Moline and Waterloo and on Walcott, Iowa, farm.

1976 Hewitt leads U.S.-China Business Council visit to China.

1977 Deere delegation visits Peking at invitation of China National Machinery Import-Export Corporation; Deere is invited to make mechanization proposal for 2,500-acre project in northern Manchuria.

1978 First major purchase of Deere farm equipment by Chinese for pilot farming project "Friendship Farm."

1979 Proposals requested for technology transfer and construction of two tractor factories and one baler factory; Chinese delegation visits Moline.

1980s China imports more than 600 John Deere tractors and components and other agricultural equipment. Deere trains Chinese scientists and engineers in equipment technology; Deere sells combine harvester and tractor technology to China.

1981 China Ministry of Agricultural Machinery selects Deere to provide design and manufacturing technology for combine harvesters; Deere transfers 1000 Series Large Combine Harvester manufacturing technologies to Jiamusi Combine Harvester Factory and Kaifeng Combine and Harvesting Factory, and transfers new tractor manufacturing technologies to three tractor factories in Tianjin, Shenyang, and Chang-chun. Chinese engineers and managers go to Deere facilities for technical training programs.

1982 Deere transfers advanced combine technologies to Jiamusi and Kaifeng combine factories.

1983 Deere agrees to sell technology for manufacture of several models of farm tractors and to provide assistance in modernizing three Chinese factories north of Beijing.

HINA **TIMELINE**

1984 Deere gets contracts to supply $25 million of farm equipment for mechanization projects in northeast China; purchase includes 400 large farm tractors, 500 grain drills, 60 planters, 200 cultivators, and 100 combines; Deere transfers tractor technology to tractor factories in Tianjin, Shenyang, and Chang-chun.

1990s Deere designs and produces cotton pickers for Xinjiang, laying foundation for modernization of cotton harvesting in China.

1994 Negotiations begin on two joint ventures, one to produce light-duty diesel engines and one to produce combine harvesters. Deere transfers manufacturing technologies of 1100 Series Large Combine Harvesters to Jiamusi Combine Harvester Factory in Heilongjiang Province.

1995 Letters of intent signed with both joint ventures. Deere opens a representative office in Beijing to help spearhead future business development in China.

1996 Deere opens sales office in Beijing.

1997 Deere signs joint-venture agreement with Jiamusi Combine Harvester Factory, creating John Deere Jialian Harvester Company Ltd., Deere's first equity investment in China.

1999 Sales outlet opened in Urumuqi in western province of Xinjiang.

2000 John Deere (China) Investment Co., Ltd. established in Beijing. Joint venture established with Tianjin Tractor Manufacturing Company, creating John Deere Tiantuo Company, Ltd. in Tianjin to manufacture tractors for China market; Deere completes purchase of all

2000 (cont.) foreign-held shares of Shanghai GE Construction Equipment Engineering Co., Ltd., a joint-venture rental company based in Shanghai; name is changed to Shanghai Deere Rental Equipment Co., Ltd.

2004 John Deere Jiamusi Works, previously John Deere Jialian Harvester Company Ltd., becomes a wholly owned Deere subsidiary.

2005 John Deere (Tianjin) Company, Ltd. established; Deere opens John Deere (Tianjin) Product Research & Development Co., Ltd., a wholly owned research and development center.

2006 John Deere (Tianjin) Company, Ltd., transmission factory opens.

2007 Deere announces it has agreed to acquire Ningbo Benye Tractor and Automobile Company.

Figure 4.7. John Deere in China Timeline.
Source: *John Deere Journal* 2007 : 6-7.

4.4 Intellectual Property Rights (IPR)

IPR issues and concerns in China relating to agricultural machinery have had a long-standing history. These issues relate to trademark, copyright, patents, and other IPR infringements and enforcement or lack of enforcement. It is estimated that about 20% of all products in the Chinese market are counterfeit or pirated (American Embassy in Beijing, 2004). Therefore, the interviews included questions aimed at identifying JDCI's experience with IPR in China. The questions also tried to identify how JDCI has dealt with these issues.

The president of JDCI indicated that on average, about 80% of IPR cases put through litigation proceedings in China are found in favor of the plaintiff (the company holding the IPR). Because of this, JDCI has made it a goal to actively pursue IPR violations. "If companies are willing to actively pursue [IPR], they will be rewarded" (JDP21).

JDCI is also developing new technology specific to the Chinese market and agricultural processes within the Chinese market. "The patenting process takes longer [in China] and is far from perfect, but John Deere plans to patent the technology they develop in China" (JDP21).

JDCI's Legal Counsel also discussed IPR as an issue and indicated that,

> IPR enforcement [in China] is an issue, but great improvement has been made especially within the last 5 years. Larger cities such as Beijing, Shanghai, etc. … have better enforcement with judges who

understand the new legislation and have some experience with it. Rural areas are a challenge and IPR legal action in these areas is sometimes not worth the cost of litigation (JDLC).

Because of this, JDCI completed a cost-benefit analysis of pursuing litigation on certain IPR issues. Sometimes, if the potential future harm of an IPR violation is large if left unchecked, then even though the immediate financial benefit is low, JDCI will take action.

Although JDCI has experienced IPR problems in China, the outlook relating to IPR future issues is toward improvement. Additional evidence of this is new legislation being considered by the Chinese government. “IPR legislation is being revised including copyright, trademark, and patent legislation and is planned to be ready in the next 1 to 2 years (2009-2010)” (JDLC).

Regardless of what new legislation is being considered, enforcement of IPR needs to be effective. New laws mean nothing without enforcement by government officials. Until adequate enforcement and legislation is in place, JDCI will be cautious about how its intellectual property (IP) is handled in China. This is especially the case for John Deere technology that is used in the production and design of new products in China.

Another example of IPR issues was mentioned by the Director of JDCI engineering and regards spare parts and accessories. He stated,

> This is where protection of IPR is important in a place where [the Chinese] are masters of duplication. Service parts can be a big

part of your business. Having the protection to avoid duplication of service parts is a challenge. If the part is relatively simple, it is easy for them to make it and sell it at half price (JDE).

Protecting IP before and after market is a priority for JDCI.

JD is very careful to protect IP they have in other places in the world besides China. They do this by restricting access of engineers and others in China into John Deere global systems. There isn't proof that China will deal with IPR issues or they may not be prosecutable through the usual systems. Expatriates have access to [John Deere global systems] but the Chinese do not. This also raises challenges for employees who need to get their jobs done but are restricted because of these issues. It is hard for Chinese John Deere engineers who want to be treated like any other John Deere engineer (JDE).

Because of the restrictions placed upon John Deere's Chinese employees as a method to protect IP, some adjustments to regular processes have been made. "They haven't had to redesign systems but they have had to adopt a 'just what we need' policy: getting agreement on what they need to do their jobs and get access to that and nothing more. In other areas [of the world], if you have access to the system, you have access to everything" (JDE).

As IPR issues continue to be a factor in China, JDCI has taken steps to protect their investments. They will actively pursue IPR violations and seek to utilize current legislation to protect current and future IP in China. JDCI

also exercises caution in how Chinese operations use current John Deere IP. Due to the current environment existing in China, restriction on IP access is necessary to safeguard John Deere technology. Adjustments to product development processes and procedures have been made to continue to successfully meet the demands of the Chinese agricultural machinery market.

4.5 Government Relations

Government relations are crucial to, and can be an effective part of, doing business in China. Because China has a centrally controlled government, new legislation can have a very quick and powerful effect on any business. Therefore, it is very important that any company understand how potential changes in government policies and laws will affect the business in the future. Local, provincial, and national government levels all have separate ways of affecting industry and business requirements and standards. As a company becomes better at cooperating with these decision-making officials, both the government and business can benefit from more transparent and efficient operations.

One example of how the cultivation of government relations has been beneficial was shared by JDCI's president regarding JDCI's harvester factory JDJW.

> A harvester company that received John Deere technology in the 1970's friendship farms now has set up a factory right next to John Deere Harvester factory and produces yellow and green machinery called Jiangliao John Deere. They would also stop customers from

> picking up their John Deere orders or would redirect them to their own factory. Therefore, John Deere petitioned officials to stop the use of the John Deere name or John Deere (who are investing and are the province's largest employer of 1,600 employees at that location) will stop production in that city immediately. Officials complied. To solve the other problems, more government relations are being developed to hopefully have the factory moved to a location other than the John Deere site (JDP20).

Because of good communication with government officials, a very important issue to JDCI's business was resolved. Further government relations will also play a key role in this and many other issues of JDCI doing business in China.

Sometimes, government legislation may not always affect business operations in the most preferred way. But it is still important to be a part of the decisions made to have the issue handled as smoothly as possible. This can often be challenging.

> Developing government relations includes many challenges. The Tiantuo John Deere factory is having to be moved to another location due to government economic development plans in Tianjin. The Chinese government has agreed to pay all of the relocation expenses but agreeing on this price has taken a great deal of time and effort over 3 years. A new factory is being built on the Joint Venture

(JV) partner's land in [TEDA] in close proximity to John Deere's already existing transmission manufacturing facility (JDP20).

The need to focus on government relations was explained by JDCI's president.

> Don't try and tell the Chinese government what to do, help them understand that you have some solutions to their problems. Show them how you can help the Chinese people and improve the current situation (i.e. setting up demonstration farms and showing solutions to the people and government and not just trying to collect the money or sell a product) (JDP21).

To further facilitate government relations, JDCI has recently hired a government relations manager to help them function more effectively in China. "As we matured as a global organization, we realized the benefit of driving government decisions here (or at least finding out earlier)" (JDP21). The new government relations manager "…will help [JDCI] see what is coming down the pipe and to influence it just as lobbying in Washington is useful" (JDP20).

Communication with government officials is something that JDCI constantly needs to do to be effective in their Chinese operation. Through their new government relations manager, better communication with Chinese government officials is occurring than would have been possible before. One example of how knowing what to expect in future Chinese legislation can be helpful regards workers' unions.

> The Chinese government isn't as open as the U.S., but they will send drafts of legislation out for businesses and organizations such as the American Chamber of Commerce and the U.S. China Business Council to comment and make suggestions on. They recently sent legislation regarding unions and John Deere is planning to offer a union option to all of its workers in China (JDP20).

Because a preliminary understanding exists regarding which potential legislation is coming, John Deere can be better prepared to facilitate any changes to its business that may need to occur relative to the proposed legislation.

This is especially important in China where legislation and policies are changing very rapidly. "The People's Republic of China has had policy changes in November 2007 and March 2008. Government policy changes frequently in China. Therefore, there is a larger 'policy risk' of doing business in China" (JDGRM). Because legislation changes at a rapid pace, it is also critical to communicate any concerns regarding new legislation before the legislation is put into effect.

> If there is something that JD believes would have a negative impact …they have an obligation to do all they can to help the MOA understand why and give them suggestions. In China they previously have had a challenge in doing so. The new government relations manager … is something that will help this improve (JDE).

A conversation with the government relations manager identified what has helped to facilitate government communication.

> A key contributor to Chinese government communication is that whatever your corporate goals are for China, they need to be aligned with the goals of the current government. You need to show a common interest. Then communicate this well and in a way that government officials will understand (JDGRM).

As these common goals are communicated, suggestions can also be made to help officials understand how one's business can help meet these goals. There may be issues affecting the industry, and as one is able to give viable, favorable solutions to these problems, future legislation may be improved to the benefit of the business, industry, and country.

A few of the current issues being considered by the Chinese government that JDCI believes are important to their business and the agricultural machinery industry are discussed below. Not only are specific issues important to these entities, but how they are handled and interpreted are also important.

Land reform, especially in regard to newly proposed legislation, is important.

> It seems the trend is to increase security of land tenure for Chinese farmers. One evidence of this is a change of wording in the new legislation from the previous 'chang qi' (長期) to 'chang jiu' (長久). The translated meaning is from the 'extended date' to the 'old or

ancient period of time' (JDGRM).

Food security goals related to grain production were also discussed by JDCI with Heilongjiang province given as an example.

> The responsibility of ¼ of the new grain increase is appointed to this province. To accomplish this goal, an increased [amount] of agricultural machinery will be required. Therefore, John Deere's relations with the national, provincial, and local government and an understanding of their implementation methods will be critical for John Deere's success in being a part of meeting this new demand (JDGRM).
>
> Large equipment would be required but the government is looking at a European manufacturer to fill that need because John Deere does not currently produce large horsepower (hp) tractors in China. The government also felt that John Deere's time in transporting large machinery to China was too long. This was mainly due to the government not requesting the machinery until a very late date compared to the date it was needed (JDGRM).

Therefore, helping the government understand why this occurred and how JDCI can effectively be a part of meeting this demand is a very important part of JDCI's business.

There are many organizations within the central government that determine legislation in China. JDCI was asked which government organizations they deal with most frequently. These Chinese government organizations are listed in Table 4.1.

Table 4.1. Chinese Government Organizations JDCI Most Frequently Deals With

Chinese Government Organizations
Ministry of Agriculture (MOA)
Ministry of Commerce (MofCom)
Ministry of Environmental Protection (MOEP)
Administration of Quality, Supervision, Inspection, and Quarantine (AQSIQ)
State Administration of Taxation
General Administration of Customs
China Banking Regulatory Commission (CBRC)
(A new ministry started March, 2008): Ministry of Industry and Information
Development Research Center (DRC)
State councils

Source: JDGRM.

Because government relations are an ongoing process, I inquired as to how JDCI can continue to improve these relations.

> Improvement needs to be made. The departments of John Deere need to communicate with the government together, in a sense, to allow John Deere to have a unified goal and voice that the Chinese government hears. Currently, different divisions of John Deere communicate directly with government officials to handle their separate affairs and issues. This has resulted in an uncoordinated and less efficient effort (JDGRM).

Being able to effectively build relations with government officials in China is an essential part of doing business there. National, provincial, and

local level relations all are important factors when implementing business operations and goals at each level. Understanding how to identify future changes in the fast-paced Chinese government will help any company become better prepared to do business in China now and in the future. Influencing and communicating with policy makers will benefit a business and the industry as both can make more well-informed decisions as a result of communication.

4.6 Legal Environment

China has a centrally planned economy with a legal environment much different from the United States. New and current legislation changes the way local or foreign-based corporations do business in China. The interpretation and implementation of legislation unique to China also affects what businesses must do to be legally compliant. The current legal situation and legal issues specifically important to the agricultural machinery industry and JDCI are highlighted and discussed. Three subtopics will be discussed: legislation, subsidies, and merger and acquisition (M&A)/ JV.

4.6.1 Legislation

JDCI's legal counsel explained some of the recent government trends in China. "The current regime (Hu jintao) is moving to a more individualistic approach compared to historical regimes. More legislation has been put in place or revised that is moving China in this direction" (JDLC). With a more individualistic approach, additional power is given to the Chinese consumer.

Increased numbers of products are now becoming available to the Chinese as well. The support of this approach allows more foreign businesses to be a part of the Chinese market. Therefore, businesses need to consider how this will affect their customers, their competition's ability to enter the market, and many other business factors.

4.6.2 Subsidies

A major legislative action which passed in 2004 has changed how the agricultural machinery industry functions in China. This action provided for the subsidization by provincial and national governments of the purchase of agricultural machinery by farmers. "To sell machinery in China you need to be on the government subsidy list. Regulations are very strict and once applied for, it takes one year to get on the list" (JDP20). As mentioned in Chapter 2, government subsidization of agricultural machinery purchases currently compensates farmers for up to 30% of the purchase price of machinery. Therefore, most farmers will not purchase machinery that is not on the subsidy list.

A conversation with a JDCI dealer again emphasized the importance of subsidies.

> Ninety-eight percent of tractors sold are ones that are subsidized. The subsidy is 30% of the price. One tractor is around 20,000 RMB. The 2% without subsidies are sold to farmers who don't want to wait a whole year to buy a subsidized tractor and because all

> of this year's subsidized tractors have been sold, they will purchase one (TD).
>
> Each province has its own variation on subsidy implementation. The agricultural machinery subsidies started in 2005 and this policy is very important to John Deere's business in China. After the PRC congress meets, implementation measures are addressed and decisions about implementation of policies are made. Each Ministry (and province) will have their own focus in the implementation of a particular policy (JDGRM).

Therefore, JDCI's focus on meeting subsidy requirements has to deal with each province's implementation measures.

An overview of the current agricultural machinery subsidy process and implementation was provided by JDCI together with additional information from the Organisation for Economic Cooperation and Development (OECD).

> Since 2004, the government has provided a subsidy for the purchase of agricultural machinery. The eligible entities are individual farmers but also so called specialised households and agricultural machine service delivery organisations. In 2008… the geographical coverage extended from around two-thirds of agricultural counties to all counties in China. The programme compensates the cost of purchases by reimbursing the purchaser or compensating the seller for 20% to 30% of the purchase price. The programme is implemented at the provincial level and it is up to local governments to decide on the

machinery and models eligible for the subsidy. The subsidy has been used to target the mechanisation of wheat harvesting and rice planting, but in 2007 trials started to include support for mechanisation of corn harvesting (OECD 2008).

To qualify for the subsidy list, some preliminary evaluations must take place. The list is updated once per year, and if the deadline is missed, the product is delayed an entire year from being placed on the subsidy list. This does not preclude a company from putting machinery on the market, but the machinery will most likely not sell well due to the high percentage of the cost covered by farmers if the government subsidy is not available.

> You have to sell 30 tractors before May-June timeframe and then give 5 tractors to the government to be tested and be evaluated. These 30 tractors are sold at a lower price and then followed and documented to help in the evaluation. By the end of the year, the MOA makes their decision on additions to the subsidy list. They will allow John Deere and others to make minor changes after the approval (JDAPM).

Part of qualifying for the subsidy list is to have each tractor model comply with safety and performance testing.

> Understanding the MOA requirements for subsidy is something that everyone in their organization in China has had to understand and they have learned a lot regarding this. The objective of the MOA is similar to the Nebraska test that confirms that farmers are getting what

they are paying for and not getting junk. It tests horsepower, drawbar power, torque rise, fuel economy, safety, noise, and others (JDE). "Things that the government evaluates and tests include: brakes, draft power, drawbar power, PTO, hydraulic lift power, noise, specifications, and others" (JDAPM).

The level of subsidy provided to farmers has been increasing every year since subsidies were implemented (see Figure 4.8).

The subsidy fund increased from CNY 480 million (USD 58 million) in 2004 to CNY 3.3 billion (USD 439 million) in 2007, including CNY 2 billion (USD 266 million) from the central government and CNY 1.3 billion (USD 173 million) of so called matching funds from local governments. In 2008, the fund from the central government alone increased to CNY 4 billion (USD 580 million) (OECD 2008).

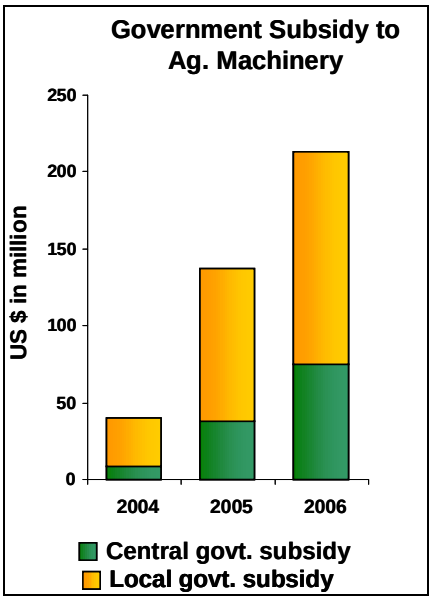


Figure 4.8. Chinese Government Subsidy Levels.
Source: JDCI.

This trend indicates that increasing investment in agricultural machinery is a high priority for the Chinese government and further changes in subsidy legislation and implementation will continue to greatly affect the agricultural machinery industry.

Not only are subsidies for agricultural machinery increasing, but the requirements to receive placement on the subsidy list are changing.

> The MOA also plays a key role in advancing agriculture by mandating what technology they want to see in tractors used in China. An example is that all transmissions must be collar shift or constant mesh transmissions. This can drive innovations [in the Chinese agricultural machinery market], even though they already exist in other places, it is something that will speed up technology (JDE).

The customers may not ask for it and they may not care much about the added cost of production resulting from the addition of new technology, but because the government mandates that new technology be incorporated into new machinery, it will be adopted faster. These technology mandates are a unique part of China's legal environment.

These agricultural subsidies are part of the Chinese government's plans to help increase farmer productivity and rural incomes. Other new agricultural policies were discussed in Chapter 2. As Chinese government investment in agriculture has continued to increase (see Figure 4.9), the likelihood of farmers being able to invest in machinery has also increased.

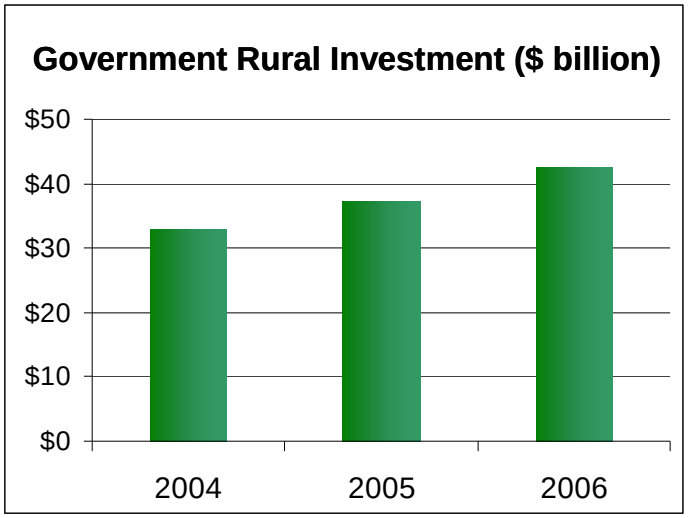


Figure 4.9. Chinese Government Rural Investment.
Source: JDCI.

This is another indication of long-term improvement of the machinery industry as well as governmental support of the Chinese agricultural machinery industry. Additional evidence that government subsidies are changing the Chinese farmer's purchasing decisions and increasing the demand for agricultural machinery in China is obtained from interviews with the farmers.

> CF1 "Farms 300 mu which is rented, owns 30 mu, and does service contracting on 600-700 mu. This is his 2nd year of farming with his current tractor which is an 80 hp John Deere tractor bought in Oct, 2007. He previously has owned a 10 hp tractor purchased in 1988" (CF1).
>
> CF2 "Contracts 400 mu and owns 200 mu. This is his 1st year farming (2008) with his two new 82 hp John Deere tractors. He previously purchased in 1990 a small 15hp tractor" (CF2).

CF3 “Contracts 300 mu and owns 10 mu. 2008 is his first year farming with his new 82 hp John Deere tractor. He previously purchased in 1987 a 55 hp Tiantuo tractor and a small 12 hp tractor” (CF3).

CF4 “Contracts 400 mu and does farm any of his own. This is his first year farming with his new 82 hp John Deere tractor. He previously purchased in the 1980’s, two small 12 hp tractors” (CF4).

All of these farmers purchased their first tractors in the 1980s and have not decided to purchase larger and newer equipment in comparison until recently when subsidies have been implemented. Increasing farmer income is also a factor, but these farmers also indicate that government subsidies have sped up their decision.

The increase in agricultural machinery numbers have also had additional effects on the number of mu service contracted by farmers and therefore will affect their ability to increase income from agricultural machinery investments. The farmers mentioned that in this area, on average, they would service contract 600 mu, but this year, more tractors are being used and, as can be seem in the above quotes, most farmers are servicing annually less mu than before.

4.6.3 M&A/JV

Setting up new businesses and the location of businesses are also regulated to a degree by the Chinese government. When companies wish to grow using M&A options, the Chinese government must first approve the action. This also occurs in the United States under certain circumstances

when very large companies are involved in the M&A action and anti-trust issues or national security issues may be involved. But in China, government approval is always a factor, especially when a large number of competitors are SOEs.

Recently, JDCI acquired a privately owned Chinese competitor, Ningbo Benye. This was done to increase market share and to enhance low-hp tractor production. Government response to this acquisition was positive.

> The Government was very supportive of John Deere. John Deere has history with the Chinese government through technology transfers and friendship farms. Within the 30 years of the Chinese opening, many companies have come and gone, but John Deere has stuck with it. The government has been very supportive of John Deere because they know they are trying to help the Chinese farmers and the Chinese people (JDP21).

However, not every joint-venture or acquisition is always approved nor is this always a smooth process through the Chinese government. One example is the recent attempt at acquisition by Agco.

> Agco [has] tried to acquire a majority share in China First Tractor [Co.] (CFT) over the last 1 and ½ years and was unsuccessful as the government decreed that at no time will a foreign entity own any part of CFT. Agco's Chief Executive Officer (CEO) sent a letter of complaint stating things about the Chinese government and doing business in China that John Deere thinks are inflamed statements and

many of the things stated, John Deere believes are not true about doing business in China (JDP21). (The letter from Agco is cited in Marsh 2008).

JDCI shared their insight as to the reasons why some companies have been more successful than others in penetrating the market and growing their operations in China through M&A and JVs.

> The government's viewpoint of FDI [foreign direct investment] has changed overtime. When John Deere has created JVs, other FDIs 10 years ago, China really needed FDI. Today they are becoming more of an equal across the globe and they have tightened the clamps on who they will allow to invest in China. The U.S. does the same thing when FDI occurs in industries they believe are critical to national securities. When China's CNOOC (China National Offshore Oil Company) wanted to invest in Chevron, the U.S. believed it was not in the interest of national security. China's construction industry is very protected and nothing higher than a 50/50 JV will currently be allowed to occur (JDP21).

> Agco wanted to have a majority stake or to wholly own CFT, who is one of the largest tractor producers in China. Therefore China viewed CFT as a critical SOE. Benye was previously part of CFT and then became its own SOE and later was sold to a private investor and finally John Deere purchased Benye from the private investor (JDP21).

Because of this, government restrictions and scrutiny were less than would occur if an SOE was being acquired by a foreign company.

JDCI's legal council provided additional insights about how the Chinese government views M&As.

> Anti-Trust legislation was enacted in August of [2008] and requires that if a company wishes to do a merger or acquisition they must file with the government and if there are no challenges to your proposal within 30 days then it is approved. If the plan is challenged then it goes through a process of validation. When acquisitions of state owned enterprises (SOE) occurs, it is a more sensitive issue and is treated with care ([to ensure that local economical impacts are favorable.]) If any M&A will place the new company with a majority of the market share, then it is not allowed (JDLC).

"Sometimes acquisition decisions are black and white but other times the government beats around the bush and, in a sense, drags things out as in the example of Agco. The government first gives peripheral reasons and after 1 and ½ years, the real reason is stated" (JDP21).

Because a JV or M&A can provide a foreign company with many advantages in the local market including established brand names, Chinese employees and, to some extent, a dealer network, M&As and JVs have been the preferred methods for entering the Chinese market by many large MNCs in the agricultural machinery industry. In 2001, CNH formed a JV with Shanghai Tractor and Internal Combustion Engine Corporation producing

low-hp tractors for the Chinese and export markets. This JV formed Shanghai New Holland Agricultural Machinery Co. Ltd. (Business Editors 2001). Mahindra & Mahindra have also set up a JV with Jiangling Motor Co. Group. in 2004 forming Mahindra (China) Tractor Co. Ltd. (Hindu Businessline 2004; Jimtrade 2005).

Establishing any organization requires consideration of legal issues. JDCI's experience in China has contributed to the strategies used to expand in the Chinese market.

> John Deere has taken different approaches to setting up operations. They first started out with technology transfer agreements. After that, based on the Chinese regulations, they could only do joint ventures with SOEs. Later they allowed this to occur with other entities as well. The ideal they would like is 100% John Deere owned companies unless there is a very strategic decision to make a JV (JDOM).

Currently, the Chinese government has some basic requirements for building a new facility.

> In setting up a new factory or location in China you must do a feasibility study that is somewhat like validating your business plan with the local authorities. This includes your investment plan, products, scale, estimated capacity, material usage, etc. An environmental impact study and articles of association are also required (JDLC).

It was asked of JDCI's president if there were any business strategy details that the Chinese government required to become established in the country. "No. There are details that the government requires to obtain building permits such as the capacity of the factory and what is intended with the use of the land, etc…" (JDP21).

As China continues to address its many legal issues and to pass legislation in accomplishing government goals, businesses need to understand how China's dynamic legal system will affect their operations and the market in which they work. In the agricultural machinery market, government subsidies are a driving factor. Regulation of how a foreign company can grow is also very important to consider in successfully meeting demand for agricultural machinery in China. Establishment of a new factory or facility is also regulated to an extent. These issues of the Chinese legal environment are not all that exist in the agricultural machinery industry but they are some of the main legal challenges and differences of doing business in China that JDCI have dealt with and learned from.

4.7 Supplier Relations

One of China's competitive advantages is labor-intensive goods, because the cost of labor is low compared to developed countries. This is a primary reason why JDCI has about 90% of their suppliers from China. The other 10% of suppliers are those who supply the most technically advanced parts. Manufacturing by any company in China will include the utilization of Chinese suppliers. These can either be privately controlled or SOEs under

government control. Both kinds of Chinese suppliers share similarities and also have unique challenges that they bring to the Chinese agricultural machinery industry. “The frequency of supplier issues in China is much higher. One reason is that they are new to the global market and don’t have the experience of traditional suppliers” (JDSCM). Some of these supplier issues that JDCI has encountered are discussed.

Because of the growing market in China, there are many companies competing for the same group of suppliers. When asked about supplier competition JDCI’s supply chain manager mentioned that “It is fierce. However there are many opportunities in China. There is more than one industry competing for the same suppliers.

In China, the view regarding suppliers is that they pick you, not that you pick them” (JDSCM).

JDCI has focused on their core values in choosing suppliers in China.

> John Deere cares, and integrity is one of their core values. They can’t afford to beat up on suppliers. Compared to other customers, such as [the] automotive [industry], John Deere’s volume is low. Therefore, they rely on their core values, respect for the supplier, and their reputation, and longevity as a company. They also want to nurture and develop their suppliers and the relationships with them (JDSCM).

Having to work with available suppliers if they do not meet all desired requirements of JDCI is more essential in China. This is due to the volume of

product that JDCI produces compared to other industries such as the automotive industry that utilize the same suppliers. Suppliers that are reputable and require little development are not always interested in JDCI because of their volume. This is a challenge of the Chinese agricultural machinery industry, not just for JDCI.

JDCI wants to help develop their suppliers to facilitate and protect JDCI quality while saving both JDCI and the supplier time and money. "These supplier relationships and the opportunity to build these relationships are very important. [JDCI] wants these relationships to improve. Therefore John Deere has invested much into their Chinese suppliers; an 'army of resources'" (JDSCM).

> Supplier certification is not a single department's decision. It's not always the lowest cost supplier that is used. Quality, engineering, supplier attitude, and others are all part of the decision to use a supplier. If the supplier has the attitude of not willing to move forward and change what the company needs, there is not much that John Deere can do to help or change that supplier. It blocks John Deere-supplier relationships (JDSCM).
>
> It is a challenge for John Deere and others in China to develop, train, and change the corporate thinking and culture of suppliers. Standardized work and Pre-production Approval Process (PPAP) is used to help suppliers with their production process and then be ready for mass production. Helping suppliers to realize that if change occurs

(especially after PPAP) it first needs to be approved by their customer [(JDCI)] (JDSCM).

Another method that JDCI has implemented in developing their Chinese suppliers is through incentive programs.

Incentive programs are used but they are not monetary incentives. John Deere will offer training, management tools, assessments, recommendations, and other supplier development methods (lean training, technical professionals, etc…) as an incentive to suppliers to become better and more efficient. This usually turns out to be a win-win situation as suppliers save costs, increase efficiency, consistency, quality, etc. … and John Deere benefits from a more standardized product or process and less problem solving efforts are needed (JDSCM).

Remote sourcing in China is a challenge as suppliers often use this practice. You cannot have this occur because you cannot guarantee ‘no change’ from the remote sourced supplier products or processes. You must physically verify supplier products and processes and use spot checks and ‘no knock’ visits to discover the unknown and see or prevent problems. You have to quantify the intangible qualities of a supplier. On the outside or first look, they may seem to be a well organized and upscale company, but the unknown parts need to be understood as well (JDSCM).

These supplier issues are points in the Chinese market that seem to require additional attention and investment to facilitate smooth operation in the company.

> One good view to have regarding Chinese suppliers is that seeing is believing. Don't take what is on paper for granted. Not just seeing the [product], but how it is made and the supplier process that is implemented. You need to know China to understand how to do business in the Chinese environment (JDSCM).
>
> Many local or indigenous suppliers such as Ningbo Benye (before acquisition) often setup supplier relationships with a one page contract or through a 'gentleman's agreement'. This can be very unstable with no defined way to handle issues, problems, or guarantee performance especially if management is changed and the new entities have to start from scratch in establishing these relationships. John Deere spells out in black and white, what is expected and if not met, how it will be dealt with. In this way, regardless of management changes, the structure is laid out and in place to keep a stable environment and guarantee John Deere standards (JDSCM).
>
> Advanced Product Quality Planning (APQP), in-house Change Management Change Process (CMCP), a documented track record, management of sub-suppliers, project management, and other tools are things that suppliers must have to minimize risk to the company. These are sometimes lacking with Chinese suppliers (JDSCM).

> If [the necessary] variables are not present, it doesn't always disqualify [the supplier]. All areas are assessed and scored with a scoring process to determine supplier capability to meet JD needs. In some cases, as companies are acquired, their suppliers follow and sometimes these suppliers do not meet John Deere criteria. Therefore they reassess them, train them, and give them a timeline to close the gaps which are not acceptable to John Deere (JDSCM).

"Sometimes it is strategically beneficial to use more than one supplier for supplying the same part to minimize your risk. Because of program deadlines, if a supplier falls through, emergency sourcing is used to make sure the program is not delayed" (JDSCM). All of these supplier relation practices used by JDCI are helping to ensure a reliable supply base to minimize risk and cost of delays and quality issues to their organization and to the Chinese customers.

> Some problems are larger than others. Sometimes certain issues such as language barriers, translation issues, and others just need to be taken note of or allow the company to be aware of. English capability of employees doesn't have to be perfect, but needs to be adequate enough to communicate with your customers and their concerns (JDSCM).

Part of managing Chinese suppliers is the common situation of gaining additional suppliers when JVs or M&As occur. Therefore, supplier consolidation may occur more frequently in Chinese business. "As John

Deere grows they want to maximize overlap of supplier usage and to help their suppliers to become bigger and to give them more business" (JDSCM).

JDCI has learned from working with Chinese suppliers and has adjusted some of their traditional production processes in effectively implementing changes with Chinese suppliers. One example came from JDCI's GT5 transmission manager.

> The U.S. engineers do not understand the Chinese supply base very well. As they implement changes, they may not have in mind Chinese supplier capabilities. Sometimes [Chinese] suppliers can not make the product to print, and if they can, sometimes it can only be done in a very costly way. Once John Deere realized this problem, they brought the U.S. engineers and Chinese suppliers together to discuss DPAR (Design Process Assembly Review) to insure the design part satisfies the functions needed and can be manufactured in a cost-effective way. It is not cost-effective to keep U.S. engineers in China for a very long time. Therefore, engineers in China play an important role in helping this connection as they communicate with U.S. engineers and can readily visit Chinese suppliers to work together on these issues (JDTPM).

SOEs are a major factor in the Chinese supplier base. Because of being government policy driven and not having to guarantee making a profit, there are additional challenges that occur with these types of suppliers.

SOEs sometimes will change a direction. They sometimes want you to do a joint venture with them. As many MNCs come to China, many suppliers will use attractive pricing to lock in their business and then afterwards, the unseen issues surface and you are left with a big problem (JDSCM).

John Deere has learned a very important lesson from the Chinese suppliers. State-owned enterprises (SOE's) have a very underdeveloped management system so when you do business with those kinds of companies, you have to follow every problem from start to finish. Sometimes they give you a low price to get your business. Afterwards, when production starts, they will ask for a price increase and you may not have as much flexibility in dealing with the situation. The cost of changing suppliers may be more than the price increase. If using an SOE for a very critical part of a product, you need to have a backup supplier planned in advance in case things go wrong, to insure your product can still be produced on time. Sometimes if an SOE has problems, John Deere's alternative suppliers are not interested because of the volume John Deere uses. Often these alternatives supply much of the automotive industry, which on-time work is difficult for SOEs to understand. John Deere has to develop these suppliers very carefully and they use John Deere employees to validate that these suppliers did their job correctly (JDTPM).

Chinese suppliers are not as developed as JDCI's traditional markets and as a result, need additional and more frequent attention. Language, business culture, and many other factors unique to China are important in Chinese supplier relationships. SOE suppliers can bring additional challenges in dealing with supplier problems, pricing, timing, and other issues that are important to being successful in doing business in China. Selecting and working with reliable suppliers and facilitating their development have assisted JDCI to meet cost, quality, and timing goals in bringing to market agricultural machinery.

4.8 Fast and Growing Market

China's economy has grown at an impressive rate. During the last decade (1996-2006), gross domestic product (GDP) has almost tripled (see Figure 3.1). One article produced by Standard Chartered Bank compares China's rate of GDP growth to other nations. The annual GDP growth rate in the United States only takes about 3 months to achieve in China (Green 2007). This likely is a good indication of how the agricultural machinery market in China is growing as well.

During my visit to JDCI operations in the cities of Beijing and Tianjin China, multiple construction projects were observed next to virtually every main road and highway. New orchards and greenhouses were also observed. Not only is China's infrastructure changing, but Chinese consumers are being offered more products and many of these consumers can afford these new products. Because many companies are racing to capture a part of the

emerging Chinese market, it has created a very fast-paced business environment.

During the interviews almost every division of JDCI mentioned the faster speed of operations, compared to John Deere's traditional markets, that is needed to meet demand in China. "China is changing and developing very quickly. Its government and laws are also quickly changing" (JDLC).

JDCI's supply chain manger described how JDCI has adjusted to this Chinese business environment. "John Deere normally would do supplier auditing once every two years [in their traditional markets]. In China that is too slow and auditing is done every six months to keep up with the rapid change that is occurring in the country" (JDSCM).

JDCI's business strategy in China has also adapted to the fast-growing agricultural machinery market.

> Because John Deere usually takes four to five years to develop a new product and have it ready for the market, they have decided to use other entry strategies, such as acquiring Benye, to enter the small tractor market quickly and in only one year. If they cannot keep up with the speed of their competitors introducing new product into the market, they will lose out on market share (JDBDP).

Not only has JDCI used different market entry and growth strategies because of the rapidly growing market, but these lessons have also been applied to John Deere's global operations. For example, JDCI has needed to bring new products to market at a faster rate than for that at which their

traditional processes were designed. This has helped them to decrease their design and production time to capture more of the Chinese market. JDCI's director of engineering discussed what JDCI has done to increase the speed of engineering new products for the Chinese market.

> They have not only had to challenge themselves but they have had to modify some of their global processes to match up the scheduling of requirement for approving products for the MOA subsidy list. Because of this they have had to pull work forward to meet their deadlines. If they didn't they would lose a whole year (JDE).

> Challenging their traditional process has been beneficial for John Deere because it demonstrates to John Deere how to bring product to market faster than they previously have. This is especially critical in growth markets such as China. John Deere's senior leaders have realized that this can be helpful in decreasing the time needed to develop products and this can be used in other markets as well (JDE).

Developing new products in China is utilizing basic designs to meet specific Chinese agricultural needs. Due to the fast-paced agricultural machinery market, John Deere is learning how to improve the speed of product development worldwide. Refining product development processes in China not only gives John Deere experience in rapid product development but also helps JDCI's position with Chinese government officials.

> Technology development is advanced technology for China, but compared with other parts of the world, would not be advanced. It is

not rocket science but it is a start. It is nonetheless, Chinese technology developed by Chinese engineers. This is helpful to John Deere because this is one of the goals of the Chinese government to help develop their nation (JDP21).

Part of this growing market is developing products unique to China's agricultural processes. "Seeders, tillage equipment, roto-tillers, rice transplanters and others are being developed especially to help develop product lines to allow more exclusive dealer arrangements" (JDP21).

As JDCI engineers develop products for this market, it is sometimes hard to know what the Chinese farmer wants because most farmers in China have never had agricultural machinery before.

> It is much harder to determine the customer requirements for a tractor or combine in China than in other, more established countries. Part of the reason is that China is not mechanized (only about 40-45% mechanized). How do you know what they will value? They don't have the experience to know what they want. It is hard to understand what the customer is thinking and what the product requirements are and if engineering doesn't understand that, they are lost (JDE).

This is a challenge and an indication of a growing economy and market.

JDCI manufactures products in China for the local market and for the export market. A great indicator of the growing Chinese market is the percentage of product JDCI manufactures for export. "Approximately 3% of our combine units are exported. These mainly go to Zimbabwe and Russia.

Approximately 1% of our tractor units are exported. These go to many countries, with the majority going to Pakistan, Thailand and Mozambique" (JDOFS). Currently, the vast majority of products are made to fill demand in the local (Chinese) market. Even though the Chinese economy currently offers many advantages to exporting finished, Chinese goods, JDCI is producing to fill the local demand.

As China continues to support and increase agricultural mechanization of farming, the agricultural machinery market will continue to grow at a rapid rate. This has caused JDCI to alter their production and development processes to keep up with the dynamic changes and increases in agricultural machinery use. Not only has JDCI adapted to market and government requirements to successfully meet this demand, they have been able to learn how to increase their global process efficiency and speed to improve John Deere's ability to meet demands in other markets.

4.9 Chinese Agricultural Machinery Market and JDCI's Marketing

There have been many factors associated with the Chinese agricultural machinery market that have been previously mentioned. This section focuses on a more detailed analysis of this market. Current Chinese market practices and conditions in the agricultural machinery industry and how JDCI has handled this market are also discussed.

In China, tractors and other forms of agricultural machinery are relatively new to the Chinese farmer. But the market for tractors in China is

growing rapidly and the number of firms selling tractors in China is increasing. One reason for this is the relatively small amount of investment needed to enter the Chinese market.

> Around the world most customers are willing to pay for better technology in higher hp tractors. That is why John Deere has been the large hp leader. When you decrease the hp, tractors become somewhat of a commodity. Everyone can afford to take the risk in entering the market. That is what Foton did. They previously were in the auto industry and decided to enter the agricultural market producing a low performing, nice looking tractor. In four to five years they became the market leader [in China]. It shows how dynamic the Chinese market is. Even though their quality was not good in the beginning, they were successful because the Chinese customer is very forgiving. If the tractor breaks but they come and fix it for free, the customer is happy (JDOM).

This illustrates how quickly competitors can become large players in a growing market.

To compete against these companies, JDCI has continued to offer higher quality products and to build their reputation in China with the long-term market in mind.

> Therefore, the only way John Deere can compete is to offer a lot of value to the customer. This is why JDCI is gaining more market share in China. Customers need to understand efficiency and that

they make more money when their equipment doesn't break as much. They are starting to do so like customers in other developed markets (JDOM).

The agricultural machinery market in China is composed of MNCs and many local companies, including privately owned corporations and government SOEs. In Figure 4.10, the market shares for the main competitors of the Chinese market are illustrated.

Because JDCI acquired Ningbo Benye in August 2007, they are transitioning the Benye brand to the John Deere brand. This increased their market share dramatically. When combining JDCI's and Benye's tractor market percentages, JDCI's total market share is 19%, or the #3 Chinese tractor market leader.

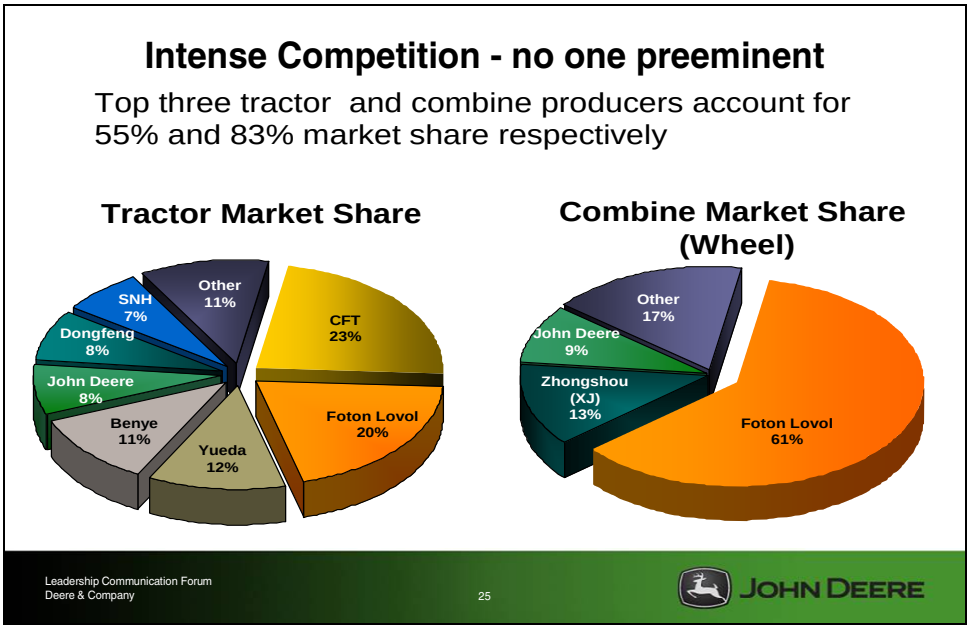


Figure 4.10. Chinese Agricultural Machinery Market Share Breakdown.
Source: JDCI 2008.
Notes: SNH is CNH's JV: Shanghai New Holland. CFT is China First Tractor, an SOE.

John Deere's long-term presence in China has given them experience and time to develop the necessary infrastructure and marketing networks to do business successfully. More recent MNC additions to the Chinese market are in the process of developing these business components. "Having a presence in China is an advantage and their competition is just getting here. Therefore, they need to establish everything that John Deere is already using such as a dealer network" (JDP21).

Competition in the Chinese agricultural machinery market has some unique aspects—SOEs are one of these. Because SOEs are structured by government officials, they do not always need to make a profit and, even if inefficiently operated, will not go out of business. This is because of government backing. This situation causes other local or MNC competitors to operate at a disadvantage to the SOEs in the Chinese market.

> Sometimes it is an even playing field as MNCs compete in the market (Such as CNH competing against John Deere) but as MNCs compete against SOEs they are many times at a disadvantage. The role of the SOEs is to keep people employed, not on returns and this causes them to not have to worry about inventory and many other things that MNCs do have to. It is the Chinese government's rules. An example: John Deere Apollo 120 tractors were forecasted too low as demand peaked. China First Tractors (CFT), an SOE, had plenty of inventory and sold it in the absence of the John Deere tractors in the market. This was John Deere's fault in not preparing for the demand

but CFT had the advantage due to not having to manage inventory as tightly (JDP21).

If the SOEs run out of money they go get more from the government; John Deere would go out of business. The SOEs also use bribes or put products on the market that don't meet MOA requirements. These are things that John Deere will not do. Example: Tractors are certified by model and have a noise requirement. There is a John Deere tractor which met the requirement with their cab version, but their open operator station did not. Even though it technically would be approved on the subsidy list, John Deere took the open tractor and reengineered it to meet the requirements. This added cost will not be seen in their returns as Chinese customers don't care about the noise requirements (JDP21).

"John Deere's S-tractor did not meet the noise requirement so they had to redesign the whole platform to do so. The competition did not meet the requirement as well, but they were approved anyways" (JDOM). These examples describe how SOEs are an important part of Chinese market competition that have certain advantages in gaining market share.

Common market segments in China are comprised of state farms, large land contractors, and private service contractors. The large majority of JDCI's current customers are in the service contractor segment. This makes sense due to the number of service contractors in China. Most Chinese farmers do not have large farms and there are a limited number of state farms,

compared with the number of private Chinese farms. Even though there are many farmers without agricultural machinery, they are willing to pay a small fee to service contractors to plow, plant, till, and harvest their small farming acres. These service contractors are investment payback driven and are very price sensitive. “Customers are not very loyal. For a tractor, they will change brands for only 100 RMB” (JDM).

To effectively meet Chinese demand for agricultural machinery, JDCI has made some adjustments to their marketing processes.

> Pricing is [something] they have had to adjust. John Deere imports products, figure their margin and then give their price to the dealer to do with what he likes. For locally produced products, they set the retail price plus freight (varying on location). The dealer takes that retail price and gets a 2% margin. If they don’t tell the dealer that this is the minimum price that they will sell the product to the customers, the dealer sometimes discounts their entire margin to the customer. Based on their metrics and sales, they give them a year end rebate. There are very few dealers that will add their own margin on top of what John Deere gives them (JDM).

Market forecasting in China has been very difficult for JDCI due to the frequent changes in government policies.

> In general, the government efforts and investment in boosting grain production and building a harmonious society keep the demand for agricultural machinery high, driving demand towards larger hp

> tractors but it destroys the normal market rhythm and normal seasonality of sales, making forecast almost impossible (JDCI President, JDM).

Forecasting methods in China are something that JDCI has needed to develop. This is discussed in the following section.

Advertising has also been adapted for local conditions. Some of John Deere's standard publications have been tailored for China.

> John Deere also prints two of their own magazines called *Furrow* and *Harvest*. *Furrow* is targeted for dealers and government officials while *Harvest* is targeted to generate new customers. These have helpful farming articles and John Deere advertisements. They also advertise in *Agricultural Machinery* and other local, provincial, and national agricultural magazines. This is important because government officials will view these (JDM).

Government officials have a powerful voice in agricultural policy matters, especially agricultural machinery subsidy list candidates and requirements.

The most effective forms of advertising include demonstrations and county fairs where Chinese farmers can see how agricultural machinery works. As many have never owned machinery, hands-on demonstrations explain better than words the benefits to the farmers.

> JDCI will also work with provincial agricultural bureaus to sponsor a John Deere Cup which will quiz farmers on their agricultural knowledge and other agriculturally related competitions. They also

> have John Deere Star in some provinces. This is a ranking they will give to customers who are using John Deere products and have the best income in a year; JDCI will give them a tour of a factory and give them a small gift and some recognition (JDM).

Another reason for advertising through demonstrations is, regardless of literacy challenges, the farmers will still understand what JDCI's products are. One literacy challenge is recognition of the John Deere logo. "It has the words 'John Deere' under the leaping deer, which customers cannot read. JDCI has looked into creating a logo with Chinese characters instead of the company's English name" (JDM). However, most of JDCI's target market has adequate literacy rates. "Most of the rural residents who are illiterate would not be able to afford a John Deere tractor in the first place. Most of their target market has at least a high school education" (JDM).

Depending on the location in China, certain advertising methods may be more effective than others.

> In central China where there is a more dense population, drive through road shows, town and village fairs, are all methods used to demonstrate their products. In Northern China it is colder in winter, making it harder to do demonstrations before the new farming season. Therefore, before the weather forecast, they will do some television advertisements. Radio is not used much (JDM).

Soft news is another form of local advertising that JDCI uses. “John Deere employees write articles about their products and then publish it as news” (JDM).

Internet advertising is only used a little, and this kind of advertising is a method that JDCI plans to use more frequently.

> Only about 5% of John Deere customers use computers, but this 5% will influence even more customers. As these computer savvy customers are asked about their opinion regarding agricultural machinery, they have the opportunity to affect many people. Blogs are important. If there are negative comments about John Deere products, they need to quickly handle them. John Deere would like to see and encourage more positive comments and consumer feedback from their customers on the Internet. One example of these types of blogs is www.veryam.com (JDM).

Dealer advertising is a very important part of JDCI’s marketing. **“**If there is an initiative that John Deere is trying to push that will not necessarily bring direct profits to dealers, John Deere will cover 100% of the cost. If there is a potential that it will increase sales for dealers either short-term or long-term, the dealer covers 50%” (JDM).

The dealerships are the most frequent end-user contact and they can have a large effect on marketing effectiveness, especially at the local level. A JDCI dealer in northern Hebei discussed what marketing measures he had implemented. “Radio, television, newspaper, road signs (tollbooth lights),

local bus television ads and grass root marketing tools have been used. We give great service and they were the very first dealer in the area and have a long history. People have known of [the dealership] for a long time" (TD).

Chinese dealerships are very different from John Deere's traditional markets.

> It is like a farm and fleet or tractor supply store that carries every brand and just wants to make a sell. You wouldn't recognize the dealership as a John Deere dealer and the only time you would see a John Deere tractor out front is if they knew you were coming or they are about to deliver it. The territory manager would be the one doing the sell job and telling customers why John Deere is better than competitors. John Deere does have some exclusive dealers but they are scattered around the country and only about 5% of dealers are exclusive. JDCI has no owned and operated dealerships [in China] (JDP21).

To better understand the dealings of a typical Chinese agricultural machinery dealer, a visit was made to a dealer in northern Hebei. During this visit it was observed that the dealership sold many different brands of agricultural machinery, as well as utility trucks and automobiles. They had several locations for demonstrations and classes about using agricultural machinery—a different location for different brands. The two main brands of tractors sold were John Deere and Foton, with 70-80% of the products being John Deere and the remainder being Foton.

The demonstrations offered by this dealer have proven to be an effective marketing tool.

> Training is offered twice a year to farmers who would like to come and participate; they do not [need] to be customers. This offers them an opportunity to also demonstrate how their products work. There are about 100 farmers annually who come. This is about 90% of their customers. The few customers who do not participate are those who have been using machinery for a while (TD).

When asked about what qualities in tractors that Chinese customers prefer, the dealer gave feedback ranking the most common to the least common. “Horsepower, brand and price, cost function, looks (cosmetics), ease of operation, and after-sale service” (TD). The importance of these characteristics to the Chinese farmer is crucial in understanding how companies can better improve their market and meet the demands of Chinese customers.

Some challenges with Chinese dealers include the different ways that JDCI’s competition does business with these dealers. This dealer discussed how JDCI’s quality is superior to other brands but other brands are catching up. Also, JDCI’s competitors give greater incentives to their dealers than do JDCI to their dealers.

> The net income that a dealer can make from a John Deere tractor is around 2,000 RMB and the rebate from the same size of tractor from Foton would be about 4,000 RMB. If John Deere does not

have good promotion/incentives for their dealers, it is hard to ask the dealers to fight for more sales of their brand. All of [JDCI's] incentives for their dealers combined are still less than other brand incentives. This occurs throughout China, not just in this province (TD).

John Deere's advantages of good applications and quality have, in the past, been way ahead of the competition. Now that gap is closing as competitors improve their products and services. John Deere product prices are higher than others and their dealer incentives are lower than others so some dealers choose to push other brands more (TD).

In addressing this challenge, JDCI understands that their dealer management program is more rigorous than their competitors' programs.

Some competitors will get as many dealers as possible. John Deere won't because they want to ensure that within a given area, they only have one dealer so they will get enough business and volume. This is how they keep their dealer loyalty. If their dealers sell more machines they will still receive more income even though their margin per machine is not as high. John Deere is looking into this challenge to see how they can rationalize the dealer service fee or warranty labor rate to help the dealer (JDM).

JDCI also works to develop their dealers.

JDCI has a dealer development function. They have standards and have recently updated those standards for China. They want to

help dealers develop to those standards. Last year they awarded the best dealers who complied with these standards with a service vehicle to help their business (JDP21).

However, there are many obstacles in developing Chinese dealers. Because of how government agricultural machinery subsidies are implemented, some dealers get preferential treatment.

> It is difficult to overcome dealer inequalities because the government promotes some of it. Subsidies drive sales and sometimes if there is a relationship between someone and a certain dealer, they will buy John Deere tractors and require that they all be sold through a specific dealer who may not even be a John Deere dealer (JDP21).

JDCI currently only has 30% of their dealers who receive all the subsidies for an area. The rest of the dealers only receive some subsidies.

To continue to improve dealer effectiveness, one tool that JDCI started using in China in 2007 was dealer auditing.

> John Deere has what they call a 'toolbox' where dealers fill in data regarding their sales and dealership, which is then audited by John Deere. Sales representatives and dealerships work together in helping to determine their efficiency and performance. If there is something John Deere would like a dealership to change, it is communicated. Some dealers require a more strategic approach than others in encouraging these changes to occur. For example, if a

dealer carries 10% of John Deere's business, it requires careful attention, such as sending top management to negotiate instead of sales representatives (JDM).

The agricultural machinery market in China is very dynamic with many idiosyncratic components that businesses must understand to be successful. There are many competitors who are seeking to grow as the Chinese market continues to expand. Due to government affairs in the PRC, many MNCs are placed at a disadvantage to SOEs and other local market players. Market conditions in China have caused JDCI to adjust some of their marketing practices, including pricing, advertising, and dealership development. Chinese agricultural machinery dealers are JDCI's end-user salesmen, and they operate very differently from JDCI's traditional dealers in other markets. JDCI is moving forward in developing their dealership network despite dealership inequalities caused by government officials. Through these measures, JDCI is continuing to improve their marketing division to know how to better meet demand for agricultural machinery in China.

4.10 Order Fulfillment Process

JDCI's order fulfillment process is an important part of successfully meeting market demand. In delivering products to the customer, many resources and factors need to be considered to effectively satisfy customers, reduce costs, and realize market opportunities. The unique features of the Chinese market that affect this portion of the business are discussed. JDCI's current order fulfillment process in China, its challenges, and successes are

also discussed. An overview of the current John Deere order fulfillment process, as it functions in their mature markets outside of China, is given as background information to aid in the understanding and comparison of JDCI's current process in China. The order fulfillment specialist at JDCI helped in providing this information.

It all starts with forecasting of their complete goods sales. They look at an annual number as well as the current month plus the next three months to focus on production planning. This forecast process has three inputs to their composite forecast process: (1) factory input, (2) marketing organization, and (3) statistical component. Factory input is the demand the factory sees, the marketing organization gets feedback from their branches to contribute a demand estimate, and the statistical component is calculated from their forecasting group in Moline, IL. These three factors are weighted based on their prior accuracy, and result in a composite forecast for retail sales (JDOFS).

This allows them to do 'days-on-hand' planning and set-up inventory turn goals by product family. An example is combines, which are very expensive, and most customers have a well thought out plan when purchasing and don't expect dealers to have them on hand. Therefore, this product has very high inventory turn-rate. It turns very quickly. Tractors, on the other hand, are not as expensive, and if customers don't see what they are looking for on hand, they will buy the competitor's brand. This therefore has very slow inventory turn-

rate because customers' purchasing behavior is more of an impulse buy than a well-planned purchase (JDOFS).

Once John Deere knows the inventory turn rate for a product and the forecasted demand, they can plan how many days on hand they need to insure enough inventory in the field to meet the forecast. They then do a lot of work within the factory to give the dealer an "availability to promise" (ATP) delivery date. The dealer will enter an order on their computer system. Then John Deere's system will look at the production schedule and within one second, give back an ATP date. There is not much cushion built into this date because they do not want to be holding inventory for too long. This allows them to better manage their assets and produce only what is needed (JDOFS).

The current situation in China is much different than John Deere's traditional markets.

They don't collect or have much of the retail sales data. They know when they've shipped it to a dealer and have been paid, but they do not know what date that product was delivered to a third party. They are working with their warranty and customer support group in China to help develop these systems to identify delivery dates, to start tracking warranties, and to allow dealers to input retail information online. This is a multi-step process, as many dealers do not currently use computers; many of their orders still come in by fax (JDOFS).

In the mean time, they are using a composite forecast that is based on shipments, not retail sales, until they are able to start tracking this data. They will need at least two years before they can statistically calculate a forecast number. Previously, the marketing group just gave a factory number, and they were very conservative in their estimate. Therefore, throughout the year, their forecast continues to increase and this does not give production adequate time to plan. Now they have the factory input and a marketing division number by product family, and they also have strategic marketing give a number. The field marketing number, as expected, is always the lowest (JDOFS).

With this new system they are now starting to implement, their composite forecast for China is higher than what marketing previously had given. They will start measuring accuracy in November 2008, look at three months, and start to weight their forecast numbers based on this accuracy. As they are changing marketing to this new process, it has been challenging to help [marketing] understand why the new forecast is higher than what they feel they can sell. They now have a lot more data compared to feelings and thoughts previously. [JDCI has] been able to bring a lot more accuracy to these numbers as well (JDOFS).

[JDCI is] also bringing their factories online with the SAP system and John Deere's complete goods system that is operating worldwide.

This will allow other factories around the globe to order John Deere China tractors. The ATP system is also in the plans for the future. Currently it takes three days for a dealer to get a delivery date, because John Deere has to manually prioritize and evaluate their production system (JDOFS).

Part of the order fulfillment process is placing the order. Currently, because JDCI has grown through JVs and M&A, if a dealership wants a combine and a tractor, they need to place orders with two separate factories. JDCI plans to consolidate this process to increase its efficiency and simplicity. This will be done by establishing a central sales organization based in JDCI's Beijing office.

As JDCI has developed their order fulfillment process in the Chinese market, they have taught their Chinese network how to accurately measure success in meeting market demand. Previously, where rough estimates and conservative forecasts were made, they are now using metrics to aid in accuracy of production and delivery scheduling. Instead of operating on an "under-promise over-deliver" method, they want to hold less inventory but still not miss out on market opportunities. JDCI is moving towards these goals as they learn how to adapt to Chinese market conditions. As they do so, both service to Chinese farmers and JDCI's operations will improve.

4.11 Conclusion

The demand for agricultural machinery in China is continuing to increase. If historical trends continue, the rate of increase in demand will also

continue to grow. Corresponding trends can be seen in the analysis of Chinese state farms. As the Chinese government continues to support agricultural machinery development and use in agriculture, it will continue to shape an important part of the agricultural machinery market in China.

The Chinese agricultural machinery market is a rapidly changing and dynamic environment that has been greatly affected by China's centrally controlled government. IPR, government relations, legal environment, SOEs all are tied to the Chinese government. As China has become more open to international trade, markets, and business, governmental role in planning economic affairs has lessened. However, as businesses have adjusted to the unique circumstances in China, Chinese government policies and practices are important factors to consider.

Through the case study of JDCI, many specific business methods and practices used in meeting the challenges and dynamics of the Chinese agricultural machinery market have aided in answering how to successfully meet this demand. Even though there are details and circumstances specific to JDCI's operations, these challenges bring enhanced experience in operating within the Chinese agricultural machinery market. These specific issues have broader lessons of application as key components of the business are handled in ways unique to China. Through these experiences, the question is answered about how a business successfully meets agricultural machinery demand in China.

CHAPTER 5

CONCLUSIONS

5.1 Introduction

In endeavoring to define the demand for agricultural machinery in China and how demand is currently being met, there are a number of points that have implications for MNCs that want to do business in China. This research has provided some additional understanding about the Chinese agricultural machinery market. The results of the research can have practical application for any company in the agricultural machinery industry and also many companies related to Chinese agriculture in general.

5.2 Implications

The demand for agricultural machinery in China is growing. Much of this growth is being driven by the Chinese government and its desire to increase rural incomes and agricultural efficiency. Other reasons are that the Chinese government desires these changes as a method to increase political stability and national food security. Not only is the growth in machinery demand in China largely influenced by the government but the Chinese government also plays a very important role in the market through SOEs.

There are many peripheral issues about the agricultural machinery market in China such as IPR, legal environment, and supplier relations specifics that will continue to evolve. The findings of this research demonstrate the rapid change occurring in each of these areas as well as the

features unique to the Chinese market. Therefore, any business wanting to expand into the Chinese agricultural machinery market must carefully consider the dynamics of these issues. Companies can also learn how to better adapt to these issues in China by understanding how JDCI has dealt with them. For example, as companies become actively involved in shaping government understanding of an industry, the results can be very beneficial to doing business in China and to the Chinese people. This was seen in the example of JDCI actively dealing with government officials on the local level in Jiamusi, China.

The composition of the Chinese agricultural machinery market is changing as companies grow through JVs and M&A. This can be seen in JDCI's example of business expansion in China. Market players are racing to meet the demands of the Chinese farmers as the market continues to expand. This information can contribute to a company's understanding of the size and scope of this industry. Businesses need to consider the outlook and composition of the market to know how to better meet demand not yet adequately filled by current market players.

The facts and research presented in this dissertation can help investors know if the agricultural machinery market in China is potentially a good investment and how to manage the implementation of such an investment. It is a fast and growing market but the speed of change can also be a risk to consider. This market is growing very quickly with a large part of the growth attributed to government incentives to Chinese farmers. However,

if government priorities change, this market could quickly decelerate. From the results obtained, growth is occurring and will likely continue into the foreseeable future. Therefore, with government policies increasing their support of agricultural each year, the Chinese agricultural machinery industry would likely be a profitable market to invest in.

This research also has implications for Chinese agricultural machinery dealers because the research will provide them with a broader picture of what is occurring throughout China; thus, they may be more inclined to alter their investment strategies within this market.

Even though this research focuses on the Chinese agricultural machinery market, many of the challenges of meeting market demands that have been identified will be similar to those found in other centrally controlled countries. However, future research must be done in these economies to determine the relevance of the findings of this dissertation in agricultural machinery markets of other nations.

5.3 Future Research

Because of the time and resource limitations to this research, only one MNC was studied. A multiple-case study of several MNCs in the Chinese agricultural machinery industry would bring additional insight into how businesses have successfully met Chinese agricultural machinery demand. If multiple MNCs have dealt with the same challenges in the Chinese market that this research has identified, then increased validity and generalizability would result.

Gathering large amounts of primary data by surveying Chinese farmers and their reasons for purchasing agricultural machinery and their general situation in the agricultural industry would have been helpful additions to the research of this topic. These data could have been analyzed to discover the weight of each factor in the average Chinese farmer's decision to purchase agricultural machinery. Since climate, policies, and the agricultural industry vary by location, these surveys could be done in multiple provinces to obtain an even more accurate observation of the Chinese agricultural machinery market.

In terms of meeting demands of the Chinese market, different agricultural industries could be compared to determine commonalities across these industries. This would result in differentiating issues specific to each industry and issues common to the Chinese agricultural sector.

This dissertation is also a good base for developing an econometric model that defines and estimates Chinese agricultural machinery demand. If increased amounts of reliable data were generated through additional research, an econometric approach would be a valid way of addressing these inquiries.

5.4 Practice

As JDCI continues to be a key player in striving to shape the machinery industry through its government relations, it will be important to continue to understand the economic factors of the Chinese agricultural machinery market and Chinese agriculture in general. This dissertation

discusses the main issues of this market and may be of some benefit to JDCI's understanding of these factors. The case study analysis of JDCI's operations also brings a good overview of the organization that may be useful for JDCI's future use and development of market solutions in China.

This research has practical application for many organizations wanting to study or understand the workings of agriculture machinery in China. It provides adequate resources, references, and findings that can be used to develop policies and business strategies pertaining to this market. The usefulness of this research is especially realized as businesses can understand how to be better prepared to enter an emerging market, especially the agricultural machinery market in China.

CHAPTER 6

SELF-REFLECTION

The experience of writing a dissertation has been a very educational, rewarding, time-consuming, and frustrating one. Along the way, I've gained a better understanding of available research methodologies, methods, and writing formats. There are many other things I have learned that cannot all be quantified or described. Some of the successes of this research and improvements that would be implemented in future research will be discussed.

My particular topic being researched is defining and meeting the demand for agricultural machinery in China. This research has allowed me to understand peripheral and specific issues of this topic. Even though there has previously been little research on this topic, I have been able to find insight and learn from the work of others. This research has taken me across the globe and has broadened my understanding of the Chinese agricultural machinery market and how current businesses are dealing with the challenges of this emerging global market.

I believe that meeting with a world-renowned MNC to complete this case study research has been a great success, and I am very grateful to many individuals who made this possible. Because of the scope and experience that this MNC has brought to the case study, very practical and real-life results have been obtained. Also, to go and visually see what is occurring in the agricultural machinery market in China was a great experience.

Challenges of this dissertation include access to accurate data and information regarding the Chinese market. Because China is an emerging market, access to reliable information has been more difficult compared to other locations. Also, compiling the results of the case study into a concise summary and analysis has been difficult. As much insight from John Deere has been shared, there is a great desire to utilize all the information obtained. However, in keeping the research focused, only data relevant to the research question were used.

If this research were to be completed again, I believe it would be helpful to include some more in-depth detail on additional issues that contribute to the agricultural machinery market in China, such as the hukou system. Even though adequate data for an econometric analysis is lacking, I would like to use the available data to analyze agricultural machinery demand and see if the results were supportive of the findings of this dissertation.

Overall, this dissertation has been very rewarding in helping me to understand more of an area that has always been a question I have wanted to look into. The information and insights gained from the completion of this dissertation will contribute in helping others understand this topic. Hopefully, through additional research, the agricultural machinery industry in China will be better understood by future generations.

REFERENCES

American Embassy in China (2004 Feb) Protecting your intellectual property rights (IPR) in China. *The American Embassy in China* [online]. Available from: http://www.usembassy-china.org.cn/ipr/ovview.html [Date accessed 18-2-09]

BBC News (2008 Mar 11) *Australia's food bowl lies empty* [online]. BBC News. Available from: http://news.bbc.co.uk/2/hi/asia-pacific/7289194.stm [Date accessed 30.9.08]

Business Editors (2001 Apr 9) CNH global announces joint venture agreement with Shanghai tractor & internal combustion. *Business Wire*. [online] Available from: http://www.allbusiness.com/company-activities-management/company-strategy/6096970-1.html [Date accessed 30.3.09]

Chan, K. and Buckingham, W. (2008 Sept) Is China abolishing the Hukou system? *The China Quarterly*. 195: 582-606

Chen, K. (2003 Feb 28) Got milk? the new craze in China is dairy drinks. *Wall Street Journal.* [online] Available from: http://www.mindfully.org/Food/2003/China-Dairy-Drinks28feb03.htm [Date accessed 30.9.08]

China Daily (2007a Dec 24) China vows to sustain farmers income growth [online]. *China Daily.* Available from: http://chinadaily.cn/bizchina/2007-12/24/content_6343466.htm [Date accessed 29.9.08]

China Daily (2007b Dec 27) Rural-urban income gap still widening [online]. *China Daily*. Available from: http://chinadaily.cn/china/2007-12/27/content_6351270.htm [Date accessed 29.9.08]

China Daily (2008a Jul 2) China's grain output to reach 540 bn kgs by 2020 [online]. *China Daily.* Available from: http://www.chinadaily.com.cn/china/2008-07/02/content_6814212.htm [Date accessed 10.3.09]

China Daily (2008b Oct 13) Chinese farmers' income to be doubled [online]. *China Daily.* Available from: http://www.chinadaily.com.cn/china/2008-10/13/content_7097899.htm [Date accessed 18.2.09]

China Daily (2009 Feb 2) Chinese farmers' income up 8% in 2008, tough 2009 ahead [online]. *China Daily.* Available from: http://www.chinadaily.com.cn/bizchina/2009-02/02/content_7439350.htm [Date accessed 18.2.09]

CNN.Com (2008a Mar 10) China to keep one-child policy [online]. *CNN.Com*. Available from: http://www.cnn.com/2008/WORLD/asiapcf/03/10/china.onechild/index.html [Date accessed 7.10.08]

CNN.Com (2008b Aug 30) Iraq signs $3 billion oil deal with China [online]. *CNN.Com*. Available from: http://www.cnn.com/2008/BUSINESS/8/30/iraq.china.oil.deal/ [Date accessed 10.3.09]

Crook, F. (2002) Betting the farm: the WTO's impact on China's agricultural sector. *China Business Review*. [online]. Available from: http://www.chinabusinessreview.com/public/0203/crook.html [Date accessed 22.9.08]

Deng, X. et al. (2006) Cultivated land conversion and potential agricultural productivity in China. *Land Use Policy*. 23(2006): 372–384

Food and Agricultural Organization (FAO) (2009) FAO statistics [online]. Food and Agricultural Organization of the United Nations. Available from: http://www.fao.org/corp/statistics/en/ [Date accessed 26.4.09]

Fan, S. (1991 May) Effects of technological change and institutional reform on production growth in Chinese agriculture. *American Agricultural Economics Association*: 266-275

Feder, G. et al. (1992 Oct) The determinants of farm investment and residential construction in post-reform China. *Economic Development and Cultural Change.* [online]. 41(1): 1-26 Available from: www.jstor.org [Date accessed 19.10.07]

Friedman, M. and Savage, L.J. (1948) The utility analysis of choices involving risk. *The Journal of Political Economy*. 56(4)

Fuller, F., Tuan, F. and Wailes, E. (2002) Rising demand for meat: who will feed China's hogs? *Economic Research Service/USDA.* [online]. Available from: http://www.ers.usda.gov/publications/aib775/aib775h.pdf [Date accessed 22.9.08]

Gale, F. (2002 Apr) China's statistics: are they reliable? *Economic Research Service/USDA*. [online]. Available from: http://www.ers.usda.gov/publications/aib775/aib775r.pdf [Date accessed 22.9.08]

Gale, F. and Collender, R. (2006 Jan) New directions in China's agricultural lending. *Economic Research Service/USDA*. [online]. Available from: http://www.ers.usda.gov/publications/wrs0601/wrs0601.pdf [Date accessed 10.3.09]

Gale, F., Lohmar, B. and Tuan, F. (2005 Feb) China's new farm subsidies. *Economic Research Service/USDA*. [online]. Available from: http://www.ers.usda.gov/publications/WRS0501/WRS0501.pdf [Date accessed 29.9.08]

Gale, F. and Park, A. (2002 Apr) Can rural income growth accelerate? *Economic Research Service/USDA*. [online]. Available from: http://www.ers.usda.gov/publications/aib775/aib775q.pdf [Date accessed 29.9.08]

Gale, F., Somwaru, A. and Diao, X. (2002 Apr) Agricultural labor: where are the jobs? *Economic Research Service/USDA*. [online]. Available from: http://www.ers.usda.gov/publications/aib775/aib775p.pdf [Date accessed 22.9.08]

Green, S. (2007 Sep 19) On the ground─Asia: China years, how many are you living? *Standard Chartered Bank.* [online] Available from: https://research.standardchartered.com/researchdocuments/Pages/ResearchArticle.aspx?&R=48839 [Date accessed 30.3.09].

Hindu Business Line (2004 Nov 10) Mahindra enters Chinese tractor market; in venture with Jiangling. *The Hindu Business Line*. [online] Available from: http://www.thehindubusinessline.com/2004/11/10/stories/2004111002680100.htm [Date accessed 30.3.09]

Hsu, H., Chern, W. and Gale, F. (2002 Apr) How will rising income affect the structure of food demand? *Economic Research Service/USDA*. [online]. Available from: http://www.ers.usda.gov/publications/aib775/aib775f.pdf [Date accessed 22.9.08]

Huang, J. and David, C.C. (1993) Demand for cereal grains in Asia: the effect of urbanization. *Agricultural Economics*. 8: 107-124

Huang, J. and Rozelle, S. (1994 Nov 15) Technological change: rediscovering the engine of productivity growth in China's rural economy. *Journal of Development Economics.* 49(1996): 337-369

International Monetary Fund (2000 Dec) Representative exchange rates for selected currencies for December 2000. *International Monetary Fund*. [online]. Available from: http://www.imf.org/external/np/fin/data/rms_mth.aspx?SelectDate=2000-12-31&reportType=REP [Date accessed 23.9.08]

JimTrade.com. (2005 Aug 22) Mahindra (China) tractor begins operations. *JimTrade.com*. [online] Available from: http://news.jimtrade.com/200508/60.htm [Date accessed 30.3.09]

Jin, S. et al. (2002 Nov) The creation and spread of technology and total factor productivity in China's agriculture. *American Agricultural Economics Association* 84(4): 916-930

John Deere Journal (2007 Aug) Keeping up with China's growth [online]. *John Deere Journal*. Available from: http://www.deere.com/en_US/compinfo/media/pdf/publications/jd_journal/jdjournal_Aug_2007.pdf [Date accessed 10.3.09]

Kane, P. and Choi, C. (1999 Oct 9) China's one child family policy. *British Medical Journal*. 319(7215): 992-994

Karadsheh, J. (2008 Aug 30) Iraq signs $3 billion oil deal with China. *CNN.com*. [online]. Available from: www.cnn.com [Date accessed 23.9.08]

Kirchhoff, S. (2008a Aug 21) Golden image of corn-based ethanol shows some erosion. *USA Today*. [online] Available from: http://www.usatoday.com/money/industries/energy/2008-08-21-ethanol-corn_N.htm [Date accessed 30.9.08]

Kirchhoff, S. (2008b Jun 20) Midwest floods send corn prices soaring past $8 a bushel. *USA Today*. [online] Available from: http://www.usatoday.com/money/industries/food/2008-06-16-corn-prices-jump_N.htm [Date accessed 30.9.08]

Li, J.D.P. (2003) Rural land tenure reforms in China: issues, regulations and prospects for additional reform. *Land Reform*. [online]. Available from: http://www.rdiland.org/PDF/PDF_Publications/LP-RuralLandTenureReforms.pdf [Date accessed 22.9.08]

Lin, J. (1992) Rural reforms and agricultural growth in China. *American Economic Review*. 82(1): 34-51

Lohmar, B., Somwaru A. and Wiebe K. (2002 Sept) The ongoing reform of land tenure policies in China. *Economic Research Service/USDA*. [online] Available from: http://www.ers.usda.gov/publications/agoutlook/sep2002/ao294f.pdf [Date accessed 22.9.08]

Marsh, P. (2008 Feb 26) Agco chief ploughs a difficult furrow. *Financial Times*. [online] Available from: http://www.ft.com/cms/s/0501c69c-e410-11dc-8799-0000779fd2ac,Authorised=false.html?_i_location=http%3A%2F%2Fwww.ft.com%2Fcms%2Fs%2F0%2F0501c69c-e410-11dc-8799-0000779fd2ac.html%3Fnclick_check%3D1&_i_referer=&nclick_check=1 [Date accessed 6.4.09]

National Bureau of Statistics of China (1997) China Agricultural Census. *National Bureau of Statistics of China.* [online] Available from: http://www.stats.gov.cn/english/# [Date accessed 5.1.09]

National Bureau of Statistics of China (2007a) China Agricultural Census. *National Bureau of Statistics of China*. [online] Available from: http://www.stats.gov.cn/english/# [Date accessed 5.1.09]

National Bureau of Statistics of China (2006) *China Agriculture Yearbook*. English ed. China Agriculture Press

National Bureau of Statistics of China (2007b) *China Statistical Yearbook*. English ed. China Statistics Press

OECD (2008) China, People's Republic of. **In**, *Agricultural policies in Non-OECD countries*. [Unpublished OECD: 1-15]

Pingali, P. (2006) Westernization of Asian diets and the transformation of food systems: implications for research and policy. *Science Direct*. 32(2006): 281-298

Rozelle, S., Huang, J. and Zhang, L. (2002 Sept 29) Emerging markets, evolving institutions, and the new opportunities for growth in China's rural economy. *China Economic Review*. 13(2002): 345-353

Rozelle, S., Pray, C. and Huang, J. (1999 June 25) Importing the means of production: foreign capital and technologies flows in China's agriculture. **In**, *Importing the means of production: foreign capital and technologies flows in China's agriculture: proceedings of the IATRC Conference,* June 1999, San Francisco, CA. 1-12

Rozelle, S. and Rosegrant, M. (1997) China's past, present, and future food economy: can China continue to meet the challenges? *Food Policy*. 22(3): 191-200

Rural Development Institute (RDI) (2007) China. *RDI.* [online] Available from: www.rdiland.org/OURWORK/OurWork_China.html [Date accessed 22.9.08]

Shane, M. and Gale, F. (2004 Oct) China: A study of dynamic growth. *United States Department of Agriculture*. [online] Available from: http://www.ers.usda.gov/publications/WRS0408/WRS0408.pdf [Date accessed 29.9.08]

Van den Berg, M., et al. (2007) The impact of increasing farm size and mechanization on rural income and rice production in Zhejiang province, China. *Agricultural Systems*. 94(2007): 841-850

Weersink, A. and Rozelle, S. (1997) Marketing reforms, market development and agricultural production in China. *Agricultural Economics*. 17(1997): 95-114

Yin, R. (1994) Case study research: design and methods. 2nd ed. Sage Publications, Inc.

Zhang, Q., Ma, Q. and Xu, X. (2004 Dec) Development of land rental markets in rural Zhejian: growth of off-farm jobs and institution building. *The China Quarterly*. 180(1): 1031-1049

APPENDICES

Appendix A: Summary of Land Tenure Development in China

Private land markets: pre-1949. Under China's feudal system, land was held by small landowners who farmed their own land, and by landlords who rented land to tenant farmers. Land markets were supported by (often local) institutions to define boundaries, register ownership, and provide titles.

Land reform: 1950-53. China's new government implemented a national land reform movement soon after coming to power in 1949. Landholdings were redistributed to landless and land-short farm households. Deeds held by landlords were destroyed, and new deeds were issued to the new owners along with full rights to rent and sell their land.

Initial collectivization: 1953-57. Shortly after land reform, Party cadres began encouraging farmers to set up agricultural producer cooperatives—small groups of farm households that pooled some or all of their land and farmed the larger plots collectively. Income was distributed according to the land each household contributed to collective production. After forming cooperatives, the cooperatives were pooled into larger collectives where income was distributed according to the amount of land and labor contributed. By 1957, over 90% of farm households had organized into roughly 700,000 large agricultural collectives.

Full collectivization: 1958-78. Under the Great Leap Forward, agricultural collectives were ultimately merged into 24,000 communes encompassing entire townships.

Households turned over nearly all of their productive assets, and teams of workers carried out nearly all production (households often maintained small private plots during all or part of the collective period). Income was distributed according to labor contribution and need through a complex system of “workpoints." This system existed through the end of the Cultural Revolution (1966-76), except for a period of partial liberalization in the early 1960s.

Decollectivization: 1978-84. Under new leadership, China's government encouraged efforts to alleviate poverty and induce economic growth. Many rural areas abandoned collective production entirely and contracted with households to deliver fixed amounts of grain in exchange for access to land. Households were allowed to keep the remaining production for their own consumption or to sell on the market.

Household Responsibility System: 1984-present. In 1984, the expanding system of contracting with households directly was officially approved by China's national government. The law stipulated that land was still owned by the collective, but did not clarify whether the collective was the village or the *xiaozu*. The law also stipulated that households should receive 15-year contracts to their land, and have the right to rent land and hire labor. Collectives maintained the right to reallocate land among households.

Subsequent clarifications and directives have encouraged extending the contract length from 15 to 30 years, providing households with written contracts, and limiting the collective's right to reallocate land.

30-Year Use-Right Policy: Beginning in 1993, China adopted a policy (but not a legal requirement) that farmers should have 30-year use rights—one generation rights—on their land. RDI's research has shown that 30 years is a sufficient time horizon to permit farmers to make virtually all forms of long-term investment in the land. This has been confirmed by fieldwork in regions of China (such as Fuyang Municipality of Anhui Province, and in Guizhou Province) where farmers in fact received secure 30-year rights shortly after the new policy was announced.

Land Management Law (LML): Then in 1998, the 30-year use rights policy was adopted as a legal requirement in a new Land Management Law (LML), with such rights to be embodied in formal written contracts. Subsequently, RDI carried out, in cooperation with Renmin University (Beijing Peoples' University), two major sample surveys—in 1999 (.pdf) and 2001 (.pdf)—on the implementation of these provisions. Each of these surveys covered over 1600 households in 17 Chinese provinces, with a probable margin of error of ± 2.4%. The survey results showed that, by mid-2001, 47% of farm households had received 30-year contacts, and 40% of farm households had high confidence that they would be on the same land for the full 30 years. The latter result projects out to 85 million farm households who now have confidence in their security of tenure.

Central Committee Document No. 18: In December of 2001, RDI's village research findings prompted officials to issue this policy directive reiterating farmers' right to voluntarily transfer their land rights while condemning, in very specific terms, any actions by local officials to interfere with farmers' rights through attempted "re-contracting" (taking farmers' land and re-contracting it to investors or corporations without voluntary action by or even compensation to the original right-holders) and similar practices. This pronouncement signaled key policy-makers' support for strengthening and protecting farmers' rights in anticipation of new legislation.

Rural Land Contracting Law (RLCL): In August of 2002, the Standing Committee of the National Peoples' Committee adopted this groundbreaking law, replacing the single article of the LML that had dealt with farmers' land-tenure rights with a detailed spelling out of farmers' land rights and remedies. The RLCL offers substantial additional assurance of farmers' 30-year rights, narrowing any possible remaining grounds for readjustments, detailing what is to be in the written contract, incorporating in formal law the protections for farmers' land rights contained in Central Committee Document No. 18, and setting forth a comprehensive range of remedies for farmers whose land rights are violated.

The RLCL spells out, for the first time, farmers' rights to carry out transactions with their land rights, including not only lease, but assignment of the full 30-year right. Estimates of the probable market value of these rights in farmers' hands, once a market has developed, range from around $400 billion

up to $1 trillion. This represents new wealth for farmers in place of what had been (using Hernando de Soto's phrase) "dead capital".

Sources: Lohmar, Somwaru, and Wiebe 2002; Rural Development Institute 2007.

Appendix B: Summary of China's WTO Agricultural Commitments

China's WTO Commitments in Agriculture

WTO issue	China agreed to...	Example
Domestic Support	Cap of 8.5% subsidies for agricultural products	Subsidies are already below 8.5%
Export Subsidies	End export subsidies	Corn
Intellectual Property Rights	Abide by WTO rules on intellectual property rights including agricultural technology	
Judicial Review	Establish tribunals, contact points	Appeal procedures
Market Access	Reduce average tariffs from 21% to 17% by 2004	Oranges from 28.4% to 11%
	Reduce nontariff barriers (licenses, quotas, technical barriers)	End licensing for sugar
	End price controls—use market forces (some exceptions); government-guided pricing for some agricultural products	Oranges (tobacco excepted); government-guided pricing for wheat, corn, rice, soybeans
	Limit quantity import quotas	
	Limit tariff-rate quotas to 10 commodities	3% tariff for 8.4 million metric tons of wheat in 2002, 65% tariff for additional wheat
	Open agricultural service market and grant trading rights to domestic and foreign enterprises in agricultural commodities and inputs such as fertilizer and agricultural chemicals.	
Nondiscrimination	Equal treatment for foreign and domestic companies	
Open Agricultural Product and Input Markets	Open grain and input markets	
Price Comparability	Several alternative methods of price determination in dumping cases; accept US classification of Chinese economy as "non-market" for limited period	In US antidumping cases, US will use 3rd country (e.g. India) price data
Right to Trade	Goods to be traded freely in all of China within 3 years, except for state-traded items	Canned corn—freely traded Bulk corn—state traded
Safeguards	China waived its right to market-disruption safeguards	
Sanitary and Phytosanitary Measures	Publish standards, measures, and product coverage within 30 days after accession; base rules on science	
State Trading	Abide by WTO rules for state trading	China will maintain state trading rights for corn, wheat, rice, etc.
Technical Barriers to Trade	Publish all technical regulations in an official journal	
Transparency	Publish laws and regulations	Official journal established
Transitional Product-Specific Safeguards	Consultations if China's products cause market disruptions in foreign markets; WTO members have market disruption safeguards against China's products for 12 years	
Transitional Review Mechanisms	Provide information on WTO implementation one year after accession.	
Uniform Administration	Apply central rules consistently throughout the provinces	

SOURCES: *Compilation of the Legal Instruments on China's Accession to the World Trade Organization*, Beijing: Falu Chubanshe, 2001. *WTO and China's Agriculture: A Basic Reader* (*WTO yu Zhongguo Nongye Jianming Duben*), Beijing: Zhongguo Nongye Chubanshe, 2002.

Source: Crook (2002 : 14).

Appendix C: Summary of Rural Credit Sources in China

Individual Savings and Informal Borrowing. Most farm investments and input purchases in rural China are financed by farmers' own savings. Most loans to rural households come from informal sources: family, friends, private money lenders, savings clubs, and pawnbrokers (Wang; Guo and He). Informal lending is not legal but it is widely tolerated in many areas.

Rural Credit Cooperatives (RCCs). Most formal loans to farm households are made by more than 30,000 rural credit cooperatives (RCCs). RCCs accept deposits from local residents and make loans to households, businesses, and other entities. RCCs were set up in agricultural communes in the late 1950s by requiring each farmer to make a small cash contribution. After collective agriculture was disbanded in the 1980s, RCCs continued as the rural arm of the state banking system with an RCC serving each of China's 40,000 townships. Reforms in 2003 and 2004 placed them under provincial governments and merged them into county- or provincial-level RCC unions (Xie). RCCs can only operate in their home township or county. Some of the stronger RCCs are being restructured as provincial rural commercial banks or cooperative banks, and some of those have recently attracted foreign investors. RCCs are cooperatives in name only. Their ownership is unclear and members do not necessarily have any say in management.

Agricultural Bank of China (ABC). Loans to agricultural enterprises come largely from the ABC, one of China's four state-owned commercial banks. It

was created in the late 1970s to carry out rural policy, but became a commercial Bank serving both urban and rural markets after reforms in 1994. The ABC lends to agricultural enterprises, rural cooperatives, and village organizations, but not usually to individual rural households.

Agricultural Development Bank of China (ADBC). Commodity procurement is supported by loans from the ADBC, formed in 1994 to relieve the ABC of its policy functions. The ADBC primarily lends to state-owned enterprises for procurement and storage of grain, cotton, and edible oils. The ADBC's role is diminishing as the government privatizes agricultural commodity marketing.

The ADBC also makes loans for agribusiness and rural infrastructure.

Recent Reforms. Since the late 1990s, the government has taken numerous steps to reform and commercialize its banking system, but it was not until 2003 that it began a major reform of rural credit cooperatives. The ABC, like China's other state-owned banks, is being transformed into a profit-seeking commercial bank with the ultimate goal of being listed on overseas stock exchanges. The creation in 2003 of a bank regulator, the China Bank Regulatory Commission (CBRC), was an important reform of the financial sector. In recent years, RCCs in several provinces have been reorganized as rural commercial or cooperative banks and most other RCCs have been merged into county- or provincial-level unions. They have been given more latitude to offer higher interest rates on deposits (to compete with post offices and banks) and adjust interest rates on loans within a band around rates set

by the People’s Bank of China. Credit reporting services have just begun operating, but evaluation of loan applications is problematic due to falsification or absence of financial records (many transactions are still conducted in cash), unfamiliarity with risk analysis, and latent cronyism.

Source: Gale and Collender (2006 : 6).

Appendix D: Initial Questions to John Deere

Information for John Deere (China) Case Study

Dear President,

Again thank you for your help and time on this matter. The information sought for in compiling this case study is as follows:

1. General history and background of John Deere being established in China.
2. General rationale for wanting to expand into China.
3. Challenges & obstacles (i.e. political, cultural, logistical) in starting Chinese operations, production, and retail.
4. How has John Deere (in general) overcome these challenges?
5. What provinces does John Deere reach with its current operations?
6. Does John Deere offer any financing options to its Chinese customers?
7. How does John Deere plan to make tractors available to more farmers in China?
8. Why the use of joint-ventures such as Tiantuo/ Ningbo Benye?
9. How do John Deere tractors compare to local brands in China in terms of quality/demand/availability to customers and especially rural farmers?
10. How successful were John Deere tractors in China as it progressed?
11. What tractor market share in China does John Deere have especially compared to local brands?

12. What percentage of tractors sold in China is 20-50hp, 50-100 hp, 100hp+?
13. Does John Deere import any tractors to sell in China?
14. What does John Deere feel the typical Chinese farmer needs to be more productive?
15. Are any NGOs helping further John Deere tractors in China?
16. How have current Chinese agricultural policies affected John Deere tractors in China?
17. Who are your principal competitors in China?

These are the basic questions that I believe will help us form the basis for this case study.

Appendix E: Initial John Deere Interview Questions

John Deere ▪翰迪▪
Interview questions

With your approval, I would like to accomplish about 10-20 one-hour interviews (shorter if need be) with key players of the case study (depending on their schedules and availability). Around 8-10 questions. These individuals include:

- <u>President of JDCI</u>

1. How do you think the Chinese government has responded to John Deere's acquisition of Ningbo Benye Tractors? Why do you say that? How do you believe future responses will unfold? Difference in Agco's and other international competitor's recent approaches to Joint Venture's/acquisitions/entry into Chinese market? (maybe mention Agco's recent failure to do so with First Tractor)
2. Do you believe other international competitors have/will be able to easily follow suit? (CNH, Mahindra) Why or why not? What other barriers to John Deere's competition exist in China? Do these barriers make it easier or more difficult for JD to develop its markets in China? What do you think John Deere's competitive advantages are? (Quality, Brand name?? How are these advantages (brand name, quality) recognized by customers and competitors in China?)

3. How have you managed Patent and Intellectual Property Rights in your China operations? (understand legislation is in place, but enforcement is lacking)
4. What barriers exist to farm sizes increasing in China? Your outlook on this? Rate of increase? Other barriers to increasing farm incomes?
5. How do you see your product mix in China developing over time? (HP options, specialized equipment, increased accessory options?) Why?
6. What challenges/restrictions does the PRC place on John Deere regarding repatriation of profits? Summary of current process?
7. How does the Chinese government see its role regarding competition? (Is it a neutral observer, does it promote competition, or does it encourage a more cooperative approach?) How is competition in China different than in other markets?
8. What agencies, officials have you needed to consider/communicate with in moving John Deere forward in China?
9. How often is communication with government officials necessary to allow John Deere to function effectively in China?
10. What information concerning strategy, operations, business dealings does the government require you to disclose? How often?
11. What is your dealer relationship structure? What is John Deere's owned and operated dealership mix in China?
12. How does John Deere develop/manage dealerships? Overcome dealer inequalities?

- Marketing Director

1. What has John Deere done to increase demand of their products in China? (may be too general)
2. What restrictions exist relating to advertising and other types of promotions in China?
3. What methods of advertising and promotion are used in China? Does this vary in each province?
4. Have you recruited any indigenous liaisons to better introduction John Deere products to rural Chinese customers?
5. How are American/Foreign products viewed to the average Chinese consumer? Are they more loyal to native brands?
6. What marketing adjustments have you needed to make in the Chinese market compared to other global locations especially
7. How have you overcome illiteracy challenges in marketing? Any other challenges with Chinese marketing?
8. What is the dealer/HQ relationship regarding marketing campaigns(implementations)? What is the marketing cost structure between dealerships/HQ?
9. Are there any government restrictions on marketing initiatives/investments? If so, how are these managed?
10. What other considerations relating to marketing do you believe would be important to consider?

- Supply Chain Manager

1. Please tell me about supplier competition. What role do other local/international tractor manufacturers play?
2. What Supply Chain Management challenges has John Deere faced in China?
3. Is there a specific example that you could share regarding how a Chinese supplier challenges surprised JD in any way?
4. Have there been many quality concerns when working with local suppliers? What main concerns have there been?
5. Have you been able to use supplier auditing or incentive programs, ranking systems to guarantee JD quality standards? What other ways are supplier quality standards managed/guaranteed?
6. Has John Deere sought any integration with suppliers in China to more easily provide reduced costs to their operations in China? Why or why not? If so, in what ways have they done so?
7. Are Chinese suppliers used to supply other global operations? Why or why not? What challenges or advantages are seen in this approach?
8. How are Chinese suppliers in terms of lag times, efficiency, inventory controls? How is this managed?
9. What percentage of your suppliers is local? What inputs are they providing? Commodities, products, services?
10. What other supply chain issues should be considered?

- One or Two John Deere Dealerships

1. What qualities in tractors do most of your John Deere customers want? Inquire about?
2. Are most customers knowledgeable about government farm machinery subsidies and has it been a challenge to effectively implement?
3. Do you offer training in machinery operation to customers? If so, to what extent is it utilized?
4. How have you implemented local marketing strategies? How successful do you believe they have been? What changes in local marketing and promotional strategies would you suggest?
5. Do you sell only John Deere or competitor products as well?
6. How are repairs and servicing for JD products handled?
7. Do you rent machinery? Do any service contracting?
8. What, if any, changes would you like to see in JD's strategy that might improve the local market for their equipment?
9. Any other information regarding John Deere, machinery in general, do you believe is important?

- If possible, one or two John Deere customers from each of the three main market segments included in the slideshow information.
    - Large State Farm
        1. How often do you purchase new farm machinery?
        2. What was your most recent JD purchase?

3. Do you believe John Deere provides adequate support to your John Deere products? Information about the product, service, etc.?
4. What have you liked about John Deere machinery?
5. What more would you like to see from John Deere?
6. How long have you used John Deere machinery?
7. How do you feel it has benefited your operations and its efficiency?
8. Any other information regarding John Deere, machinery in general, do you believe is important?

- Large Contractor

8. Why did you buy John Deere equipment? What equipment did you purchase?
9. To you, what is the most important reason that you wanted to use agricultural machinery?
10. Why not hire more labor instead?
11. How long have you used John Deere machinery?
12. How do you believe it has benefited your operations and its efficiency?
13. Do you believe other farmers would like to implement machinery in their operations? Would you encourage them to do so? Why or why not?

14. Any other information regarding John Deere, machinery in general, do you believe is important?

- Service Contractor

1. How many farmers/mu per year do you contract to work? Do you personally own?
2. Why did you buy John Deere equipment? What equipment did you purchase from John Deere?
3. Do you believe you can grow your business as a result of purchasing agricultural equipment? Why or why not?
4. How often do you purchase new machinery?
5. How are fuel costs affecting your business? How has this affected your desire/ability to purchase more farm equipment?
6. What else is helping or hurting your business?
7. What uses besides agriculture, if any, do you use your equipment for? (construction, hired to move things, etc?)
8. What do you like/dislike about John Deere machinery?
9. Any other information regarding John Deere, machinery in general, do you believe is important?

- Any key managers that you feel would be appropriate (Employee Supervisors?)

1. What have you liked about working at John Deere?
2. What are John Deere's main employee incentive programs? (獎勵 jiang3 li4)

3. What kinds, if any, of educational opportunities or reimbursement programs do you support or offer? How does John Deere view this issue regarding its Chinese workforce?
4. What Chinese/English learning programs, if any, do you support or offer to employees?
5. How have you managed language challenges and bilingual operations in China?
6. What other employee/workforce issue do you believe are important to consider in China?

- Any others, as the study progresses, that would be available and beneficial to adding insight into the case.