Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Factors Shaping the Operation of Machinery Hire Services: Case Studies on the Implementation of the Institution for Rental Service of Agricultural Machinery (IRSAM) Programme in the Special Region of Yogyakarta, the Republic of Indonesia

A thesis presented in partial fulfilment of the
requirements for the degree of

Master
of
AgriCommerce

at Massey University, Palmerston North,
New Zealand

KODRAD WINARNO

2017

ABSTRACT

As part of the government initiative to improve the production of agricultural commodities, particularly the five major staples – rice, maize, soybeans, sugar and beef, the Ministry of Agriculture (MoA) of the Republic of Indonesia launched the implementation of the Institution for Rental Service of Agricultural Machinery (IRSAM) programme in 1998. The programme aims to encourage the use of farm machinery at the farm level to improve agricultural production, and to promote farmers to develop a rural business unit by providing agricultural machinery services to other farmers.

The IRSAM programme has been rolled out for more than 18 years. From this programme, many farmers have received machinery and started to provide services to other farmers. Nevertheless, the implementation of the IRSAM programme has been applied to different areas of the Republic of Indonesia, and showed various levels of success. Some IRSAMs have successfully developed the units into profitable businesses. However, the majority of the IRSAMs are still underdeveloped. This research is interested in gaining a deeper understanding of the factors that are shaping the operation of IRSAMs, especially in the Special Region of Yogyakarta and how they are working on those factors. By understanding the various factors, there would be a possibility for this research to provide recommendations on how the MoA will be able to improve the implementation of the IRSAM programme.

A multiple case studies approach was used to explore factors and circumstances, which influence the operation of the IRSAM. Two cases were selected in the Special Region of Yogyakarta. One IRSAM was chosen in each of Gunungkidul Regency and Bantul Regency, respectively. This research applied purposive and snowballed sampling to select participants. Sixteen groups of participants were interviewed. This research analysed the data using qualitative data analysis method.

The results revealed four significant factors influenced the operation of both IRSAMs. These were: 1) managers with good administrative and finance skills, 2) the availability of capable machinery operators, 3) the demand for machinery services from farmers (farmer group members and non-members), and 4) the availability of institutional support

from the public and private sectors that enable the IRSAM to flourish, such as access to financial aid, the availability of spare parts, access to agricultural extension services, training for IRSAM employees, and rural infrastructure (rural road networks and irrigation networks).

Although most of these factors have been identified in other literature, significantly, this research highlighted one factor that has previously not been identified. This factor was the availability of alternative private providers/other IRSAMs around the selected IRSAMs. Additionally, it was revealed that the formal organisation structure of the IRSAM seemed only to exist in the Republic of Indonesia. The formal structure has made the roles of manager and operators a significantly important factor in affecting the operation and success of the IRSAM.

This research illustrates the complexity of the dynamic factors that affect the operation of small-scale machinery service providers. The local circumstances and different characteristics of situations are going to mean that the specific factors and settings that are shaping the performance of the machinery hiring group will vary. This research shows how the delivery process of the IRSAM programme using a blanket policy does allow the IRSAMs to perform well across different situations. This study highlights the value that could be had for the IRSAMs to perform better if the government better targets types of machinery to match specific needs of farmers in different areas. Besides, the research suggests that the government could develop a database management system of public and private machinery hire services to obtain information on the actual supply and demand of machinery services.

Keywords: farm machinery hire services, small-scale farmers, agricultural mechanisation, IRSAM, custom hiring, the Special Region of Yogyakarta,

Title: Factors Shaping the Operation of Machinery Hire Services, Case Studies on the Implementation of the Institution for Rental Service of Agricultural Machinery (IRSAM) Programme in the Special Region of Yogyakarta, the Republic of Indonesia

Author: Kodrad Winarno

Degree: Master of AgriCommerce

ACKNOWLEDGEMENTS

First, I would like to express Alhamdulillah, all praises just to Allah, for the endless blessing and guidance so that I was able to finish this research.

I also show my greatest appreciation to my supervisor, Associate Professor Peter Tozer for his guidance, advice, and support he has provided in the thesis. I would also thank my co-supervisor, Dr Janet Reid, for the patience, guidance, encouragement, and constructive suggestions she has given in the thesis. I have been very lucky to have both supervisors who cared so much and provided constant support for my work.

Special gratitude goes to my wife and son for their continued support and encouragement during the study. Many thanks go to my colleagues and friends for their support. Many thanks to my fellow students and staff from the Institute of Agriculture and Environment.

I am very thankful that the New Zealand Government has awarded me the NZ AID Scholarship, which has made it possible for me to obtain my Masters Degree at Massey University, Palmerston North. I would like to thank the ISSO team, especially, Sylvia Hooker, Jamie Hooper, and Dave Broderick, who have been supporting my study and other things related to it.

Many thanks go to the members of the Tirto Sari Farmer Group (TSFG) in Wonosari District, Gunungkidul Regency, and the Argorejo Farmer Group Association (AFGA) in Sedayu District, Bantul Regency, the Special Region of Yogyakarta, the Republic of Indonesia for participating in this research.

ABBREVIATIONS

2WT	Two Wheeled Tractors
4WT	Four Wheeled Tractors
AFGA	The Argorejo Farmer Group Association
AMMOTRAC	The Agricultural Mechanics and Operators' Training Centre
AMSEC	The Agricultural Mechanisation Service Enterprise Centres of Ghana
BAPPEDA	Badan Perencanaan Pembangunan Daerah Kabupaten Bantul / Regional Development Planning Agency of Bantul
CIA	Central Intelligence Agency
CSAM	Centre for Sustainable Agricultural Mechanisation
DPPKA	Dinas Pendapatan Pengelolaan Keuangan dan Aset Provinsi Daerah Istimewa Yogyakarta / Provincial Agency for Revenues, Financial and Asset Management
FAO	Food and Agriculture Organisation of the United Nations
FGD	Focus Group Discussion
GA	General Assembly
GAPOKTAN	Gabungan Kelompok Tani / Farmer Group Association
GDP	Gross Domestic Product
GOI	The Government of the Republic of Indonesia
GRDP	The Gross Regional Domestic Product
IAARD	The Indonesian Agency for Agricultural Research and Development
IRRI	International Rice Research Institute
JICA	The Japan International Cooperation Agency
MOA	The Ministry of Agriculture of the Republic of Indonesia
MUHEC	The Massey University Human Ethic Committee
NAERLS	National Agricultural Extension Research Liaison Services of Nigeria
NGO	Non-Governmental Organisation
NPFS	National Programme for Food Security of Nigeria
OECD	The Organisation for Economic Co-operation and Development
PNG	Papua New Guinea
POKTAN	Kelompok Tani / Farmer Group
PTOS	Power Tiller Operated Seeder in Bangladesh
QDA	Qualitative Data Analysis
SMEDC	The Small and Medium Enterprise Development Centre
TSFG	The Tirto Sari Farmer Group
UPJA / IRSAM	Usaha Pelayanan Jasa Alat Mesin Pertanian / The Institution for Rental Service of Agricultural Machinery

TABLE OF CONTENTS

ABSTRACT i
ACKNOWLEDGEMENTS iii
ABBREVIATIONS iv
TABLE OF CONTENTS v
LIST OF TABLES vii
LIST OF FIGURES viii
CHAPTER ONE: INTRODUCTION 1
1.1 Background 1
1.2 Problem statement 2
1.3 Research questions 3
1.4 Objectives 3
1.5 Significance of the study 4
CHAPTER TWO: THE AGRICULTURAL MECHANISATION STRATEGY IN THE REPUBLIC OF INDONESIA 5
2.1 Introduction 5
2.2 The Republic of Indonesia in general 5
2.3 Overview of agricultural sector 7
2.3.1 Climate, annual rainfall and agricultural land area 7
2.3.2 Agricultural production 9
2.3.3 The characteristics of the Indonesian farmers 10
2.4 Agricultural mechanisation strategy 10
2.4.1 Agricultural mechanisation development 10
2.4.2 The development of IRSAM programme 12
2.5 Summary 15
CHAPTER THREE: LITERATURE REVIEW 16
3.1 Introduction 16
3.2 The role of mechanisation in agriculture in developing countries 16
3.2.1 Definition of mechanisation in agriculture 17
3.2.2 The role of agricultural mechanisation 18
3.2.3 Agricultural mechanisation as a system 19
3.3 Overview of farm machinery hire services 20
3.3.1 Definition and types of machinery hiring services 21
3.3.2 Public-led machinery hire services 23
3.3.3 Private-led machinery hire services 25
3.4 Factors shaping the operation of farm machinery hire services 27
3.4.1 The role of skilled staff in supporting the business 28
3.4.2 Demands for machinery hire services 30
3.4.3 Institutional support 32
3.5 Summary 39
CHAPTER FOUR: RESEARCH DESIGN 41
4.1 Introduction 41
4.2 Research design 41
4.3 Research site and case selection 42
4.4 Selection of participants 43
4.5 Data collection methods and fieldwork process 44
4.6 Data analysis techniques 47
4.7 Ethical considerations 48
4.8 Summary 48

CHAPTER FIVE: CASE DESCRIPTION 50
5.1 Introduction 50
5.2 The Special Region of Yogyakarta 50
5.3 Description of Gunungkidul Regency 52
5.3.1 Introduction 52
5.3.2 Agro-ecological conditions 52
5.3.3 The role of agriculture sector in the Regency's economy 54
5.3.4 Land-use allocation, farm practices, agricultural production and farm machinery population 54
5.3.5 The Tirto Sari Farmer Group 55
5.4 Description of Bantul Regency 63
5.4.1 Introduction 63
5.4.2 Agro-ecological conditions 64
5.4.3 The role of the agriculture sector in the Regency's economy 64
5.4.4 Land-use allocation, farm practices, agricultural production and farm machinery population 65
5.4.5 The Argorejo Farmer Group Association 66
5.5 Summary 72
CHAPTER SIX: RESULTS 74
6.1 Introduction 74
6.2 Case of Gunungkidul Regency 74
6.2.1 The development of the Tirto Sari IRSAM 74
6.2.2 The organisational structure of the Tirto Sari IRSAM 76
6.2.3 Factors that shape the operation of the Tirto Sari IRSAM 77
6.3 Case of Bantul Regency 90
6.3.1 The development of the Argorejo IRSAM 90
6.3.2 The organisational structure of the Argorejo IRSAM 93
6.3.3 Factors that shape the operation of the Argorejo IRSAM 93
6.4 Summary 102
CHAPTER SEVEN: DISCUSSION 104
7.1 Introduction 104
7.2 The characteristics of the cases 105
7.3 Key factors shaping the operation of the IRSAM 105
7.3.1 Managers with good administrative and finance skills 106
7.3.2 The availability of capable operators 109
7.3.3 Demand for machinery services from farmers 111
7.3.4 The availability of institutional support 116
7.4 Summary 121
CHAPTER EIGHT: CONCLUSION 123
8.1 Conclusion 123
8.2 Policy implication of the research findings 124
8.3 Recommendations 125
8.4 Evaluation of the research design 126
8.5 Further research 127
REFERENCES 128
APPENDICES 139

LIST OF TABLES

Table 1. Selected agricultural production of the Republic of Indonesia from 2010 to 2015 9
Table 2. Agricultural machinery industry development in the Republic of Indonesia from 1988 to 1997 (in unit) 12
Table 3. The utilisation of selected farm machinery in the Republic of Indonesia from 1998 to 2002 12
Table 4. Number of IRSAMs in the Republic of Indonesia from 2006 to 2012 13
Table 5. The IRSAM classification 14
Table 6. Main agricultural production of Gunungkidul Regency 54
Table 7. The number of farm machinery in Gunungkidul Regency in 2009 and 2014 55
Table 8. Cropping patterns of the TSFG in 2016 60
Table 9. The member of AFGA in food crops in 2016 70
Table 10. Cropping patterns of the AFGA in 2016 70
Table 11. Comparison between TSFG and AFGA 73
Table 12. Farm machinery owned by the Tirto Sari IRSAM in 2016 76
Table 13. Farm machinery owned by the Argorejo IRSAM in 2016 92
Table 14. Factors which shape the operation of the Tirto Sari IRSAM and the Argorejo IRSAM 102
Table 15. List of interviewed participants 139
Table 16. Interview guidance 142

LIST OF FIGURES

Figure 1. Map of the Republic of Indonesia 6
Figure 2. Land area by utilisation in the Republic of Indonesia from 2009 to 2014 (Ha) 8
Figure 3. Qualitative analysis as an iterative spiral..... 47
Figure 4. Map of the Republic of Indonesia and the Special Region of Yogyakarta. 51
Figure 5. Map of the Special Region of Yogyakarta showing Gunungkidul and Bantul Regencies 51
Figure 6. Map of Gunungkidul Regency showing the research site 52
Figure 7. Average monthly rainfall of Gunungkidul Regency in 2014 53
Figure 8. The units under the TSFG 56
Figure 9. The TSFG pumping station 57
Figure 10. TSFG secretariat building..... 58
Figure 11. The organisational structure of the TSFG 58
Figure 12. Map of Bantul Regency showing the research site..... 63
Figure 13. Average monthly rainfall of Bantul Regency in 2014..... 64
Figure 14. The organisational structure of the AFGA 68
Figure 15. The organisational structure of the Tirto Sari IRSAM 76
Figure 16. The influencing factors that shape the operation of the Tirto Sari IRSAM... 77
Figure 17. The organisational structure of the Argorejo IRSAM 93
Figure 18. The influencing factors that shape the operation of the Argorejo IRSAM.... 94
Figure 19. Key factors shaping the operation of the Tirto Sari IRSAM and the Argorejo IRSAM 107
Figure 20. A Kubota MX 5000 4WT delivers land preparation in a dryland field in the Karang Rejek village..... 158
Figure 21. A Quick G-1000 2WT in the Tirto Sari IRSAM warehouse 158
Figure 22. A multi-crop thresher, a Quick G-3000 2WT, and a water pump in the Tirto Sari IRSAM warehouse..... 159
Figure 23. A Yanmar EF 393T 4WT delivers land preparation in a paddy field in Argorejo village 160
Figure 24. A Quick G-3000 2WT delivers land preparation in a paddy field in the Argorejo village 160
Figure 25. An Indo Jarwo Crown paddy transplanter in the Argorejo IRSAM warehouse 161
Figure 26. A Quick H-140R combine harvester in the Argorejo IRSAM warehouse .. 161